



ISSN 1020 - 3397

المجلة الصحية لشرق المتوسط

**Eastern
Mediterranean
Health Journal**

**La Revue de Santé
de la Méditerranée
orientale**

**Vol. 15 No. 3 May/Mai
June/Juin**

2009

المجلد الخامس عشر، العدد ٣،
أيار/مايو
حزيران/يونيو

المكتب الإقليمي لشرق المتوسط

Regional Office for the Eastern Mediterranean
Bureau régional de la Méditerranée orientale

مَنْظِمَةُ الصَّحَّةِ الْعَالَمِيَّةِ

World Health Organization
Organisation mondiale de la Santé

المجلة الصحية لشرق المتوسط

هي المجلة الصحية الرسمية التي تصدر عن المكتب الإقليمي لشرق المتوسط بمنظمة الصحة العالمية. وهي منبر لتقديم السياسات والمبادرات الجديدة في الخدمات الصحية والترويج لها، ولتبادل الآراء والمفاهيم والمعطيات الوبائية ونتائج الأبحاث وغير ذلك من المعلومات، وخاصة ما يتعلق منها بإقليم شرق المتوسط. وهي موجهة إلى كل أعضاء المهن الصحية، والكليات الطبية وسائر المعاهد التعليمية، وكذا المنظمات غير الحكومية المعنية، والمراكز المتعاونة مع منظمة الصحة العالمية والأفراد المهتمين بالصحة في الإقليم وخارجه.

EASTERN MEDITERRANEAN HEALTH JOURNAL

IS the official health journal published by the Eastern Mediterranean Regional Office of the World Health Organization. It is a forum for the presentation and promotion of new policies and initiatives in health services; and for the exchange of ideas, concepts, epidemiological data, research findings and other information, with special reference to the Eastern Mediterranean Region. It addresses all members of the health profession, medical and other health educational institutes, interested NGOs, WHO Collaborating Centres and individuals within and outside the Region.

LA REVUE DE SANTÉ DE LA MÉDITERRANÉE ORIENTALE

EST une revue de santé officielle publiée par le Bureau régional de l'Organisation mondiale de la Santé pour la Méditerranée orientale. Elle offre une tribune pour la présentation et la promotion de nouvelles politiques et initiatives dans le domaine des services de santé ainsi qu'à l'échange d'idées, de concepts, de données épidémiologiques, de résultats de recherches et d'autres informations, se rapportant plus particulièrement à la Région de la Méditerranée orientale. Elle s'adresse à tous les professionnels de la santé, aux membres des instituts médicaux et autres instituts de formation médico-sanitaire, aux ONG, Centres collaborateurs de l'OMS et personnes concernés au sein et hors de la Région.

The Eastern Mediterranean Health Journal is abstracted/indexed in the Index Medicus and MEDLINE (Medical Literature Analysis and Retrieval Systems on Line) and the ExtraMed-Full text on CD-ROM, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), CAB International, Lexis Nexis™, Scopus and the Index Medicus for the WHO Eastern Mediterranean Region (IMEMR).

EMHJ is also available on the World Wide Web: <http://www/emro.who.int/emhj.htm>

ALL ARTICLES ARE PEER REVIEWED

ISSN 1020-3397

© WORLD HEALTH ORGANIZATION, 2009

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitations of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned.

The authors alone are responsible for the views expressed, which do not necessarily reflect the opinion of the World Health Organization or of its Member States.

COVER: Remote sensing image of the area of the world that includes the Eastern Mediterranean Region. Cover image produced by the Canada Centre for Remote Sensing, Ottawa, Canada. (NOAA AVHRR Composite) Reproduced with permission

Cover designed by Ahmed Hassanein

Printed on acid-free paper

Printed by WHO Regional Office for the Eastern Mediterranean, Cairo

المجلة الصحية لشرق المتوسط

**Eastern
Mediterranean
Health Journal**

**La Revue de Santé
de la Méditerranée
orientale**

**Vol. 15 No. 3 May/Mai
June/Juin 2009**

المجلد الخامس عشر، العدد ٣، أيار/مايو
حزيران/يونيو

Contents

Letter from the Editor.....	492
<i>Research articles</i>	
TB contact investigations: 12 years of experience in the National TB Programme, Morocco 1993–2004	
<i>S. Ottmani, M. Zignol, N. Bencheikh, L. Laâsri, L. Blanc and J. Mahjour</i>	494
Results of the feasibility test of the Practical Approach to Lung Health in the Syrian Arab Republic	
<i>F. Me'etary, S-E. Ottmani, A. Pio, S. Baghdadi, G. Assafin, M. Koraym, M. Saleh, H. Bashour, A. Seita and L. Blanc</i>	504
Immune response to measles vaccine after mass vaccination in Urmia, Islamic Republic of Iran	
<i>Z. Yekta, R. Pourali, M.R. Taravati, S. Shahabi, S. Salary, F. Khalily and A. Farzin</i>	516
Rubella seroprevalence among women aged 15–39 years in Morocco	
<i>H. Caidi, S. Bloom, M. Azilmaat, A. Benjouad, S. Reef and R. El Aouad</i>	526
Surveillance of childhood vaccine-preventable diseases at health facilities in Jeddah, Saudi Arabia	
<i>N.K.R. Ibrahim and H.M. Al Bar</i>	532
Prevalence of oropharyngeal colonization by <i>Haemophilus influenzae</i> type b in Iranian children	
<i>A. Karimi, A. Alborzi, A. Fahimzad, M. Gooya, A. Esteghamati, S.H. Armin and F. Fallah</i>	544
Stunting is a major risk factor for overweight: results from national surveys in 5 Arab countries	
<i>A. El Taguri, F. Besmar, A. Abdel Monem, I. Betilmal, C. Ricour and M-F. Rolland-Cachera</i>	549
The use of body mass index for measurement of fat mass in children is highly dependant on abdominal fat	
<i>A. El Taguri, M. Dabbas-Tyan, O. Goulet and C. Ricour</i>	563
CD95 expression in white blood cells of malnourished infants during hospitalization and catch-up growth	
<i>M.F. Nassar, S.R. El-Batrawy and N.M. Nagy</i>	574
Persistence of goitre in children post-salt iodization in Islamic Republic of Iran: autoimmune status	
<i>M.H. Dabbaghmanesh, A. Sadegholvaad, F. Ejtehadi and G.R.Omrani</i>	584
Prevalence of type 2 diabetes in the Islamic Republic of Iran: systematic review and meta-analysis	
<i>A.A Haghdooost, M. Rezazadeh-Kermani, B. Sadghirad and H.R. Baradaran</i>	591
Incidence of cancer in Gulf Cooperation Council countries, 1998–2001	
<i>N. Al-Hamdan, K. Ravichandran, J. Al-Sayyad, J. Al-Lawati, Z. Khazal, F. Al-Khateeb, A. Abdulwahab and A. Al-Asfour</i>	600

Association of reproductive factors with the incidence of breast cancer in Gulf Cooperation Council countries	
<i>K. Ravichandran and A.S. Al-Zahrani</i>	612
Woman abuse and pregnancy outcome among women in Khoram Abad, Islamic Republic of Iran	
<i>N. Khodakarami, H. Naji, M.G. Dashti and M. Yazdgerdi</i>	622
Providing emotional stability through relaxation training	
<i>M. Janbozorgi, A. Zahirodin, N. Norri, R. Ghafarsamar and J. Shams</i>	629
Effect of music on anxiety, stress, and depression levels in patients undergoing coronary angiography	
<i>F. Moradipanah, E. Mohammadi and A.Z. Mohammadil</i>	639
Publications indexed in Medline and Embase originating from the Syrian Arab Republic: a survey	
<i>H.E. Matar, M.Q. Almerie, C.E. Adams and A. Essali</i>	648
تدريس اللغة الإنكليزية بكلية الطب، جامعة دمشق	
قاسم طه السارة	653
دور منظمة الصحة العالمية وبرامجها العربي في النهوض باللغة العربية	
قاسم طه السارة	665
Pharmacoepidemiological study of self-medication in adults attending pharmacies in Alexandria, Egypt	
<i>S.A. Sallam, N.M. Khallafallah, N.K. Ibrahim and A.O. Okasha</i>	683
Skin manifestations of chronic hepatitis C virus infection in Cairo, Egypt	
<i>H.M.Z. Raslan, W.M. Ezzat, M.F. Abd El Hamid, H. Emam and K.S. Amre</i>	692
Lupus et virus d'Epstein-Barr	
<i>I. Tazi, S. Fehri, K. Elghrari, T. Ouazzani et N. Benchemsi</i>	701
Microbiological quality and sample collection policy for dairy products in Ramallah and Al-Bireh district, Palestine	
<i>I.A. Al-Khatib and S.M. Al-Mitwalli</i>	709
Distribution of ABO and Rh D blood groups in the population of Poonch district, Azad Jammu and Kashmir	
<i>M.N. Khan, I. Khaliq, A. Bakhsh, M.S. Akhtar and M. Amin-ud-Din</i>	717
Healthy lifestyle habits among Greek university students: differences by sex and faculty of study	
<i>I. Tiroidimos, I. Georgouvia, T-N. Savvala, E. Karanika and D. Noukari</i>	722
Review	
Immune thrombocytopenia in children with reference to low-income countries	
<i>A. Rehman</i>	729
Reports	
Design and implementation of a hospital information system for the Palestine Red Crescent Society in Lebanon	
<i>L. Rossi, E. Materia, A. Hourani, H. Yousef, V. Racalbutto, C. Venier and M. Osman</i>	738
Developing a holistic accreditation system for medical universities of the Islamic Republic of Iran	
<i>A. Yousefi, T. Changiz, N. Yamani, R.H. Zahrai and S. Ehsanpour</i>	747
Case reports	
Contact irritant dermatitis from insect secretions: report of 74 cases in a military unit in Eritrea	
<i>R.M. Smadi, B.Y. Smadi and A. Ka'abneh</i>	757
Congenital tick-borne relapsing fever: report of a case with transplacental transmission in the Islamic Republic of Iran	
<i>M. Mahram and M.B. Ghavami</i>	761
Letter to the Editor	765
Guidelines for authors	766
WHO sales and discount policy	772

Eastern Mediterranean Health Journal

M. Haytham Khayat MD, FRSH, *Editor-in-chief*

Mohammad Afzal MSc, MPhil, PhD, *Executive Editor*

Editorial Board

Ibrahim M. Abdel Rahim MBBS, MPH&TM, MRCP
Houssain Abouzaid MS (Chem Eng), MS (Sanit Eng), DrS
Zuhair Hallaj MD, DPH, DrPH
Mohamed Hussein M. Khalil MD, MPH, PhD (Biostat)
Haifa Madi MD, MPH
Belgacem Sabri MD, MPA, MA (Econ)
Abdel Aziz Saleh Dip (Hosp Pharm), Dip (Indus Pharm), PhD
Kassem Sara MD, MAM
Anna Verster MBBS, Dip Nutr
M. Helmy Wahdan MD, DPH, PhD

International Advisory Panel

Dr S. Aboulazm. Professor of Orthodontics. Egypt
Dr Abdul Rahman Al-Awadi BSc, MD, MPH, Honorary
FRCM, Ireland, Honorary Dr. Law, Korea, Honorary
FRCS & P, Glasgow, FRCP, Edinburgh. Kuwait
Dr Fariba Al-Darazi RN, MSc, PhD. Bahrain
Dr M. Al-Nozha, MD, FRCP, FACC, FESC. Professor of
Medicine and Consultant Cardiologist. Saudi Arabia
Dr Ala'din Alwan MD, FRCP, FFPHM. Iraq
Dr F. Azizi. Professor of Internal Medicine and
Endocrinology. Islamic Republic of Iran
Dr K. Bagchi BSc, MD, PhD. India
Professor K. Dawson BA, MD, PhD, FRCP, FRACP,
FRCPCH, DOBst, RCOG. New Zealand
Professor Kaussay Dellagi MD. Tunisia
Dr R. Dybkaer MD. Denmark
Dr M. Aziz El-Matri. Professor of Medicine. Tunisia
Professor F. El-Sabban BSc, MS, PhD. United States of
America
Dr A.H. El-Shaarawi MSc (Stat), PhD (Stat). Canada
Professor N. Fikri-Benbrahim PhD (Pub health)
(SocSci). Morocco
Professor A.T. Florence BSc (Pharm), PhD, DSc, FRSC,
FRPharmS, FRSE. United Kingdom
Professor Cheherezade M.K. Ghazi BS (Nursing), MS
(Nursing), DPH, MPA. Egypt
Professor M.A. Ghoneim MD, MD (Hons). Egypt

Dr J.A. Hashmi DTM&H, FRCP. Pakistan
Professor J. Jervell MD, PhD. Norway
Professor G.J. Johnson MA, MD, BChir, FRCS (C),
FRCOphth, DCEH. United Kingdom
Dr M. Kassas. Emeritus Professor of Plant Ecology.
Egypt
Professor M.M. Legnain MBBS, MRCP, FRCOG.
Libyan Arab Jamahiriya
Professor El-Sheikh Mahgoub DipBact, PhD, MD,
FRCPath. Sudan
Professor A.M.A. Mandil MSc (Paediatric), MPH, DrPH.
Egypt
Professor A.B. Miller MB, FRCP. Canada
Professor S.S. Najjar MD. Lebanon
Dr Abubaker A. Qirbi BSc, MD (Edin), FRCP (Can),
FRCP FRCPath (UK). Republic of Yemen
Professor O.S.E. Rasslan MD, PhD. Egypt
Professor W.A. Reinké MBA, PhD. United States of
America
Professor I.A. Sallam, MD, Dip High Surgery Cairo,
Honorary FRCS, PhD (Glasgow), LRCP, MRCS,
FRCS (London), ECFMG. Egypt
Dr C.Th.S. Sibinga FRCP (Edin), FRCPath.
The Netherlands
Mr Taoufik Zeribi Eng BSc, MSc. Tunisia

Editorial: Fiona Curlet, Eva Abdin, Alison Bichard, Guy Penet

Letter from the Editor

The concept of health promotion is rooted in a salutogenic view of health, which aims to strengthen people's health through empowerment, and collaborative and participatory processes. Health promotion shifts the focus away from narrow disease prevention approaches to actions on the wider social determinants of health. The Division of Health Protection and Promotion (DHP) in the World Health Organization (WHO) Regional Office for the Eastern Mediterranean is concerned with translating this conceptual framework into coherent, integrated and synergistic policies, action plans and activity programmes for health promotion and protection. It visualizes health as a resource for enhancing social and human capital through promotion of healthy lifestyles, reproductive health, child and adolescent health, mental health, healthy environments and health literacy and minimization of risk factors for chronic noncommunicable diseases (NCDs).

The extent of the health problems faced today is vast and while some are age-old, some are new and emerging. NCDs, mainly cardiovascular diseases, cancers, diabetes and chronic respiratory diseases, are a leading threat to human health and development. NCDs are the biggest killers globally, causing 60% of all deaths, with 80% being in low- and middle-income countries. While 14% of the global burden of disease is attributed to mental, neurological and substance use disorders, the treatment gap in low- and middle-income countries is as wide as 70%–90%. Because of their magnitude and associated mortality and morbidity, WHO has traditionally focused on nutritional deficiencies. However, all regions of the world are witnessing a dramatic increase in other forms of malnutrition, such as obesity, which are emerging from unhealthy lifestyles and which are precursors for NCDs. Violence and injuries, including road traffic injuries, suicides, homicides, drownings, war injuries, and burns, account for 9% of global mortality, as many deaths as from HIV, malaria and tuberculosis combined; the burden of mortality in this Region is one of the highest in the world with an age-standardized mortality of 88/100 000 population. WHO has selected "Tobacco Health Warnings" as the theme for the 2009 World No Tobacco Day. Tobacco health warnings on cigarettes packs are among the strongest defences against the global epidemic of tobacco which is responsible for so much disease and death.

DHP provides leadership and direction to countries of the Region for urgent national efforts to tackle these threats to health and well-being, to promote healthy lifestyles and to mitigate their consequences. Under the guiding principles of equity, gender sensitivity and human rights, and in collaboration with all stake-holders, DHP contributes to WHO's strategic directions through research and development on essential interventions to promote the health of all and ensure access to adequate prevention, treatment, care and support for those in need, thus reducing excess mortality and morbidity, especially among poor or marginalized populations.

رسالة من المحرّر

ينبع مفهوم تعزيز الصحة من الرؤية الخاصة بتحقيق الصحة والمعاقة للناس. ويرمي هذا المفهوم إلى تقوية صحة الأفراد من خلال عمليات تمكين تعاونية وتشاركية. ويؤدّي مفهوم تعزيز الصحة إلى التحوّل من التركيز على الأساليب الضيقة المتمثلة في الوقاية من الأمراض، إلى العمل ضمن المجال الأرحب للمحددات الاجتماعية للصحة. وشعبة حفظ الصحة وتعزيزها بالمكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط، معنية بترجمة هذا الإطار المفاهيمي إلى سياسات، وخطط عمل، وبرامج للأنشطة تتسم بالترابط والتكافل والتآزر، من أجل حفظ الصحة وتعزيزها. فهي تنظر إلى الصحة باعتبارها مورداً لتعزيز رؤوس الأموال الاجتماعية والبشرية من خلال تعزيز أنماط الحياة الصحية، والصحة الإنجابية، وصحة الأطفال والمراهقين، والصحة النفسية، والبيئات الصحية، والمعارف الصحية، والتقليل لأدنى حد من عوامل اختطار الإصابة بالأمراض المزمنة غير السارية.

إن كم المشكلات الصحية التي نواجهها اليوم هو كم كبير. وإذا كان بعض هذه المشكلات موجوداً منذ زمن، فإن بعضها الآخر يمثل مشكلات جديدة وناشئة. وتشكل الأمراض غير السارية، وهي الأمراض القلبية الوعائية، وأمراض السرطان، والسكري، والأمراض التنفسية المزمنة، تهديداً رئيسياً لصحة الإنسان، وللتنمية. فمعظم الوفيات التي تقع في العالم هي ناجمة عن هذه الأمراض، حيث إنها تقف وراء نحو 60٪ من كل الوفيات على مستوى العالم، يقع 80٪ منها في البلدان المنخفضة الدخل، والمتوسطة الدخل. وعلى الرغم من أن 14٪ من العبء المرضي العالمي يُعزى إلى الاضطرابات النفسية والعصبية ومعاقرة مواد الإدمان، إلا أن الفجوة العلاجية في البلدان المنخفضة الدخل، والمتوسطة الدخل هي فجوة واسعة جداً إلى حد أنها تصل إلى ما بين 70٪ و 90٪. وترتكز منظمة الصحة العالمية، عادة، على مشاكل العوز التغذوي، وذلك بالنظر إلى كبر حجمها، ومعدلات الوفيات والمرضاة المرتبطة بها. ومع ذلك، فإن جميع أقاليم المنظمة تشهد زيادة هائلة في أشكال أخرى من سوء التغذية مثل السمّة التي تنشأ بفعل أنماط الحياة غير الصحية، والتي تعد نذيراً للأمراض غير السارية. وعلى جانب آخر، فإن حالات العنف والإصابات، بما فيها الإصابات الناجمة عن حوادث الطرق المرورية، وحالات الانتحار، والقتل، والفرق، وإصابات الحروب، والحروق، مسؤولة عن 9٪ من الوفيات على الصعيد العالمي، معادلة في ذلك الوفيات الناجمة عن أمراض الإيدز، والملاريا، والسل مجتمعة. ويُعدّ عبء الوفيات في هذا الإقليم واحداً من أعلى أعباء الوفيات في العالم حيث يبلغ، وفقاً لمعدلات الوفيات المصنّفة بحسب السن، 88 لكل 100 000 من السكان. وعلى صعيد آخر، اختارت منظمة الصحة العالمية "التحذيرات الصحية ضد التبغ" موضوعاً لليوم العالمي للامتناع عن التبغ لعام 2009. وتعد التحذيرات الصحية ضد التبغ، الموجودة على علب السجائر، من أقوى الوسائل الدفاعية ضد الوباء العالمي للتبغ، المسؤول عن قدر كبير من الأمراض والوفيات.

وتتضمن شعبة حفظ الصحة وتعزيزها بدور القيادة والتوجيه لبلدان الإقليم من أجل بذل الجهود الحثيثة والعاجلة للتصدي لهذه التهديدات التي تواجه تحقيق الصحة والمعاقة، ولتعزيز أنماط الحياة الصحية، والتخفيف من تداعيات تلك التهديدات. وفي ضوء المبادئ الإرشادية ذات الصلة بالمساواة ومراعاة الفروق بين الجنسين، وحقوق الإنسان، وبالتعاون مع جميع أصحاب الشأن المعنيين، تسهم شعبة حفظ الصحة وتعزيزها في التوجهات الاستراتيجية للمنظمة، من خلال أنشطة البحوث والتطوير في مجال التدخلات الأساسية الرامية إلى تعزيز الصحة لدى الجميع، وضمان إتاحة تلقي خدمات الوقاية والمعالجة، والرعاية، والمساندة الملائمة من قبل هؤلاء الذين هم في حاجة إليها، مما يقلل من المعدلات المرتفعة من الوفيات والمرضاة، ولأسيا بين القطاعات السكانية الفقيرة والمهمشة.

TB contact investigations: 12 years of experience in the National TB Programme, Morocco 1993–2004

S. Ottmani,¹ M. Zignol,¹ N. Bencheikh,² L. Laâsri,² L. Blanc¹ and J. Mahjour²

التقصّيات حول المخالطين لمرضى السّل: خبرة البرنامج الوطني لمكافحة السّل لمدة 12 عاماً؛ المغرب 1993–2004
صلاح الدين عثمانى، ماطيو زنيول، نعيمة بن الشيخ، لحسن لعسري، ليوبول بلان، جواد محجور

الخلاصة: استعرض الباحثون المعطيات المجموعة في الفترة من عام 1993 حتى عام 2004 كجزء من الأنشطة الروتينية للبرنامج الوطني لمكافحة السل في المغرب. وقد تم كشف ما يزيد على مليون مخالط في المساكن لمرضى السّل موزعين على ما يقرب من 200 000 من استقصاء. ووسطياً، تم مسح 77٪ من المخالطين الذين تم التعرف عليهم بقصد كشف السّل عندهم كل سنة. وكان المعدّل الإجمالي لوقوع السل 2.5٪. أما النسبة المئوية لحالات السّل المكتشفة بين المخالطين في المساكن لحالات مسجلة فوصل إلى 5.6٪. وتشير هذه النتائج إلى ارتفاع القوعات ارتفاعاً يُعتدُّ به إحصائياً لدى الأطفال دون عشر سنوات ولدى المرضى الذين يشخصون لإصابتهم بالمعقد الأولي المترافق بأعراض. ويعد تنفيذ التقصّيات حول المخالطين لمرضى السّل كجزء من الأنشطة الروتينية لخدمات البرامج الوطنية لمكافحة السّل أمراً ممكناً في بلدان الشريحة الدنيا من الدخل المتوسط.

ABSTRACT We reviewed data collected from 1993 to 2004 as part of the routine activities of the national tuberculosis (TB) control programme (NTP) in Morocco. More than 1 million household TB contacts were identified in approximately 200 000 investigations. On average, 77% of identified contacts were screened every year; overall prevalence was 2.5%. The proportion of TB cases identified in household contacts of registered cases was 5.6%. This was significantly higher in children under 10 years and in patients registered and diagnosed with symptomatic primary complex. Performing TB contact investigations as part of the routine activities of NTP services is feasible in low–middle-income countries.

Recherches sur les personnes en contact avec des tuberculeux : les résultats de 12 ans d'expérience dans le programme national de lutte contre la tuberculose du Maroc, 1993–2004

RÉSUMÉ Nous avons analysé les données recueillies de 1993 à 2004 dans le cadre des activités de routine du programme national de lutte contre la tuberculose (PNT) au Maroc. Plus d'un million de sujets en contact à leur domicile avec des personnes atteintes de tuberculose ont été recensés à l'occasion de quelque 200 000 recherches. En moyenne, 77 % de ces sujets ont fait l'objet d'un dépistage annuel de la tuberculose ; la prévalence globale de la maladie était de 2,5 %. La proportion de cas de tuberculose dénombrés parmi les sujets en contact à leur domicile avec des cas de tuberculose enregistrés était de 5,6 %. Ce chiffre était significativement plus élevé chez les enfants de moins de 10 ans et chez les patients enregistrés pour lesquels un diagnostic de complexe primaire avait été posé. Il est possible de rechercher les sujets en contact avec des personnes atteintes de tuberculose dans le cadre des activités de routine des services du PNT dans les pays à revenu faible et moyen.

¹Stop TB Department, World Health Organization, Geneva, Switzerland (Correspondence to S Ottmani: ottmanis@who.int).

²Direction of Epidemiology and Disease Control, Ministry of Health, Rabat, Morocco.

Received: 25/05/08; accepted 12/11/08

Introduction

Tuberculosis (TB) is generally diagnosed by performing clinical, bacteriological, and/or radiological investigations in persons who present with symptoms or signs suggestive of TB [1], or by screening high risk groups such as people living with human immunodeficiency virus (HIV) or those who have been exposed to TB transmission by being in close contact with an infectious TB case.

Tracing, identifying, and investigating individual contacts of infectious TB cases is a time-consuming exercise that is largely conducted on routine basis only in countries with high resources and low TB prevalence. In resource-limited settings, TB contact investigations are often documented only in the framework of research studies with usually limited number of contacts evaluated.

Morocco is a low-middle-income country where the DOTS strategy to control TB recommended by the World Health Organization (WHO) has been successfully implemented since 1991 [2] and the global targets set up by the World Health Assembly for the year 2005 [3] were achieved by 1995 and have been maintained since that time [4]. In 2005, the notified incidence of all forms of TB was 83 cases/100 000 population and incidence of sputum smear-positive pulmonary TB (SSPPT) was 41 cases/100 000 population, with a detection rate for SSPPT of over 95% [5].

In Morocco, TB is principally diagnosed through evaluation of persons who present with symptoms or signs suggestive of TB; investigation of persons found to be HIV-positive; and investigation of close contacts of specific categories of cases with TB.

The objective of this study was to report the outcomes of TB contact investigation activities carried out on routine basis by the National TB Control Programme (NTP) of

Morocco from 1993 to 2004, the latest year for which data are available.

Methods

In this retrospective study the results of all contact investigations performed by the NTP during the period 1993–2004 were analysed. In Morocco, TB contact identification and investigation are performed routinely in each province and prefecture and the results are reported to the central unit of the NTP on an annual basis [6] (although DOTS was implemented in 1991, data on contact investigations were only included in the annual report from 1993).

The procedures for conducting TB contact investigations in Morocco are defined in the NTP guidelines [7]. A TB index case, i.e. the person around whom contact investigation should be carried out, is defined as any case with SSPPT or with symptomatic primary complex (SPC). A patient with SPC is defined as a patient who presents with clinical symptoms compatible with TB, hilar or inter-bronchial lymph nodes with or without lung infiltrates on the chest X-ray, and a positive tuberculin skin test. Recent contact with a patient with active TB and/or young age are additional arguments for the diagnosis of SPC. Patients with SPC are sputum smear-negative and treated using category III treatment regimen (2RHZ/4RH) [7].

TB contact is defined as any person living in the same household as the index case at the time of diagnosis.

For each index case, a list of all household contacts is established by the NTP services. Household contacts are then contacted through the health post network, itinerant nurses, or social workers, and systematically invited to undergo clinical examination and chest X-ray. If TB contacts

are children aged under 10 years, a tuberculin skin test is performed in addition to the clinical examination and chest X-ray.

If any clinical sign and/or radiological abnormality suggestive of TB are documented, the person is requested to provide 3 sputum samples for smear microscopy examination. In line with the NTP guidelines [7], a sputum specimen is collected on the spot; then the contact is given a sputum container to collect an early morning specimen at home. The following day, at the time the household contact brings the early morning specimen to the health facility, a third specimen for sputum smear examination is taken.

Cases of TB identified during contact investigations are registered in one of the following categories according to the diagnosis: SSPPT, sputum smear-negative pulmonary TB (SSNPT), extrapulmonary TB (EPT) or SPC. These cases are classified, treated and monitored like all the other TB patients identified from persons who presented to the health facilities with symptoms or signs suggestive of TB.

Children below 5 years of age are systematically provided with isoniazid chemoprophylaxis (5mg/kg daily for 6 months) if no active TB is diagnosed.

The indicators used to assess the outcome of household TB contact investigation are: proportion of identified household contacts screened for TB; prevalence of active TB among the contacts screened; and proportion of active TB identified in household contacts among all TB cases registered.

The chi-squared test was used to assess the statistical significance of the difference between 2 proportions; the Fisher exact test was used whenever an expected number was below 5 in any cell of a 2×2 contingency table. A test result was considered statistically significant when the *P*-value was < 0.05 .

Ethical approval was not required because this study was retrospective, using aggregated information collected on a routine basis by the NTP.

Results

From 1993 to 2004, more than 200 000 household investigations were carried out by the NTP services of Morocco (Table 1). These investigations identified 1 023 323 household TB contacts (5.1 identified contacts per investigation); among them 787 683 were screened for active TB. In the 1990s, the number of household TB contacts identified every year was over 90 000. Since the year 2000, this number has progressively decreased, reaching 50 257 in 2004 (Table 1). However, the proportion of household contacts screened per year remained more or less stable (overall 77.0%; range: 67.8%–82.0%). The ratios of household contacts screened per investigation also remained stable over the study period (average: 4.0 contacts screened per investigation; range: 3.2–4.6) (Table 1).

Between 1993 and 1999 the number of contact investigations exceeded the number of cases notified with SSPPT or with SPC around whom contact investigations should be carried out. From 2000 the number of household contact investigations was lower than the number of cases of SSPPT or SPC notified (Figure 1).

The prevalence of any form of TB among households screened remained stable, ranging between 1.9% and 3.7% over the 12 years (overall 2.5%) (Table 2). A similar trend over time was observed for the prevalence of SSPPT, SSNPT, EPT and SPC.

The prevalence of any form of TB tended to be higher among contacts aged ≥ 10 years than among younger contacts, although important variations between years

Table 1 Outcome of household tuberculosis (TB) contact investigations, Morocco 1993–2004

Year	No. of households investigated	TB contacts identified		TB contacts screened		% ^b
		No.	Ratio ^a	No.	Ratio ^a	
1993	17 612	90 016	5.1	73 826	4.2	82.0
1994	20 706	105 935	5.1	84 968	4.1	80.2
1995	18 825	97 247	5.2	79 573	4.2	81.8
1996	19 198	95 295	5.0	69 012	3.6	72.4
1997	21 023	91 517	4.4	69 501	3.3	76.0
1998	15 741	90 685	5.8	72 485	4.6	80.0
1999	19 434	98 399	5.1	74 591	3.8	75.8
2000	15 706	88 898	5.7	65 011	4.1	73.1
2001	14 480	80 080	5.5	65 449	4.5	81.7
2002	14 588	67 796	4.6	45 989	3.2	67.8
2003	13 486	67 198	5.0	50 061	3.7	74.5
2004	10 103	50 257	5.0	37 217	3.7	74.1
Overall	200 902	1 023 323	5.1	787 683	4.0	77.0

^aNo. per household investigated.^bPercentage of TB contacts screened among TB contacts identified.

were observed. The prevalence of SSPPT, SSNPT and EPT was more often significantly higher among contacts aged ≥ 10 years than among those aged < 10 years. In contrast, the prevalence of SPC was always significantly higher in those aged < 10 years (Table 2).

Between 3% and 10% of all TB cases (any form) registered during the study period were identified among household contacts. Similar proportions were observed among the SSPPT and SSNPT cases registered, while those for EPT tended to be lower (Table 3). The overall proportions of cases identified in contacts among those registered with any form of TB, SSPPT, SSNPT and EPT were 5.6%, 5.6%, 6.5% and 3.1% respectively. However among the SPC cases registered during the study period, 27.0% on average (range 18%–34.7%) were identified annually among household contacts (Table 3).

The stratification by age group shows that the proportion of TB cases identified in household contacts among registered cases

was much higher in patients aged < 10 years in comparison to those aged ≥ 10 years. This difference was statistically significant for all years among those registered with any form of TB, SSPPT and EPT, and for most of the years among patients with SPC. Almost 20% of the patients aged < 10 years who were registered for any form of TB between 1993 and 2004 were identified through household contact investigations (Table 3).

Discussion

The cumulative number of contacts investigated (787 683 over 12 years) is enormous and far exceeds the size of the largest studies published in the medical literature, ranging from about 1750 to over 3000 [8–11].

The number of households investigated was consistently over 15 000 per annum between 1993 and 2000, then decreased significantly from 15 706 in 2000 to 10 103 in 2004 (Table 1). This decrease cannot

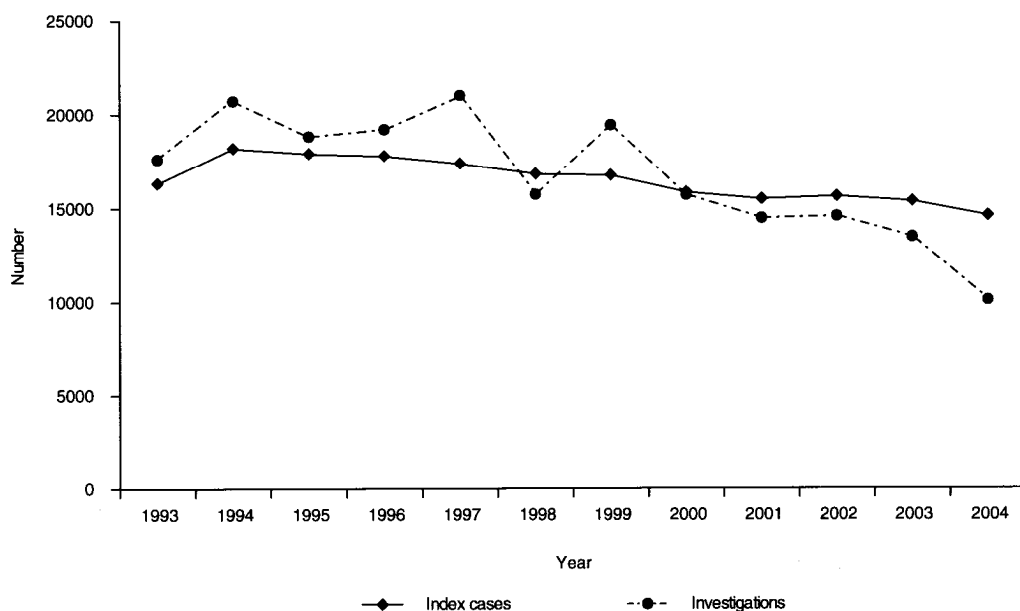


Figure 1 Number of index cases and contact investigations by year, Morocco 1993–2004

be solely explained by the slow decrease in the burden of the disease in Morocco [12]. In fact, further analysis shows that the number of households investigated usually exceeded the number of index cases for whom contact investigations needed to be undertaken between 1993 and 1999. This suggests that in that period the NTP services in some provinces considered as index cases not only SSPPT and SPC, as recommended in the NTP guidelines, but also SSNPT and/or EPT. Before the implementation of DOTS services in 1991, contact investigation was undertaken for any form of TB, including EPT; when the NTP adopted the new strategy, SSNPT and EPT cases were no longer considered index cases. Some provinces continued to use the old definition of index case after the introduction of the DOTS strategy. Between 2000 and 2003, the new definition of index cases started to be used across all provinces.

The number of household investigations became slightly lower than the number of index cases, which is quite acceptable given that some index cases can be clustered in the same household (Figure 1). However, in 2004, the number of households investigated was much lower than expected. This was due to the fact that the NTP services of the provinces of Larache and Fès did not report the findings of their household contact investigation activities carried out over that year. In 2004, the number of index cases identified in these 2 provinces accounted for 8.3% of the total number of index cases in Morocco [6].

The fact that the definition of index case adopted in 1991 took some time to be fully used in all provinces may have introduced some heterogeneity in the data. This may limit the possibility of appropriately assessing the outcomes of contact investigation over time. Fair assessment would have

Table 2 Prevalence of tuberculosis (TB) among household TB contacts screened for active TB according to age group and category of TB, Morocco 1993-2004

Year	Any form of TB (%)			SSPPT (%)			SSNPT (%)			EPT (%)			SPC (%)		
	Age (years)	P		Age (years)	P		Age (years)	P		Age (years)	P		Age (years)	P	
	All < 10	≥ 10		All < 10	≥ 10		All < 10	≥ 10		All < 10	≥ 10		All < 10	≥ 10	
1993	2.0	1.4	2.3 < 0.001	1.0	0.1	1.3 < 0.001	0.4	0.1	0.5 < 0.001	0.3	0.1	0.4 < 0.001	0.4	1.1	0.1 < 0.001
1994	3.1	2.0	3.5 < 0.01	1.8	0.1	2.3 < 0.001	0.3	0.1	0.3 < 0.001	0.5	0.1	0.6 < 0.001	0.5	1.7	0.2 < 0.001
1995	2.1	2.1	NS	1.0	0.1	1.2 < 0.001	0.3	0.1	0.4 < 0.001	0.3	0.2	0.3 < 0.001	0.5	1.7	0.1 < 0.001
1996	2.4	1.7	2.7 < 0.001	1.0	0.1	1.4 < 0.001	0.4	0.1	0.5 < 0.001	0.5	0.2	0.6 < 0.001	0.5	1.4	0.3 < 0.001
1997	3.7	2.2	4.3 < 0.001	1.7	0.1	2.3 < 0.001	0.5	0.1	0.6 < 0.001	0.9	0.3	1.2 < 0.001	0.6	1.7	0.2 < 0.001
1998	1.9	1.8	NS	0.8	0.0	1.0 < 0.001	0.2	0.1	0.2 < 0.001	0.5	0.2	0.6 < 0.001	0.4	1.5	0.1 < 0.001
1999	1.9	1.9	NS	0.8	0.0	1.0 < 0.001	0.3	0.1	0.4 < 0.001	0.3	0.1	0.4 < 0.001	0.4	1.6	0.1 < 0.001
2000	2.3	2.9	2.2 < 0.001	0.9	0.1	1.1 < 0.001	0.3	0.1	0.3 < 0.001	0.6	0.4	0.6 < 0.001	0.5	2.4	0.1 < 0.001
2001	3.1	2.1	3.3 < 0.001	1.5	0.1	1.7 < 0.001	0.4	0.2	0.4 < 0.001	0.9	0.4	1.0 < 0.001	0.4	1.4	0.2 < 0.001
2002	2.4	2.5	NS	1.1	0.2	1.3 < 0.001	0.3	0.2	0.3 NS	0.6	0.5	0.7 < 0.05	0.4	1.6	0.1 < 0.001
2003	2.2	1.8	2.3 < 0.01	1.1	0.2	1.3 < 0.001	0.2	0.1	0.3 < 0.001	0.5	0.4	0.6 < 0.01	0.3	1.2	0.1 < 0.001
2004	2.0	1.9	NS	1.0	0.1	1.1 < 0.001	0.2	0.1	0.2 NS	0.5	0.3	0.6 < 0.01	0.3	1.4	0.1 < 0.001
Overall	2.5	2.0	2.6 < 0.001	1.1	0.1	1.5 < 0.001	0.3	0.1	0.4 < 0.001	0.5	0.2	0.6 < 0.001	0.5	1.6	0.1 < 0.001

P-value assesses statistical significance of the proportion difference between the age groups < 10 and ≥ 10.

NS = not statistically significant (P ≥ 0.05).

SSPPT = sputum smear-positive pulmonary TB; SSNPT: sputum smear-negative pulmonary TB; EPT = extrapulmonary TB; SPC = symptomatic primary complex.

been possible if the data on the outcome of contact investigation were compiled at the national level by type of index case (i.e. SSPPT and SPC).

The study findings suggest that the NTP services need to routinely monitor how the guidelines are applied in the field, collect and compile the information by type of index case, and regularly analyse the data on contact investigation activities in order to take appropriate action.

In Morocco, TB contact investigation in households was a component of the routine activities carried out by the NTP services for many years before the implementation of DOTS. This study shows that a significant proportion of household contacts identified by the NTP services is screened (overall: 77.0%). This result was consistent throughout the study period, showing that performing contact tracing is feasible and sustainable in a limited-resource country setting.

Contrary to what happened with the definition of index case [7,13] the definition of TB contact (household members) did not change over the study period and across provinces. This allows for making comparisons between provinces as well as assessing trends over time of the outcome of contact investigation activities. It is important to note that, as per national guidelines, chest X-ray is used in TB screening free of charge for all contacts. Chest X-ray is felt to be an important incentive which made it possible

Table 3 Distribution of cases identified among contacts of those registered as having tuberculosis (TB) according to age and category of TB, Morocco 1993–2004

Year	Any form of TB (%)			SSPPT (%)			SSNPT (%)			EPT (%)			SPC (%)							
	Age (years)	P		Age (years)	P		Age (years)	P		Age (years)	P		Age (years)	P						
	All	< 10	≥ 10	All	< 10	≥ 10	All	< 10	≥ 10	All	< 10	≥ 10	All	< 10	≥ 10					
1993	5.4	17.6	4.6	< 0.001	5.5	34.0	5.4	< 0.001 ^a	7.7	15.5	7.3	< 0.001	2.6	4.9	2.4	< 0.001	18.0	25.3	7.3	< 0.001
1994	8.8	21.4	7.9	< 0.001	10.5	21.9	10.5	< 0.01	5.8	8.2	5.7	NS	4.5	4.9	4.5	NS	27.3	33.4	17.3	< 0.001
1995	5.6	23.3	4.5	< 0.001	5.4	31.4	5.3	< 0.001 ^a	6.5	13.5	6.2	< 0.001	2.3	6.7	2.1	< 0.001	26.7	33.5	15.2	< 0.001
1996	5.3	17.6	4.6	< 0.001	5.1	39.6	4.9	< 0.001 ^a	5.9	7.0	5.8	NS	2.9	4.5	2.8	< 0.05	27.8	28.7	26.5	NS
1997	8.5	24.2	7.6	< 0.001	8.3	25.0	8.2	< 0.001	9.8	8.7	9.8	NS	5.7	8.6	5.5	< 0.01	32.3	38.5	20.6	< 0.001
1998	4.7	19.5	3.9	< 0.001	4.4	12.1	4.4	< 0.05 ^a	4.7	11.5	4.4	< 0.001	3.0	5.9	2.9	< 0.001	25.8	33.7	10.9	< 0.001
1999	4.6	21.7	3.8	< 0.001	4.4	15.2	4.3	< 0.05 ^a	6.9	17.3	6.6	< 0.001	2.1	4.1	2.0	< 0.001	30.4	38.5	15.1	< 0.001
2000	5.2	22.4	4.2	< 0.001	4.6	29.3	4.6	< 0.001 ^a	6.5	7.2	6.5	NS	3.1	5.9	3.0	< 0.001	34.7	42.4	16.7	< 0.001
2001	7.2	16.9	6.7	< 0.001	7.5	23.4	7.4	< 0.001 ^a	9.2	17.1	8.9	< 0.01	4.9	7.3	4.8	< 0.01	29.2	27.8	32.4	NS
2002	3.8	16.7	3.3	< 0.001	3.8	34.2	3.7	< 0.001 ^a	5.4	18.3	4.8	< 0.001	2.3	5.8	2.1	< 0.001	23.5	30.9	13.8	< 0.001
2003	4.1	15.3	3.6	< 0.001	4.3	38.1	4.2	< 0.001 ^a	5.1	9.5	5.0	NS ^a	2.5	5.4	2.3	< 0.001	24.5	30.4	15.0	< 0.001
2004	2.8	11.5	2.5	< 0.001	2.9	11.1	2.8	< 0.001 ^a	3.4	14.8	3.1	< 0.001 ^a	1.7	3.0	1.7	< 0.05	23.0	26.8	15.9	< 0.01
Overall	5.6	19.5	4.8	< 0.001	5.6	26.6	5.5	< 0.001	6.5	11.8	6.3	< 0.001	3.1	5.6	3.0	< 0.001	27.0	32.9	16.9	< 0.001

^aFisher exact test.

P-value assesses statistical significance of the proportion difference between the age groups < 10 and ≥ 10. NS = not statistically significant (P ≥ 0.05). SSPPT = sputum smear-positive pulmonary TB; SSNPT = sputum smear-negative pulmonary TB; EPT = extrapulmonary TB; SPC = symptomatic primary complex.

to achieve high screening rates among household contacts over many years. It is likely that if no chest X-ray was offered a much lower proportion of household contacts would have presented for screening.

The experience from Morocco shows that screening the closest contacts is highly effective. If all household contacts were screened every year, the proportions identified would likely be higher; our estimate for the overall proportion of TB cases (any type) identified in contacts among all registered TB patients would be 7.3% instead of 5.6%. Even though the proportion of SPC cases identified in contacts among all registered SPC patients is high, the number of SPC cases accounted for a small proportion among all registered TB cases; their percentage steadily decreased from 5.5% in 1993 to 1.9% in 2004 (6). By limiting contact investigations to households, only a few TB cases among other types of contacts, such as schoolmates or workmates, are likely to be missed [14]. To reach them, large amounts of resources are needed for a (very probably) modest yield [15].

The prevalence of each type of TB among household contacts did not vary very much across the years even though in some provinces all TB cases were considered index cases from 1993 to 1999. On average, the prevalence of TB (any type) among household contacts was 2.5%, in line with the findings reported in most of the literature (2%–4%) [10,16–19],

although a few studies have reported higher figures, 8% [20,21].

The prevalence of TB (any type) among household contacts was several fold higher than in the general population; for instance, it was 21 times and 19 times higher in 2003 and 2004 respectively [4]. Our data also clearly show that a non-negligible proportion of TB cases aged < 10 years is identified through household contact investigations. Our findings suggest that the implementation of such activity has a good yield in this age group, particularly regarding SSPTB, 11.1%–39.6%, and SPC, 25.3%–42.4% (Table 3). As already highlighted in a previous study, the yield for contact investigations is higher among the young and for SPC [22]. Early diagnosis and treatment of SPC could prevent the occurrence of major events such as miliary TB or TB meningitis, particularly in children.

Even though most of the NTPs worldwide consider contact investigation important for TB control, this activity is rarely properly implemented, supervised, evaluated or documented in resource-limited settings. WHO recommends that at least children under 5 years of age and HIV-positive persons who are household contacts of SSPPT cases should be screened for TB and systematically provided with isoniazid chemoprophylaxis if no active TB is identified [23,24]. However, the definition of index case and TB contact are not clear, and no guidelines exist describing the procedures to be used for screening and

follow-up of contacts or specifying the modalities to monitor, evaluate and document investigation activities.

The NTP in Morocco succeeded in building its contact investigation system within routine TB control services because clear national guidance was developed and implemented.

Standardization of definitions and clear recommendations for contact investigation are urgently needed in order to assist countries to set up contact tracing and management procedures, adapt and develop policies and national approaches for contact investigations, and ultimately be able to compare the findings of such activity within and between countries.

Contact investigation is an intervention designed to control and ultimately eliminate TB [25] and it has been shown to be a cost-effective in high-income and low TB prevalence countries [26]. The experience from Morocco shows that conducting contact investigations routinely and under programme conditions is feasible in a low-middle-income country with a relatively high incidence of TB and that an appropriate information system is needed to be able to document the performance of such exercise.

Unfortunately no economic evaluation to determine the cost-effectiveness of contact investigation activities has been conducted in low-income settings. Such an evaluation would be extremely useful for NTPs that plan to introduce contact investigations as part of the routine activities of the programme.

References

1. *Treatment of tuberculosis: guidelines for national programmes*. Geneva, World Health Organization, 2003 (WHO/CDS/TB/2003.313).
2. Ottmani S et al. La tuberculose et la lutte antituberculeuse au Maroc de 1980 à 1998. *Bulletin épidémiologique*, 1998, 35:2–12.
3. Forty-fourth World Health Assembly. Resolutions and decisions. Geneva, World Health Organization, 1991 (Resolution WHA 44.8).

4. Global tuberculosis control. Geneva, World Health Organization, WHO Reports 1997 (WHO/TB/97.225), 1998 (WHO/TB/98.237), 1999 (WHO/CDS/CPC/TB/99.259), 2000 (WHO/CDS/TB/2000.275), 2001 (WHO/CDS/TB/2001.287), 2002 (WHO/CDS/TB/2002.295), 2003 (WHO/CDS/TB/2003.316), 2004 (WHO/HTM/TB/2004.331), 2005 (WHO/HTM/TB/2005.349), 2006 (WHO/HTM/TB/2006.362).
5. *Global tuberculosis control: surveillance, planning, financing*. Geneva, World Health Organization, 2007 (WHO/HTM/TB/2007.376).
6. *Rapports annuels du programme national de lutte anti-tuberculeuse; années 1993 à 2004*. Direction de l'épidémiologie et de lutte contre les maladies. Rabat, Ministry of Health, 1993–2004.
7. *Guide de la lutte anti-tuberculeuse à l'usage des professionnels de santé*. Rabat, DELM, Ministry of Health, 2001.
8. Narain R et al. Distribution of tuberculous infection and disease among households in a rural community. *Bulletin of the World Health Organization*, 1966, 34:639–54.
9. Wares DF et al. Is TB contact screening relevant in a developing country setting? Experiences from eastern Nepal, 1996–1998. *International journal of tuberculosis and lung disease*, 2000, 4:920–4.
10. Claessens NJM et al. High frequency of tuberculosis in households of index TB patients. *International journal of tuberculosis and lung disease*, 2002, 6:266–9.
11. Saunders LD, Irwig LM, Wilson TD. Tuberculosis management in Soweto. *South African medical journal*, 1984;66(9):330–3.
12. Dye C et al. The decline of tuberculosis epidemics under chemotherapy: a case study in Morocco. *International journal of tuberculosis and lung disease*, 2007, 11(11):1225–31.
13. *Guide de la lutte anti-tuberculeuse*. Rabat, DELM, Ministry of Public Health, 1996.
14. Genewein A et al. Molecular approach to identifying route of transmission of tuberculosis in the community. *Lancet*, 1995, 342:841–4.
15. Veen J. Microepidemics of tuberculosis: the stone-in-the-pond principle. *Tubercle and lung disease*, 1992, 73(2):73–6.
16. Kumar RA et al. Pulmonary tuberculosis among contacts of patients with tuberculosis in an urban Indian population. *Journal of epidemiology and community health*, 1984; 38(3):253–8.
17. Espinal MA et al. Infectiousness of *Mycobacterium tuberculosis* in HIV-1-infected patients with tuberculosis: a prospective study. *Lancet*, 2000, 355(9200):275–80.
18. Teixeira L et al. Infection and disease among household contacts of patients with multidrug-resistant tuberculosis. *International journal of tuberculosis and lung disease*, 2001, 5(4):321–8.
19. Andrews RH et al. Prevalence of tuberculosis among close family contacts of tuberculous patients in South India, and influence of segregation of the patient on the early attack rate. *Bulletin of the World Health Organization*, 1960, 23:463–510.
20. Kritski AL et al. Transmission of tuberculosis to close contacts of patients with multidrug-resistant tuberculosis. *American journal of respiratory and critical care medicine*, 1996, 153(1):331–5.
21. Bayona J et al. Contact investigations as a means of detection and timely treatment of persons with infectious multidrug-resistant tuberculosis. *International journal of tuberculosis and lung disease*, 2003, 7(12 Suppl. 3):S501–9.
22. Beyers N et al. A prospective evaluation of children under the age of 5 years living

- in the same household as adults with recently diagnosed pulmonary tuberculosis. *International journal of tuberculosis and lung disease*, 1997, 1(1):38–43.
23. *Interim policy on collaborative TB/HIV activities*. Geneva, World Health Organization, 2004 (WHO/HTM/TB/2004.330).
 24. *Guidance for national tuberculosis programmes on the management of tuberculosis in children*. Geneva, World Health Organization, 2006 (WHO/HTM/TB/2006.371).
 25. Rieder HL. *Interventions for tuberculosis control and elimination*. Paris, International Union Against Tuberculosis and Lung Disease, 2002:1–251.
 26. Dasgupta K et al. Comparison of cost-effectiveness of tuberculosis screening of close contacts and foreign-born populations. *American journal of respiratory and critical care medicine*, 2000, 162:2079–86.

WHO Report 2009. Global tuberculosis control. Epidemiology, strategy, financing

The WHO Report 2009 is WHO's thirteenth annual report on global tuberculosis (TB) control in a series that started in 1997. It presents WHO's latest assessment of the epidemiological burden of TB (numbers of cases and deaths), as well as progress towards the 2015 targets for global TB control that have been established within the context of the Millennium Development Goals. It also includes a thorough analysis of implementation and financing of the WHO's Stop TB Strategy and the Stop TB Partnership's Global Plan to Stop TB, since in combination these have set out how TB control needs to be implemented and funded to achieve the 2015 targets. The report gives particular attention to the period 2006–2009, but selected epidemiological, implementation and financial data are presented for previous years as well.

Bringing together data reported by 196 out of 212 countries and territories in 2008, as well as data collected from these countries and territories in previous years, Global tuberculosis control 2009 is the definitive source of information about the national and international response to the worldwide TB epidemic.

Results of the feasibility test of the Practical Approach to Lung Health in the Syrian Arab Republic

F. Me'emary,¹ S-E. Ottmani,² A. Pio,³ S. Baghdadi,⁴ G. Assafin,⁵ M. Koraym,¹ M. Saleh,⁶ H. Bashour,⁷ A. Seita⁴ and L. Blanc²

نتائج اختبار الجدوى للأسلوب العملي لصحة الرئة في الجمهورية العربية السورية
فادية معماري، صلاح الدين عثمان، أنطونيو بيو، سميحة بغداد، جورج عسافين، محمود كُرَيْم، معن الصالح،
هيام بشور، أكهيرو سيتا، ليوبولد بلانك

الخلاصة: قِيمَ الباحثون تنفيذ الأسلوب العملي لصحة الرئة في مرافق الرعاية الأولية في الجمهورية العربية السورية، وتأثيره على المدى القريب على الرعاية النفسية لدى المرضى الذين تزيد أعمارهم عن 5 سنوات. وبعد تدريب 76 طبيباً عاماً على الأسلوب العملي لصحة الرئة، موزعين على 75 مركزاً صحياً، لاحظ الباحثون ازدياداً في إحالة الحالات وفي فحص لطاخات البلغم للمرضى. وبلغ نقص العدد الوسطي للأدوية التي توصف لكل مريض 14.8٪، والنقص في وصف المضادات الحيوية 33.3٪، فيما ازداد وصف الأدوية الاستنشاقية، كما انخفضت التكاليف الإجمالية لوصف الأدوية بمقدار 26.2٪.

ABSTRACT We assessed implementation of the Practical Approach to Lung Health (PAL) in primary care facilities in the Syrian Arab Republic and its short-term impact on respiratory care in patients aged 5+ years. After training on PAL for 76 general practitioners in 75 health centres, referrals and sputum smear examinations for patients increased. The mean number of drugs prescribed per patient decreased by 14.8% and that of antibiotics by 33.3%, while prescriptions for inhaled medications increased. The mean cost of drug prescriptions fell by 26.2%.

Résultats du test de faisabilité de l'approche pratique de la santé respiratoire en République arabe syrienne

RÉSUMÉ Nous avons évalué la mise en œuvre de l'approche pratique de la santé respiratoire (APSR) dans les services de soins de santé primaires de la République arabe syrienne et ses effets à court terme sur les soins respiratoires chez les patients âgés de 5 ans et plus. Après la formation à l'APSR dispensée à 76 médecins généralistes dans 75 centres de santé, le nombre d'orientations de patients vers des services spécialisés et d'examen de frottis de crachats a progressé. Le nombre moyen de médicaments prescrits par patient a diminué de 14,8 % et celui des antibiotiques de 33,3 %, alors que les prescriptions de médicaments inhalés ont augmenté. Le coût moyen des prescriptions de médicaments a chuté de 26,2 %.

¹Ministry of Health, Damascus, Syrian Arab Republic.

²Stop TB Department, World Health Organization, Geneva, Switzerland (Correspondence to S-E. Ottmani: ottmanis@who.int).

³Senior Consultant, Mar Del Plata, Argentina.

⁴Stop TB Unit, Department of Communicable Diseases, World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt.

⁵Syrian Chest Disease Association, Damascus, Syrian Arab Republic.

⁶Private Chest Clinic, Damascus, Syrian Arab Republic.

⁷Department of Epidemiology, Damascus University School of Medicine, Damascus, Syrian Arab Republic.

Received: 01/7/08; accepted: 18/11/08

Introduction

Respiratory illness is common throughout the world and are often the leading reason for seeking care in primary health care (PHC) settings. Surveys carried out by the World Health Organization (WHO) in 9 developing countries showed that approximately 20% of patients attend PHC facilities for respiratory symptoms [1]. Within the framework of the Stop TB Strategy, WHO has developed the Practical Approach to Lung Health (PAL) which aims to improve the quality of management of respiratory patients [2]. It is a patient-centred approach to diagnosis and treatment of common respiratory illnesses encountered in PHC settings. It promotes a symptom-based and integrated approach to management, and seeks to standardize service delivery through the development and implementation of clinical guidelines. PAL is intended to ensure coordination among different levels of health care and between tuberculosis (TB) control programmes and general health services in order to improve the efficiency of respiratory case management within the district health system [3].

Successful implementation of PAL in a country needs to be adapted to the national health policy and priorities as well as to the existing human and logistic resources [3]. It also needs to follow a stepwise process [4]. In October 2003, the National TB Programme (NTP) of the Syrian Arab Republic, in collaboration with WHO, initiated the process of adoption of PAL.

Further to a field assessment jointly carried out by WHO and the Syrian Ministry of Health in March 2004, a national working group on PAL was established and an agenda for development and implementation of the approach was adopted. The first activity of the working group was to develop guide-

lines and training materials for PAL in line with WHO guidance. The next step was to test the feasibility of implementation of the PAL guidelines and assess the short-term impact on the clinical practices of general practitioners (GPs) in PHC facilities. The feasibility test was based on the comparison between a baseline survey, before training GPs about PAL, and an impact survey, done shortly after training.

The objective of this paper is to present and discuss the findings of this feasibility test, taking into account the limitations of the methodology used and the PAL experience obtained so far in other countries.

Methods

The baseline and impact surveys were conducted according to the protocol specified by WHO for testing the feasibility of PAL [5].

Study setting and sample

The baseline and impact surveys were carried out in the same PHC facilities located in 3 governorates and involved the same GPs. The governorates of Daraa, Homs and Latakia were selected because of the availability of qualified health personnel and the technical and logistic capacity to monitor the quality of data collection, compile these data and supervise the health staff involved in the surveys.

A total of 75 PHC facilities were selected as follows: 18 in Daraa, 29 in Homs and 28 in Latakia. These PHC facilities were selected because of their level of involvement in ensuring PHC service delivery to the community and easy access for patients to the TB laboratory and referral levels. In each of the 75 PHC facilities, at least 1 GP was enrolled on a voluntary basis in the feasibility test and in 1 facility in Daraa 2 were

enrolled, making a total of 76 GPs involved in both surveys. Each GP was considered a data collection site.

Data collection methods

Participant enrolment

The eligibility criteria for data collection were: age ≥ 5 years and had sought care for ≥ 1 respiratory symptom in any of the selected PHC facilities during the survey period. Both surveys used the same definition of a TB suspect as the NTP, i.e. any patient with productive cough ≥ 15 days. Other respiratory conditions were classified according to the categories proposed in the study protocol, according to the *ICD-10* [6].

During the data collection periods all eligible respiratory patients who sought care in the 75 selected PHC facilities were seen by the 76 GPs enrolled in the study.

Tools

The data were collected in the same manner in both surveys. For each eligible patient the GP recorded: identification number, description of clinical symptoms, demographic characteristics, initial diagnosis and management decision. For each patient, the same identification number was specified in the forms used for requesting complementary investigations, patient drug prescriptions, treatment cards and any other patient health documents. This number was used to collect follow-up data on patients. If a patient was prescribed drugs, a copy of that prescription was kept on the data collection site.

Furthermore, in each of the 2 surveys, data were collected on the number of patients who visited the PHC facility for any reason, recorded by sex and age. Specific information was also collected from the TB laboratories and TB and chest disease clinics to assess the follow-up of each TB suspect identified in the survey registers.

Baseline survey

The 76 GPs were first trained to collect the data on the study register and the other forms in order to standardize the data collection process. Data collection for the baseline survey was carried out from 11 to 15 December 2005. Follow-up information was collected during the 30 days after registration, as specified in the study protocol.

Training on PAL guidelines

From 8 to 12 January 2006, the 76 GPs involved in the baseline survey were trained on the use of the locally adapted PAL guidelines. The training was carried out by the national working group members and the study supervisors.

Impact survey

From 22 to 26 January 2006, the impact survey was carried out in the same 75 PHC facilities, involving the same 76 GPs who had received training on PAL. The process of data collection was the same as for the baseline survey. As well as applying the knowledge received during training, GPs could use the PAL guidelines to manage respiratory patients during this second survey. The 30-day follow-up period for the impact survey ended on 23 February 2006.

Monitoring system

The national working group coordinated the various activities inherent in the feasibility test, ensured the logistics needed, supported the supervisory activities and checked the quality of data collection. Moreover, 3 groups (1 for each governorate) of 5 study supervisors each were established. Each group ensured that GPs were trained on data collection as well as on PAL guidelines and was responsible for the supervision and

monitoring of the survey activities in the selected PHC facilities.

Statistical analysis

The analysis involved comparison of the distribution of the data on the variables in the baseline and impact surveys. The Student *t*-test was used for comparing 2 means and the chi-squared test for comparing proportions. The Fisher exact test was used when the expected number was below 5 in 2×2 contingency tables. The Mann-Whitney test was used to compare a non-normal distribution of a variable between the baseline and impact surveys. A statistical difference was considered significant when *P*-value was below 5%.

A data entry programme was adapted and developed specifically for these surveys, using *Epi-Info*, version 6.04b.

Results

Characteristics of patients

The baseline and impact surveys registered 1806 and 1099 respiratory patients respectively aged 5+ years in the 75 selected PHC units, a 39.1% decrease between the surveys.

The proportion of respiratory patients among all outpatients of this age group was significantly different between the baseline survey (35.8%) and the impact survey

Table 1 Distribution by sex and presence of respiratory symptoms of patients aged 5 years and more attending first level health facilities in the Syrian Arab Republic

Patient characteristic	Baseline survey		Impact survey		P-value
	No.	%	No.	%	
All conditions					
Female	3174	63.0	2864	63.5	> 0.05
Male	1865	37.0	1646	36.5	
Total	5039	100.0	4510	100.0	
Respiratory symptoms					
Female	1004	55.6	613	55.8	> 0.05
Male	802	44.4	486	44.2	
Total	1806	100.0	1099	100.0	
Respiratory symptoms/all patients					
Female	1004/3174	31.6	613/2864	21.4	< 0.001
Male	802/1865	43.0	486/1646	29.5	< 0.001
Total	1806/5039	35.8	1099/4510	24.4	< 0.001
	Mean (SD)		Mean (SD)		
Age (years)					
Female	23.9 (17.6) ^a		25.1 (17.4) ^b		> 0.05
Male	20.0 (19.1) ^a		22.5 (18.8) ^b		< 0.05
Total	22.2 (18.3)		24.0 (18.0)		< 0.05

^aComparison of mean age of females and males in the baseline survey (*P* < 0.001).

^bComparison of mean age of females and males in the impact survey (*P* < 0.05).

SD = standard deviation.

Table 2 Frequency of symptoms and signs, concomitant diseases and risk factors among respiratory patients in the Syrian Arab Republic

Characteristic	Baseline survey (n = 1806)		Impact survey (n = 1099) ^a		P-value
	Mean (SD)		Mean (SD)		
Duration of symptoms (days)	3.7 (4.6) ^b		3.9 (4.7)		> 0.05 ^c
	No.	%	No.	%	
Visits in previous month	218	12.1	147	13.4	> 0.05
Sign/symptom					
Cough	936	51.8	496	45.2	< 0.001
Fever	1025	56.8	551	50.2	< 0.001
Nasal discharge	487	27.0	314	28.6	> 0.05
Sore throat	508	28.1	298	27.2	> 0.05
Expectoration	215	11.9	147	13.4	> 0.05
Shortness of breath	166	9.2	122	11.1	> 0.05
Nasal obstruction	32	1.8	9	0.8	< 0.05
Chest pain	97	5.4	65	5.9	> 0.05
Wheezing	82	4.5	55	5.0	> 0.05
Otalgia	114	6.3	76	6.9	> 0.05
Sneezing	28	1.6	15	1.4	> 0.05
Ear discharge	8	0.4	8	0.7	> 0.05
Dysphonia	20	1.1	14	1.3	> 0.05
Other symptoms	353	19.5	291	26.5	< 0.001
Concomitant disease					
Any	177	9.8	77	7.0	< 0.01
Chronic respiratory disease	57	3.2	25	2.3	> 0.05
Hypertension	45	2.5	16	1.5	> 0.05
Coronary heart disease	11	0.6	7	0.6	> 0.05
Diabetes	36	2.0	13	1.2	> 0.05
Other diseases	52	2.9	25	2.3	> 0.05
Risk factor					
Any	570	31.6	287	26.1	< 0.01
Smoking	186	10.3	122	11.1	> 0.05
Alcohol	1	0.1	0	0.0	> 0.05 ^d
Pregnancy ^e	11/457	2.4	4/320	1.3	> 0.05
Other risk factors	357	19.8	160	14.5	< 0.001

^aFor prevalence of symptoms n = 1097 because no information on symptoms was registered in 2 patients. ^bDuration of symptoms not registered in 1 patient in the baseline survey. ^cMann-Whitney test; ^dFisher exact test. ^eDenominator = number of women of child-bearing age. SD = standard deviation.

(24.4%) (Table 1) ($P < 0.001$). The proportion of female patients enrolled was higher than that of males in both surveys (Table 1). However, the percentage of respiratory patients as a proportion of all outpatients

was higher in males than in females and declined with age in both sexes (data not shown).

The mean age of study participants was 22.2 years in the baseline and 24.0 years

in the impact survey. In both surveys, the mean age was greater in females.

No significant differences were found between the 2 surveys in terms of: duration of symptoms before presentation; proportion of patients who visited any health facility at least once for respiratory symptoms within the last month; proportion of patients with existing chronic respiratory disease; and proportion of patients using tobacco at the time of the survey (Table 2). Cough, fever, nasal discharge, sore throat and expectoration were the most frequently reported symptoms in both surveys.

Distribution of patients

In general, there was no significant difference in the distribution of respiratory conditions between the 2 surveys. Acute respiratory infection accounted for > 90% of respiratory patients and chronic respiratory disease for < 10% (Table 3). The proportion of patients with asthma was 4.7% in both surveys, while for chronic obstructive

pulmonary disease it was significantly higher in the impact survey (1.5%) than in the baseline survey (0.7%) ($P < 0.05$).

The overall referral rate increased from 4.5% in the baseline survey to 6.6% in the impact survey ($P < 0.05$), mainly due to the significant increase in referral for hospitalization (0.3% to 1.2%) ($P < 0.05$) (Table 4).

Detection of TB

The proportion of respiratory patients in whom sputum smear examinations were requested increased significantly from 0.2% in the baseline survey to 1.9% in the impact survey (Table 5). The increase among patients who had respiratory symptoms for ≥ 15 days rose from 4.5% to 17.4%. Among all respiratory patients, the proportion of those who underwent sputum smear examinations significantly increased from 0.2% in the baseline survey to 1.5% in the impact survey. No smear-positive TB case was identified in either survey; however, 1 case of cervical lymph TB was diagnosed in the impact survey.

Drug prescription patterns

Of the respiratory patients 96.7% received a drug prescription in the baseline survey and 94.4% in the impact survey (Table 6). The mean number of drugs prescribed per patient decreased by 14.8% in the impact survey and the mean number of drugs prescribed per patient who received a prescription decreased by 14.3%.

Among patients who received a drug prescription, the proportion who were prescribed antibiotics decreased by 27.4% in the impact study, while the number of antibiotics per patient prescribed drugs decreased by 33.3%. Antibiotic prescriptions decreased in all categories of respiratory condition. Among patients who were prescribed antibiotics, the proportion who received amoxicillin or penicillin increased

Table 3 Distribution of respiratory conditions in the baseline and impact surveys in the Syrian Arab Republic

Respiratory condition	Baseline survey (<i>n</i> = 1806)		Impact survey (<i>n</i> = 1099)	
	No.	%	No.	%
ARI	1688	93.4	1006	91.5
AURI	1258	69.7	739	67.2
ALRI	417	23.1	251	22.8
Pneumonia	13	0.7	16	1.5
CRD	99	5.5	73	6.6
Asthma	85	4.7	52	4.7
COPD	12	0.7	17	1.5*
Other condition	19	1.1	20	1.8

* $P < 0.05$.

ARI = acute respiratory infection; AURI = acute upper respiratory infection; ALRI = acute lower respiratory infection (not pneumonia); CRD = chronic respiratory disease; COPD = chronic obstructive pulmonary disease.

Table 4 Referral and complementary investigations prescribed for respiratory patients at first level health facilities in the baseline and impact studies in the Syrian Arab Republic

Referral and complementary investigations	Baseline survey (n = 1806)		Impact survey (n = 1099)		% change ^a	P-value
	No.	%	No.	%		
Overall referrals	82	4.5	72	6.6	+46.7	< 0.05
Hospitalization	5	0.3	13	1.2	+300.0	< 0.05
Specialist	16	0.9	14	1.3	+44.4	> 0.05
Laboratory tests ^b	15	0.8	3	0.3	-62.5	> 0.05
Chest X-ray	39	2.2	31	2.8	+27.3	> 0.05
Other tests	15	0.8	7	0.6	-25.0	> 0.05

^aBetween impact and baseline surveys.

^bLaboratory tests other than tuberculosis sputum smear examination.

significantly, while those who were prescribed cephalosporins, oxacillin, lincomycin and quinolones decreased significantly in the impact survey (data not shown).

Among respiratory patients who were prescribed any drug, the prescription of bronchodilator drugs was similar in both surveys (7.5% and 7.2%) (Table 6). However, prescriptions significantly increased for inhaled β -agonists (1.4% to 3.9%) and decreased for the other β -agonist forms and for theophylline in the impact survey (data not shown). The proportion of patients prescribed corticosteroids drugs increased nonsignificantly, the proportion prescribed inhaled corticosteroids increased significantly, 0.2% to 1.4% ($P < 0.001$).

For respiratory patients who received a drug prescription, the proportion who were prescribed expectorants, aspirin, antihistamines and vitamins significantly decreased in the impact survey in contrast to the significant increase in the proportion who were prescribed paracetamol (57.6% to 65.2%).

Cost of drug prescriptions

The mean cost of the prescription of any drug per patient who was prescribed drugs decreased significantly (-26.2%) in the impact survey ($P < 0.001$) (Table 7). This decrease was significant in patients with acute upper respiratory infection as well as in those with acute lower respiratory infection.

Table 5 Sputum smear examinations (SSE) according to symptom duration in the baseline and impact surveys in the Syrian Arab Republic

Duration of respiratory symptoms	Baseline survey						Impact survey					
	Total		SSE requested		SSE performed		Total		SSE requested		SSE performed	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 15 days	1739	96.3	1	0.06	—	—	1053*	95.8	13	1.2***	—	—
≥ 15 days	66	3.7	3	4.5	—	—	46*	4.2	8	17.4**	—	—
Total	1805 ^b	100.0	4	0.2	3	0.2	1099	100.0	21	1.9***	16	1.5***

*Fisher exact test; ^bDuration of symptoms was not registered for 1 patient in the baseline survey.

** $P > 0.05$; *** $P < 0.001$.

Table 6 Drug prescription among respiratory patients in the baseline and impact surveys in the Syrian Arab Republic

Drug prescription	Baseline survey		Impact survey		% change	P-value
	Mean (SD)		Mean (SD)			
No. drugs prescribed per patient	2.70 (1.04)		2.30 (0.93)		-14.8	< 0.001
No. drugs per patient prescribed drugs	2.80 (0.93)		2.40 (0.76)		-14.3	< 0.001
No. antibiotics prescribed per patient prescribed drugs	1.11 (0.64)		0.74 (0.65)		-33.3	< 0.001
No. antibiotics per patient prescribed antibiotics	1.29 (0.49)		1.17 (0.40)		-9.3	< 0.001
	No.	%	No.	%		
No. patients prescribed drugs/ total no. patients	1747/1806	96.7	1038/1099	94.4	-2.4	< 0.01
No. patients prescribed antibiotics/ no. patients prescribed drugs	1511/1747	86.5	652/1038	62.8	-27.4	< 0.001
No. patients prescribed antibiotics/ no. patients prescribed drugs for:						
AURI	1057/1222	86.5	467/705	66.2	-23.5	< 0.001
ALRI	388/419	92.6	157/252	62.3	-32.7	< 0.001
CRD	59/93	63.4	23/69	33.3	-47.5	< 0.001
Other	7/13	53.8	5/12	41.7	-22.5	> 0.05
No. patients prescribed a specific medication/no. prescribed drugs:						
Any bronchodilator	131	7.5	75	7.2	-4.0	> 0.05
Inhaled β -agonist	25	1.4	41	3.9	+178.6	< 0.001
Any corticosteroid	55	3.1	35	3.4	+9.7	> 0.05
Inhaled corticosteroid	3	0.2	15	1.4	+600.0	< 0.001
Expectorant	518	29.7	257	24.8	-16.5	< 0.01
Antitussive	349	20.0	198	19.1	-4.5	> 0.05
Nasal decongestant	672	38.5	378	36.4	-5.5	> 0.05
Aspirin	40	2.3	9	0.9	-60.9	< 0.01
Paracetamol	1006	57.6	676	65.2	+13.2	< 0.001
Antihistamine	699	40.0	359	34.6	-13.5	< 0.01
Vitamins	61	3.5	17	1.6	-54.3	< 0.01

AURI = acute upper respiratory infection; ALRI = acute lower respiratory infection; CRD = chronic respiratory disease. SD = standard deviation.

tion, mainly due to the reduction in the cost of antibiotic prescriptions.

The decrease in the average cost of drug prescriptions per patient in the impact survey also seemed to be related to the reduction in the mean cost of adjunct drug prescription per patient (other

than antibiotics, bronchodilator drugs or corticosteroids). Among the patients who received a bronchodilator prescription, the mean cost of bronchodilators per patient increased (+33.0%) in the impact survey ($P < 0.05$); likewise, among patients who were prescribed corticosteroids, the mean

Table 7 Mean cost of drug prescriptions per respiratory patient in the baseline and impact surveys in the Syrian Arab Republic

Variable	Baseline survey Mean (SD)	Impact survey Mean (SD)	% change ^a	P-value
<i>Cost of prescription for respiratory patients prescribed drugs (SP)</i>				
All respiratory patients	205.6 (138.8)	151.7 (111.0)	-26.2	< 0.001
AURI patients	190.9 (123.7)	142.0 (100.3)	-25.6	< 0.001
ALRI patients	237.2 (158.9)	159.4 (108.2)	-32.8	< 0.001
CDR patients	258.1 (190.0)	220.9 (160.0)	-14.4	> 0.05
Other patients	178.1 (97.6)	99.4 (58.4)	-44.2	< 0.05
<i>Cost of antibiotics for patients prescribed drugs (SP)</i>	136.2 (123.9)	83.4 (99.9)	-38.8	< 0.001
<i>Cost of antibiotics for patients prescribed antibiotics (SP)</i>				
All respiratory patients	157.1 (120.1)	132.8 (96.6)	-15.5	< 0.001
AURI patients	149.6 (107.1)	127.9 (91.8)	-14.5	< 0.001
ALRI patients	174.3 (147.3)	145.1 (94.2)	-16.8	< 0.05
CDR patients	177.9 (132.3)	123.7 (90.3)	-30.5	> 0.05
Other patients	143.8 (96.3)	101.5 (66.2)	-29.4	> 0.05
<i>Cost of bronchodilators for patients prescribed bronchodilators (SP)</i>	74.2 (72.1)	98.7 (84.0)	+33.0	< 0.05
<i>Cost of corticosteroids for patients prescribed corticosteroids (SP)</i>	57.8 (68.9)	118.6 (107.9)	+105.2	< 0.01
<i>Cost of other drugs (SP)</i>	64.1 (44.2)	59.5 (39.1)	-7.2	< 0.01
<i>Total cost (SP)</i>	356 223	157 182		
<i>% of total costs</i>	<i>%</i>	<i>%</i>		
Antibiotics	66.5	55.1	-17.1	< 0.001
Bronchodilators	2.7	4.7	+74.1	< 0.001
Corticosteroids	0.9	2.6	+188.9	< 0.001
Other drugs	29.9	37.6	+25.8	< 0.001

^aBetween impact and baseline surveys.

SP = Syrian pounds; AURI = acute upper respiratory infection; ALRI = acute lower respiratory infection; CDR = chronic respiratory disease; TB = tuberculosis; SD = standard deviation.

cost of corticosteroids per patient increased (+105.2%) ($P < 0.01$).

The distribution of costs was significantly modified between the 2 surveys (Table 7). The cost of antibiotic prescriptions as a proportion of overall drug prescriptions decreased significantly (-17.1%) in the impact survey at the expense of a significant increase in the proportion of bronchodilator, corticosteroid and other drug prescriptions.

Discussion

The focus of this study was not on its external validity or the generalizability of its findings. Our concern was to ensure the internal validity of the study, avoiding biases that would prevent comparability between the data sets of the baseline and impact surveys. Therefore we did not make a random selection of governorates, PHC facilities or

GPs. In order to maximize comparability, both surveys used the same study protocol, were carried out within a 6-week interval (i.e. under similar weather and climate conditions) and involved the same 75 PHC facilities. As the GPs involved were the same, it was expected that a satisfactory level of comparability would be reached and only the behaviour of GPs in providing respiratory care would be different in the impact survey because of the training on PAL they received.

The number of respiratory patients registered in the impact survey was unexpectedly lower than in the baseline survey (39.1% lower). The decrease was mainly observed in Homs (in 27 out of 30 PHC facilities) and Latakia (in 24 out of 28 PHC facilities), but further investigation could not explain the reason for the decrease. On average, every GP managed clusters of 23.8 respiratory patients in the baseline survey and 14.5 in the impact survey. It is likely that patients included in the same cluster were managed in a similar manner by the GP. It is important to highlight that the observation unit for analysis was the patient and not the GP. Therefore, the results were likely to be influenced by some degree of clustering effect, although this may have been reduced by the relatively high number of GPs in the surveys. The clustering effect was likely to be higher in the baseline survey than in the impact survey because of the larger number of patients per cluster and this may have caused some distortion of comparability between the 2 data sets.

Nevertheless, in general the patients enrolled in the baseline survey were not significantly different from those recruited for the impact survey. This suggests that the 2 data sets were quite comparable.

More females attended the health facilities than males in both surveys. Similar results were reported in 8 countries where the first PAL surveys took place [1] and

in studies conducted in Bolivia [7], Jordan [8], Kyrgyzstan [9] and Tunisia (A. Ben Kheder, personal communication).

In both surveys more than 20% of patients aged 5+ years who attended PHC facilities for any reason were respiratory patients. This proportion was 9%–37% in PAL surveys in 5 countries [1].

Feasibility tests of PAL using a similar study protocol carried out in Bolivia [7], Jordan (K. Abu Rumman, personal communication) and Kyrgyzstan [9] reported that training on PAL significantly reduced the referral of patients from primary to secondary care. In contrast, our study found that training on PAL significantly increased referrals from PHC units. Further studies are needed to explore whether and to what extent training on PAL reduces referral to higher levels of health care and therefore improves the integration of respiratory condition management into PHC services.

Our findings suggest that training on PAL promotes the use of SSE, as the rate of requests and the rate of smears performed increased between the 2 surveys. The proportion of respiratory patients eligible for SSE (symptom duration ≥ 15 days) also increased. Similar results were reported in Bolivia [7] and Tunisia (A. Ben Kheder, personal communication). The proportion of respiratory patients who underwent SSE also significantly increased. The results did not show that applying PAL in PHC units increases TB detection because the sample size was too small to detect sufficient numbers of cases. A randomized controlled trial in South Africa showed a significant increase in TB case detection among respiratory patients after physicians had been trained on PAL [10]. In a feasibility study on PAL in Kyrgyzstan, the approach did not improve TB detection in terms of quantity and quality of cases [9]. However, the NTP of Kyrgyzstan was not involved in

the development of PAL guidelines nor in the conduct of the study, whereas in Bolivia, Tunisia and the Syrian Arab Republic the NTP was fully involved in the various phases of PAL development. This suggests that involvement of the NTP in PAL adaptation and development is crucial in order to improve the management of suspected TB cases as an integral part of the management of respiratory conditions.

The survey clearly showed that applying PAL has an impact in reducing drug prescriptions in general through a reduction in the prescription of antibiotics and to some extent adjuvant drugs. It also showed a reduction in the cost of drug prescriptions per patient, particularly for antibiotics in acute respiratory infections. Similar results were reported in Bolivia [7], Jordan [8], Kyrgyzstan [9], Nepal [11] and Tunisia (A. Ben Kheder, personal communication). Our findings suggest that training on PAL tends to increase the prescription of inhaled medications. In general, these results indicate that PAL is likely to promote good management practices for asthma and chronic obstructive pulmonary disease. Similar results were observed in Algeria (N. Zidouni, personal communication), Jordan [8], South Africa [10], Kyrgyzstan [9] and Tunisia (A. Ben Kheder, personal communication).

In summary, our findings suggest that application of PAL improves quality in the selection of TB suspects, decreases drug prescriptions, particularly antibiotic prescriptions, increases the prescription of drugs for inhalation use and reduces the average cost of drug prescriptions in respiratory patients.

However, most of the results that have been reported so far, including ours, show only the short-term impact of PAL in the framework of pilot studies or operational research. Results of the long-term application of PAL are not yet available, but it is hoped that it will increase the proportion of respiratory patients managed in PHC; decrease the proportion of respiratory patients hospitalized; improve TB screening among respiratory patients, particularly those who meet the definition of TB suspects; improve the quality of the diagnosis of pulmonary TB; decrease the number of asthma attacks and exacerbations of chronic obstructive pulmonary disease, particularly in emergency rooms; decrease the number of patients who are admitted to intensive care units for exacerbation of chronic respiratory diseases; reduce drug prescriptions for respiratory patients, particularly antibiotics; and reduce the cost of respiratory case management within the district health system. These, however, need to be carefully documented in countries such as El Salvador, Morocco and Kyrgyzstan, where PAL services have been provided on a routine basis in PHC settings for over 3 years.

Acknowledgements

The authors are indebted to Bashir Adib, Jamal Alouch, Mazin Kassibati, Muhamed Mussalamat, Muin Faluh, Naser Daâbul, Nadir Mameez and Youssef Muhamed. This study was supported by a grant from the World Health Organization.

References

1. *Respiratory care in primary care settings—a survey in 9 countries*. Geneva, World Health Organization, 2004 (WHO/HTM/TB/2004.333).
2. *The stop TB strategy. Building on and enhancing DOTS to meet the TB-related Millennium Development Goals*. Geneva,

- World Health Organization, 2006 (WHO/HTM/TB/2006.368).
3. *Practical Approach to Lung health (PAL): a primary health care strategy for integrated management of respiratory conditions in people of five years of age and over.* Geneva, World Health Organization, 2005 (WHO/HTM/TB/2005.351; WHO/NMH/CHP/CPM/CRA/05.3).
 4. Murray JF, Pio A, Ottmani S. PAL: a new and practical approach to lung health. *International journal of tuberculosis and lung disease*, 2006, 10:1188–91.
 5. *Practical Approach to Lung Health. Manual to initiate PAL implementation.* Geneva, World Health Organization, 2009.
 6. *International statistical classification of diseases and related health problems*, 10th revision. Geneva, World Health Organization, 2003.
 7. Camacho M et al. Results of PAL feasibility test in primary health care facilities in four regions of Bolivia. *International journal of tuberculosis and lung disease*, 2007, 11:1246–52.
 8. Abu Rumman K et al. Training on the Practical Approach to Lung Health: effect on drug prescribing in primary health care settings in Jordan. *Eastern Mediterranean health journal*, 2009, 15(1):111–121.
 9. Brimkulov N et al. Feasibility test results of the Practical Approach to Lung health in Bishkek, Kyrgyzstan. *International journal of tuberculosis and lung disease*, 2009, 13(4):533–9.
 10. Fairall LR et al. Effect of educational outreach to nurses on tuberculosis case detection and primary care of respiratory illness: pragmatic cluster randomized controlled trial. *British medical journal*, 2005, 331:750–4.
 11. Shrestha N et al. Practical Approach to Lung Health in Nepal: better prescribing and reduction of cost. *Tropical medicine and international health*, 2006, 11:765–72.

Fifth meeting of the Subgroup on Public–Private Mix for TB Care and Control (Cairo, Egypt, 3–5 June 2008)

The Subgroup on Public–Private Mix (PPM) for TB Care and Control was established by the global Stop TB Partnership's DOTS Expansion Working Group to help promote and facilitate active engagement of all relevant public and private health care providers in TB control.

The fifth meeting to be hosted by the WHO Regional Office of the Eastern Mediterranean will concentrate on mechanisms and tools to building capacities of institutions supporting and/or undertaking TB care provision such as, national professional organizations, large hospitals, and corporate sector health establishments. Ways for effective use of International Standards for TB Care as the basis and a tool to achieve institutional strengthening for TB control will also be examined. Donor and community perspectives on PPM will be discussed and new initiatives such as PPM for TB/HIV and PPM MDR TB will be introduced.

Immune response to measles vaccine after mass vaccination in Urmia, Islamic Republic of Iran

Z. Yekta,¹ R. Pourali,¹ M.R. Taravati,² S. Shahabi,² S. Salary,¹ F. Khalily² and A. Farzin³

الاستجابة المناعية للقاح الحصبة بعد التلقيح الجموعي في أورميا، بجمهورية إيران الإسلامية
زهرا يكتا، رضا بور علي، محمد رضا طراوتي، شهرام شاهابي، شاهر سالاري، فهيمه خليلي، آزاده فرزین

الخلاصة: درس الباحثون مدى فعالية حملة التلقيح الجموعي للحصبة في أورميا، بجمهورية إيران الإسلامية، بدراسة معدلات الانتشار المصلية للإيج جي والاستجابة للأضداد وفق المعطيات المزدوجة قبل وبعد الحملة. ولاحظ الباحثون أن المعدل الإجمالي للمصلية لدى الـ 624 فردا الخاضعين للدراسة والذين تتراوح أعمارهم بين 5-25 عاماً قد ازدادت بعد مرور سنة على حملة التلقيح، فأصبحت 72.3٪ بعد أن كانت 53.0٪. وقد وجدوا أن الارتفاع في عيار الأضداد قد حدث في جميع الفئات العمرية باستثناء الفئة 21-25 عاماً التي كانت تحظى بأعلى عيار قبل الحملة. وأجرى الباحثون تحليلاً بالتحوف اللوجستي، ووجدوا اقتران الارتباط ذي الاعتداء الإحصائي على الحالة المناعية قبل التلقيح بالاستجابة المصلية. وقد يكون تفحص عيارات الأضداد قبل التلقيح الجموعي فعّالاً لقاء التكاليف، ولاسيما في المناطق ذات التغطية المرتفعة باللقاحات والتي يسري فيها الفيروس.

ABSTRACT We investigated the effectiveness of the mass measles vaccination campaign in Urmia, Islamic Republic of Iran, by examining the measles IgG seroprevalence and antibody response from paired data before and after the campaign. The overall seropositive rate of 624 subjects aged 5–25 years increased 1 year after the mass vaccination (from 53.0% to 72.3%). A rise in antibody titre occurred in all age groups except the 21–25 years group, which had the highest titre before mass vaccination. On logistic regression analysis, only immune status prior to vaccination was significantly associated with the seroresponse. It may be cost-effective to check antibody titres before mass vaccinations, especially in high vaccine coverage regions with circulating wild virus.

Réponse immunitaire au vaccin antirougeoleux après une vaccination de masse à Orumieh (République islamique d'Iran)

RÉSUMÉ Nous avons étudié l'efficacité de la campagne de vaccination antirougeoleuse de masse à Orumieh (République islamique d'Iran) en examinant la séroprévalence des IgG anti-rougeole et la réponse en anticorps à partir de données appariées avant et après la campagne. Le taux global de séropositivité de 624 sujets âgés de 5 à 25 ans augmentait un an après la vaccination de masse (il passait de 53,0 à 72,3 %). Une augmentation du titre d'anticorps était observée dans tous les groupes d'âges, à l'exception des 21-25 ans, qui avaient le titre le plus élevé avant la vaccination de masse. Selon l'analyse de régression logistique, seul le statut immunitaire avant la vaccination était significativement associé à la réponse sérologique. Il peut s'avérer économiquement efficace de vérifier les titres d'anticorps avant les vaccinations de masse, notamment dans les régions où la couverture vaccinale est élevée et où le virus sauvage circule.

¹Department of Community Medicine; ²Department of Immunology, Faculty of Medicine, Urmia University of Medical Sciences, Urmia, Islamic Republic of Iran (Correspondence to Z. Yekta: yekta42@yahoo.com).

³University of Cincinnati College of Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, United States of America.

Received: 10/10/06; accepted: 17/12/06

Introduction

Measles is an important vaccine-preventable childhood disease which causes considerable mortality and morbidity in developing countries [1]. It remains a significant public health problem, killing an estimated 1 million people worldwide each year [2].

Although measles vaccination is highly effective in children in the developing world when performed in carefully monitored settings [3,4], vaccination programmes have not been uniformly successful [5]. Most cases of measles in vaccinated persons occur in the subset of individuals who did not undergo serological conversion after vaccination. This is known as primary vaccine failure [6]. The frequency of primary vaccine failure is variable and has been shown to be function of age at the time of vaccination, the number of doses, the immunogenicity of the strain of the virus used to manufacture the vaccine, improper handling and geographic region [7–11]. Development of protective immunity after vaccination also depends on several other factors. Familial aggregation was observed in poor responders to measles vaccine, suggesting a genetic basis for variation in the antibody response to vaccine [12,13]. Maternal antibody status, intercurrent infection and nutritional status have also been mentioned in several studies [14–16].

Measles vaccination was introduced to all parts of the Islamic Republic of Iran in 1970 and in recent decades it has been delivered as 2 routine doses of vaccine (at ages 9 and 15 months). The continuing occurrence of measles in older children, and the experience of other countries, led to the decision to administer a compulsory single dose of measles, mumps and rubella (MMR) vaccine to the whole population aged 5–25 years in August 2003 regardless of their

vaccination status. The overall coverage of MMR vaccine after the mass campaign as reported by the Iranian Ministry of Health and Medical Education was estimated to be 97%. Very high vaccination coverage of more than 95% may be needed to interrupt transmission of the highly contagious measles virus [15–17].

This study was undertaken to investigate the effectiveness of the campaign in Urmia city and the surrounding area, by examining the measles IgG seroprevalence and antibody response in paired data before and after the mass measles vaccination campaign. It was expected that the data obtained would help to assess the feasibility of measles elimination in the country.

Methods

The measles mass vaccination campaign in the Islamic Republic of Iran was conducted in the 5–25 year age group from 1 December to 31 December 2003. During the campaign, a total of 387 317 people in Urmia received the MMR vaccine provided by the Iranian Department of Health. The vaccination was performed with 0.5 mL of vaccine (Serum Institute of India, Pune, India).

Study sites and population

Our study was undertaken in Urmia from 25 September to 25 November 2003 (before the mass campaign) and from 25 September to 25 November 2004 (after the campaign). Sampling was performed in 2 stages; initially we selected 8 health care centres from a total of 18 such centres in the city by cluster sampling (based on data from the local deputy for health) and 00 subjects aged 5–25 years meeting our criteria were selected by simple random sampling after stratifying for age and sex at each health

care centre. Health care centres hold data about the characteristics of residents such as age and sex.

Just before the vaccination campaign, a sample of 5 mL blood was drawn from the 800 selected residents. Blood was centrifuged and the plasma was removed and frozen at -76°C until assay. Individuals with a previous history of measles and those with any immune-compromising conditions were excluded. All participants were interviewed and information about previous vaccination was validated from health centre records. Those who reported having at least 1 dose of measles vaccination during childhood (9 or 15 months of age) were included. Patients who did not have their vaccination status recorded on the official vaccine card were excluded.

At 12 months after the mass vaccination, blood samples were obtained from the same subjects. A total of 176 (21.8%) people were unavailable for follow-up; therefore 625 subjects participated in both the before and after studies. Although most of the loss occurred in the 15–25 year age group, it was not statistically different from the attrition in the other age groups.

The study was approved by the ethics committees of both Urmia University of Medical Sciences and the local deputy for health.

Serology

The antimeasles antibody levels were measured with an enzyme-linked immunosorbent assay (ELISA) of IgG antibodies using a commercial kit (Immuno-Biological Laboratories Inc., Hamburg, Germany). The sensitivity and specificity of the measles IgG ELISA test reported by the manufacturer were both $> 95\%$. The cut-off titres were set as follows: seronegative < 8 IU/mL, borderline 8–12 IU/mL and seropositive > 12 IU/mL.

Statistical analysis

Data on age (categorized into 4 groups: 5–10, 11–15, 16–20, 21–25 years), sex, history of measles vaccination status (1 or 2 times) were obtained from all the subjects in the sample. Measles IgG seroprevalence and the mean [standard deviation (SD)] antibody titres were compared before and after vaccination. Immune response was considered as an increase in the mean antibody titre after vaccination.

The relationship was assessed between vaccination antibody response (changes in mean of antibody before and after mass vaccination) (dependent variable) and age group, sex, immunity status and vaccination status (independent variables). Data were analysed by SPSS, version 11. Chi-squared, Kruskal–Wallis, Wilcoxon and Mann–Whitney U tests were performed as appropriate in 2-tailed analyses. Logistic regression analysis was also used to examine the relationship between the vaccination antibody response (rising antibody after mass vaccination) (dichotomized dependent variable) with sex, age, history of vaccination (1 or 2 previous doses of measles vaccine) and antibody status before vaccination, while controlling for potential confounding variables [marital status, ethnicity (Turkish, Persian, Kurdish), education level]. All variables were entered in the model to obtain the odds ratio (OR) and 95% confidence interval (CI) adjusted for the significant predictors of the seroresponse. P -value < 0.05 was considered significant.

Results

A total of 625 subjects were tested by comparing the mean of level of antimeasles antibodies and the prevalence of antibody seropositivity before and after vaccination.

Before vaccination, 193/625 (30.9%) of subjects had negative antibody titres (< 8 IU/

mL) and 101 (16.3%) had borderline titres. After vaccination only 86 (13.8%) remained negative and 87 (13.9%) had borderline titres. Although the overall seropositivity rate increased after mass vaccination from 331/625 (53.0%) before the mass campaign to 452/625 (72.3%) after ($P < 0.05$), the mean antibody titre before mass vaccination showed no significant difference compared with the titre after the mass campaign: 47.1 (SD 3.5) IU/mL versus 46.4 (SD 2.4) IU/mL.

Table 1 provides comparisons of mean antibody titres and seropositivity before and after the mass vaccination campaign by subjects' characteristics. An increase in the prevalence of seropositivity was observed in all age groups and the increment was slightly greater in the 16–20 years group. A rise in the mean antibody titre occurred in participants aged < 20 years after the mass vaccination. However, the mean antibody titre decreased significantly in the 21–25-

year-olds, who had the highest antibody titres before mass vaccination, so a negative response was observed in this age group ($P < 0.05$) (Figure 1).

The response to vaccination based on subjects' immunity level showed a considerable increase in antibody titre in seronegative and borderline subjects, but seropositive individuals showed a significantly decrease in antibody titre after vaccination ($P < 0.05$). In other words, among the seropositive subjects the mean antibody titre reached a lower level after the mass vaccination compared to before ($P < 0.05$) (Figure 2).

We also compared the response to vaccination based on antibody titres before vaccination. This showed that the increase in antibody titre was inversely proportional to the prevaccination titre; having a titre > 100 IU/mL prior to vaccination was associated with a negative response after vaccination.

Of the 625 participants, 429 (68.64%) had a history of vaccination administered 2

Table 1 Measles seropositive rates before and after the mass vaccination campaign and proportion of vaccination responders by subjects' characteristics

Variable	Total no.	Before mass vaccination (n = 625)			After mass vaccination (n = 625)			Vaccination responders ^b		
		Seropositive ^a		Mean (SD) IgG titre (IU/mL)	Seropositive ^a		Mean (SD) IgG titre (IU/mL)	No.	%	
		No.	%		No.	%				
<i>Age (years)</i>										
5–10	187	87	46.5	35.7 (12.2)	127	67.9	38.8 (14.2)	135	72.2	
11–15	170	80	47.1	28.5 (7.4)	110	64.7	29.4 (9.7)	130	76.5	
16–20	137	66	48.2	28.7 (9.3)	101	73.7	36.3 (11.4)	105	76.6	
21–25	131	98	74.8	106.8 (21.2)	114	87.0	89.8 (12.1)	72	55.0	
<i>Prior measles vaccination</i>										
1 dose	196	136	69.4	80.1 (14.8)	166	84.7	69.9 (17.2)	130	66.3	
2 doses	429	195	45.5	32.0 (8.2)	286	66.7	35.6 (12.7)	312	72.7	
<i>Sex</i>										
Male	287	157	54.7	50.1 (10.2)	207	72.1	45.2 (12.6)	196	68.3	
Female	338	174	51.5	44.6 (7.7)	245	72.5	47.4 (10.5)	246	72.8	

^aAntibody titre > 12 IU/mL; ^bHigher antibody titre after mass vaccination.

n = total number of subjects; SD = standard deviation.

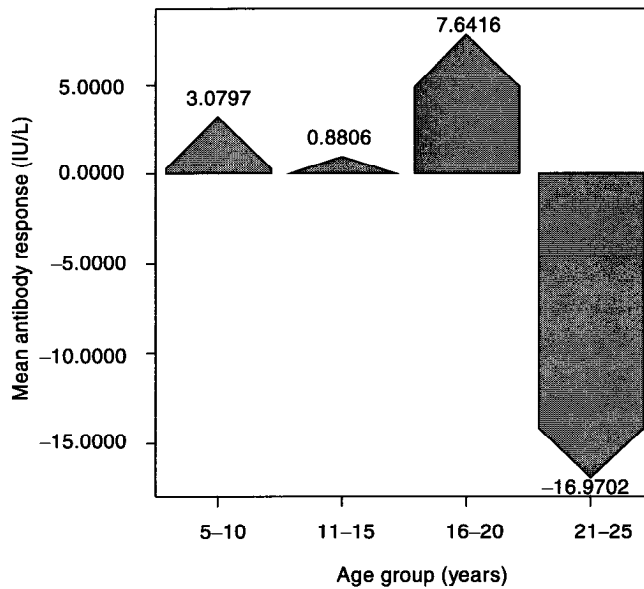


Figure 1 Mean antibody response before and after the mass vaccination campaign by age group

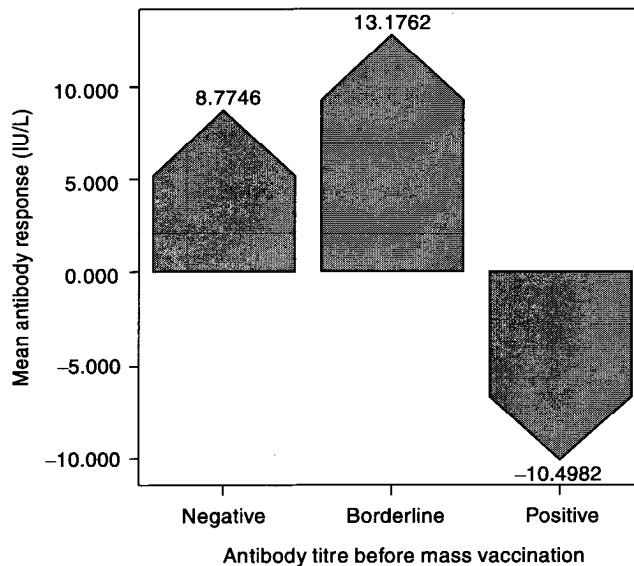


Figure 2 Mean antibody response before and after the mass vaccination campaign by vaccination immunity status before campaign (seronegative < 8 IU/mL, borderline 8–12 IU/mL, seropositive > 12 IU/mL)

times during childhood (9 and 15 months). The proportion of vaccination responders was slightly higher among those who had had 2 prior doses of vaccine than only 1 dose (Table 1). The mean antibody responses based on vaccination history in different age groups are shown in Table 2. The results show that there was a significant difference in antibody response according to vaccination history only in the 16–20 year age group.

The mean level of antimeasles antibodies was slightly lower after vaccination in males than females (Table 1) (mean titre 45.2 IU/L versus 47.4 IU/L). However, there was a significant difference in the mean antibody response according to sex [–4.9 (SD 3.2) IU/L for males versus 2.8 (SD 2.6) IU/L for females] ($P < 0.05$).

We used multiple logistic regression analysis to estimate the association between antibody status before mass vaccination as categorical independent variables (negative, borderline, positive) and the antibody response after the mass vaccination campaign, while controlling for the effect of potentially confounding variables such as

age group, sex and vaccination history during childhood. A significant relationship was seen between previous antibody level and response to vaccination. The reference category for the model was the seronegative group. The ORs for borderline and positive participants before vaccination were 0.38 (95% CI: 0.15–0.81) and 0.16 (95% CI: 0.1–0.67) ($P < 0.05$) respectively.

Discussion

Vaccine failure is one of the factors responsible for the high incidence of measles after the introduction of measles vaccine into the Expanded Programme of Immunization (EPI) [18]. Despite the success of the current vaccine in controlling the disease, the importance of vaccine failure has become increasingly apparent [19]. Mass catch-up measles vaccination campaigns are recommended by the World Health Organization (WHO) as one of the main strategies to control or eliminate measles [20].

Despite the 97% vaccination coverage reported by the Ministry of Health after the

Table 2 Mean measles antibody titres and seropositive rates before and after the mass vaccination campaign by age group

Age group (years)	IgG titre vaccination history	Before mass vaccination ($n = 625$) Mean (SD) IgG titre (IU/mL)	After mass vaccination ($n = 625$) Mean (SD) IgG titre (IU/mL)	Mean antibody response (IU/mL)	P-value
5–10	1 dose	47.1 (20.5)	51.5 (16.5)	4.4	0.97
	2 doses	35.3 (4.7)	38.3 (3.6)	3.0	
11–15	1 dose	41.7 (12.4)	41.3 (22.7)	–0.4	0.87
	2 doses	27.0 (2.9)	28.0 (4.7)	1.0	
16–20	1 dose	36.1 (8.5)	35.4 (4.8)	–0.6	0.041
	2 doses	23.5 (4.2)	37.0 (4.9)	13.5	
21–25	1 dose	110.3 (13.4)	92.9 (8.5)	–17.4	< 0.001
	2 doses	83.4 (30.6)	69.5 (19.5)	–13.9	

n = total number of subjects; SD = standard deviation.

mass vaccination in Urmia, the seropositivity rate only reached about 75%, far below the herd immunity level of 95% needed to halt transmission [21], which means that almost 25% of the target group had no immunity. Kuroiwa et al. in Laos reported that the seroconversion rate of measles antibody was as low as 74% even though the mass campaign was more intensive than a routine immunization service. This finding reflects the difficulty of increasing the immunity of children at the community level by mass measles vaccination campaigns [22]. This low seroconversion rate was consistent with the vaccine efficacy through routine immunization (68%), which was estimated in Kuroiwa's previous study [23]. This problem, which has also been highlighted by our study, is confirmed by the low seropositive rate among young people with a vaccine history before the campaign (53%).

Kuroiwa et al. also revealed that the campaign seemed to be more useful in weak EPI activity areas, where the reduction of measles cases is urgently needed [22].

Several other authors estimated that the prevalence of susceptibility to either clinical or subclinical reinfection in vaccinated populations was 19%–31% [24]. The degree of population immunity to achieve measles elimination in Asia has not been established at present. Although an ideal susceptibility level could be very different for different countries, as a whole the serological profile against measles in Urmia was well below the WHO target levels for Europe [25].

Although mass vaccination raised the measles seropositive rate (from 53% to 73%) in Urmia, we cannot, however, expect the same positive impact on measles elimination. This means that some individuals in our study are "poor responders" to vaccination, and will be at risk of subclinical infection relatively soon after immunization [26].

Many observations have suggested that some factors may limit the capacity of children in the developing world to mount a response to vaccination. These include factors in the child, such as nutritional status, specific micronutrient status [21] and chronic or inter-current infections [5,21], as well as factors in the system, such as poor maintenance of the cold-chain supply [27] or purchase of suboptimal products [28]. Moreover, recent findings show that genetic factors play a role in determining vaccination success in different geographic regions [29,30].

The findings of serological analysis in the present study show a higher antibody response among females. This is in agreement with the general concept that measles antibodies in women are marginally higher than that in men [1,31].

Our results show that the pre-immunization antibody level was inversely correlated with the response to vaccination. This finding is in agreement with other studies showing that high measles antibody titres interfere with the mean antibody response, and the greatest increase occurred in those with the lowest pre-immunization titres [25,32–35]. Therefore antibody response titres were significantly inversely correlated with antibody status before mass vaccination, i.e. subjects with high antibody status showed a weak response [26,36–39].

The vaccination response was slightly higher in those who had received 2 previous doses of measles vaccine compared with those who had only 1 dose, but this difference was not significant. When this was analysed for different age groups, the 16–20-year-old group had a significantly stronger response among participants who had had 2 previous doses of vaccine compared with those receiving only 1 dose. However, in the other age groups there was no significant difference in this parameter. This may be due to

the existence of higher pre-immunization levels of measles antibody in the serum of participants who received 2 previous doses than that of participants who had 1 previous dose. The cause of a higher pre-immunization antibody level in participants with 1 dose may be a lower immunity against measles virus in these persons compared to participants with 2 doses, and consequently a higher rate of subclinical infection by wild measles virus in participants with 1 prior dose of vaccine.

The age-specific vaccination response showed a considerable decrease in the mean antibody titre after vaccination in the > 20 years age group, and the proportion of subjects with a higher mean antibody level after vaccination was higher in those aged 5–20 years old. However, the lack of an increasing antibody titre after vaccination at age > 20 years can be related to the inhibitory effects of the high pre-immunization antibody level in this age group, although this cannot explain the decreased antibody titre after immunization by itself. The decrease in antibody titre may be related to a balance between the humoral and cellular response to measles virus. Having a higher level of antibody before reimmunization might produce a lower antibody response after revaccination. Such an effect has been

proposed for maternal antimeasles antibodies [35].

Based on the vaccination response in age groups 16–20 and 20–25 years old, it seems to be cost-effective to check antibody titres before mass vaccination, especially in high vaccine coverage regions with circulating wild virus. It is clear that a more detailed understanding is needed of the immune response to measles vaccination in young people in developing countries and the factors that limit or modify this response if we are to succeed in the drive towards eradicating measles [21].

In summary, with vaccine-maintained herd immunity, it may be possible to eradicate certain infectious disease. However, large-scale vaccination programmes will shift the age distribution of cases, which might have serious consequences [40]. We suggest that periodical serological studies are needed to determine the seropositivity level at different ages.

Acknowledgements

Financial support was provided by Urmia University of Medical Sciences and the Health Deputy. We thank Mahnaz Kafily and Ebrahim Tarive for their technical assistance.

References

1. Lyamuya EF et al. Serum levels of measles IgG antibody activity in children under 5 years in Dar-es-Salaam, Tanzania. *Annals of tropical paediatrics*, 1999, 19(2):175–83.
2. Ovsyannikova IG et al. Associations between human leukocyte antigen (HLA) alleles and very high levels of measles antibody following vaccination. *Vaccine*, 2004, 22(15–16):1914–20.
3. Henderson RH et al. Global control of vaccine-preventable diseases: how progress can be evaluated. *Reviews of infectious diseases*, 1989, 11(Suppl. 3):S649–54.
4. Cutts FT et al. Successes and failures in measles control. *Journal of infectious diseases*, 1994, 170(Suppl. 1):S32–41.
5. Bautista-Lopez NL et al. Immune response to measles vaccine in Peruvian children. *Bulletin of the World Health Organization*, 2001, 79(11):1038–46.
6. Hayden GF. Measles vaccine failure. A survey of causes and means of prevention.

- Clinical pediatrics*, 1979, 18(3):155–6, 161–3, 167.
7. Black FL et al. Inadequate immunity to measles in children vaccinated at an early age: effect of revaccination. *Bulletin of the World Health Organization*, 1984, 62(2):315–9.
 8. Centers for Disease Control and Prevention. Update: changes in notifiable disease surveillance data—United States, 1992–1993. *Morbidity and mortality weekly report*, 1993, 42(42):824–36.
 9. Progress toward elimination of measles from the Americas. *Morbidity and mortality weekly report*, 1998, 47(10):189–93.
 10. Mathias RG et al. The role of secondary vaccine failures in measles outbreaks. *American journal of public health*, 1989, 79(4):475–8.
 11. Paunio M et al. Secondary measles vaccine failures identified by measurement of IgG avidity: high occurrence among teenagers vaccinated at a young age. *Epidemiology and infection*, 2000, 124(2):263–71.
 12. Poland GA et al. The genetic basis for variation in antibody response to vaccines. *Current opinion in pediatrics*, 1998, 10(2):208–15.
 13. Janaszek W, Slusarczyk J. Immunity against measles in populations of women and infants in Poland. *Vaccine*, 2003, 21(21–22):2948–53.
 14. Adu FD et al. Low seroconversion rates to measles vaccine among children in Nigeria. *Bulletin of the World Health Organization*, 1992, 70(4):457–60.
 15. Albrecht P et al. Persistence of maternal antibody in infants beyond 12 months: mechanism of measles vaccine failure. *Journal of pediatrics*, 1977, 91(5):715–8.
 16. Expanded Programme on Immunization (EPI). Safety of high titer measles vaccines. *Weekly epidemiological record*, 1992, 67(48):357–61.
 17. Garly ML et al. The challenge of improving the efficacy of measles vaccine. *Acta tropica*, 2003, 85(1):1–17.
 18. Ariyasriwatana C et al. Antibody response after measles immunization. *Journal of the Medical Association of Thailand*, 2003, 86(Suppl. 3):S701–6.
 19. Jacobson RM et al. The association of class I HLA alleles and antibody levels after a single dose of measles vaccine. *Human immunology*, 2003, 64(1):103–9.
 20. Chuang SK et al. Mass measles immunization campaign: experience in the Hong Kong Special Administrative Region of China. *Bulletin of the World Health Organization*, 2002, 80(7):585–91.
 21. Huang CL et al. Humoral and cellular immune response after measles vaccination in Taiwan. *Journal of microbiology, immunology, and infection*, 2005, 38(3):169–75.
 22. Kuroiwa C et al. Difficulties in measles elimination: prevalence of measles antibodies before and after mass vaccination campaign in Laos. *Vaccine*, 2003, 21(5–6):479–84.
 23. Kuroiwa C et al. Measles epidemiology and outbreak investigation using IgM test in Laos. *Journal of epidemiology/ Japan Epidemiological Association*, 2001, 11(6):255–62.
 24. Muller CP. Measles elimination: old and new challenges? *Vaccine*, 2001, 19(17–19):2258–61.
 25. Kim SS et al. Sero-epidemiology of measles and mumps in Korea: impact of the catch-up campaign on measles immunity. *Vaccine*, 2004, 23(3):290–7.
 26. Glass K et al. Waning immunity and sub-clinical measles infections in England. *Vaccine*, 2004, 22(29–30):4110–6.
 27. Krugman RD et al. Impotency of live-virus vaccines as a result of improper handling in clinical practice. *Journal of pediatrics*, 1974, 85(4):512–4.

28. Adu FD et al. Low seroconversion rates to measles vaccine among children in Nigeria. *Bulletin of the World Health Organization*, 1992, 70(4):457–60.
29. Tan PL et al. Twin studies of immunogenicity—determining the genetic contribution to vaccine failure. *Vaccine*, 2001, 19(17–19):2434–9.
30. Poland GA et al. Identification of an association between HLA class II alleles and low antibody levels after measles immunization. *Vaccine*, 2001, 20(3–4):430–8.
31. Gdalevich M et al. Measles antibody prevalence rates among young adults in Israel. *American journal of infection control*, 2002, 30(3):165–9.
32. Cutts FT, Badis F. Controle de la rougeole dans les pays en developpement [Measles control in developing countries]. *Santé*, 1994, 4(3):163–71.
33. Wong-Chew RM et al. Cellular and humoral immune responses to measles in immune adults re-immunized with measles vaccine. *Journal of medical virology*, 2003, 70(2):276–80.
34. Rager-Zisman B et al. The effect of measles-mumps-rubella (MMR) immunization on the immune responses of previously immunized primary school children. *Vaccine*, 2003, 21(19–20):2580–8.
35. Bertley FM et al. Measles vaccination in the presence of maternal antibodies primes for a balanced humoral and cellular response to revaccination. *Vaccine*, 2004, 23(4):444–9.
36. Crowe JE Jr. Influence of maternal antibodies on neonatal immunization against respiratory viruses. *Clinical infectious diseases*, 2001, 33(10):1720–7.
37. Wilkins J et al. Additional evidence against measles vaccine administration to infants less than 12 months of age: altered immune response following active/passive immunization. *Journal of pediatrics*, 1979, 94(6):865–9.
38. Linnemann CC Jr et al. Measles immunity after revaccination: results in children vaccinated before 10 months of age. *Pediatrics*, 1982, 69(3):332–5.
39. Cohn ML et al. Measles vaccine failures: lack of sustained measles-specific immunoglobulin G responses in revaccinated adolescents and young adults. *Pediatric infectious disease journal*, 1994, 13(1):34–8.
40. Giesecke J. The epidemiology of vaccination. In: Giesecke J, ed. *Modern infectious disease epidemiology*. London, Hodder Arnold, 2002:226–40.

Rubella seroprevalence among women aged 15–39 years in Morocco

H. Caidi,^{1,4} S. Bloom,² M. Azilmaat,³ A. Benjouad,⁴ S. Reef² and R. El Aouad¹

معدل الانتشار المصلي للحصبة الألمانية بين النساء بعمر 15–39 عاماً في المغرب

حياة قايدى، شارون بلوم، مصطفى ازملاط، عبد العزيز بن جواد، سوزان ريف، رجاء العواد

الخلاصة: أعد الباحثون هذه الدراسة للتعرف على معدل انتشار الحصبة الألمانية لدى النساء في سن الإنجاب في المغرب، وتوزعه وفق فئات العمر، محاولة منهم للمساهمة في إعداد استراتيجيات للتلقيح ضد الحصبة الألمانية في المغرب. وأجروا اختبارات لـ 967 من النساء اللاتي تتراوح أعمارهن بين 15 و39 عاماً في سنة 2002 ووجدوا أن 161 امرأة (16.6%) لديهن استعداد لأضداد الإي جي للحصبة الألمانية، كما وجد الباحثون معدلاً أعلى بمقدار يُعتد به إحصائياً من الاستعداد لدى النساء بعمر 15–39 عاماً حيث بلغ 29.3% مقابل 8.3% لدى النساء بعمر 35–39. وهناك ما يقدر بـ 77 562 ولادة لطفل حي لنساء معرضات للإصابة بالحصبة. ولم يلاحظ وجود فروق إحصائية في معدلات الانتشار المصلي بين النساء في الأرياف (81.5%) والنساء في المدن (85.0%). وعلى ذلك فإن قدراً كبيراً من الاختطار يحدق بالنساء المغربيات اللاتي هن في سن الإنجاب، للإصابة بعدوى الحصبة الألمانية.

ABSTRACT This study was designed to determine the age-specific rubella seroprevalence in women of childbearing age in Morocco and to contribute to the development of a rubella vaccination strategy in the country. Of 967 women aged 15–39 years tested in 2000, 161 (16.6%) were susceptible to rubella based on absence of IgG antibodies. A significantly higher rate of susceptibility among women aged 15–19 years was observed (29.3%) compared with age 35–39 years (8.3%). An estimated 77 562 live births occur annually to rubella-susceptible women. No statistical difference in seroprevalence was seen between women in rural and urban areas (81.5% and 85.0% respectively). A substantial risk of rubella infection exists for Moroccan women of childbearing age.

Séroprévalence de la rubéole chez les femmes âgées de 15 à 39 ans au Maroc

RÉSUMÉ Cette étude visait à déterminer la séroprévalence de la rubéole par âge chez les femmes en âge de procréer au Maroc, et à contribuer à l'élaboration d'une stratégie de vaccination antirubéoleuse dans le pays. Sur 967 femmes âgées de 15 à 39 ans soumises à des tests en 2002, 161 (16,6 %) étaient sensibles à la rubéole du fait de l'absence d'anticorps IgG anti-rubéole. Le taux de sensibilité observé chez les femmes âgées de 15 à 19 ans (29,3 %) était significativement plus élevé que chez les femmes âgées de 35 à 39 ans (8,3 %). On estime à 77 562 le nombre annuel de naissances vivantes chez les femmes sensibles à la rubéole. En ce qui concerne la séroprévalence, aucune différence statistique n'a été observée entre les femmes vivant dans les zones rurales et dans les zones urbaines (81,5 % et 85,0 % respectivement). Il existe un risque important d'infection par la rubéole chez les femmes marocaines en âge de procréer.

¹National Institute of Hygiene, Rabat, Morocco (Correspondence to H. Caidi: hcaidi@lycos.com).

²National Immunization Program, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America.

³Ministry of Health, Rabat, Morocco.

⁴Department of Biology, Mohamed V University, Rabat, Morocco.

Received: 19/09/06; accepted: 20/12/06

Introduction

Rubella is a mild illness in adults and children and up to 50% of cases are asymptomatic. However, if a woman is infected during her pregnancy, particularly in the first trimester of pregnancy, serious consequences, such as miscarriage, fetal death/stillbirth or a combination of debilitating birth defects known as congenital rubella syndrome (CRS), may occur [1]. The clinical manifestations of CRS include hearing impairment, heart defects, ocular abnormalities and mental retardation. Worldwide, it is estimated that over 100 000 infants are born with CRS annually [2].

The main goal of rubella vaccination programmes is to eliminate or reduce rubella infection in pregnant women and the concomitant risk of CRS in their babies [3]. A country's decision to begin infant or childhood rubella vaccination often relates to the level of its measles control and planned enhanced measles control activities [4]. In the World Health Organization (WHO) meeting on CRS in 2000, one of the recommendations was that countries undertaking measles elimination should consider rubella elimination by using measles and rubella (MR) vaccine through the childhood programme of vaccination. In addition, countries should ensure immunity among women of childbearing age [5,6].

In 2003, Morocco introduced MR vaccine into the routine childhood immunization programme. Children were to receive MR vaccine at school entry (age 6 years). Routine measles coverage in Morocco was estimated at 94% in 2005 [7]. Estimated MR vaccination coverage is greater than 90%. While Morocco does not collect rubella and CRS surveillance data, seroprevalence studies in Moroccan women of childbearing age undertaken between 1970 and 1999 showed that 14.8% to 33.5% were seronegative [8,9]. A retrospective chart review performed by one of the authors esti-

mated an average annual CRS rate of 8.5 per 10 000 live births between 1990 and 2000 [10]. Measles, mumps and rubella (MMR) vaccine has been increasingly used in the private health care sector in Moroccan cities since 1987, but up to 2002, nationwide only about 5% of the birth cohort was vaccinated against rubella (Aventis-Pasteur, written communication, 2003).

To provide the Moroccan Ministry of Health with a more up-to-date profile of rubella risk among women of childbearing age, we performed a serological study in 2003 on an existing collection of sera from a nationally representative serosurvey of anaemia in the year 2000.

Method

Sample

Sera were used from a Ministry of Health project sponsored by the United Nations Children's Fund (UNICEF) that was conducted in the year 2000 with the primary goal of estimating the prevalence and risk factors for iron-deficiency anaemia and goitre among women of reproductive age. The sample of women in the UNICEF-sponsored study used the same sampling scheme as the 1997 national survey of mother and child health (PA-PCHILD) [11]. In the original 2000 study, 1524 women of childbearing age (15–45 years) were enrolled. From these women, 967 (63.5%) sera were available for testing of rubella-specific immunoglobulin G (IgG).

Data collection

All testing was conducted at the national laboratory in Rabat, Morocco. An IgG enzyme-linked immunoassay was used to detect rubella-specific IgG antibodies, according to the manufacturer's specifications [Wampole Laboratories, Cranbury, New Jersey, United States of America (USA)]. For quality assurance, 10% of the negative

and positive sera were retested at the MMR laboratory of the Centers for Disease Control and Prevention (CDC) in Atlanta, USA. The 10% positive and negative sera retested at CDC were consistent with results in Morocco. The limit of detection of the test is 6.2 IU/mL. Individuals with an IgG titre > 8.6 IU/mL were defined as seropositive. Titres of 6.2–8.6 IU/mL were classified as borderline. In this analysis, women with borderline or negative test results were considered as susceptible, which yielded a maximum estimate of rubella susceptibility for the purpose of developing a vaccination strategy.

Analysis

Five-year age strata (15–19, 20–24, 25–29, 30–34 and 35–39 years) were used to describe susceptibility levels. Data were analysed using *Epi-info*, version 6. The Pearson chi-squared test was used to examine the association between susceptibility and age.

We estimated the number of CRS cases by fitting various catalytic models to the seroprevalence data via the method of maximum likelihood. Using the age-specific force of infection from this model, together with demographic data such as the population of women by age, we calculated the number of women infected with rubella per year. Using data on birth distribution by age of mother, we determined the annual number of women infected while pregnant. Adjusting for risks specific to the gestation period, we estimated the number of CRS cases per year.

Results

Of the 967 women aged 15–39 years, 161 (16.6%) had negative or borderline test results (Table 1). The difference in susceptibility between the oldest (35–39 years) and youngest age group (15–19 years) was statistically significant: 12/145 (8.3%) versus

51/174 (29.3%) ($P < 0.0001$). Comparing women of childbearing age by geographic location (urban versus rural), no statistical difference in the seroprevalence rate was seen between women in rural and urban areas (total 81.5% and 85.0% respectively), in any of the age groups (Table 1).

A review of the national statistics on birth distributions by maternal age for the year 2003 revealed that 9.1% of all births in Morocco occurred among women aged 15–19 years, 23.8% among ages 20–24 years, 25.7% among ages 25–29 years, 21.9% among ages 30–35 years and 14.0% among ages 35+ years (Table 2). Applying this distribution of births to the proportion of susceptible women in each age group, we estimated the susceptible births by the age of the mother. An estimated total 21 154 births occurred annually to rubella-susceptible women aged 25–29 years, and 77 562 to all women of childbearing age.

The annual number of births in Morocco is approximately 338 879 [7]. According to CDC estimates for the number of CRS cases in Morocco (Glasser RI, personal communication), we estimated that around 916 children are born with CRS each year, 555 in urban and 361 in rural areas.

Discussion

This study provides the first national level data on the rubella seroprevalence and will serve as a baseline now that MR vaccine has been introduced into the population. The high proportion of women of childbearing age susceptible to rubella (16.6%) indicates a high risk of CRS in Morocco. In addition to susceptibility data, we used all available data evidence, such as the distribution of births by maternal age, the high proportion of women of childbearing age and also the early age at marriage in rural and urban areas in an attempt to develop

Table 1 Seroprevalence of rubella IgG antibodies among women of childbearing age by age group and area of residence

Age (years)	Total				Urban				Rural				P-value	95% CI (%)				
	No.		%		Total		IgG negative		IgG positive		Total				IgG negative		IgG positive	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			No.	%	No.	%
15-19	174	17.9	72	25	32.0	47	68.0	102	26	25.5	76	74.5	0.187	65-78				
20-24	191	19.7	110	19	17.3	91	82.7	81	15	18.6	66	81.4	0.820	76-87				
25-29	256	26.4	136	17	12.5	119	87.5	120	23	19.2	97	80.8	0.142	79-88				
30-34	201	20.7	105	10	9.6	95	90.4	96	14	14.6	82	85.4	0.269	83-92				
35-39	145	14.9	79	4	5.2	75	94.8	66	8	12.0	58	88.0	0.124	86-95				
Total	967	100.0	502	75	14.9	427	85.0	465	86	18.4	379	81.5	-	-				

CI = confidence interval.

an optimal rubella vaccination strategy in Morocco. In fact, 71.3% of all births occurred among women aged 20-34 years, the age group most susceptible to rubella exposure.

Studies conducted in many countries have shown a different seroprevalence of rubella antibodies among women of childbearing age; for example, 96.2% in Shiraz, Islamic Republic of Iran [12] and 90.1% in Senegal [13]. Achieving elimination of rubella and CRS requires vaccination coverage of children and women of childbearing age [14]. Moreover, different levels of susceptibility do not necessarily predict the same risk of CRS, because of the variation in the force of infection, population density, migration and birth patterns and other factors [3,15,16]. Likewise, there is 19% consanguinity in Morocco [17], and consanguinity has been shown to be associated with an increased risk of birth defects, some of which resemble CRS [18]. In addition, comparison of susceptibility levels is difficult due to different designs and timing of studies in relation to previous outbreaks, variability of testing and titre cut-off points used to define susceptibility.

In Morocco, several barriers remain to achieving rubella vaccination coverage in persons of childbearing age. A major barrier is limited access to preventive health care by rubella-susceptible populations. Because rubella vaccination is not mandated and universally provided for adults, more complex, targeted strategies are needed to ensure that adults of childbearing age are rubella immune. In addition, before 2003 rubella vaccine was available only in the private health sector, so childhood immunization coverage remains low, and transmission patterns of rubella infection may shift towards adults, including women of childbearing age [19,20]. Although, in general, the presence of specific antibodies correlates with protection, there are differences between tests in the cut-off level at which results are reported as "positive". Even when the same cut-off is used, differences between commercial kits exist, which reflect different antigen preparations and test parameters used. It is known that reinfection can occur in individuals with pre-existing antibody levels above the accepted cut-off level and is more common after

Table 2 Estimated number of births to susceptible women of childbearing age by age group

Age group (years)	Annual live births in 2002 ^a (n = 528 553)		% of women susceptible ^b	Estimated no. of susceptible pregnant women
	No.	%		
15–19	48 014	9.1	29.3	14 068
20–24	125 793	23.8	17.8	22 391
25–29	135 602	25.6	15.6	21 154
30–34	115 808	21.9	11.9	13 781
35–39	74 313	14.0	8.3	6 168

^aSource: United Nations demographic yearbook.

^bSeronegative + borderline.

immunization than after natural infection [18,21]. Antibody levels greater than 15 IU/mL are usually considered to be protective against reinfection [22].

Our findings highlight the need for the country to establish surveillance of trends in susceptibility to rubella and CRS incidence and perhaps to introduce of rubella vaccination among women of childbearing age. Overall, in Morocco, MMR vaccination in the private health sector is likely to lead to long-term increases in the burden of CRS among women who do not have access to the private sector [23]. Eliminating rubella and CRS in Morocco will not occur until national rubella vaccination programmes

are expanded to include vaccination coverage for children and women of childbearing age. As the first national level data on seroprevalence of rubella among women of childbearing age, our results will be useful for future studies in this domain.

Acknowledgements

The authors would like to thank Dr Joseph Icenogle and Mrs Emily Abernathy, Centers for Diseases Control and Prevention, Atlanta, Georgia, and Dr Imad Cherkaoui, Ministry of Health, National Institute of Hygiene, Rabat, Morocco.

References

1. Roberston SE et al. Control of rubella and congenital rubella syndrome (CRS) in developing countries. Part 2: Vaccination against rubella. *Bulletin of the World Health Organization*, 1997, 75:69–80.
2. De Nobrega M, Maurice WLL, Juliano Y. Study of the hearing loss in children and adolescents, comparing the periods of 1990–1994 and 1994–2000. *International journal of pediatric otorhinolaryngology*, 2005, 69:829–38.
3. Jazbec A, Delimar M, Vrzic VS. Simulation model of rubella, the effects of vaccination strategies. *Applied mathematics and computation*, 2004, 153:75–96.
4. Centers for Diseases Control. Measles, mumps, and rubella—vaccine use and strategies for elimination of measles, rubella, and congenital rubella syndrome and control of mumps: recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morbidity and mortality weekly report*, 1998, 47(RR-8):1–57.
5. *Control of rubella and congenital rubella syndrome (CRS) in developing countries.*

- Geneva, World Health Organization, 2001 (WHO/V&B/00.03).
6. Kanbur NO et al. Age specific rubella seroprevalence of an unvaccinated population of adolescents in Ankara, Turkey. *Japanese journal of infectious disease*, 2003, 56:23–5.
 7. *Santé en chiffre 2005. Edition 2006*. Rabat, Ministry of Health, 2005 (<http://www.sante.gov.ma/Departements/dprf/SEIS/SanteEnChiffres.htm>, accessed 27 January 2008).
 8. Nejmi S, Nazih A, Omri B. Enquête immunologique sur la rubéole chez la femme Marocaine de la région de Rabat [Immunological survey of rubella in women of the Moroccan region of Rabat]. *Maroc médicale*, 1972, 52:420–5.
 9. Nejmi S, L'Kassmi H. *Profil immunitaire de la femme Marocaine vis-à-vis de la rubéole et de la toxoplasmose. Enquête immunologique sur la rubéole chez la femme Marocaine de la région de Rabat et de Meknès* [Immune profile of Moroccan women vis-à-vis rubella and toxoplasmosis. Immunological survey of rubella in women of the Moroccan region of Rabat and Meknes]. Paper presented at the Fifth National Congress of Neonatology, Meknès, Morocco, 2003.
 10. Bloom S et al. Congenital rubella syndrome burden in Morocco: a rapid retrospective assessment. *Lancet*, 2005, 365:135–41.
 11. Azelmat M. *1997 National survey on mother and child health (PAPCHILD)*. Rabat, Ministry of Health, and Cairo, Arab League, 1999.
 12. Doroudchi M et al. Seroepidemiological survey of rubella immunity among three populations in Shiraz, Islamic Republic of Iran. *Eastern Mediterranean health journal*, 2001, 7(1/2):128–38.
 13. Dromigny JA, Nabeth P, Perrier Gros Claude JD. Evaluation of the seroprevalence of rubella in the region of Dakar (Senegal). *Tropical medicine and international health*, 2003, 8(8):740–3.
 14. Dykewicz CA et al. Rubella seropositivity in the United States, 1988–1994. *Clinical infectious diseases*, 2001, 33:1279–86.
 15. Cutts FT, Vynnycky E. Modelling the incidence of congenital rubella syndrome in developing countries. *International journal of epidemiology*, 1996, 28:1176–84.
 16. Cutts FT et al. Control of rubella and congenital rubella syndrome (CRS) in developing countries. Part 1: Burden of disease from CRS. *Bulletin of the World Health Organization*, 1997, 75:55–68.
 17. Bouazzaoui L. Consanguinité et santé publique au Maroc [Consanguineous marriages and public health in Morocco]. *Bulletin de l'Académie nationale de médecine*, 1994, 178:1013–27.
 18. Durkin MS et al. Prenatal and postnatal risk factors for mental retardation among children in Bangladesh. *American journal of epidemiology*, 2000, 152:1024–33.
 19. Hinman AR et al. Economic analyses of rubella and rubella vaccine: a global review. *Bulletin of the World Health Organization*, 2002, 80:264–70.
 20. Roberston SE et al. Rubella and congenital rubella syndrome: global update. *Revista Panamericana de salud publica*, 2003, 14(5):306–15.
 21. Davidkin I et al. Duration of rubella immunity induced by two-dose measles, mumps and rubella (MMR) vaccination. A 15-year follow-up in Finland. *Vaccine*, 2000, 18(27):3106–12.
 22. Wysokińska T et al. The prevalence of anti-rubella antibodies in women of child-bearing age in Poland. *Vaccine*, 2004, 22:1899–902.
 23. Vynnycky E, Gay NJ, Cutts FT. The predicted impact of private sector MMR vaccination on the burden of congenital rubella syndrome. *Vaccine*, 2003, 21:2708–19.

Surveillance of childhood vaccine-preventable diseases at health facilities in Jeddah, Saudi Arabia

N.K.R. Ibrahim^{1,2} and H.M. Al Bar²

ترصد الأمراض الممكن توقيها باللقاح لدى الأطفال في المرافق الصحية في جدة، المملكة العربية السعودية
نهلة خيس رجب إبراهيم، حسين محمد البار

الخلاصة: أجرى الباحثان دراسة مستعرضة شملت 33 من المرافق الصحية في جدة، المملكة العربية السعودية، لتقييم أداء هذه المراكز الصحية، وما لدى العاملين الصحيين فيها من معارف حول أنشطة ترصد أمراض الطفولة التي يمكن توقيها باللقاحات. واستخدم الباحثان استبياناً لتقييم الترصد أعدته منظمة الصحة العالمية واستبياناً صُمم خصيصاً للمعارف. واتضح أن هنالك جوانب قصور في بعض البنود المتعلقة بالترصد. وبلغت النسبة المثوية للمرافق الصحية التي لديها دليل تدريبي حول الترصد (57.6%) والتي تستكمل السجلات السريرية بشكل صحيح 60.6%. وخلال الأشهر الستة المنصرمة كان 36.4% من المرافق تفتقد النماذج الملائمة للترصد، بينما لم يخضع للمراجعة الإشرافية سوى 18.2% من هذه المرافق. ولم تزد نسبة العاملين الصحيين الذين لديهم درجة تبعت على الرضى من المعرفة عن الربع.

ABSTRACT A cross-sectional study was conducted at 33 randomly selected health facilities in Jeddah, Saudi Arabia, to assess health facilities' performance and health workers' knowledge of surveillance activities for childhood vaccine-preventable diseases. The WHO surveillance assessment questionnaire and a specially designed knowledge questionnaire were used. There were deficiencies in some surveillance items. The percentages of health facilities that had the surveillance manual and correctly filled clinical registers were 57.6% and 60.6% respectively. In the 6 months preceding the study, 36.4% of facilities lacked the appropriate surveillance forms while only 18.2% had received supervision reviews. Only one-quarter of health workers had a satisfactory knowledge score.

Surveillance des maladies de l'enfant à prévention vaccinale dans des établissements de santé de Djeddah (Arabie saoudite)

RÉSUMÉ Une étude transversale a été menée dans 33 établissements de santé de Djeddah (Arabie saoudite) choisis au hasard, afin d'évaluer l'efficacité de ces établissements et les connaissances des professionnels de santé en matière d'activités de surveillance des maladies de l'enfant pouvant être évitées par la vaccination. On a utilisé le questionnaire d'évaluation de la surveillance mis au point par l'OMS et un questionnaire spécial sur les connaissances. Certains items ont révélé des points faibles. Les pourcentages d'établissements de santé qui disposaient du manuel relatif à la surveillance et qui remplissaient correctement les registres cliniques étaient respectivement de 57,6 % et 60,6 %. Six mois avant l'étude, 36,4 % des établissements ne possédaient pas les formulaires de surveillance adéquats et seuls 18,2 % avaient reçu des rapports de supervision. Seuls un quart des professionnels de santé obtenaient un score de connaissances satisfaisant.

¹Department of Epidemiology, High Institute of Public Health, University of Alexandria, Alexandria, Egypt (Correspondence to N.K.R. Ibrahim: nahlakhamis@yahoo.com).

²Department of Family and Community Medicine, Faculty of Medicine, King Abdelaziz University, Jeddah, Saudi Arabia. Received: 06/06/06; accepted: 28/12/06

Introduction

The threat of communicable diseases is re-emerging in developed countries [1], while in the Eastern Mediterranean Region these diseases are still the most common causes of death, disability and illness [2]. Developing effective and efficient national surveillance and response/control systems is important for national, regional and global health security [2,3].

Public health surveillance is "the ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health-related event" [4]. Data dissemination by public health surveillance systems can be used for immediate public health action, programme planning and evaluation, and formulating research hypotheses [4,5]. Successful communicable disease surveillance depends on effective bidirectional flow of information between the local level of health care and communicable disease control units at regional, national and global levels [6].

Childhood immunization programmes are incomplete without proper surveillance of vaccine-preventable diseases (VPD) [7]. Such surveillance makes it possible to estimate the burden of diseases, decide about the appropriate policies to reduce these diseases, identify pockets of susceptibility and control potential outbreaks [8]. In Saudi Arabia, the Expanded Programme on Immunization (EPI) provides vaccination against the major childhood diseases [9]. However, evaluations of the surveillance system at the health facility level have been limited in scope and content. The aim of this study, therefore, was to assess the surveillance system for childhood VPD at the health facility level in Jeddah governorate, and to determine the knowledge of health care workers about VPD surveillance.

Methods

Study design

A cross-sectional study was conducted at 33 randomly selected health facilities in Jeddah governorate during the period December 2005 to February 2006. The focus of this assessment was on childhood VPD, namely tuberculosis, hepatitis B, poliomyelitis, diphtheria, pertussis, tetanus, measles, mumps, rubella and meningitis (as *Haemophilus influenza* type b is the commonest cause of bacterial meningitis in children aged 2 months to 5 years in this area).

Sample

The sample included 27 primary health care (PHC) units, randomly selected from a total of 38 PHC facilities from all 6 Ministry of Health supervision districts by the proportional allocation technique. Also, 3 private and 3 government hospitals were randomly selected from a list of all hospitals in Jeddah.

Data collection

The data were collected using 2 questionnaires.

Assessment of national communicable disease surveillance and response system

The WHO generic questionnaire for assessment of national communicable disease surveillance and response systems at health facility level was used [10], with some modifications to be specific for assessment of childhood VPD. It was completed by the person in charge of surveillance at each health facility, usually a health inspector but sometimes a nurse or doctor. The questionnaire included both interview and observation items. Questions were asked about the efficacy and quality of the surveillance system in addition to observing and checking the presence of important materials needed for the surveillance system.

The following items were assessed:

- Information sources (presence of national surveillance manual; presence of standard case definitions for childhood VPD).
- Clinical registry (presence of clinical registers; whether registers filled correctly).
- Case detection (presence of materials for collecting, storing and transporting specimens for suspected cases of VPD).
- Case reporting (lack of appropriate surveillance forms in the preceding 6 months; whether last monthly report agrees with the clinical register for diseases targeted for eradication, diseases targeted for elimination, epidemic-prone diseases and any country-priority disease; presence in the preceding 3 months of 12 weekly reports and 3 monthly reports; whether weekly reports submitted on time).
- Data analysis (presence of data analysis of VPD cases by place, time and line graphs; presence of action threshold for 1 country-priority disease; presence of demographic data used as denominators).
- Epidemic preparedness (presence of a written case management protocol for 1 epidemic-prone disease).
- Epidemic response (whether prevention and control measures are implemented based on local data).
- Assessment of feedback (presence of at least 1 feedback bulletin or report on surveillance from a higher level in the preceding 1 year).
- Assessment of supervision (presence of at least 1 written supervision report from a higher level in the preceding 6 months).
- Training (whether respondent ever received training on surveillance).
- Adequacy of resources (presence of stationery, computers, statistical packages, e.g. *SPSS* or *Epi-Info*, faxes and motor vehicles).

Knowledge about surveillance for childhood VPDs

The second questionnaire was a pre-designed interview questionnaire for assessing the knowledge of health care workers about surveillance for childhood VPDs and related topics. All health care workers involved in preventive care who were available on the day of the study and agreed to participate were included in the study. The questionnaire consisted of 2 sections; the 1st section enquired about personal data: sex, educational level and job and whether any training on surveillance had been received. In the 2nd section, the knowledge of health workers about different items of surveillance was assessed. The knowledge items consisted of 26 open-ended questions about:

- Definition of surveillance.
- Definition of international notification weeks and the number.
- Diseases under EPI, their definitions, with examples (suspected and confirmed cases of poliomyelitis, measles, tetanus and tuberculosis).
- Classes of reporting of communicable diseases, with examples of 1st, 2nd and 3rd classes for VPD.
- When and how to report different classes of VPD.
- Types of data to be reported on immediate, weekly and monthly reports for childhood VPD.
- Name of report submitted in case of absence of poliomyelitis (zero report).
- Different preventive and control measures of some cases of VPD.

Statistical analysis

Statistical analysis was conducted using SPSS, version 13. For the surveillance questionnaire, the performance indicators were calculated using WHO methods [10]. For the knowledge questionnaire, a knowledge score was calculated. Responses to each question were scored from 0–2 (0 for incorrect answer or don't know, 1 for incomplete answer and 2 for correct complete answer). The total knowledge score ranged from 0–52 and was graded as follows: poor score: < 26, fair score: 26–34.5, good score: > 34.5. The chi-squared test was calculated, or the Fisher exact test when the cells had a frequency of ≤ 5 . Results were considered statistically significant with a P -value < 0.05.

Results

Table 1 shows that the national surveillance manual was present in 57.6% of the selected health facilities. It was observed that the percentage of facilities that correctly filled the clinical register of childhood VPD was 60.6%. Regarding the ability to confirm cases of VPD, observation revealed that 60.6%, 51.5%, 48.5% and 24.2% of health facilities had the ability to collect sputum, stool, blood and cerebrospinal fluid samples respectively. Regarding the capacity to handle specimens, 60.6% of facilities had a functional cold-chain supply, 42.4% had transport media and 48.5% had packing materials.

Table 1 also shows that 36.4% of health facilities lacked the appropriate surveillance forms for reporting of childhood VPD in the preceding 6 months. In only one-third of health facilities did the last monthly summary report agree with the clinical register for diseases targeted for eradication (poliomyelitis) and for elimination (measles).

The table also shows that the percentage of health facilities that had the correct number of weekly reports in the 3 months preceding the study (12 reports) was only 27.3%, while the percentage was slightly better (39.3%) regarding the correct number of monthly reports (3 reports). As regards the timeliness of reports, only 27.3% of health facilities submitted the weekly reports on time in the 3 months preceding the study.

Regarding data analysis, the results of the study revealed that no computerized database system was available at the health facility level, analysis of data was limited and generally data were analysed at the district level. One-third of the facilities conducted analysis of data by place, 39.3% by time, while prepared line graphs were found in only 12.1% of the health facilities. In 27.3% of health facilities, health care workers reported that they had an action threshold for at least 1 of the country-priority diseases; however, observation showed that the action threshold for poliomyelitis was found in 18.2% of the facilities and for measles in 15.2%.

Regarding epidemic preparedness and response, Table 1 shows that 57.6% of the facilities had a case management protocol for 1 epidemic-prone disease, and 60.6% implemented prevention and control measures based on local data.

The presence of at least 1 feedback report from a higher level during the preceding 1 year was found in 24.2% of the facilities, while a surveillance performance supervision review in the preceding 6 months was present in only 18.2%. Training on surveillance was reported by 66.7% of health workers.

Assessment of the availability of surveillance resources showed that 63.6%, 54.5%, 84.8%, 48.5% and 6.1% of the health fa-

Table 1 Performance indicators of childhood vaccine-preventable diseases surveillance system at health facilities in Jeddah

Item	No. of facilities (n = 33)	%
<i>Presence of surveillance manual</i>		
Reported (yes)	19	57.6
Observed (yes)	19	57.6
<i>Case detection and registration</i>		
Clinical registry		
Reported (present)	25	75.8
Observed (correct filling of registers)	20	60.6
Presence of vaccine-preventable diseases standard case definition		
Reported (yes)	18	54.5
Observed (yes)	19	57.6
<i>Ability to confirm cases</i>		
Ability to collect sputum sample:		
Reported (yes)	25	75.8
Observed (presence of collection materials)	20	60.6
Ability to collect stool sample:		
Reported (yes)	23	69.7
Observed (presence of collection materials)	17	51.5
Ability to collect blood or serum sample:		
Reported (yes)	25	75.8
Observed (presence of collection materials)	16	48.5
Ability to collect CSF sample:		
Reported (yes)	8	24.2
Observed (presence of collection materials)	8	24.2
Capacity to handle all samples:		
Reported (yes)	15	45.5
Observed (presence of working cold-chain)	20	60.6
Observed (presence of transport media for specimens)	14	42.4
Observed (presence of packing material for shipment of specimens)	16	48.5
<i>Data reporting</i>		
Lack of appropriate surveillance forms in last 6 months	12	36.4
Last monthly report agreed with the register for:		
Disease targeted for eradication (poliomyelitis)	11	33.3
Disease targeted for elimination (measles)	11	33.2
Epidemic-borne disease (meningitis)	12	36.4
Disease of major public health importance (meningitis)	12	36.4
Correct number of weekly reports in last 3 months	9	27.3
Correct number of monthly reports in last 3 months	13	39.3
All weekly reports submitted on time in last 3 months	9	27.3

Table 1 Performance indicators of childhood vaccine-preventable diseases surveillance system at health facilities in Jeddah (concluded)

Item	No. of facilities (n = 33)	%
<i>Analysis of data</i>		
Description by place	11	33.3
Description by time	13	39.3
Description by line graph	4	12.1
Presence of action threshold for a country-priority disease (reporting)	9	27.3
Presence of action threshold for a country-priority disease (poliomyelitis)	6	18.2
Presence of action threshold for a country-priority disease (measles)	5	15.2
Presence of demographic data	5	15.2
<i>Epidemic preparedness</i>		
Presence of case management protocol for 1 epidemic-prone disease	19	57.6
<i>Epidemic response</i>		
Implementation of prevention and control measure based on local data	20	60.6
<i>Feedback</i>		
Presence of at least 1 feedback report from higher level during the last year	8	24.2
<i>Supervision</i>		
Presence of surveillance supervision report in the last 6 months	6	18.2
<i>Training</i>		
Staff received training on disease surveillance and epidemic management	22	66.7
<i>Resources available</i>		
Stationery	21	63.6
Computer	18	54.5
Fax	28	84.8
Vehicle	16	48.5
Statistical package ^a	2	6.1

^aEpi-Info/SPSS.

CSF = cerebrospinal fluid.

cilities had stationery, computers, faxes, vehicles and statistical packages (*Epi-Info/SPSS*) respectively.

Regarding the knowledge of health workers about surveillance activities, it was found that only about one-quarter (24.1%)

of health care providers had a satisfactory knowledge score, 29.3% had a fair score while about a half (46.6%) obtained a poor score. After combining the fair and satisfactory knowledge scores, no statistically significant difference was found between

the health workers' level of knowledge and the type of facility or sex ($P > 0.05$) (Table 2). No statistically significant difference was found between the level of knowledge of those who had attended a training course on surveillance and those who had not ($P > 0.05$). On the other hand, respondents with a higher level of education (university or postgraduate degree), physicians and those with shorter work experience (< 10 years) had statistically significant better knowledge scores compared to others ($P < 0.05$).

Discussion

Public health surveillance systems provide information for action against infectious

disease threats [11] and evaluating these systems is necessary to ensure that problems of public health importance are being monitored efficiently and effectively [12,13].

Standardized case definitions for diseases under surveillance are important for providing uniform criteria for reporting cases [12]. The results of the present study revealed that the percentage of health facilities with access to the official standard case definition of childhood VPD was 57.6%. This low rate may be attributed to a lack of available case definitions at health facilities or a lack of knowledge of health workers about them. However, the rate reported from the present study is better than that

Table 2 Relationship between the knowledge scores of health workers about surveillance of vaccine-preventable diseases and studied variables

Variable	Poor knowledge		Fair/satisfactory knowledge		χ^2	P-value
	No. of staff	%	No. of staff	%		
<i>Type of health facility</i>						
Primary health care	21	52.5	19	47.5	1.80	0.17
Hospital	6	33.3	12	66.7		
<i>Sex</i>						
Male	10	34.5	19	65.5	3.39	0.06
Female	17	58.6	12	41.1		
<i>Educational level</i>						
University/postgraduate	7	29.2	17	70.8	4.97	0.02
Less than university	20	58.8	14	41.2		
<i>Job</i>						
Physician	5	26.3	14	73.7	4.65	0.02 ^a
Other specialty	22	56.4	17	42.6		
<i>Period of working (years)</i>						
< 10	12	34.3	23	65.7	5.33	0.02
10+	15	65.2	8	34.8		
<i>Received training on surveillance</i>						
Yes	13	48.1	14	51.9	0.05	1.00
No	14	45.2	17	54.8		
<i>Total</i>	27	46.4	31	53.4		

^aFisher exact test.

from a study from Uganda in 2000, where only 35% of facilities had the official standard case definition of EPI diseases [14].

In our study 60.6% of facilities correctly and completely filled the clinical register for VPD. An earlier study in 2000 in Jeddah to evaluate communicable diseases reporting found that the usefulness of reporting diminished because of incomplete, absent or incorrect filling of personal and disease data [15]. The problem of incorrect and incomplete form-filling may be due to a lack of knowledge of the people in charge of surveillance about how to fill registers and reports. Our results agree with the study in Uganda where the corresponding rate was 56% [14]. In the United States of America (USA), despite state and local laws requiring medical providers to report notifiable infectious diseases to the public health authorities, a literature review of 33 published studies between 1970 and 1999 revealed that the percentage of complete reports varied from 9% to 99% and was most strongly associated with the disease being reported [16].

Many health facilities in our study did not have the capacity to properly collect, store and transport specimens of suspected cases of VPD. This may be because cases that need laboratory investigations are referred to more advanced laboratories. This result concurs with the results of a study of VPD surveillance in Georgia (a former republic of the Soviet Union) in 2002 [8].

Results from Uganda showed that 65% of facilities lacked an adequate supply of reporting forms during the 6 months preceding the study [14]. The corresponding figure from our study was better, with only 36.4% of facilities lacking the appropriate forms. This is perhaps due to differences in the resources available for health care between the countries. However, our rate still requires improvement. A study to as-

sess the structure and performance of infectious disease surveillance using the health management information system (HMIS) in Tanzania reported a slightly better rate (27% of facilities lacked these forms) [3]. This better rate may be because the WHO Regional Office for Africa approved the integrated disease surveillance and response strategy for strengthening infectious disease surveillance and response capacity in Tanzania, where it has been applied since 1998.

In about one-third of the health facilities in the present study the monthly report agreed with the clinical register (for diseases targeted for eradication, elimination, epidemic-prone diseases and those with major public health importance). This low rate may be attributed to a lack of health workers' knowledge about these diseases, their classification, and when and how to report them. However, the current rate is slightly better than that obtained from Uganda (29%) [14].

Under-reporting of infectious diseases remains a major problem in communicable diseases surveillance [17]. A study from the USA in 1999 found that only 33% of the diseases on the list for national surveillance were actually reportable in each of the responding States [12]. In our study the percentage of health facilities that had submitted the correct number of weekly reports in the 3 months preceding the study was only 27.3%. This rate is low and requires much improvement. In Germany in 2003, the first evaluation of the surveillance systems of notifiable diseases using an electronic database system revealed that their programme was very successful, with 90% of facilities transmitting data weekly [18]. This may be due to the benefits gained from application of an electronic database system, which is a much easier and less costly way of transmitting data.

Timeliness of reporting is a key performance measure of public health surveillance systems [19]. In the present study only 27.3% of health facilities submitted the correct number of weekly reports on time during the 3 months preceding the study. This low rate may be attributed to health workers' lack of understanding of the importance of timeliness of reporting. A slightly higher rate (35%) was obtained from Tanzania [3]. Analysis of the National Notifiable Diseases Surveillance System in the USA showed that long lag times in reporting and variability in reporting across states limited the usefulness of the data [19]. For these reasons, a computer database, the Public Health Surveillance Knowledgebase was established in 2003 in order to facilitate the integration of information sources [20]. Even so, when database systems for notifiable diseases are in place, such as in New South Wales, Australia, there may be factors limiting their ability to provide timely and accurate data [21].

We found that the analysis of data about VPD in children at the health facility level was limited; only about one-third of facilities conducted analysis of cases by place and time, while only 12.1% prepared line graphs. This low figure may be attributed to analysis of data at the higher (district) level and lack of statistical packages (such as *SPSS* or *Epi-info*) or people trained to use them at the health facility level. Our result agrees with a critical review of infectious diseases surveillance in Gaza, Palestine, where prepared line graphs were reported from 10% of health facilities [17]. These results also agree with that from an assessment of infectious disease surveillance systems in Armenia where very few surveillance data were computerized, analysed or used to develop or evaluate public health policy [22].

It was reported from the Tanzanian study that 29% of medical offices had population denominators to use for data analyses [3]. On the other hand, a lower rate (15.2%) was obtained in our study. This can be attributed to a lack of availability of census data at the health facilities, and to the analysis of these data at district level.

While 27.3% of health facilities reported having a threshold action for one of the country-priority diseases, on observation it was found that an action threshold for poliomyelitis was found in only 18.2% of facilities and for measles in 15.2%. Results from Uganda showed that 27% of health facilities had a threshold action for epidemic-prone diseases [14].

Regarding epidemic preparedness and response, 57.6% of facilities had a case management protocol for 1 epidemic-prone disease and 60.6% had implemented prevention and control measures based on local data. The rate obtained in our study requires much improvement by increasing the availability of management protocols and training health workers on these. A lower rate was reported from Uganda, where 50% of facilities conducted community prevention and control measures [14]. On the other hand, better results were obtained from Tanzania, where 79% of facilities using HMIS implemented prevention and control measures based on local data [3].

Lack of feedback from the reporting centres to the health centres hampers improvements in clinical practice [22]. In our study the presence of at least 1 feedback report (during the preceding 6 months) was found in only 24.2% of facilities, and a performance supervision review was found in 18.2%. Better results were obtained from the Tanzanian study, where 42% of facilities using HMIS received supervision or feedback during the same time period [3].

On the other hand, in Uganda, feedback was found in 15% of facilities and supervision in 32% [14].

In the present study two-thirds of health workers in charge of surveillance reported receiving training. This agrees with results from Uganda where 62% of health providers received training on surveillance [14]. On the other hand, a higher rate (81%) was reported from Tanzania [3].

Our study found a deficiency of resources needed for surveillance at the health facility level, such as computers and statistical software. This may also be due to the analysis of data at district level. Similar results were obtained from Brazil, where there was a lack of equipment and a deficiency in staff qualifications [23]. The Ugandan study reported a greater deficiency in resources than our study; stationery was found only in 25% of facilities [4].

Regarding knowledge of health providers about different items of surveillance, about a half (46.6%) of them in our study had a poor knowledge score; only about a quarter of health providers had a satisfactory knowledge score. The low standard of knowledge is of concern and needs improvement. The results of a study in 1997 for assessment of surveillance and control of poliomyelitis in Egypt showed that the knowledge of some health workers was incomplete [24]. The results of a focus group discussion to assess knowledge about VPD surveillance in Georgia in 2003 showed that health providers had poor knowledge about surveillance and the regulations and accordingly the level of these activities was minimal [25]. In our study, no statistical significant difference was found between the knowledge of health workers who received training about surveillance and those who did not. This indicates that the training

courses need to be revised. The results also showed that physicians who had university degrees and above, and those who with shorter work experience, had better knowledge scores. The reason for this may be that graduate health care providers, especially those who are recently graduated, usually study the topic of reporting and surveillance of infectious diseases during their course at university.

It is concluded from the present study that there are deficiencies in some areas of the surveillance systems for childhood VPD in the health facilities of Jeddah governorate. Given the importance of surveillance in monitoring and controlling VPD, there is an urgent need to address the deficiencies in resources, reporting and knowledge within the health facilities in order to correct them and improve the surveillance system for childhood VPD in Jeddah. The development of continuing education, staff motivators and electronic database systems are among the strategies recommended in this regard.

Acknowledgements

The authors would like to thank all the students who participated in collection of the data and all those who facilitated and helped in accomplishing this work. Special thanks go to the manager of Jeddah Directorate of Health Affairs, the head of the communicable disease department, and the head of the medical license department. In addition we are grateful to the head of the surveillance unit at district level for facilitating the study. Thanks are also extended to all staff of the health facilities visited for generously providing the time to help in data collection.

References

1. Wigzell H. A European CDC? *Science*, 2005, 307(5716):1691.
2. *Documentation of integrated disease surveillance and response implementation in the African and Eastern Mediterranean Regions. Report of a WHO meeting. Harare, Zimbabwe, 4-15 November 2002. Geneva, World Health Organization, 2003 (WHO/CDS/CSR/LYO/2003.5).*
3. Nsubuga P et al. Structure and performance of infectious disease surveillance and response, United Republic of Tanzania, 1998. *Bulletin of the World Health Organization*, 2002, 80(3):196-203.
4. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines. *Morbidity and mortality weekly report*, 2001, 50:1-36.
5. Desenclos JC. Surveillance des maladies infectieuses: principes et l'organisation en France en 2005 [Surveillance of infectious diseases: principles and organization in France in 2005]. *Médecine et maladies infectieuses*, 2005, 35(5):232-44.
6. Nelesone T et al. Short communication: strengthening sub-national communicable disease surveillance in a remote Pacific Island country by adapting a successful African outbreak surveillance model. *Tropical medicine and international health*, 2006, 11(1):17-21.
7. John TJ et al. Communicable diseases monitored by disease surveillance in Kottayam district, Kerala state, India. *Indian journal of medical research*, 2004, 120(2):70-2.
8. Ministry of Labor, Health and Social Affairs and National Center for Disease Control. *Assessment of vaccine preventable disease surveillance systems in Georgia*. Bethesda, Maryland, The Partners for Health Reformplus Project, Abt Associates Inc., 2002 (Technical Report No. 028).
9. أمين عبد الحميد مشخص، محمد نجيب عبد الله، حامد عبد القادر الشيخ. الأمراض المعدية ومستجدياتها العالمية: منظمة الصحة العالمية (المكتب الإقليمي لشرق المتوسط)، وزارة الصحة الوكالة المساعدة للطب الوقائي (المملكة العربية السعودية)، 2004.
10. *Protocol for the assessment of national communicable disease surveillance and response systems*. Geneva, World Health Organization, 2001 (WHO/CDS/CSR/ISR/2001.2).
11. *Global health: challenges in improving infectious disease surveillance systems*. Washington DC, United States General Accounting Office, 2001 (GAO-01-722).
12. Roush S et al. Mandatory reporting of diseases and conditions by health care professionals and laboratories *Journal of the American Medical Association*, 1999, 282(2):164-70.
13. Hopkins RS. Design and operation of state and local infectious disease surveillance systems. *Journal of public health management and practice*, 2005, 11(3):184-90.
14. Assessment of infectious disease surveillance—Uganda, 2000. *Morbidity and mortality weekly report*, 2000, 49(30):687-91.
15. Bakarman MA et al. Assessment of reporting and recording system of communicable diseases in Jeddah Region. *Saudi medical journal*, 2000, 21(8):751-4.
16. Doyle TJ et al. Completeness of notifiable infectious disease reporting in the United States: an analytical literature review. *American journal of epidemiology*, 2002, 155(9):866-74.
17. Awad R et al. A critical review of the infectious diseases surveillance system in the Gaza Strip. *Eastern Mediterranean health journal*, 2001, 7(1/2):274-9.

18. Krause G et al. Erste Bewertung der Überwachungssysteme der meldepflichtigen Krankheiten gemäß der Infektionskrankheit Kontrolle Gesetz in Deutschland [First evaluation of the surveillance systems of notifiable diseases under the infectious disease control law in Germany]. *Gesundheitswesen*, 2003, 65(Suppl. 1):S8–12.
19. Jajosky RA, Groseclose SL. Evaluation of reporting timeliness of public health surveillance systems for infectious diseases. *BMC public health*, 2004, 4:29.
20. Doyle TJ et al. PHSkb: A knowledge base to support notifiable disease surveillance. *BMC medical informatics and decision making*, 2005, 5:27.
21. Persson L et al. Notifiable diseases database system: review and development strategy. *New South Wales public health bulletin*, 2004, 15(1/2):10–2.
22. Wuhib T et al. Assessment of the infectious diseases surveillance system of the Republic of Armenia: an example of surveillance in the Republics of the former Soviet Union. *BMC public health*, 2002, 2:3–10.
23. Leite JA, Assis MM, de Cerqueira EM. Vigilância epidemiológica no sistema local de saúde [Epidemiologic surveillance in the local health system]. *Revista brasileira de enfermagem*, 2003, 56(2):178–83.
24. Heddaya ZM. *Surveillance and control of poliomyelitis in Alexandria* [PhD thesis]. Alexandria, Egypt, Department of Epidemiology, High Institute of Public Health, University of Alexandria, 1997.
25. Djibuti M et al., eds. *Knowledge, attitudes, and behaviors toward VPD surveillance among health care providers and community members in Georgia: Focus Group Discussion Report*. Bethesda, Maryland, Abt Associates, Partners for Health Reform Plus, 2003.

Prevalence of oropharyngeal colonization by *Haemophilus influenzae* type b in Iranian children

A. Karimi,¹ A. Alborzi,² A. Fahimzad,¹ M. Gooya,³ A. Esteghamati,⁴ S.H. Armin¹ and F. Fallah⁵

معدّل انتشار استعمار المستدمية النزلية من النمط بي للبلعوم القموي للأطفال الإيرانيين
عبد الله كريمي، عبد الوهاب البرزي، علي رضا فهيم زاد، محمد مهدي كويا، علي استقامتي، شهناز آرمين، فاطمة
فلاح

الخلاصة: يودّي الحاملون الأصحاء للمستدمية النزلية من النمط بي دوراً هاماً في نشر المرض الغزوي. وتهدف هذه الدراسة لتقييم مدى الحاجة إلى تطعيم الأطفال الإيرانيين ضد المستدمية النزلية من النمط بي، وذلك بتقدير معدّل انتشار استعمارها للبلعوم القموي بينهم. وقد حضّر الباحثون المزارع من مسحات فموية بلعومية أخذت من ألف طفل موزعين على 25 من مراكز الرعاية النهارية في طهران في الفترة من تشرين الأول/أكتوبر 2005 حتى آذار/مارس 2006. وقد بلغ معدّل انتشار المستدمية النزلية من النمط بي 7.6٪، وهو مشابه لما عليه في البلدان النامية الأخرى قبل إدخال اللقاح المقترن المضاد لها. ويوصي الباحثون بإدراج اللقاح المضاد للمستدمية النزلية من النمط بي في البرنامج الوطني الإيراني للتلقيح.

ABSTRACT Healthy carriers of *Haemophilus influenzae* type b (Hib) play an important role in the spread of invasive disease. The aim of this study was to assess the need for Hib vaccination in Iranian children by estimating the prevalence of Hib oropharyngeal colonization among children in Tehran. Cultures were prepared from oropharyngeal swabs of 1000 children in 25 day-care centres in Tehran from October 2005 to March 2006. The prevalence of Hib carriers was 7.6%, similar to other developing countries prior to inoculation with the conjugate Hib vaccine. We recommend Hib vaccination be included in the Iranian national programme of immunization.

Prévalence de la colonisation oropharyngée par l'*Haemophilus influenzae* de type b chez les enfants iraniens

RÉSUMÉ Les porteurs sains de *Haemophilus influenzae* de type b (Hib) jouent un rôle important dans la propagation de la maladie invasive. L'objectif de cette étude était d'évaluer la nécessité d'une vaccination contre le Hib chez les enfants iraniens en estimant la prévalence de la colonisation oropharyngée par le Hib chez les enfants de Téhéran. Des cultures ont été préparées à partir d'échantillons oropharyngés prélevés sur 1 000 enfants fréquentant 25 crèches de Téhéran d'octobre 2005 à mars 2006. La prévalence des porteurs de Hib était de 7,6 %, soit un chiffre similaire à celui des autres pays en développement avant l'inoculation par le vaccin Hib conjugué. Nous recommandons l'ajout de la vaccination contre le Hib au programme national de vaccination iranien.

¹Department of Paediatric Infectious Diseases; ²Department of Microbiology, Faculty of Medicine, Shaheed Beheshti Medical University, Tehran, Islamic Republic of Iran (Correspondence to A. Fahimzad: safahimzad@yahoo.com).

³Department of Paediatric Infectious Diseases, Faculty of Medicine, Shiraz University of Medical Sciences, Shiraz, Islamic Republic of Iran.

⁴Department of Paediatric Infectious Diseases, Faculty of Medicine, Iran Medical University, Tehran, Islamic Republic of Iran.

⁵Ministry of Health and Medical Education, Tehran, Islamic Republic of Iran.

Received: 05/09/06; accepted: 28/11/06

Introduction

Haemophilus influenzae type b (Hib) is a Gram-negative pleomorphic coccobacilli which can exist in an asymptomatic carrier state or can induce severe invasive diseases such as meningitis, septic arthritis and pneumonia which have a high mortality rate [1]. Oropharyngeal carriage of Hib is important in the transmission, pathogenesis and immunologic response [2].

The availability of conjugated capsular Hib vaccine has dramatically reduced the incidence of Hib-induced diseases in North America [3], Europe [4] and more recently in developing countries such as Brazil [5]. In unvaccinated populations, the invasive diseases caused by Hib particularly affect children under 6 years old [2,6].

There are few studies about the Hib carrier rate in developing countries [2,7,8]. This study was done to estimate the Hib carrier rate among children under 6 years old attending day-care centres in Tehran to answer the question whether Hib vaccination is needed in the Islamic Republic of Iran.

Methods

A total of 25 day-care centres (out of 625) were chosen randomly from different parts of Tehran. All children attending the selected centres were sampled. To select a representative sample, the probability proportional to size sampling technique and simple random cluster sampling technique were used to select the day-care centres. Assuming a frequency of Hib carrier rate of 5% and $d = 2\%$ the sample size required was estimated to be about 460. Based on the sampling method (cluster sampling) we considered the effect size to be equal to

2. So the final estimated sample size was around 920.

Specimens were collected during the 6 months from October 2005 to March 2006. Parental consent was obtained and a questionnaire with information including age, sex, parents' level education, duration of stay in day-care centre, number of family members and history of recent respiratory tract infection was completed for each child. Children who were ill at the time of the study were excluded.

Oropharyngeal samples were collected with sterile swabs and immediately streaked onto chocolate agar plates. All media were incubated in candle jars with 5% CO₂ at 37 °C for 24–48 hours. Suspected colonies were confirmed by Gram staining of smears and their requirement for factors V and X for growth (V and X factor disks from Mast Diagnostics), and then a latex agglutination kit was used to identify Hib (Mast Diagnostics). Gamma-aminolevulinic acid rapid test (Becton, Dickinson Company) was used as a further confirmation test for Hib.

Data were analysed by logistic regression for survey data using *Stata/SE*, version 8.0. The level of significance was set at $P = 0.05$.

Results

Out of 1000 children from 25 day-care centres who participated, the cultures of 76 (7.6%, standard error = 0.96) were positive for Hib. There were no statistically significant differences in the Hib carrier rate for any demographic characteristic (Table 1) or for other variables, including length of residence in the day-care centre, presence of siblings aged < 5 years, symptoms of common cold during the previous 1 month and having a smoker in the family (Table 2).

Table 1 Demographic characteristic of the study children in relation to *Haemophilus influenzae* type b (Hib) status

Demographic characteristic	Total (n = 1000)		Hib +ve (n = 76)		Hib -ve (n = 924)		OR (95% CI)	P-value
	No.	%	No.	%	No.	%		
Age (years)							1.25 (0.88–1.87)	0.21
< 2	8	0.8	0	0.0	8	0.9		
2–< 4	251	25.1	16	21.1	235	25.4		
4–< 6	700	70.0	57	75.0	643	69.6		
≥ 6	41	4.1	3	3.9	38	4.1		
Sex							1.40 (0.96–2.03)	0.07
Male	475	47.5	34	44.7	491	53.1		
Female	525	52.5	42	55.3	433	46.9		
Father's education							0.89 (0.50–1.59)	0.66
University	670	67.0	53	69.7	617	66.8		
Diploma	300	30.0	21	27.6	279	30.2		
Below diploma	30	3.0	2	2.6	27	3.0		
Mother's education							0.95 (0.61–1.46)	0.80
University	584	58.4	44	57.9	540	58.4		
Diploma	382	38.2	31	40.8	351	38.0		
Below diploma	34	3.4	1	1.3	33	3.6		

OR = odds ratio; CI = confidence interval.

Table 2 Environmental conditions of the study children in relation to *Haemophilus influenzae* type b (Hib) status

Environmental condition	Hib +ve (n = 76)		Hib -ve (n = 924)		OR (95% CI)	P-value
	Mean	SE	Mean	SE		
Duration of attendance at day-care centre (months)	16.1	1.4	15.4	1.1	1.00 (0.99–1.02)	0.55
Duration of daily stay in day-care centre (hours)	5.8	0.2	5.8	0.1	1.00 (0.86–1.17)	0.97
	No.	%	No.	%		
Sleep in room alone at night	21	27.6	262	28.4	1.04 (0.61–1.77)	0.89
Sleep with other siblings or parents	55	72.4	661	71.5	0.92 (0.59–1.44)	0.71
Presence of siblings under 5 years old	4	5.3	70	7.6	0.60 (0.25–1.42)	0.23
Tobacco smoke exposure	10	13.2	140	15.2	0.85 (0.41–1.78)	0.65
Symptoms of common cold in previous month	10	13.2	82	8.9	1.56 (0.84–2.88)	0.15

SE = standard error; OR = odds ratio; CI = confidence interval.

Discussion

On the basis of some unpublished Iranian reports of a low incidence of Hib meningitis in children < 5 years old (12.5/100 000), we decided to evaluate the Hib carrier rate and answer the question whether we need to initiate Hib vaccination in the Islamic Republic of Iran. Evaluation of the colonization rate in the oropharynx or nasopharynx gives an indication of the possible rate of Hib invasive diseases. One study suggested that oropharyngeal culture for Hib carriers is more sensitive than nasopharyngeal culture [9].

In our study the oropharyngeal Hib carrier rate in the children at day-care centres was 7.6%. This is similar to reports from other developing countries such as the Dominican Republic (7.7%) [10], Turkey (9%) [11], Brazil before vaccination (7.3%) [12], as well as remote areas of developed countries such as Alaska (5%–7%) [8]. This prevalence is higher than the Hib colonization rate in some developed countries before vaccination (2%–5%) [2, 13]. In these countries the carrier rate has reduced dramatically since vaccination [13].

Two previous studies in the Islamic Republic of Iran showed a low Hib meningitis rate and a high Hib carrier rate, despite an appropriate and reliable method of culturing [unpublished data]. There are some possible explanations for these findings. Antibiotic consumption is high in the Islamic Republic of Iran, and some occult Hib bacteraemia

could be prevented by antibiotic therapy before there is induction of invasive diseases such as meningitis. Although the Hib carrier rate cannot be influenced by antibiotic administration [14], early antibiotic consumption can lead to the negative cerebrospinal fluid culture profile of aseptic meningitis [15]. Genetic factors could be another explanation, although there is no evidence that these affect the rate of blood invasion following the carrier state.

Some studies have showed a correlation between Hib colonization and young age (< 2 years), contact with index cases, day-care centre children and vaccination status [7, 8, 16]. Although there is controversy about the correlation between the Hib carrier rate and other factors, such as sex, number of siblings < 5 years old and recent respiratory disease [17], our study showed no significant relationship of these variables with the Hib rate. Since it was difficult to take swabs from children < 2 years old, this was a limitation to our study.

We recommend Hib vaccination be included the Iranian national programme of immunization.

Acknowledgements

This study was supported by the Paediatric Infectious Research Centre (PIRC) in Mofid Children's Hospital in Tehran. We are grateful to the Iran National Science Foundation (INSF) for financial support.

References

1. Turk DC. Clinical importance of *Haemophilus influenzae*. In: Sell SH, Wright PF, eds. *Haemophilus influenzae: epidemiology, immunology and prevention of diseases*. New York, Elsevier, 1982.
2. Barbour ML. Conjugate vaccines and the carriage of *Haemophilus influenzae* type b. *Emerging infectious diseases*, 1996, 2(3):1–9.
3. Liptak GS et al. Decline of pediatric admissions with *Haemophilus influenzae* type b in New York State, 1982–1993: relation to immunizations. *Journal of pediatrics*, 1996, 130:923–30.

4. Van Alphen L et al. Effect of nationwide vaccination of 3-month-old infants in the Netherlands with conjugate *Haemophilus influenzae* type b vaccine: high efficacy and lack of herd immunity. *Journal of pediatrics*, 1997, 131:869–73.
5. Bonifacio da Silva ME, Marin JM. An epidemiological study of *Haemophilus influenzae* at a Brazilian day care center. *Brazilian journal of infectious diseases*, 2001, 5(5):260–8.
6. Li KI, Dashefsky B, Wald ER. *Haemophilus influenzae* type b colonization in household contacts of infected and colonized children enrolled in day care. *Pediatrics*, 1986, 78:15–20.
7. Villasenor-Sierra A et al. Prevalencia de estado de portador de *Haemophilus influenzae* en niños de ciudad Nezahualcóyotl, estado de México [Prevalence of carrier state of *Haemophilus influenzae* in children of Nezahualcóyotl city, state of Mexico]. *Salud pública México*, 1996, 38(2):87–93.
8. Galil K et al. Reemergence of invasive *Haemophilus influenzae* type b disease in a well-vaccinated population in remote Alaska. *Journal of infectious diseases*, 1996, 179:101–6.
9. Coen PG, Health PT, Garnet GP. The Hib immunization programme in the Oxford region: an analysis of the impact of vaccine administration on the incidence of disease. *Epidemiology and infection*, 1999, 123(3):389–402.
10. Gomez E et al. The epidemiology of *Haemophilus influenzae* type b carriage among infants and young children in Santo Domingo, Dominican Republic. *Pediatric infectious disease journal*, 1998, 17:782–6.
11. Bakir M et al. Pharyngeal colonization with *Haemophilus influenzae* type b among healthy Turkish infants and children. *Pediatrics international*, 2002, 44:381–6.
12. Bricks LF et al. Oropharyngeal colonization by *Haemophilus influenzae* in healthy children from Taubaté (São Paulo), prior to the *Haemophilus influenzae* type B vaccination program in Brazil. *Revista do Hospital das Clínicas*, 2004, 59(5):236–43.
13. *Haemophilus influenzae* infections. In: Pikerling LK, ed. *Red book: report of the Committee on Infectious Diseases*, 26th ed. Elk Grove Village, Illinois, American Academy of Pediatrics, 2003:293–301.
14. Shapiro ED. Persistent pharyngeal colonization with *Haemophilus influenzae* type b after intravenous chloramphenicol therapy. *Pediatrics*, 1981, 67:435–7.
15. Schulkind ML, Altermeier WA III, Ayoub CM. A comparison of ampicillin and chloramphenicol therapy in *Hemophilus influenzae* meningitis. *Pediatrics*, 1971, 48:411–6.
16. Murphy TV et al. Pharyngeal colonization with *Haemophilus influenzae* type b in children in a day care center without invasive disease. *Journal of pediatrics*, 1985, 106:712–6.
17. Michaels RH et al. Factors affecting pharyngeal *Haemophilus influenzae* type b colonization rates in children. *Journal of clinical microbiology*, 1976, 4:413–7.

Stunting is a major risk factor for overweight: results from national surveys in 5 Arab countries

A. El Taguri,^{1,2} F. Besmar,¹ A. Abdel Monem,³ I. Betilmal,⁴ C. Ricour¹ and M-F. Rolland-Cachera⁵

التقزم من عوامل الخطر الرئيسية لزيادة الوزن: نتائج مستمدة من المسوحات الوطنية في خمسة بلدان عربية
عادل التاجوري، فواز بسمار، أحمد عبد المنعم، إبراهيم بيت المال، كلود ريكور، ماري فرانسواز رولاند-كاشيرا
الخلاصة: أجرى الباحثون تحليلاً حول زيادة الوزن والتقزم من واقع المعطيات المستمدة من المسوحات الوطنية التي أجريت بين عامي 2001 و2004 في خمسة بلدان عربية هي: جيبوتي والجمهورية العربية الليبية والمغرب والجمهورية العربية السورية والجمهورية اليمنية. وقد عرّف الباحثون التقزم وزيادة الوزن وفق المعايير الجديدة للنمو التي أعدتها منظمة الصحة العالمية. واتضح لهم أن زيادة الوزن تتراوح بين 8.9% في الجمهورية اليمنية و20.2% في الجمهورية العربية السورية. وأن نسبة الاختطار لزيادة الوزن بين المصابين بالتقزم يتراوح بين 2.14 في جيبوتي و3.85 في الجمهورية العربية الليبية؛ وهي أيضاً تتراوح بين 0.76 في الأطفال المتوسطي التقزم في اليمن و7.15 في الأطفال الشديدي التقزم في الجمهورية العربية الليبية؛ فيما تراوح الجزء السببي بين 7.49% و69.76% بين السكان.

ABSTRACT We analysed data on overweight and stunting from large national surveys performed between 2001 and 2004 in 5 Arab countries (Djibouti, Libyan Arab Jamahiriya, Morocco, Syrian Arab Republic and Yemen). Overweight and stunting were defined according to new WHO growth standards. Overweight ranged from 8.9% in Yemen to 20.2% in Syrian Arab Republic. The risk ratio (RR) for overweight in stunted children ranged from 2.14 in Djibouti to 3.85 in Libyan Arab Jamahiriya. RR ranged from 0.76 in mildly stunted children of Yemen to 7.15 in severely stunted children in Libyan Arab Jamahiriya. Etiological fraction in the population ranged from 7.49% to 69.76%.

Le retard de croissance comme important facteur de risque de surpoids : résultats d'études nationales dans cinq pays arabes

RÉSUMÉ Nous avons analysé les données sur le surpoids et le retard de croissance provenant de vastes études nationales réalisées entre 2001 et 2004 dans cinq pays arabes (Djibouti, Jamahiriya arabe libyenne, Maroc, République arabe syrienne et Yémen). Le surpoids et le retard de croissance étaient définis conformément aux nouvelles normes de croissance de l'OMS. Le taux de surpoids variait de 8,9 % au Yémen à 20,2 % en République arabe syrienne. Le rapport des risques (RR) de surpoids chez les enfants présentant un retard de croissance était compris entre 2,14 à Djibouti et 3,85 en Jamahiriya arabe libyenne. Ce rapport allait de 0,76 chez les enfants présentant un léger retard de croissance au Yémen, à 7,15 chez ceux présentant un important retard de croissance en Jamahiriya arabe libyenne. La fraction étiologique dans la population était comprise entre 7,49 % et 69,76 %.

¹Hôpital Necker Enfants Malades, Paris, France (Correspondence to A. El Taguri: tajouri@pediatrician.com).

²Department of Family and Community Medicine, Alfateh University, Tripoli, Libyan Arab Jamahiriya.

³Pan Arab Project for Family Health (PAPFAM), League of Arab States.

⁴World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt.

⁵Unité de Surveillance et d'Epidémiologie Nutritionnelle, Unité de Recherche et d'Epidémiologie Nutritionnelle, Centre de Recherche en Nutrition Humaine Ile-de-France, Paris, France.

Received: 12/09/07; accepted: 20/11/07

Introduction

Malnutrition is a leading contributor to the global burden of disease [1]. Malnutrition refers not only to deficiency states, but also to excesses or imbalances in intake of energy, protein and/or other nutrients [2]. Globally, undernutrition is an underlying or associated cause in at least half of all childhood deaths [3]. On the other hand, overweight is becoming a public health problem even in many of the developing nations; the prevalence in some has reached even higher levels than in many industrialized countries [4,5]. Countries in the Middle East and North Africa have a high prevalence of overweight in children [6]. It has been reported that by the year 2020, over 60% of the disease burden and mortality in developing countries will result from noncommunicable diseases as a consequence of the rising prevalence of overweight. Management of these diseases will be beyond the capacity of many of these nations [7].

Both undernutrition and overnutrition have a great impact on social, economic and health care systems. Both these forms of malnutrition can coexist [8]. Community interventions that are designed to prevent or treat one problem can exacerbate the other and displace the whole population curve to the right, generating a significant proportion of overweight and obese children [9]. In an individual child, the relation between stunting and overweight is not simply a situation of coexistence; epidemiological and experimental evidence is accumulating to indicate that there is a causal relationship [10]. On the other hand, in developed countries, an association was found between BMI and stature in children, with height and adiposity being positively related [11].

The aim of the present work was to assess the prevalence of overweight and stunting, and the association between stunting and overweight in children under 5 years of

age based on available and comparable data from countries in the Eastern Mediterranean Region.

Methods

Data source

The study was a secondary analysis of data collected from nationwide surveys performed in the Eastern Mediterranean Region. The most recent and comparable data from surveys performed in the same time period were available for 5 countries from 2 different surveys. The data for the Syrian Arab Republic, Morocco, Djibouti and Yemen came from the Pan Arab Project for Family Health (PAPFAM). This project is a series of cross-sectional, nationally representative, 2-stage, stratified cluster sample surveys that were performed in the Region starting in 2001 [12]. Data from the Libyan Arab Jamahiriya came from the Multiple Indicator Cluster Sample Survey (MICS), which was a series of similar surveys performed in many countries around the world that was organized principally by the United Nations Children's Fund [13,14]. The series essentially assessed the achievement of different countries in fulfilling their commitment to goals agreed upon in the 1989 Convention on the Rights of the Child.

Data were collected in interviews with mothers during household visits using standard questionnaires, with a few modifications to conform to local disease and disease determinants patterns. The full set of questionnaires contained: items related to child health and its determinants such as vaccination, birth, and nutrition; items related to mother's health and reproductive history; and items on household characteristics and surrounding environment, such as the availability of a safe water supply, sanitation facilities, garbage collection, and wealth or assets of the families.

Outcome measures

Weight, height and age were used to calculate z-scores of body mass index for age (BMI/A) and height for age (H/A) using the newly published growth charts from the World Health Organization (WHO) multiple centre growth reference study [15]. BMI was calculated by dividing the weight in kilograms by the square of the height in metres. Children were classified as obese if they had a BMI/A z-score greater than 2 standard deviations (SD) of the median of the WHO growth standards, and as stunted if they had a H/A z-score below -2 SDs of the median [15]. Unless stated otherwise, stunting refers to moderate and severe stunting. We also included in the same stage of analysis, mild stunting. This included children whose H/A z-score was < -1 but ≥ -2 SDs. Wasting was diagnosed if the weight-for-height (W/H) z-score was < -2 SDs.

Household assets were used to construct an asset index as a proxy measure for socioeconomic status in 3 countries. For Djibouti and the Libyan Arab Jamahiriya, a socioeconomic classification that incorporated parents' occupation and education was used [16]. Each of the 5 populations was separately divided into 3 socioeconomic groups: privileged, intermediate and underprivileged. Independent variables used were basic epidemiological attributes such as age, sex, socioeconomic status, geographic region and urban/rural residence.

Statistical analysis

Data analysis was done using WHO *Anthro 2005* software (WHO, Geneva, Switzerland), and *SPSS* for Windows, version 13. The WHO *Anthro 2005* program considers z-score values for W/H and BMI/A < -5 SDs as outliers, while for H/A and W/A it considers z-score values < -6 SDs as outliers. We used risk ratio (RR) to measure the association between being stunted and

being overweight. This indicates the probability of being overweight in the stunted sub-sample divided by the probability of being overweight in the non-stunted sub-sample. Etiological fraction among the exposed (EF_e) was calculated as $(RR-1)/RR$, while etiological fraction in the population (EF_p) was calculated as $[Pe (RR-1)]/[Pe (RR-1) + 1]$, where Pe is the proportion of exposure to the risk factor in the population. EF_e as such measures the proportion of overweight among stunted children that could be attributed to stunting, while EF_p measures the proportion of overweight in the general population that could be attributed to stunting. Level of significance was set at $P < 0.05$.

Results

Yemen had the lowest gross domestic product (GDP) and is classified by WHO as a very high prevalence area for underweight. The Libyan Arab Jamahiriya had the highest GDP. The Libyan Arab Jamahiriya, Syrian Arab Republic and Morocco are all classified by WHO as low prevalence areas for underweight. The highest proportion of urban dwellers was in the Libyan Arab Jamahiriya and Djibouti, while the lowest was in Yemen (Table 1).

Yemen had the highest prevalence of moderate to severe stunting (57.6%). Djibouti had the highest prevalence of wasting (17.8%), while the Libyan Arab Jamahiriya had the lowest rate of both wasting (4.8%) and stunting (18.5%). Overweight ranged from 8.9% in Yemen to 20.2% in the Syrian Arab Republic (Table 2).

Overweight was more prevalent in rural than in urban areas except in Morocco, while in the Syrian Arab Republic, overweight prevalence was higher in both urban and rural areas than in suburban areas.

Table 1 Basic characteristic of children participating in the study

Variable	Libyan Arab Jamahiriya	Syrian Arab Republic	Morocco	Djibouti	Yemen
Type and year of survey	MICS 2, 2003	PAPFAM, 2001	PAPFAM, 2003–2004	PAPFAM, 2002	PAPFAM, 2003
Country classification for underweight ^a	Low	Low	Low	Intermediate	Very high
Sample size	7232	5454	5380	1538	10924
GNI per capita (US\$) ^b	5540	1160	1320	910	520
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Residence					
Urban	6056 (83.7)	1662 (30.5)	5752 (51.2)	1215 (79.0)	2243 (20.5)
Suburban	–	906 (16.6)	–	249 (16.2)	–
Rural	1176 (16.3)	2886 (52.9)	2628 (48.8)	74 (4.8)	8681 (79.5)
Sex					
Male	3608 (49.9)	2804 (51.4)	2672 (49.7)	780 (50.8)	5658 (51.8)
Female	3624 (50.1)	2650 (48.6)	2709 (50.3)	757 (49.2)	5266 (48.2)
Socioeconomic classification					
Privileged	690 (9.5)	1459 (26.8)	1342 (25.3)	612 (34.8)	3898 (35.8)
Intermediate	4125 (57.0)	1809 (33.2)	2265 (42.3)	220 (14.3)	3606 (33.1)
Underprivileged	2417 (33.4)	2177 (40.0)	1747 (32.6)	706 (45.9)	3381 (31.1)
Age (years)					
≤ 1	1295 (17.9)	887 (16.3)	1047 (19.5)	206 (15.2)	2262 (20.7)
> 1–≤ 2	1418 (19.6)	975 (17.9)	1052 (19.6)	286 (21.2)	2118 (19.4)
> 2–≤ 3	1466 (20.3)	1210 (22.2)	1043 (19.4)	292 (21.6)	2160 (19.8)
> 3–≤ 4	1663 (23.0)	1231 (22.6)	1178 (21.9)	282 (20.9)	2240 (20.5)
> 4–≤ 5	1390 (19.2)	1151 (21.1)	1060 (19.7)	285 (21.1)	2144 (19.6)

^aBased on WHO Statistical Information System (<http://www.who.int/whosis/data/Search.jsp>, accessed 27 November 2008) and Global prevalence of underweight among children under age five. Map Design Unit of the World Bank (<http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategyMaps.pdf>, accessed 27 November 2008).

^bSource: World Bank, 2003 [39].

GNI = gross national income.

The prevalence of overweight was highest in privileged groups in the Syrian Arab Republic and Djibouti, while it was highest in underprivileged groups in Morocco. In the Libyan Arab Jamahiriya and Yemen, it was highest in the intermediate group. The highest regional prevalence of overweight in the Syrian Arab Republic was in Halab and Al-Raka (31.5% and 47.8% respectively), while in Morocco the highest regional prevalence was 23.2% in Fes-

Boulemane (complete regional data are not presented but are available on request). In Yemen, the prevalence of overweight was highest in Al-Maharah (22.5%) and Ibb (20.7%) governorates and in the Libyan Arab Jamahiriya it was highest in Tarhuna and Missallata region (24.4%). Both stunting and overweight were more prevalent in boys than girls (Table 3).

Stunting prevalence was higher in rural areas in all countries and was higher in

Table 2 Prevalence of nutritional indicators based on current surveys by country

Variable	Libyan Arab Jamahiriya	Syrian Arab Republic	Morocco	Djibouti	Yemen
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Overweight (> 2 BMI/A z-score)	963 (13.4)	1100 (20.2)	832 (15.5)	137 (10.2)	975 (8.9)
Wasting (< -2 W/H z-score)	312 (4.8)	516 (9.5)	546 (10.2)	241 (17.8)	1920 (17.7)
Stunting					
Mild (<-1 H/A z-score)	612 (24.7)	1135 (20.8)	1259 (23.4)	319 (23.6)	1974 (18.1)
Moderate/severe (< -2 H/A z-score)	1208 (18.5)	1640 (29.4)	1187 (22.0)	357 (26.5)	6297 (57.6)
Moderate (between -2 and -3 H/A z-score)	649 (9.9)	782 (14.3)	723 (13.4)	205 (15.2)	2231 (20.4)
Severe (< -3 H/A z-score)	559 (8.6)	822 (15.1)	464 (8.6)	153 (11.3)	4066 (37.2)

BMI/A = body mass index for age, W/H = waist for height, H/A = height for age.

underprivileged groups in the Libyan Arab Jamahiriya and Djibouti (Table 3).

Overall RR for overweight in stunted children was highest in Libyan Arab Jamahiriya (3.85) and lowest in Djibouti (2.14). However, within countries the RR ranged from 0.76 in mildly stunted children in Yemen to as high as 7.15 in severely stunted children in the Libyan Arab Jamahiriya and 11.88 in children in the Hadramout region in Yemen.

RR for overweight was higher among stunted children in rural areas of the Libyan Arab Jamahiriya, Djibouti and Yemen in comparison to urban areas. In the Libyan Arab Jamahiriya, Morocco and Yemen, RR for overweight among stunted children was higher in privileged groups, while in the other 2 countries it was highest in the intermediate socioeconomic groups. The risk increased with age except in the Syrian Arab Republic and Djibouti, where it increased initially but decreased at around 4 years of age. In all countries, the increase in risk was evident with increasing degree of stunting (Table 4). Risk of overweight decreased with increased H/A z-score in all countries, but in Yemen it rose sharply again at H/A z-score > 3 (Figure 1).

The geographical distribution of risk for overweight within countries was also variable. In the Libyan Arab Jamahiriya, the RR (95% confidence interval) ranged from 0.98 (0.31–3.10) in Sirt region to 5.59 (3.93–7.94) in Tarhuna and Misalata regions. In the Syrian Arab Republic, it ranged from 1.57 (0.78–3.18) in Daraa to 10.67 (3.65–31.26) in Al-Latakia. In Morocco, the range was from 1.27 (0.70–2.31) in Doukkala-Abda to 5.58 (3.69–8.46) in Marrakech. In Yemen, the RR was low in Lahej at 0.61 (0.27–1.42) and increased to 11.88 (1.50–93.93) in Hadramout.

The lowest etiological fraction among stunted children was in Djibouti (53.27%) and the highest was in stunted children of the Libyan Arab Jamahiriya (73.25%). In the different subgroups, it was lowest in stunted children in the suburban regions (28.57%) and in children younger than 1 year of age (30.07%) in Djibouti, while the highest etiological fraction among stunted children was in rural areas (80.27%) and in children older than 4 years (81.24%) in the Libyan Arab Jamahiriya. The etiological fraction in the population as a whole ranged from 23.12% in Djibouti to 48.42% in Yemen (Table 5).

Table 3 Prevalence of overweight and stunting in different subgroups by country

Variable	Libyan Arab Jamahiriya		Syrian Arab Republic		Morocco		Djibouti		Yemen	
	Overweight	Stunting	Overweight	Stunting	Overweight	Stunting	Overweight	Stunting	Overweight	Stunting
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
<i>Residence</i>										
Urban	796 (13.2)	940 (17.2)	335 (20.2)	440 (26.5)	440 (16.0)	442 (16.1)	102 (9.2)	285 (26.4)	140 (6.2)	1099 (49.0)
Suburban	-	-	161 (17.8)	256 (28.3)	-	-	28 (13.1)	54 (25.4)	-	-
Rural	167 (14.3)	280 (26.5)	604 (20.9)	908 (31.5)	392 (14.9)	745 (28.3)	7 (11.9)	18 (30.0)	836 (9.6)	5198 (59.9)
<i>Sex</i>										
Male	500 (13.9)	645 (19.9)	613 (21.9)	910 (32.5)	475 (17.8)	631 (23.6)	85 (12.3)	193 (27.9)	526 (9.3)	3298 (58.3)
Female	463 (12.9)	575 (17.5)	487 (18.4)	694 (26.2)	357 (13.2)	556 (20.5)	52 (7.9)	164 (24.8)	449 (8.5)	2999 (57.0)
<i>Socioeconomic class</i>										
Privileged	87 (12.7)	93 (15.1)	311 (21.3)	518 (35.5)	209 (15.6)	374 (27.9)	65 (10.6)	136 (22.2)	333 (8.5)	2369 (60.8)
Intermediate	559 (13.7)	657 (17.6)	366 (20.2)	531 (29.4)	316 (14.0)	543 (24.0)	21 (9.5)	54 (24.7)	373 (10.3)	2215 (61.4)
Under-privileged	317 (13.2)	470 (21.6)	422 (19.4)	553 (25.4)	299 (17.1)	264 (15.1)	52 (9.9)	167 (32.2)	261 (7.7)	1686 (49.9)
<i>Age (years)</i>										
≤ 1	201 (15.5)	246 (20.7)	138 (15.6)	218 (24.6)	181 (17.3)	171 (16.3)	19 (9.3)	39 (18.9)	214 (9.5)	731 (32.3)
> 1-≤ 2	289 (20.5)	299 (23.2)	54 (26.1)	358 (36.7)	22 (21.1)	269 (25.6)	34 (11.9)	93 (32.5)	222 (10.5)	1241 (58.6)
> 2-≤ 3	212 (14.6)	257 (19.7)	303 (25.0)	442 (36.5)	202 (19.4)	299 (28.7)	30 (10.3)	89 (30.5)	212 (9.8)	1455 (67.4)
> 3-≤ 4	151 (9.2)	257 (17.2)	257 (20.9)	361 (29.3)	147 (12.5)	273 (23.2)	29 (10.2)	78 (27.6)	190 (8.5)	1497 (66.8)
> 4-≤ 5	109 (8.0)	161 (12.9)	148 (12.9)	225 (19.5)	79 (7.5)	175 (16.5)	25 (8.8)	59 (20.7)	137 (6.4)	1374 (64.1)

Table 4 Risk ratio for overweight in stunted children in different subgroups by country

Variable	Libyan Arab Jamahiriya	Syrian Arab Republic	Morocco	Djibouti	Yemen
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
Overall risk	3.85 (3.45-4.30)	3.56 (3.2-3.96)	2.8 (2.48-3.16)	2.14 (1.56-2.92)	2.63 (2.27-3.05)
Residence					
Urban	3.63 (3.22-4.10)	3.92 (3.25-4.73)	2.96 (2.51-3.49)	2.29 (1.59-3.30)	2.35 (1.66-3.33)
Suburban	-	3.47 (2.63-4.58)	-	1.40 (0.67-2.90) ^a	-
Rural	5.35 (4.01-7.14)	3.40 (2.94-3.92)	2.89 (2.41-3.45)	3.11 (0.77-12.51)	2.62 (2.23-3.09)
Sex					
Male	3.90 (3.35-4.54)	3.35 (2.90-3.86)	2.46 (2.10-2.89)	1.94 (1.31-2.88)	2.62 (2.14-3.21)
Female	3.78 (3.22-4.44)	3.78 (3.23-4.42)	3.23 (2.68-3.90)	2.40 (1.43-4.03)	2.64 (2.13-3.27)
Socioeconomic class					
Privileged	4.35 (3.03-6.24)	3.10 (2.53-3.80)	4.36 (3.38-5.62)	1.79 (1.11-2.89)	2.77 (2.12-3.61)
Intermediate	4.13 (3.58-4.77)	3.84 (3.19-4.62)	2.78 (2.27-3.39)	4.58 (1.98-10.62)	2.62 (2.05-3.36)
Underprivileged	3.35 (2.76-4.07)	3.71 (3.14-4.38)	2.27 (1.83-2.81)	2.03 (1.21-3.40)	2.45 (1.89-3.17)
Age (years)					
≤ 1	3.56 (2.80-4.52)	2.43 (1.80-3.28)	1.72 (1.28-2.31)	1.43 (0.55-3.69) ^a	2.02 (1.57-2.60)
> 1-≤ 2	3.16 (2.61-3.83)	2.70 (2.17-3.35)	2.23 (1.78-2.80)	1.73 (0.93-3.21) ^a	3.12 (2.25-4.33)
> 2-≤ 3	3.57 (2.83-4.51)	4.31 (3.46-5.37)	2.88 (2.26-3.66)	2.00 (1.02-3.91)	3.96 (2.59-6.05)
> 3-≤ 4	3.79 (2.84-5.07)	3.98 (3.19-4.96)	4.06 (3.20-5.46)	4.30 (2.13-8.69)	3.15 (2.10-4.72)
> 4-≤ 5	5.33 (3.80-7.49)	3.22 (2.41-4.31)	4.23 (2.80-6.39)	1.80 (0.82-3.97) ^a	4.60 (2.71-7.81)
Degree of stunting					
Mild	1.72 (1.46-2.03)	2.22 (1.95-2.76)	1.75 (1.47-2.08)	1.15 (0.73-1.80) ^a	0.76 (0.58-1.00) ^b
Moderate	2.57 (2.13-3.10)	3.66 (3.10-4.31)	2.62 (2.20-3.12)	1.98 (1.29-3.02)	0.83 (0.64-1.07) ^b
Severe	7.15 (6.27-8.16)	6.17 (5.35-7.11)	4.70 (4.20-5.50)	2.65 (1.74-4.02)	3.20 (2.68-3.82)

^aRisk was not statistically significant.^bStunting was a protective factor but it was not statistically significant.

P < 0.05.

RR = risk ratio; CI = confidence interval.

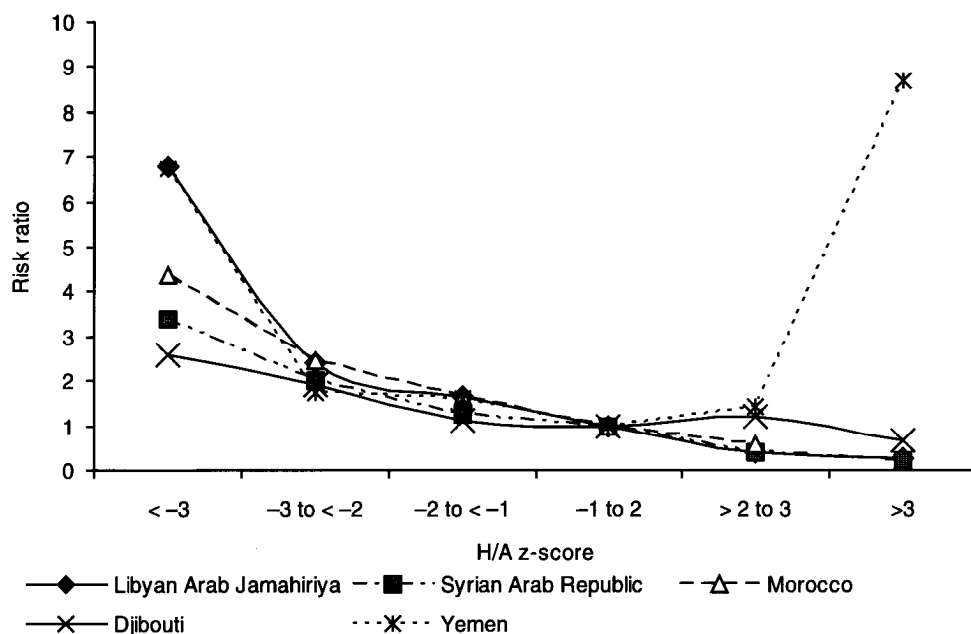


Figure 1 Risk ratio of overweight according to height for age (H/A) z-score in 5 Arab countries

Discussion

Overweight is no longer considered a disease of industrialized nations only. The growing economies and changes in lifestyles in many developing countries, with the accompanying changes in diet and physical activity patterns, have contributed to the appearance of overweight in these countries, while low income, limited choices of food, lack of parks/gardens and public thoroughfares for play and exercise, and inadequate and/or inappropriate education may make it difficult for people to seek and secure healthier foods and lifestyles in these countries [17].

The current study used data from nationally representative surveys to compare the prevalence of both overweight and stunting and to examine the relationship between them in 5 Arab countries that are in various stages of economic transition. These

surveys are useful because of the valuable information collected and because of their inter-nation comparability. However, they were primarily established to look for undernutrition rather than overnutrition. No data were collected on variables related to overweight, such as television viewing, maternal nutrition, food practices of the family, or parental weight. Given the current findings, these data should be included in future surveys.

For GDP, we used data from the World Bank rather than national sources. Notably for the Libyan Arab Jamahiriya, the figures given are much lower than figures obtained from authorities in the country (US\$ > 6000). In view of the characteristics of the country, it could be argued that the national figures are probably more representative, but for consistency we kept the source data the same for all the countries.

Table 5 Impact measures of stunting as a determinant for overweight in exposed group and in the whole population

Variable	Libyan Arab Jamahirliya		Syrian Arab Republic		Morocco		Djibouti		Yemen	
	EFe (%)	EFp (%)	EFe (%)	EFp (%)	EFe (%)	EFp (%)	EFe (%)	EFp (%)	EFe (%)	EFp (%)
Overall	73.25	34.74	71.91	42.95	64.29	28.44	53.27	23.12	61.98	48.42
Residence										
Urban	71.84	31.13	74.49	43.57	66.22	23.92	56.33	25.37	57.45	39.78
Suburban	—	—	71.18	41.13	—	—	28.57	9.10	—	—
Rural	80.27	53.55	70.59	42.99	65.40	34.85	67.85	38.78	61.83	49.26
Sex										
Male	74.36	36.58	70.15	43.24	59.35	25.71	48.45	20.87	61.83	48.58
Female	73.54	32.72	73.54	42.14	69.04	31.43	58.33	25.79	62.12	48.27
Socioeconomic class										
Privileged	77.01	33.62	67.74	42.67	77.06	48.30	44.13	24.83	63.90	51.77
Intermediate	75.79	35.53	73.96	45.47	64.03	29.85	78.17	46.91	61.83	49.94
Underprivileged	70.15	33.63	73.05	40.76	55.95	16.08	50.74	14.95	59.18	41.92
Age (years)										
≤ 1	71.91	34.72	58.85	26.02	41.86	10.45	30.07	7.49	50.50	24.78
> 1-≤ 2	68.35	33.35	62.96	38.41	55.16	23.84	42.20	19.27	67.95	55.40
> 2-≤ 3	71.99	33.63	76.80	54.76	65.28	35.02	50.00	23.28	74.75	66.60
> 3-≤ 4	73.61	32.46	74.87	46.60	75.37	41.54	76.74	47.64	68.25	58.96
> 4-≤ 5	81.24	35.78	68.94	30.29	76.36	34.81	44.44	14.25	78.26	69.76

EFe = etiological fraction among exposed; EFp = etiological fraction in the population.

The prevalence of overweight in the current study, even for the lowest prevalence countries (8.9%–20.2%), was high. In most countries in Africa and Asia, rates of wasting are 2.5–3.5 times higher than rates of overweight [6]. Although the criteria for overweight used in our study were different, BMI/A rather than weight for height, the prevalence of overweight in the Libyan Arab Jamahiriya and the Syrian Arab Republic was much higher than wasting. In Morocco it was also higher but less so, while in Djibouti and Yemen wasting was still more prevalent than overweight.

It is believed that a wide difference in the prevalence of wasting and stunting indicates an early phase of nutritional transition where acute forms (wasting) usually start to decrease first, while in the more privileged countries, both acute and chronic forms show lower prevalence rates [18]. We observed this in the current study as the less privileged countries such as Djibouti and Yemen had high prevalence rates of both forms of undernutrition, while the Syrian Arab Republic and Morocco had low levels of wasting and intermediate levels of stunting, and the Libyan Arab Jamahiriya, with the highest GDP among the studied countries, is classified as a low prevalence area for both wasting and stunting.

The prevalence of overweight and stunting was greater in boys than girls. This has been reported in other studies [19], while the prevalence of overweight for both sexes varies between studies across different ages and ethnic groups [20].

Overweight is related to lifestyle, which is related to urbanization, housing and leisure-time activities. In industrialized nations, overweight is associated with low income and underprivileged groups as these consume more energy-dense but inexpensive foods and they are less engaged in physical activities. In developing

countries, overweight is more prevalent in privileged groups [17]. Although this was true for the Syrian Arab Republic and Djibouti, overweight was more frequent in underprivileged groups in Morocco and in intermediate groups in the Libyan Arab Jamahiriya and Yemen. Among possible alternative explanations in our study is that the asset index that we constructed for the current data was not validated in separate studies in these particular populations.

The prevalence of overweight is higher in urban areas than rural or poor urban areas in many developing countries [21]. Urban residence in the current surveys followed locally established definitions in these countries and these are probably not comparable. The relative division in urban areas of worse- or better-off residential areas was not examined in our study. Only 2 of the surveys we used looked at suburban areas as a distinct group. These areas were different in many aspects from both urban and rural areas. Further surveys should systematically include data for suburban and worse- or better-off residential urban areas.

Traditional explanations for the increased risk of overweight associated with stunting observed in developing countries include reduced physical activity and increased high-fat intake. However, increasingly the role of chronic undernutrition in early life is being recognized. Stunting or low H/A is a public health problem worldwide. It measures cumulative deficient growth and is a feature of a complex syndrome including developmental delay, impaired immune function, reduced cognitive function, metabolic disturbances leading to accumulation of body fat, loss of lean mass and increased risk of hypertension [3]. Stunting prevalence is high in developing countries, reaching almost 50% of children in certain regions of the world [22,23]. Even in industrialized nations like the United States of America,

at least 5% of children were reported to be stunted [24].

The relationship between stunting and overweight is not an artefact [25]. BMI is a reliable index of body composition even in stunted children [26].

The deleterious effects of stunting and overweight can start in the uterus and may continue after birth. Both stunting and overweight are related to method of feeding, weaning, and context of eating that would shape future food acceptance and food habits [27]. A number of studies have demonstrated metabolic alterations in children suffering from undernutrition in all tissues and body systems [10]. These alterations are towards energy conservation and maintaining a low metabolism. Stunted children have impaired regulation of food intake and have higher susceptibility to the effects of high-fat diets [28]. When energy intake improves, deposition of fat over time, especially in the abdomen, may result [25]. On the other hand, absence of a relation between stunting and overweight has also been reported [29]. The risk of a stunted child becoming obese did not follow perfectly the increase in prevalence of overweight, nor did it always follow the prevalence of stunting. However, a high prevalence of wasting may decrease the risk of developing overweight, as seen in Djibouti and Yemen, which would also explain the absence of association between these 2 conditions found in another study [21].

There were more intra-country variations in the risk than inter-country variation in our current study. The risk of stunting-overweight was higher in rural areas and in severe forms of stunting, and variably increased with age. The relation started at even earlier ages in the more privileged countries than was previously noted and was absent at younger ages in countries with a high prevalence of wasting and/or under-

weight. Unlike in a previous study [21], we found no difference in RR between boys and girls. Although some studies showed that improved nutrition in conjunction with a decreased prevalence of infections has contributed synergistically to improving linear growth as well as increasing the prevalence of overweight in developed countries [11,30], the finding that increased height was related to overweight only in Yemen is difficult to explain.

Overweight among stunted children depends on the availability of extra energy in a child who was programmed to use energy more economically. Stunting itself is not the direct cause, as many stunted children do not become obese; many stunted children become underweight. The mechanism that leads to overweight in stunted children explains also why we found a higher risk of overweight in stunted children from privileged groups in the Libyan Arab Jamahiriya. Underprivileged groups may have the knowledge, the attitude and the capacity to correct stunting, but unfortunately not always in the most appropriate approach. Yemen and the Syrian Arab Republic had the highest population attributable risk. In Yemen, this was because of the high prevalence of stunting even if the RR was lower than in other countries, while in the Syrian Arab Republic this was due to the high prevalence of overweight and the accompanying RR. Managing stunting in Yemen will prevent almost half the cases of overweight in the population, especially in older children, in rural areas and in underprivileged groups. The highest etiological fraction was in the Libyan Arab Jamahiriya, especially in rural areas and older children.

Findings from the current study indicate that preventive measures, such as public health campaigns on healthy food and encouragement to increase physical activity, should be instituted in the region. Other

measures, such as pre-pregnancy and early childhood interventions, should also be directed towards maternal undernutrition, intrauterine growth retardation, compromised lactation and infant feeding [31]. Only a handful of studies have addressed childhood overweight in the region in the

last few decades [32–37]. Childhood overweight is not yet high on the agenda of national nutrition programmes in the region [38] but our study suggests that such programmes should incorporate prevention and management, even in those countries with high prevalence of undernutrition.

References

1. Ezzati M et al. Selected major risk factors and global and regional burden of disease. *Lancet*, 2002, 360(9343):1347–60.
2. *Child growth standards*. Geneva, World Health Organization, 2006 (<http://www.who.int/childgrowth/en/>, accessed 8 October 2008).
3. Branca F, Ferrari M. Impact of micronutrient deficiencies on growth: the stunting syndrome. *Annals of nutrition & metabolism*, 2002, 46(Suppl. 1):8–17.
4. Maire B et al. Transition nutritionnelle et maladies chroniques non transmissibles liées à l'alimentation dans les pays en développement [Nutritional transition and non-communicable diet-related chronic diseases in developing countries]. *Santé*, 2002, 12(1):45–55.
5. *Obesity. Preventing and managing the global epidemic*. Geneva, World Health Organization, 2000 (WHO Technical Report Series, No. 894).
6. De Onis M, Blossner M. *Prevalence and trends of overweight among preschool children in developing countries*. *American journal of clinical nutrition*, 2000, 72(4):1032–9.
7. Murray CJ, Lopez AD. Evidence-based health policy—lessons from the Global Burden of Disease Study. *Science*, 1996, 274(5288):740–3.
8. *The world health report: reducing risk, promoting healthy life*. Geneva, World Health Organization, 2002.
9. Uauy R, Kain J. The epidemiological transition: need to incorporate obesity prevention into nutrition programmes. *Public health nutrition*, 2002, 5(1A):223–9.
10. Sawaya AL, Roberts S. Stunting and future risk of obesity: principal physiological mechanisms. *Cadernos de saúde pública*, 2003, 19(Suppl. 1):S21–8.
11. Freedman DS et al. Height and adiposity among children. *Obesity research*, 2004, 12(5):846–53.
12. Pan Arab Project for Family Health (PAP-FAM). The League of Arab States. (http://www.papfam.org/arab_league/default.htm, accessed 7 October 2008).
13. United Nations Children's Fund. *Multiple Indicators Cluster Sample Surveys (MICS). Monitoring the situation of children and women: MICS2 questionnaire* (<http://www.childinfo.org/MICS2/finques/M2finQ.htm>, accessed 30 November 2008).
14. *The Libyan National Multiple Indicators Cluster Sample Survey. Preliminary report, the general corpus for planning and health care*. Tripoli, General People's Committee, Libyan Arab Jamahiriya, 2003.
15. MGRS. Enrolment and baseline characteristics in the WHO Multicentre Growth Reference Study. *Acta paediatrica. Supplementum*, 2006, 450:7–15.
16. El-Tajouri RF. *Cross sectional study of growth in urban pre-school children in*

- Libya [PhD dissertation]. Zurich, Switzerland, University of Zurich, 1979.
17. Caballero B. Introduction. Symposium: Obesity in developing countries: biological and ecological factors. *Journal of nutrition*, 2001, 131(3):866S–870S.
 18. Shgair H AA, Sharshoor S. Nutritional status of children in some Arab countries. In: *Arab Congress for Maternal & Child Health*. PAPChild – League of Arab States, 1999.
 19. Wamani H et al. Boys are more stunted than girls in sub-Saharan Africa: a meta-analysis of 16 demographic and health surveys. *BMC pediatrics*, 2007, 7:17.
 20. Wang Y, Wang JQ. A comparison of international references for the assessment of child and adolescent overweight and obesity in different populations. *European journal of clinical nutrition*, 2002, 56(10):973–82.
 21. Julia M et al. Influence of socioeconomic status on the prevalence of stunted growth and obesity in prepubertal Indonesian children. *Food and nutrition bulletin*, 2004, 25(4):354–60.
 22. *4th Report on the World Nutrition Situation. Nutrition throughout the life cycle*. Geneva, United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition in collaboration with International Food Policy Research Institute, 2000 (<http://www.ifpri.org/pubs/books/4thrpt/4threport.pdf>, accessed 8 October 2008).
 23. Bwibo NO, Neumann CG. The need for animal source foods by Kenyan children. *Journal of nutrition*, 2003, 133(11 Suppl. 2):3936S–3940S.
 24. *Third report on nutrition monitoring in the United States: executive summary*. Washington DC, US Government Printing Office, 1995:51 (<http://www.cdc.gov/nchs/data/misc/tronm.pdf>, accessed 9 October 2008).
 25. Popkin BM, Richards MK, Montiero CA. Stunting is associated with overweight in children of four nations that are undergoing the nutrition transition. *Journal of nutrition*, 1996, 126(12):3009–16.
 26. Hoffman DJ et al. Comparison of techniques to evaluate adiposity in stunted and nonstunted children. *Pediatrics*, 2006, 117(4):e725–32.
 27. Maffeis C. Aetiology of overweight and obesity in children and adolescents. *European journal of pediatrics*, 2000, 159(Suppl. 1):S35–44.
 28. Hoffman DJ et al. Why are nutritionally stunted children at increased risk of obesity? Studies of metabolic rate and fat oxidation in shantytown children from Sao Paulo, Brazil. *American journal of clinical nutrition*, 2000, 72(3):702–7.
 29. Duran P, Caballero B, de Onis M. The association between stunting and overweight in Latin American and Caribbean preschool children. *Food and nutrition bulletin*, 2006, 27(4):300–5.
 30. He Q, Karlberg J. BMI in childhood and its association with height gain, timing of puberty, and final height. *Pediatric research*, 2001, 49(2):244–51.
 31. Lukito W, Wahlqvist ML. Weight management in transitional economies: the “double burden of disease” dilemma. *Asia Pacific journal of clinical nutrition*, 2006, 15(Suppl.):21–9.
 32. Moussa MA et al. Factors associated with obesity in school children. *International journal of obesity and related metabolic disorders*, 1994, 18(7):513–5.
 33. Malik M, Bakir A. Prevalence of overweight and obesity among children in the United Arab Emirates. *Obesity research*, 2007, 8(1):15–20.
 34. Al-Nuaim AR, Bamgboye EA, Al-Herbish A. The pattern of growth and obesity in Saudi Arabian male school children. *Inter-*

- national journal of obesity and related metabolic disorders*, 1996, 20(11):1000–5.
35. Jabre P et al. Overweight children in Beirut: prevalence estimates and characteristics. *Child: care, health and development*, 2005, 31(2):159–65.
 36. Mokhtar N et al. Diet culture and obesity in northern Africa. *Journal of nutrition*, 2001, 131(3):887S–892S.
 37. Benjelloun S. Nutrition transition in Morocco. *Public health nutrition*, 2002, 5(1A):135–40.
 38. *Report on the regional workshop on infant and young child feeding*. Casablanca, Morocco, 28–31 July 2003. Cairo, World Health Organization Regional Office for the Eastern Mediterranean, 2003.
 39. The World Bank. Countries and Regions [website]. (<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/0,,pagePK:180619~theSitePK:136917,00.html>, accessed 8 October 2008).

Malnutrition

Malnutrition remains one of the most serious health problem and the single biggest contributor to child mortality in the Eastern Mediterranean region. A significant proportion of children are undernourished and over a third of the population suffers from micronutrient deficiencies.

Malnutrition is a major contributor to the total global disease burden. More than one-third of child deaths worldwide are attributed to undernutrition. Poverty is a central cause of undernutrition.

A key indicator of chronic malnutrition is stunting – when children are too short for their age group compared to the WHO child growth standards. About 178 million children globally are stunted, resulting from not enough food, a vitamin- and mineral-poor diet, and disease. As growth slows down, brain development lags and stunted children learn poorly. Stunting rates among children are highest in Africa and Asia.

Source: WHO/EMRO Nutrition website
(<http://www.emro.who.int/nutrition/malnutrition.htm>)

The use of body mass index for measurement of fat mass in children is highly dependant on abdominal fat

A. El Taguri,^{1,2} M. Dabbas-Tyan,¹ O. Goulet¹ and C. Ricour¹

استخدام مُنسب كتلة الجسم لقياس الكتلة الشحمية لدى الأطفال
عادل التاجوري، مريم دباس - طيان، أوليفير قولية، كلود ريكور

الخلاصة: درس الباحثون العلاقة بين شحم الجسم ومُنسب كتلة الجسم لدى أطفال بدينين من سكان يتنمون إلى أعراق متعددة. وقارنوا أحراز - Z لمنسب كتلة الجسم بالقياس المزدوج لامتصاص الأشعة السينية للتعرف على تركيب كامل الجسم وعلى توزيع الشحم في مختلف أجزائه. واتضح أن أفضل معادلة للتعرف على مُنسب كتلة الجسم هي تقسيم الرقم 1 على $[0.159 - 0.013 \times \text{الشريحة المئوية لمجمل شحم البطن}] - (0.01 \times \text{حز ز لمنسب كتلة الجسم})$ ؛ حيث تتراوح قيمة الشريحة المئوية لشحم البطن بين 1 و 5. وقد اتضح وجود توافق مرتفع لمنسب كتلة الجسم المتوقع مع مُنسب كتلة الجسم بالقياس المزدوج لامتصاص الأشعة السينية، ولم تكن هناك فروق يمكن كشفها في هذه العلاقة بين المجموعات العرقية (الإثنية) المختلفة. وينبغي أن يُستخدم كل من مُنسب كتلة الجسم وشحم البطن كعوامل تقريبية وسيطة لتحديد مدى الشحامة.

ABSTRACT We examined the relationship between body fat and body mass index (BMI) in a multiethnic population of obese children. BMI z-scores were compared to DEXA measures of whole body composition and regional fat distribution. Fat mass index (FMI) was best predicted by the equation: $1/[(0.159 - 0.013 \times \text{percentile of total abdominal fat}) - (0.01 \times \text{BMI z-score})]$, where percentile of abdominal fat ranges from 1 to 5. Predicted FMI had high agreement with FMI measured by DEXA. There were no detectable differences in this relation between different ethnic groups. Both BMI and abdominal fat should be used as a proxy to determine adiposity.

L'IMC comme mesure de la masse grasseuse chez l'enfant est très lié à la quantité de graisse abdominale

RÉSUMÉ Nous avons examiné la relation entre la masse grasseuse et l'indice de masse corporelle (IMC) dans une population multiethnique d'enfants obèses. Les scores Z d'IMC ont été comparés aux mesures DEXA relatives à la composition de l'ensemble du corps et à la répartition des graisses dans les différentes régions de l'organisme. La meilleure prédiction de l'indice de masse grasseuse (IMG) était obtenue grâce à l'équation : $1/[(0,159 - 0,013 \times \text{percentile de la graisse abdominale totale}) - (0,01 \times \text{score Z d'IMC})]$, la graisse abdominale étant quantifiée de 1 à 5. On observait une grande concordance entre les prévisions relatives à l'IMG et la mesure de cet indice par la méthode DEXA. Il n'existait pas dans ce rapport de différence détectable entre les groupes ethniques. L'IMC et la graisse abdominale devraient être utilisés comme indicateurs indirects pour déterminer l'adiposité.

¹Service de gastroenterologie et nutrition pédiatrique, Hôpital Necker Enfants malades, Paris, France (Correspondence to A. El Taguri: tajoury@pediatrician.com).

²Department of Family and Community Medicine, Alfateh University, Tripoli, Libyan Arab Jamahiriya.

Received: 10/07/07; accepted: 09/12/07

Introduction

Obesity is a leading underlying cause of morbidity and mortality worldwide. Its prevalence in many developing countries such as in North Africa, the Gulf region, Latin America and the Caribbean is even higher than in some of the industrialized nations [1,2]. The basic process in obesity is the accumulation of excess fat in the body to the extent that health is adversely affected. The diagnosis should ideally be based on the accurate measurement of this amount of excessive fat. Different techniques are used for that purpose. Examples include underwater weighing, total body water, total body electrical conductivity, total body potassium, computed tomography, magnetic resonance, and dual energy X-ray absorptiometry (DEXA). Because of complexity, skills required and cost, the use of these methods is limited to research and validation studies in referral settings as standard methods [3]. In practice, in adults as well as in children, we rely on anthropometric measures such as body mass index (BMI) [4–6]. Reference ranges of BMI for children of predominantly Caucasian populations have been published in a number of countries [4,7,8]. In addition to simplicity, the advantages of BMI include its wide usage across disciplines ranging from international surveillance to individual patient assessment. However, BMI is only a surrogate measure of body fat as it is a ratio of total body weight, not only body fat, to the square of height.

In comparative studies of BMI with standard techniques such as DEXA, the correlation varies from weak to very strong [9,10]. Most validation studies have been conducted in Caucasians in North America and Europe. Ethnic comparisons have been made with African-American and Hispanic groups. Other studies have involved Indonesians, Sri Lankans, Chinese and other

Asians [11–13]. The application of formulas established on 1 population may produce biased estimates when applied to another race. Ethnic- or population-specific predictive equations have to be developed for the assessment of body composition, especially in a multicultural society [12,13].

The interpretation of BMI as a measure of fatness in groups of children and adolescents should be cautious across sex, age, height, muscularity and race groups [10,14,15]. To the best of our knowledge, no study has looked specifically at ethnic groups from North Africa. In addition, in most validation studies, the role of regional body fat distribution [14], the accuracy of BMI in individual obese children [14,16], the use of standard techniques for measuring agreement between different methods [17] and multiple regression were not all looked for simultaneously in the same study.

Our aim was to examine the relationship between BMI and body fat as measured by DEXA in a multiethnic population of obese children that also included children of North African origin.

Methods

Design

We performed a retrospective study based on records from the hospital-based childhood obesity management unit of the Department of Paediatric Gastroenterology and Nutrition of the Hôpital Necker Enfants malades in Paris, France. This specialized unit serves obese children from a multiethnic population in one of the areas with the highest prevalent of obesity in France. The unit is equipped with facilities for sophisticated investigations such as DEXA for body compartment measurements (Hologic Corporation, Waltham, United States of America).

Subjects

Children included in the study were all obese children who attended day care in the unit during the period 1999–2006, and for whom different DEXA measures on body and regional composition were available.

Measures

BMI z-scores were determined using the LMS method for constructing normalized growth standards [18] and referred to French growth curves [4].

DEXA was used to assess composition and regional distribution of body fat. Each subject's body was scanned by DEXA. Whole body fatness was based on the DEXA total body fat (TBF). Whole body fat was adjusted for weight (DEXA percentage body fat, PBF) which was defined as $100 \times \text{fat mass/body weight}$. It was also adjusted for height (DEXA fat mass index, FMI) defined as TBF/height^2 . Regional distribution of fat in the abdomen was expressed as DEXA total abdominal fat (TAF), and was also adjusted for weight (DEXA percentage of abdominal fat, PAF), and height (DEXA abdominal fat index, AFI) defined as TAF/height^2 [19].

Statistical tools and analysis

Statistical packages that were used were: *Epi-Info*, version 6.04 (CDC, Atlanta, USA) for data entry, *SPSS*, base version 13 (SPSS Inc, Chicago, Illinois, USA) for correlations and linear regressions, and *Analyse-it*[®] plus method evaluation (Analyse-it Software Ltd., Leeds, England, UK) for assessing agreement between DEXA body fat composition and values predicted from BMI. Statistical differences were considered significant if the *P*-value was < 0.05 .

Pearson correlation was used to assess the relationship between different body fat measures and BMI metrics for the entire sample and for different subgroups. We

used various combinations for categorizing whole body fat composition, regional distribution and BMI metrics. Since body fat is influenced by many factors, we used multiple regressions to predict whole body fat depending on variables such as BMI, abdominal fat, sex, age and race. ANOVA testing was used to assess the significance of the multiple regression models.

Other standard statistical techniques used were scatter plotting for assessment of linearity, histograms and P-P plot for checking normality of the error term, and transformation/inversion of BMI for correction of heteroscedasticity in the residuals. In multiple regressions, multicollinearity was assessed by tolerance, variance inflation factor, Eigen values and condition indices. Multicollinearity was controlled by rerunning regression with transformed BMI and z-scores, by different categorization of whole body and abdominal fat measures and by stepwise model selection. Bias plots such as the difference plot and the Bland–Altman plot were used for assessing agreement between measuring methods.

Results

During the period of study, 748 obese children attended day care in the unit (Table 1); 59.6% were non-Caucasians. Characteristics of these children, including their regional origins and their anthropometric data, are shown in Table 1. Abdominal fat constituted 42.6% of the total body fat.

Examination of BMI against different body fat measurements such as PBF showed that these variables are suitable for linear regression models. Linearity was more evident when other derivatives of BMI such as $\log\text{BMI}$, inverse BMI and BMI z-score, or adjusted derivatives of body fat such as FMI were used (Figure 1). Pearson correlation

Table 1 Characteristics of the children involved in the study

Variable	No. (%) (n = 748)
Sex	
Boys	324 (43.3)
Girls	424 (56.7)
Geographic origin of mother	
Metropolitan France	310 (41.4)
North Africa	124 (16.6)
Overseas France (mostly the Antilles)	65 (8.7)
Sub-Saharan Africa	51 (6.8)
Other	198 (26.5)
	Mean (SD)
Age (years)	11.66 (2.8)
Anthropometric measures	
BMI (kg/m ²)	30.11 (5.6)
BMI z-score	4.24 (1.0)
Body and regional composition measures	
DEXA body fat (%)	44.21 (8.0)
DEXA abdominal fat (%)	41.78 (5.6)
DEXA total body fat (kg)	32.67 (13.9)
DEXA total abdominal fat (kg)	13.92 (6.56)
DEXA fatty mass index (kg/m ²)	13.61 (4.4)
DEXA abdominal fat index (kg/m ²)	5.78 (2.2)

SD = standard deviation; BMI = body mass index;
DEXA = dual energy X-ray absorptiometry

between BMI and PBF was fair ($r = 0.54$) [20]. Correlations were stronger between BMI and measures such as FMI ($r = 0.89$), PAF ($r = 0.86$) and TAF ($r = 0.90$). Pearson correlation between FMI and AFI was also strong ($r = 0.96$). BMI explained only one-third of the variations in PBF ($R^2 = 0.29$), while it explained more than three-quarters of the variation in FMI ($R^2 = 0.79$).

The correlation between BMI and FMI differed slightly between different groups: boys (0.92) and girls (0.86); age categories (0.89–0.90); geographic origin of the mother, France metropolitan (0.87), North Africa (0.89), Sub-Saharan Africa (0.92),

and France overseas (0.92). In the initial evaluation, the correlation did not differ significantly between those with high AFI (0.88) and low AFI (0.89). Further multi-level division into subgroups showed that the correlation between BMI and FMI was strong ($r > 0.8$) in most of these subgroups. In only 3 of them, the correlation was moderately strong (r ranging from 0.6 to 0.8) (Table 2). Categorizing AFI into percentiles led to a U-shaped correlation between BMI and FMI according to percentile of AFI (Figure 2).

The best model fit, found by stepwise multiple regression, is presented in the following equation: Predicted FMI = $1/[(0.159 - 0.013 \times \text{percentile of TAF}) - (0.01 \times \text{BMI z-score})]$; where percentile of TAF is an ordinal measure ranging from 1 to 5, while BMI z-score is a continuous variable.

In this model, after adding z-score and abdominal fat to the model, none of the remaining predictors was significant. ANOVA testing showed that the model was statistically significant ($P < 0.01$). The model as revealed by its r value of 0.87 was very strong. It explained 75% of changes in FMI (adjusted R^2). The model's ability to explain body fat compares favourably with that of other models that included other ways for expressing BMI, other body fat composition variables, or adjusted abdominal fat measures such as AFI or PAF. It had low collinearity as indicated by high tolerance of 0.92, low variance inflation factor of 1.084, Eigen value far from zero, and a maximum condition index of < 10.52 . Using other predictors such as BMI or logBMI increased collinearity with sex, age, and/or race, as indicated by collinearity diagnostics, without significant gain in correlation strength.

Comparison of the predicted FMI from the proposed equation with DEXA measured FMI showed high agreement as re-

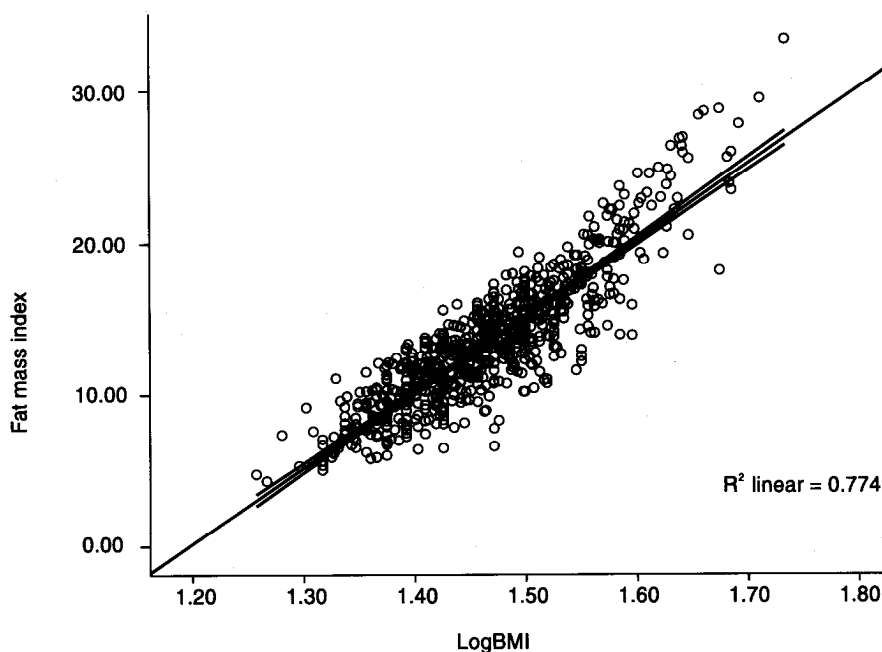


Figure 1 Linear relationship between fatt mass index and logBMI ($n = 683$)

vealed by the 2 bias plots, the difference plot and the Bland–Altman plot (Figures 3a and 3b). The 2 methods agreed in 99.8% of measures.

Discussion

BMI is a more reliable measure of fatness than measures such as triceps skin-fold thickness [6]. Still, it is not a precise estimate of the underlying proportion of fat and lean tissue as subjects with the same BMI value do not necessarily have similar levels of obesity [6,21]. In the current study, BMI explained only one-third of PBF, which is within the wide range of 14%–81% found in previous studies [9].

Many previous studies have assessed the ability of BMI to diagnose obesity within a group of the normal population by calculat-

ing sensitivity, specificity, predictive values, receiver operated characteristic curves and area under the curve in comparison to standard techniques [22]. Few studies have assessed BMI in obese children rather than in the normal population [14,16] and the role of abdominal fat has rarely been studied [14,23]. In our study, we had no data on maturational stage, but previous studies have shown that this was not an important factor in either sex [3,24].

The strength of the correlation between BMI and body fat measures previously found ranged from moderate to very strong. Few studies have used BMI z-scores or logBMI [3,22,24]. Using BMI z-score or logBMI and TBF gave stronger correlations than using BMI and PBF [3,9,10,14,22]. This may be related to the curvilinear relationship between BMI and both PBF and

Table 2 Pearson correlation between body mass index and high and low fat mass index in obese children by age group (n = 501)

	Boys						Girls					
	Metropolitan France		North Africa		Sub-Saharan Africa		Metropolitan France		North Africa		Sub-Saharan Africa	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Age 1-10 years												
Number	28	31	23	1	6	2	10	3	17	9	10	5
Correlation	0.88**	0.91**	0.95**	-	0.94**	-	0.87**	0.87	0.83**	0.94**	0.88**	0.96*
Age ≥ 11 years												
Number	29	33	14	15	1	0	29	8	11	20	13	8
Correlation	0.66**	0.81**	0.88**	0.64*	-	-	0.91**	0.82*	0.94**	0.95**	0.94**	0.95**

*Correlation significant at $P < 0.05$; ** Correlation significant at $P < 0.01$.

- No measurement possible.

FMI [25,26]. As in the current study, the use of height-adjusted body fatness indices such as FMI had advantages over unadjusted measures such as TBF or weight-adjusted measures such as PBF in children [25]. FMI is discrete, easy to measure and is expressed in the common unit of BMI [25].

Previous studies have shown that correlations are not equal in the subgroups of sex, age and race. Stronger correlations have been found in girls [9,22], preadolescents and early adolescents [16,27]. For the same BMI values, Hispanic and Asian children have higher PBF, while African-American children have lower PBF values than white children with the same BMI value. Furthermore, ethnic differences were not equal in both sexes [13,28,29]. Studies have shown also that ethnic and gender differences are age-related. In boys, the age-related increase in BMI is accompanied by relatively small changes in FMI, whereas in girls, the age-related increase occurs with a doubling in FMI [25]. In our study, when we stratified sex, age and race subgroups according to abdominal fat content, the strength of correlations in all the subgroups was comparable.

From the current study, the model that best predicted whole body fat with least collinearity was the model incorporating both BMI z-score and abdominal fat. Previous regression models in similar studies have reported that variables such as sex, age and race were significant contributors in the equation [14,24]. It is understandable that when we use BMI z-score, we would not normally need to adjust for age and sex since the BMI z-scores are already age- and sex-adjusted. BMI z-score and LogBMI are superior to BMI alone. This is why it is preferable to use BMI z-score rather than BMI percentile when we need to explain PBF [3] or monitor weight management interventions [30]. When BMI is used, a decrease

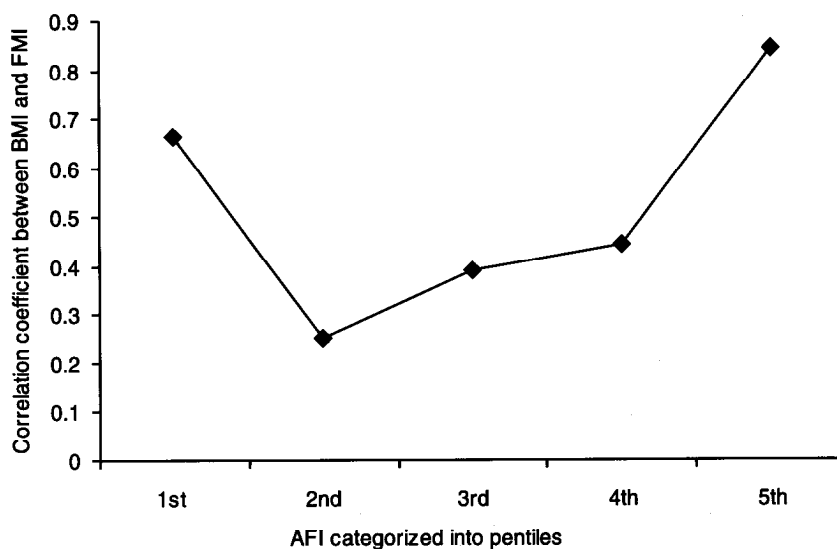


Figure 2 U-shaped correlation between body mass index (BMI) and fat mass index (FMI) according to category of abdominal fat as measured by abdominal fatty index (AFI) ($n = 683$)

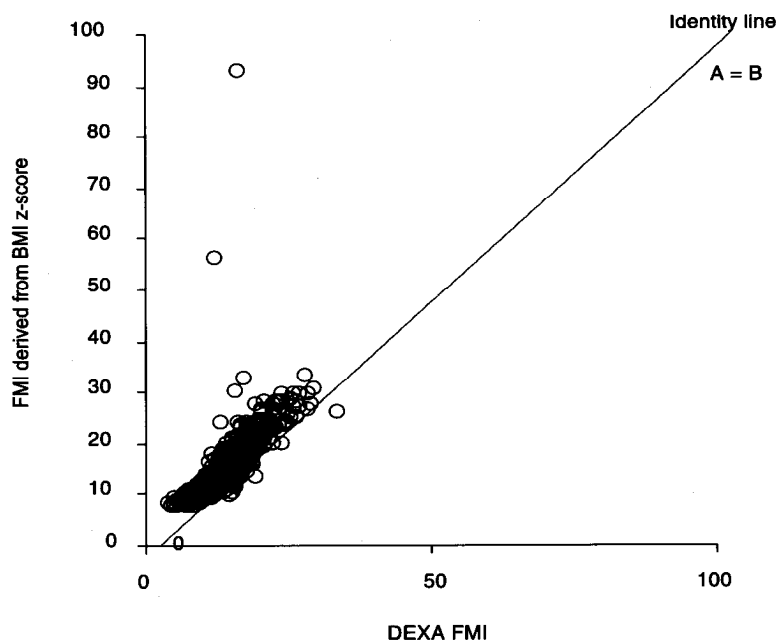


Figure 3a Difference between predicted fat mass index (FMI) and FMI measured by DEXA in obese children ($n = 683$). Predicted FMI = $1 / [(0.159 - 0.013 \times \text{percentile of total abdominal fat}) - (0.01 \times \text{BMI z-score})]$

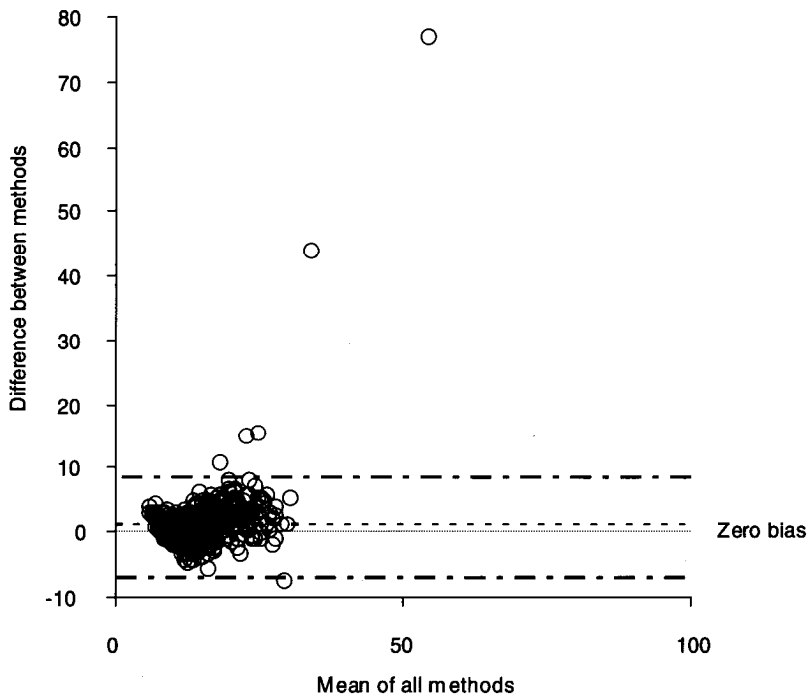


Figure 3b Bland–Altman plot comparing the predicted fat mass index (FMI) and the FMI measured by DEXA in obese children ($n = 683$). The 2 measures agreed in 99.8% of cases. Predicted FMI = $1/[(0.159 - 0.013 \times \text{percentile of total abdominal fat}) - (0.01 \times \text{BMI z-score})]$.

in BMI for a young boy does not have the same meaning as the same decrease in BMI for an older girl.

The absence of ethnic differences found in our study has been previously noted in some other studies [3,27]. Ethnic differences have been attributed to abnormal trunk/leg proportions that could distort the results of BMI and body fat [31]. These ethnic differences may also be attributed to differences in body regional distribution of fat. Previous studies have shown that African-Americans have less intra-abdominal adipose tissue than their Caucasian counterparts [32]. These differences are believed to be acquired since racial differences in regional body composition disappear when

socioeconomic and dietary feeding practices are controlled for [33].

The model in the current study indicates the importance of abdominal fat in whole body fat and its relation with BMI. Some of the previous studies in adults and in children have also noted the importance of abdominal fat in whole body fat [14,34]. The current study postulates that the imprecision seen in BMI as a measure of body fat composition in sex, age and ethnic subgroups may be due to differences in abdominal fat content. These differences in the correlation of BMI to body fat disappear when controlled for by abdominal fat. In addition, the effect of abdominal fat on whole body fat is not necessarily linear, since we only picked

up these differences when abdominal fat values were stratified into 4 or 5 categories. This finding is in line with previous findings that there are particular points at which the abdominal region becomes or ceases to be the main location for storage of fat in body [35]. The contribution of accumulation of fat in the abdomen differs from its accumulation in the whole body as it is less related to height or surface area of the body. In our study no data were available on the waist circumference of the children. Using waist circumference rather than only DEXA-measured abdominal fat would have been useful, as this would have facilitated translation of our findings to daily practice by the construction of a nomogram for prediction of FMI from both BMI z-score and waist circumference.

Correlations measure the degree of association but they do not provide informa-

tion on the accuracy of the measures being correlated. When evaluating the merits of a measure, it is advisable to consider more than the correlation coefficient [3,17]. So we wanted to test whether estimation of FMI from BMI using the equation given earlier could serve as a proxy for DEXA-obtained-FMI in all sex, age and race subgroups. The results of the 2 bias plots showed that the 2 measures are nearly identical and can be used interchangeably.

BMI is a useful measure for total body fat across different ethnic groups, including North Africans and Sub-Saharan Africans, but its use in all ethnic groups is dependant on the amount of deposited abdominal fat. In follow-up of individual children, both BMI and abdominal fat should be looked at as a proxy method to determine whole body fat.

References

1. De Onis M, Blossner M. Prevalence and trends of overweight among preschool children in developing countries. *American journal of clinical nutrition*, 2000, 72:1032–9.
2. Popkin BM. Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. *American journal of clinical nutrition*, 2006, 84:289–98.
3. Field AE et al. Which metric of relative weight best captures body fatness in children? *Obesity research*, 2003, 11:1345–52.
4. Rolland-Cachera MF, et al. Body mass index variations: centiles from birth to 87 years. *European journal of clinical nutrition*, 1991, 45:13–21.
5. *Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee*. Geneva, World Health Organization, 1995.
6. Dietz WH, Bellizzi MC. Introduction: the use of body mass index to assess obesity in children. *American journal of clinical nutrition*, 1999, 70:123S–5S.
7. Must A, Dallal GE, Dietz WH. Reference data for obesity: 85th and 95th percentiles of body mass index (wt/ht^2) and triceps skinfold thickness. *American journal of clinical nutrition*, 1991, 53:839–46.
8. Cole TJ, Freeman JV, Preece MA. Body mass index reference curves for the UK, 1990. *Archives of disease in childhood*, 1995, 73:25–9.
9. Maynard LM et al. Childhood body composition in relation to body mass index. *Pediatrics*, 2001, 107:344–50.
10. Pietrobelli A et al. Body mass index as a measure of adiposity among children and

- adolescents: a validation study. *Journal of pediatrics*, 1998, 132:204–10.
11. Gurrici S et al. Relationship between body fat and body mass index: differences between Indonesians and Dutch Caucasians. *European journal of clinical nutrition*, 1998, 52:779–83.
 12. Wickramasinghe VP et al. Impact of ethnicity upon body composition assessment in Sri Lankan Australian children. *Journal of paediatrics and child health*, 2005, 41:101–6.
 13. He M et al. Body fat determination by dual energy X-ray absorptiometry and its relation to body mass index and waist circumference in Hong Kong Chinese. *International journal of obesity and related metabolic disorders*, 2001, 25:748–52.
 14. Daniels SR, Khoury PR, Morrison JA. The utility of body mass index as a measure of body fatness in children and adolescents: differences by race and gender. *Pediatrics*, 1997, 99:804–7.
 15. Himes JH, Dietz WH. Guidelines for overweight in adolescent preventive services: recommendations from an expert committee. The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services. *American journal of clinical nutrition*, 1994, 59:307–16.
 16. Lazarus R et al. Body mass index in screening for adiposity in children and adolescents: systematic evaluation using receiver operating characteristic curves. *American journal of clinical nutrition*, 1996, 63:500–6.
 17. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet*, 1986, 1:307–10.
 18. Cole TJ. The LMS method for constructing normalized growth standards. *European journal of clinical nutrition*, 1990, 44:45–60.
 19. VanItallie TB et al. Height-normalized indices of the body's fat-free mass and fat mass: potentially useful indicators of nutritional status. *American journal of clinical nutrition*, 1990, 52:953–9.
 20. Chan YH. Biostatistics 104: correlational analysis. *Singapore medical journal*, 2003, 44:614–9.
 21. Flegal KM, Wei R, Ogden C. Weight-for-stature compared with body mass index-for-age growth charts for the United States from the Centers for Disease Control and Prevention. *American journal of clinical nutrition*, 2002, 75:761–6.
 22. Mei Z et al. Validity of body mass index compared with other body-composition screening indexes for the assessment of body fatness in children and adolescents. *American journal of clinical nutrition*, 2002, 75:978–85.
 23. Lean ME, Han TS, Deurenberg P. Predicting body composition by densitometry from simple anthropometric measurements. *American journal of clinical nutrition*, 1996, 63:4–14.
 24. Taylor RW et al. Identifying adolescents with high percentage body fat: a comparison of BMI cutoffs using age and stage of pubertal development compared with BMI cutoffs using age alone. *European journal of clinical nutrition*, 2003, 57:764–9.
 25. Demerath EW et al. Do changes in body mass index percentile reflect changes in body composition in children? Data from the Fels Longitudinal Study. *Pediatrics*, 2006, 117:e487–95.
 26. Chang CJ et al. Low body mass index but high percent body fat in Taiwanese subjects: implications of obesity cutoffs. *International journal of obesity and related metabolic disorders*, 2003, 27:253–9.
 27. Sampei MA et al. Comparison of the body mass index to other methods of body fat evaluation in ethnic Japanese and

- Caucasian adolescent girls. *International journal of obesity and related metabolic disorders*, 2001, 25:400–8.
28. Deurenberg P, Yap M, van Staveren WA. Body mass index and percent body fat: a meta analysis among different ethnic groups. *International journal of obesity and related metabolic disorders*, 1998, 22:1164–71.
29. Wang J et al. Asians have lower body mass index (BMI) but higher percent body fat than do whites: comparisons of anthropometric measurements. *American journal of clinical nutrition*, 1994, 60:23–8.
30. Kirk S et al. The relationship of health outcomes to improvement in BMI in children and adolescents. *Obesity research*, 2005, 13:876–82.
31. Norgan NG. Population differences in body composition in relation to the body mass index. *European journal of clinical nutrition*, 1994, 48(Suppl. 3):S10–25, discussion S26–7.
32. Freedman DS et al. The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics*, 1999, 103:1175–82.
33. Freedman DS et al. Racial differences in the tracking of childhood BMI to adulthood. *Obesity research*, 2005, 13:928–35.
34. Saelens BE et al. Visceral abdominal fat is correlated with whole-body fat and physical activity among 8-y-old children at risk of obesity. *American journal of clinical nutrition*, 2007, 85:46–53.
35. Radic R et al. Ultrasound measurement in defining the regional distribution of subcutaneous fat tissue. *Collegium antropologicum*, 2002, 26(Suppl.):59–68.

CD95 expression in white blood cells of malnourished infants during hospitalization and catch-up growth

M.F. Nassar,¹ S.R. El-Batrawy² and N.M. Nagy³

تعبير الواسمة CD95 في الكريات البيض لدى الرضع سيئي التغذية أثناء دخولهم المستشفى وخلال فترة النمو التداخلي

مي فؤاد نصار، سلوى رضا البطراوي، نادية ناجي

الخلاصة: لا يزال سوء التغذية يمثل أحد الأعباء الصحية الرئيسية في البلدان النامية. وقد أجرى الباحثون تقديراً للقياس الخلوي والجريان لأحد واسمات الاستماتة CD95 في عدلات ولمفاويات ووحيدات الدم المحيطي لدى 18 رضيعاً يعانون من سوء التغذية بالطاقة والبروتين بدون وذمات، إلى جانب 12 رضيعاً مصابين بالوذمات، وذلك عند إدخالهم المستشفى وبعد إجراء التأهيل التغذوي لهم تحت الإشراف، مع مقارنة ذلك كله بنتائج مستمدة من 12 حالة شاهدة. ووجد الباحثون أن تعداد الواسمة CD95 في كل من العدلات واللمفاويات والوحيدات أعلى بمقدار يُعتد به إحصائياً لدى الرضع الذين يعانون سوء التغذية بالطاقة والبروتين، وتحسنت تلك النتائج بعد التأهيل التغذوي لكن دون الوصول إلى مقاديرها لدى الشواهد. وقد تكون الاستماتة المحفزة في الدم المحيطي لدى مرضى سوء التغذية بالطاقة والبروتين واسمة لزيادة العدوى وللاضطرابات المناعية؛ ويعود هذا الخلل لسابق عهده بعد التأهيل التغذوي المناسب.

ABSTRACT Malnutrition continues to be a major health burden in developing countries. Flow cytometric estimation of the apoptotic marker CD95 in peripheral neutrophils, lymphocytes and monocytes was done for 18 infants with non-oedematous protein energy malnutrition (PEM) and 12 oedematous ones, on hospital admission and after supervised nutritional rehabilitation, and compared with 12 matched controls. CD95 counts in the 3 types of white blood cells were significantly higher in PEM infants and showed improvement after nutritional rehabilitation yet not reaching the control values. Enhanced apoptosis in the leukocytes of peripheral blood of PEM patients may be a marker of increased infection and immune disturbances. This derangement reverses upon proper nutritional rehabilitation.

Expression de CD95 dans les leucocytes des nourrissons souffrant de malnutrition pendant l'hospitalisation et lors du rattrapage de croissance

RÉSUMÉ La malnutrition continue de faire peser un lourd fardeau sanitaire sur les pays en développement. Une estimation par cytométrie en flux du marqueur apoptotique CD95 dans les neutrophiles, lymphocytes et monocytes périphériques a été réalisée chez 18 nourrissons présentant une malnutrition protéino-énergétique (MPE) sous sa forme non œdémateuse et chez 12 sous sa forme œdémateuse, lors de l'hospitalisation et après réadaptation nutritionnelle contrôlée ; les résultats ont ensuite été comparés à ceux de 12 témoins appariés. L'expression de CD95 dans les trois types de globules blancs était significativement plus élevée chez les nourrissons atteints de MPE et s'améliorait après la réadaptation nutritionnelle sans toutefois atteindre les valeurs témoins. Une augmentation de l'apoptose dans les leucocytes du sang périphérique des patients atteints de MPE peut être un marqueur d'infection accrue et de troubles immunitaires. Ce dérèglement disparaît avec une réadaptation nutritionnelle appropriée.

¹Department of Paediatrics; ²Department of Clinical Pathology, Faculty of Medicine, Ain Shams University, Cairo, Egypt (Correspondence to M.F. Nassar: maie_nassar@yahoo.co.uk).

³Department of Anthropology, National Research Centre, Cairo, Egypt.

Received: 30/01/07; accepted: 14/03/07

Introduction

Malnutrition, both protein–energy malnutrition (PEM) and micronutrient deficiencies, continues to be a major health burden in developing countries. Globally it is the most important risk factor for illness and death. In these communities, a high prevalence of both poor diet and infectious disease exist in a vicious circle [1].

PEM in children is frequently associated with an increased incidence of bacterial, fungal and viral infections [2] and is the most common cause of secondary immunodeficiency [3–5]. Human and murine studies confirm that there is a significant degree of host immunosuppression in PEM, leading to increased morbidity and mortality. Apoptosis is a well-recognized process of cell death occurring as a series of changes in dying cells under several physiological conditions [6,7] and has been implicated as an important mediator in the immunosuppression observed in several disease states [8]. Lymphocyte apoptosis has been described in peripheral blood and lymphatic organs during infection [9].

Blood cells with receptors for the apoptotic marker CD95 (Fas antigen) can be identified in peripheral blood using flow cytometry [10] or polymerase chain reaction assay [11]. Identification of CD95 on various cells in the body was previously reported to be helpful in the diagnosis of a number of diseases and disorders [12,13]. Enhanced apoptosis in PEM patients was previously reported [14], but only on the peripheral blood lymphocytes using annexin V expression, which is not a direct cellular marker of apoptosis as CD95 expression.

This study of infants with PEM in Egypt was designed to assess CD95 expression to elucidate the apoptotic changes in different types of peripheral white blood cell (WBC) in the 2 subtypes of PEM, oedematous and non-oedematous, and to correlate

these findings with the patients' clinical and laboratory parameters. Moreover, we aimed to assess the use of CD95 expression as a marker for following up these patients during their nutritional rehabilitation and its usefulness in predicting the prognosis of PEM patients.

Methods

Patients

The current study was performed on 42 infants recruited from the Children's Hospital, Ain Shams University, Cairo, Egypt during the period October 2005 to March 2006. The sample comprised 30 infants suffering from PEM and 12 clinically healthy age- and sex-matched controls. Infants suffering from chronic illnesses, chromosomal abnormalities and those on medication prior to enrolment were excluded from the study.

The infants with PEM were categorized into 2 groups according to Heird [15]. There were 18 non-oedematous infants (8 males and 10 females) with mean age 10.78 [standard deviation (SD) 4.72] months and 12 oedematous (4 males and 8 females) with mean age 11.67 (SD 4.92) months. They had appropriate birth weight and all had a dietetic cause for their condition starting after the first 6 months of life.

The controls were recruited among those presenting for dietetic advice, vaccination or circumcision (in males) at the outpatient clinic in the Children's Hospital, Ain Shams University. The control infants, 4 males and 8 females with mean age 13.17 (SD 6.45) months, had anthropometric measurements within the normal percentiles for their age and sex according to Ogden et al. [16].

Data collection

After obtaining the approval of the ethics committee at Ain Shams University Children's Hospital, informed written consent

was obtained from the parents or legal guardians.

The parents of all the PEM cases and controls were asked to give a detailed dietary history, using a questionnaire written in simple Arabic language, with 24-hour recall of feeding.

All case and control children were given a thorough clinical examination, with collection of anthropometric measurements (weight, height, skull circumference and mid-arm circumference) to detect the type and degree of malnutrition in cases as well as a systemic examination to detect any other systems affected. Weight was measured on an electronic scale with minimal clothing and without shoes. Length was measured to the nearest 0.1 cm with a portable measuring board using standard procedures [17]. Skull circumference was measured to the nearest 0.1 cm with a metal tape. Weight, height and skull circumference were plotted against the percentiles to obtain the percentage of the median for age according to Ogden et al. [16]. Mid-arm circumference was measured at the middle of the left arm to the nearest 0.1 cm.

For the laboratory workup clotted, venous blood and EDTA blood were collected under aseptic conditions from all children. Serum samples were used for the determination of serum albumin, urea, creatinine, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) (Synchro CX-5 Delta, Beckman Instruments, California, United States of America) and C-reactive protein (CRP). The EDTA blood was used for complete blood count (CBC) (Coulter T660, Miami, United States of America) as well as estimation of CD95 in 3 types of WBC (neutrophils, lymphocytes and monocytes) by flow cytometry. The 3 cell types were separated by their forward versus side scatter distribution on plots.

After 2 months $\pm$ 2 weeks of supervised nutritional rehabilitation according to the

WHO [18], re-evaluation of the PEM infants was done using the same pre-intervention measurements and investigations.

Nutritional rehabilitation

After the management of life-threatening and emergency conditions in the PEM infants, supervised feeding was started. Caloric intake during the first week of treatment was 80–100 kcal/kg/day, keeping in mind the continuity of breastfeeding in the case of breastfed infants. The diet given was low in protein, fat and sodium and high in carbohydrates, as almost all severely malnourished infants have infections, impaired liver and intestinal functions and problems related to electrolyte imbalance.

With the return of the infant's appetite, the calorie intake was increased to 150–200 kcal/kg/day with increases in the amounts and decreases in the frequency. A high-protein diet was given and vitamins and minerals (potassium, magnesium and zinc) were continued in increased amounts. Iron was given during this stage to treat anaemia. The infant remained in hospital for the first part of this rehabilitation phase (3 weeks after admission), and was then followed up in the nutritional rehabilitation outpatient clinic.

Statistical analysis

Statistical analysis was done using SPSS, version 10 and *Statistica*, version 5. The Kolmogorov–Smirnov test was used to detect non-parametric data. Student *t*-test was used for parametric data and Mann–Whitney test for non-parametric data. To compare values before and after nutritional rehabilitation, paired *t*-test was used for parametric data and Wilcoxon signed rank test for non-parametric data. Correlation studies were also done. The numerical data were represented as mean (SD) and median (interquartile range). The differences were considered significant at $P < 0.05$.

Results

Anthropometric measurements were lower in non-oedematous and oedematous PEM infants compared with controls (Table 1). These showed significant improvement after nutritional rehabilitation (but still did not reach the control values in most of the infants) except for the mid-arm circumference in oedematous patients which showed almost no change at follow-up (Table 2). Serum albumin and haemoglobin levels showed significant improvement before and after nutritional rehabilitation without reaching the control values (Tables 1 and 2). Total leukocyte count was significantly higher in both PEM groups compared with the controls and decreased after nutritional rehabilitation (Tables 1 and 2).

There were no significant differences in the anthropometric measurements and laboratory parameters between the oedematous and non-oedematous PEM patients, except for significantly lower weight and higher serum albumin in the non-oedematous group (Table 1). Liver and kidney functions were within the normal range for age and sex from the start of the study, according to Nicholson and Pesce [19].

The CD95 counts in peripheral neutrophils and lymphocytes in PEM infants, oedematous and non-oedematous, were significantly higher compared with the controls (Table 3). CD95 levels in monocytes were also higher in PEM infants compared with controls, but this was only significant for the non-oedematous group (Table 3). There was also a non-significant difference between the non-oedematous and oedematous PEM patients as regards the CD95 level in the 3 WBCs (Table 3). The CD95 expression in the 3 types of cell showed improvement after nutritional rehabilitation, although not reaching control values, but this was significant only for neutrophils and lymphocytes (Figures 1–3).

Although CD95 expression in neutrophils showed no significant correlation with weight-for-age, it showed significant negative correlation with each of the initial values in the PEM patients for percentage length-for-age ($r = -0.39$; $P < 0.05$), skull circumference ($r = -0.67$; $P < 0.001$) and serum albumin ($r = -0.36$; $P < 0.05$), with no significant difference after nutritional rehabilitation ($r = -0.04$, $r = -0.13$ and $r = -0.21$ respectively; $P > 0.05$ for all). Additionally, significant positive correlation was found between CD95 expression in neutrophils and initial and follow-up CRP values in PEM infants ($r = 0.80$; $P < 0.001$ and $r = 0.36$; $P < 0.05$ respectively).

Discussion

The present study showed enhanced apoptotic tendency in the 3 types of WBC in PEM patients, regardless of the type of malnutrition. Increased CD95 expression was evident in the neutrophils, lymphocytes and monocytes. Neutrophils are known to protect the body against pyogenic infections. Their function is closely related to that of lymphocytes and macrophages (activated monocytes in tissues) [20]. Thus the results of our study suggest that the body's protection against infection is impaired in PEM patients, as shown by the significant positive correlation between CD95 expression in neutrophils and CRP values in PEM patients. Additionally, the increased apoptotic tendency detected here depended on the severity of the PEM condition since it showed a significant negative correlation with the initial anthropometric measurements and serum albumin.

The enhanced apoptosis we found in PEM patients agrees with El-Hodhod et al., although they detected increased apoptotic tendency only in peripheral blood lymphocytes of PEM patients using annexin V

Table 1 Anthropometric measurements and laboratory parameters of infants with non-oedematous and oedematous protein-energy malnutrition before nutritional rehabilitation compared with controls

Variable	Mean $\pm$ SD or Median (interquartile range)			Group 1 vs 3	t or z value ^a	
	Non-oedematous Group 1 (n = 18)	Oedematous Group 2 (n = 12)	Control Group 3 (n = 12)		Group 2 vs 3	Group 1 vs 2
Weight (% of median for age)	51.80 (10.05)	70.29 (9.93)	99.90 (14.16)	-4.58 ^a , <i>P</i> < 0.001	-4.17 ^a , <i>P</i> < 0.001	-3.39 ^a , <i>P</i> < 0.001
Length/height (% of median for age)	86.24 $\pm$ 4.96	86.94 $\pm$ 5.94	96.54 $\pm$ 1.64	-6.91, <i>P</i> < 0.001	-5.39, <i>P</i> < 0.001	-0.35, <i>P</i> > 0.05
Skull circumference (% of median for age)	95.04 (6.59)	90.24 (10.14)	98.69 (2.47)	-4.24 ^a , <i>P</i> < 0.001	-4.17 ^a , <i>P</i> < 0.001	-1.36 ^a , <i>P</i> > 0.05
Mid-arm circumference (cm)	9.50 (1.38)	10.75 (1.50)	12.50 (2.00)	-4.26 ^a , <i>P</i> < 0.001	-3.17 ^a , <i>P</i> < 0.01	-1.55 ^a , <i>P</i> > 0.05
Serum albumin (g/dL)	3.70 (0.55)	1.95 (0.40)	4.25 (0.60)	-3.84 ^a , <i>P</i> < 0.001	-4.17 ^a , <i>P</i> < 0.001	-4.59 ^a , <i>P</i> < 0.001
Haemoglobin (g/dL)	8.30 (1.28)	8.30 (0.80)	10.90 (1.80)	-4.58 ^a , <i>P</i> < 0.001	-4.06 ^a , <i>P</i> < 0.001	-0.90 ^a , <i>P</i> > 0.05
Total leukocyte count (/mm ³)	11.91 $\pm$ 3.10	13.33 $\pm$ 1.65	8.20 $\pm$ 1.06	-3.98, <i>P</i> < 0.001	-9.07, <i>P</i> < 0.01	-1.45, <i>P</i> > 0.05
C-reactive protein (mg/L)	48.00 (48.00)	24.00 (36.00)				-1.14 ^a , <i>P</i> > 0.05

*Non-parametric data were detected by Kolmogorov-Smirnov test and presented as median (interquartile range). The test of significance was Mann-Whitney test. SD = standard deviation.

Table 2 Anthropometric measurements and laboratory parameters of infants with non-oedematous and oedematous protein-energy malnutrition and values before and after nutritional rehabilitation

Variable	Mean $\pm$ SD or Median (interquartile range)				t or z value ^a	t or z value ^a
	Non-oedematous (n = 18)		Oedematous (n = 12)			
	Before	After	Before	After		
Weight (% of median for age)	51.80 (10.05)	85.84 (6.04)	70.29 (9.93)	85.00 (7.19)	-3.73 ^a , P < 0.001	-3.07 ^a , P < 0.01
Length/height (% of median for age)	86.86 (9.41)	92.90 (2.59)	87.73 (8.54)	90.54 (7.30)	-3.73 ^a , P < 0.001	-3.07 ^a , P < 0.01
Skull circumference (% of median for age)	95.04 (6.59)	95.78 (3.16)	90.24 (10.14)	96.68 (4.35)	-3.73 ^a , P < 0.001	-3.07 ^a , P < 0.01
Mid-arm circumference (cm)	9.50 (1.38)	13.50 (2.75)	10.75 (1.50)	10.35 (0.50)	-3.74 ^a , P < 0.001	-1.19 ^a , P > 0.05
Serum albumin (g/dL)	3.70 (0.55)	4.20 (0.73)	1.95 (0.40)	2.95 (0.20)	-3.28 ^a , P < 0.001	-3.09 ^a , P < 0.01
Haemoglobin (g/dL)	8.30 (1.28)	9.70 (0.78)	8.30 (0.80)	9.75 (0.90)	-3.74 ^a , P < 0.001	-3.08 ^a , P < 0.01
Total leukocyte count (/mm ³)	11.91 $\pm$ 3.10	8.44 $\pm$ 1.51	13.33 $\pm$ 1.65	9.63 $\pm$ 2.64	7.27, P < 0.001	5.54, P < 0.001
C-reactive protein (mg/L)	48.00 (48.00)	6.00 (7.50)	24.00 (36.00)	3.00 (12.00)	-3.76 ^a , P < 0.001	-3.09 ^a , P < 0.01

^aNon-parametric data were detected by Kolmogorov-Smirnov test and presented as median (interquartile range). The test of significance was Wilcoxon matched pairs test.

SD = standard deviation.

Table 3 CD95 levels in peripheral blood cells of infants with non-oedematous and oedematous protein-energy malnutrition before nutritional rehabilitation compared with controls

Variable	Mean $\pm$ SD or Median (interquartile range)	Group 1 vs 3	t or z value ^a Group 2 vs 3	Group 1 vs 2
	Non-oedematous Group 1 (n = 18)	Oedematous Group 2 (n = 12)	Control Group 3 (n = 12)	
Neutrophil CD95 (%)	34.97 $\pm$ 7.08	39.10 $\pm$ 13.95	22.23 $\pm$ 4.85	5.42, $P < 0.01$
Lymphocyte CD95 (%)	50.90 (11.53)	47.20 (10.30)	37.80 (2.80)	-2.54 ^a , $P < 0.05$
Monocyte CD95 (%)	8.64 (4.02)	7.36 (2.77)	6.08 (2.65)	-2.38 ^a , $P < 0.05$

^aNon-parametric data were detected by Kolmogorov-Smirnov test and presented as median (interquartile range). Test of significance was Mann-Whitney test.

SD = standard deviation.

assay [14]. They correlated this finding with the increased incidence of infection in their series of patients. Our results also agree with previous murine studies. Enhanced macrophage apoptosis in a murine model of PEM was reported by Rivadeneira et al. [8]. As in our study and that of El-Hodhod et al. [14], they suggested that their findings may help to explain the associated immune dysfunction observed in malnutrition.

Additionally, Reddy Avula et al. reported increased Fas and Fas-L gene expression which closely correlated with enhanced apoptosis of lymphocytes in mice fed caloric-restricted diets [21]. An interesting aspect of this finding was raised by these authors. They suggested that this may contribute to the known beneficial effects of calorie restriction such as prolongation of lifespan by activating chronic physiologically mediated apoptosis.

Disturbed levels of macro- and micro-nutrients that occur in PEM could be the cause of the enhanced apoptosis seen here. For instance, deprivation of various amino acids or glucose induces cell cycle arrest and cell death [22]. Additionally, folate deficiency enhances apoptosis in lymphocytes [23] and studies of zinc deficiency have become important for demonstrating that nutritional imbalances can readily induce apoptosis in a variety of cell types [24]. Moreover, Savino reported that malnutrition secondary to deficiency in uptake of proteins, metal elements or vitamins, consistently results in changes in the thymus gland [25]. Thus these macro- and micro-nutrient deficiencies can act directly or via apoptosis-induced thymocyte depletion. In fact, in 2001, Ortiz et al. proposed a theory for enhanced apoptosis in experimentally malnourished rats: the greater levels of spontaneously apoptotic cells associated with malnutrition could be related to alterations of the microenvironment of the

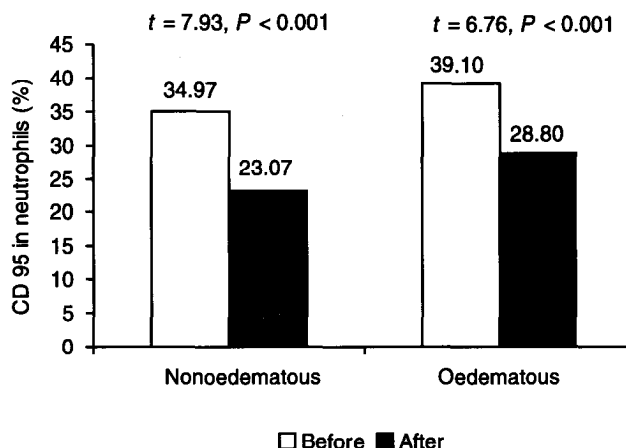


Figure 1 Neutrophil CD95 levels in infants with non-oedematous and oedematous protein-energy malnutrition before and after nutritional rehabilitation

thymus and/or to an obstruction of early thymocyte maturation [7].

We can speculate that this enhanced apoptosis detected in PEM patients could be attributed to either the malnourished status

itself or be a consequence of the recurrent infections. What favours the former theory is the demonstration of improved apoptotic process on nutritional rehabilitation accompanied by clinical improvement, despite the

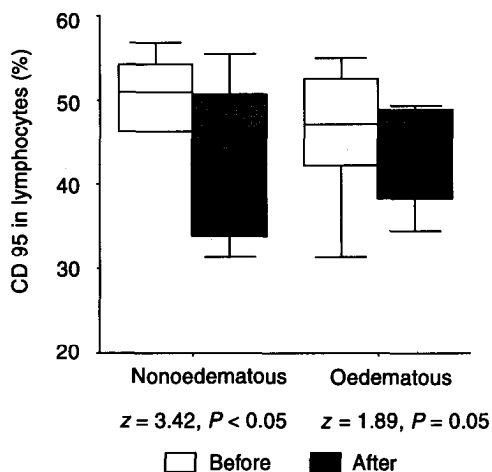


Figure 2 Lymphocyte CD95 levels in infants with non-oedematous and oedematous protein-energy malnutrition before and after nutritional rehabilitation

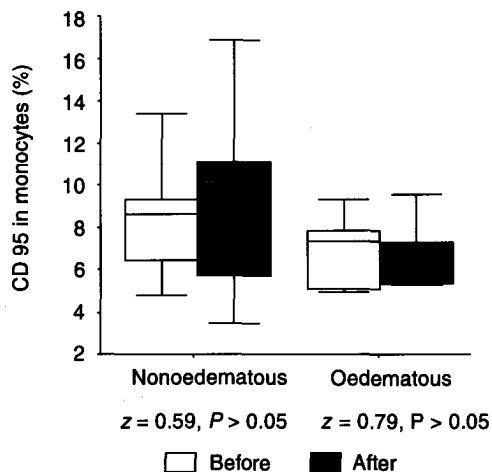


Figure 3 Monocyte CD95 levels in infants with non-oedematous and oedematous protein-energy malnutrition before and after nutritional rehabilitation

persistence of the significant correlation between CD95 expression on neutrophils and CRP.

Enhanced apoptosis could explain the pathogenesis of many organ dysfunctions that occur in PEM patients, for instance, cardiac malfunctions as described by El-Sayed et al. [26] and exocrine pancreatic dysfunction reported by El-Hodhod et al. [14]. This suggestion awaits further verification on appropriate animal models.

In conclusion, there is enhanced apoptosis in the peripheral blood of PEM patients, regardless of the type of PEM, and this is suggested as a cause of increased infection and immune disturbances in those patients.

Larger-scale studies are suggested to further elucidate this point and demonstrate the enhanced apoptotic tendency in other types of blood cell and subpopulations of lymphocytes as well as various other organs to emphasize the role of apoptosis in the morbidity and mortality from such disease. Although this apoptotic tendency reverses with proper nutritional rehabilitation, follow-up studies are also recommended to verify the point raised by other authors about the beneficial effects of calorie restriction in prolongation of lifespan, bearing in mind that in PEM, calorie restriction would have occurred only at an early period of the patient's life.

References

1. Muller O, Krawinkel M. Malnutrition and health in developing countries. *Canadian Medical Association journal*, 2005, 173(3):279–86.
2. Schopfer K, Douglas SD. Neutrophil function in children with kwashiorkor. *Journal of laboratory and clinical medicine*, 1976, 88:450–6.
3. Chandra RK. Marginal malnutrition and immunocompetence. In: Harper AE, Davis GK, eds. *Symposia from the XIIth International Congress on Nutrition*. New York, Alan R Liss, 1981:261–5.
4. Fraker PJ, King LE. A distinct role for apoptosis in the changes in lymphopoiesis and myelopoiesis created by deficiencies in zinc. *FASEB journal*, 2001, 15(14):2572–8.
5. Islam Z et al. Endotoxin potentiation of trichothecene-induced lymphocyte apoptosis is mediated by up regulation of glucocorticoids. *Toxicology and applied pharmacology*, 2002, 180(1):43–55.
6. Howie SE, Harrison DJ, Wyllie AH. Lymphocyte apoptosis: mechanisms and implications in disease. *Immunological reviews*, 1994, 142:141–56.
7. Ortiz R et al. Flow cytometric analysis of spontaneous and dexamethasone-induced apoptosis in thymocytes from severely malnourished rats. *British journal of nutrition*, 2001, 86(5):545–8.
8. Rivadeneira DE et al. Malnutrition-induced macrophage apoptosis. *Surgery*, 2001, 129(5):617–25.
9. Zuñiga E et al. Apoptosis de linfocitos asociada a enfermedades infecciosas [Lymphocyte apoptosis associated to infections]. *Medicina (B Aires)*, 2002, 62(2):189–96.
10. Wu CC et al. Apoptotic markers on lymphocytes and monocytes are unchanged during single hemodialysis sessions using either regenerated cellulose or polysulfone membranes. *Clinical nephrology*, 2005, 64(3):198–204.
11. Sawhney et al. Age related changes in Fas (CD95) and Fas ligand gene expression and cytokine profiles in healthy Indi-

- ans. *Asian Pacific journal of allergy and immunology*, 2006, 24(1):47–56.
12. Wei et al. CD95-induced osteoarthritic chondrocyte apoptosis and necrosis: dependency on p38 mitogen activated protein kinase. *Arthritis research and therapy*, 2006, 8(2):R37.
 13. Fischer-Posovszky P et al. Role of CD95-mediated adipocyte loss in autoimmune lipodystrophy. *Journal of clinical endocrinology and metabolism*, 2006, 91(3):1129–35.
 14. El-Hodhod MA et al. Apoptotic changes in lymphocytes of protein energy malnutrition patients. *Nutrition research*, 2005, 25:21–9.
 15. Heird WC. Food insecurity, hunger and undernutrition. In: Behrman RE, Kliegman RM, Jenson HB, eds. *Nelson textbook of pediatrics*, 17th ed. Philadelphia, WB Saunders, 2004:167–73.
 16. Ogden CL et al. Centers for disease and prevention 2000 growth charts for the United States: improvements to the 1997 National Center for Health Statistics version. *Pediatrics*, 2002, 109(1):45–60.
 17. Jelliffe DB. *The assessment of the nutritional status of the community (with special reference to field surveys in developing regions of the world)*. Geneva, World Health Organization, 1966:3–271 (WHO Monograph Series No. 53).
 18. *Management of severe malnutrition: a manual for physicians and other senior health workers*. Geneva, World Health Organization, 1999.
 19. Nicholson JF, Pesce MA. Reference ranges for laboratory tests and procedures. In: Behrman RE, Kliegman RM, Jenson HB, eds. *Nelson textbook of pediatrics*, 17th ed. Philadelphia, WB Saunders, 2004:2396–427.
 20. Smolen JE, Boxer LA. Functions of neutrophils. In: Beutler E et al., eds. *Williams textbook of hematology*, 6th ed. New York, McGraw-Hill, 2001:761–84.
 21. Reddy Avula CP et al. Calorie restriction increases Fas/Fas-ligand expression and apoptosis in murine splenic lymphocytes. *FEBS letters*, 1999, 458(2):231–5.
 22. Ishii T et al. Nutritional deficiency affects cell cycle status and viability in A549 cells: role of p27Kip1. *Cancer letters*, 2004, 213(1):99–109.
 23. Lin HL et al. In vitro folate deficiency induces apoptosis by a p53, Fas (Apo-1, CD95) independent, bcl-2 related mechanism in phytohaemagglutinin-stimulated human peripheral blood lymphocytes. *British journal of nutrition*, 2006, 95(5):870–8.
 24. Fraker PJ. Roles for cell death in zinc deficiency. *Journal of nutrition*, 2005, 135(3):359–62.
 25. Savino W. The thymus gland is a target in malnutrition. *European journal of clinical nutrition*, 2002, 56(Suppl. 3):S46–49.
 26. El-Sayed HL et al. Structural and functional affection of the heart in protein energy malnutrition patients on admission and after nutritional recovery. *European journal of clinical nutrition*, 2006, 60:502–10.

Persistence of goitre in children post-salt iodization in Islamic Republic of Iran: autoimmune status

M.H. Dabbaghmanesh,¹ A. Sadegholvaad,¹ F. Ejtehad¹ and G.R. Omrani¹

استمرار الدُّراق (ضخامة الدرقية) بين الأطفال بعد معالجتهم بأملاح اليود في جمهورية إيران الإسلامية: حالة التمنيع للذات

محمد حسين دباغ منش، عبد الصمد صادق الوعد، فرداد اجتهادي، علام حسين رنجبر عمراني

الخلاصة: قَيَّم الباحثون معدَّل انتشار التهاب الدُّراق بالتمنيع الذاتي في عينة عشوائية تتألف من 1188 من أطفال المدارس الذين تتراوح أعمارهم بين 8 و13 عاماً ويتناولون أملاح اليود لإعادة وضع الدرق لديهم إلى حالة السويَّة في جمهورية إيران الإسلامية. وقد بلغ معدَّل الدُّراق 39.6٪، وكانت معظم الحالات سهلة الجس ولكنها غير مرئية. وفي عينة جزئية تتألف من 500 طفل بلغ الإفراغ الوسطي لليود في البول 18.8 ميكروغرام/ديسي لتر، مما يشير إلى تناول كميات سويَّة من اليود. وكانت أضداد إنزيم بيرأكسيداز الدرق إيجابية لدى 3.7٪ من الأطفال، وكانت مرتبطة ارتباطاً يُعَدُّ به إحصائياً بمعدَّل انتشار الدُّراق وبنقص نشاط الدرقية. ولم يكن هناك ارتباط بين إفراغ اليود في البول وبين إيجابية أضداد إنزيم البرأوكسيداز الدرقية، ولا للمقدار الوسطي لتلك الأضداد، ولا لمعدَّل انتشار نقص نشاط الدرق أو معدَّل انتشار الدُّراق. ويُفسَّر التهاب الدرق بالتمنيع الذاتي بعض حالات الدُّراق، وتمس الحاجة لتقييم العوامل الأخرى المسببة له.

ABSTRACT We evaluated the prevalence of autoimmune thyroiditis in a random sample of 1188 schoolchildren aged 8–13 years with normalized iodine intake in the Islamic Republic of Iran. The prevalence of goitre was 39.6%; the majority had palpable but non-visible goitre. Of a subsample of 500 children, median urinary iodine excretion (18/8 µg/dL) indicated normal iodine intake. Thyroid peroxidase (TPO) antibody was positive in 3.7% of children and was significantly correlated with the prevalence of goitre and hypothyroidism. No correlation was seen between urinary iodine excretion and positive TPO antibody, mean TPO antibody, hypothyroidism or prevalence of goitre. Autoimmune thyroiditis explains some cases of goitre but other goitrogenic factors need to be evaluated.

Persistance du goitre chez les enfants après iodation du sel en République islamique d'Iran : état auto-immun

RÉSUMÉ Nous avons évalué la prévalence de la thyroïdite auto-immune dans un échantillon aléatoire de 1 188 élèves âgés de 8 à 13 ans recevant un apport d'iode standard en République islamique d'Iran. La prévalence du goitre était de 39,6 % ; dans la majorité des cas, ce goitre était palpable mais non visible. Dans un sous-échantillon de 500 enfants, la valeur moyenne d'excrétion urinaire d'iode (18/8 µg/dL) indiquait un apport d'iode normal. Les anticorps anti-thyroperoxydase (TPO) étaient positifs chez 3,7 % des enfants et significativement corrélés avec la prévalence du goitre et de l'hypothyroïdie. Aucune corrélation n'a été observée entre l'excrétion urinaire de l'iode et les anticorps anti-TPO positifs, les taux moyens d'anticorps anti-TPO, l'hypothyroïdie ou la prévalence du goitre. La thyroïdite auto-immune explique certains cas de goitre mais les autres facteurs goitrigènes doivent être évalués.

¹Department of Internal Medicine, Endocrine and Metabolism Research Centre, Shiraz University of Medical Sciences, Shiraz, Islamic Republic of Iran (Correspondence to M.H. Dabbaghmanesh: dabbaghm@sums.ac.ir).

Received: 10/07/06; accepted: 27/11/06

Introduction

Iodine deficiency has a number of important health consequences which together are called iodine deficiency disorder. The most serious of these are endemic goitre, hypothyroidism, stillbirth, congenital abnormalities and impairment of intellectual development [1].

Previous national surveys of iodine deficiency in the Islamic Republic of Iran revealed endemic goitre and iodine deficiency in all provinces [2]. The main strategy for control of iodine deficiency was country-wide salt iodization and mandatory production of iodized salt for household use, which started in 1994. Subsequently, the Islamic Republic of Iran became iodine sufficient and this achievement was recognized by the World Health Organization (WHO) Regional Office for the Eastern Mediterranean (EMRO) in the year 2000 [3].

Despite this success, goitre is still endemic in schoolchildren [4]. Now that iodine intake is normalized, causes other than iodine deficiency have to be considered in schoolchildren with thyroid enlargement. The most important differential diagnosis for persistence of goitre is thyroid autoimmunity.

A study in which iodide was administered to patients with goitre showed evidence of autoimmunity [5], with 42.8% developing positive thyroid autoantibodies. Another study showed that increased iodine intake was associated with an increased incidence of autoimmune thyroiditis [6]. However, no study has evaluated the contribution of autoimmunity to the prevalence of goitre in Iranian schoolchildren after the salt iodization programme. We therefore aimed to assess thyroid function and the prevalence of positive thyroid autoantibodies in Iranian schoolchildren 10 years after iodine supplementation was started.

Methods

The study was conducted in Marvdasht, an urban community of approximately 150 000 inhabitants, situated 50 km from Shiraz, the capital of Fars province, from April to November 2005.

The sample was selected from all children aged 8–13 years attending the 97 schools in the area. The sampling frame consisted of the list of schools. We selected 40 clusters from this list by cluster random sampling and 100 schoolchildren in each of the 6 year groups were chosen randomly from the clusters. The selected children (600 boys, 600 girls) and their parents were invited to participate in the study; all except 12 accepted. These 1188 children (598 boys, 590 girls) were enrolled after their parents provided written informed consent. None of them was taking thyroid medication.

For each child, the size of the thyroid was determined by an endocrinologist and graded as non-palpable goitre (grade 0), palpable but non-visible goitre (grade 1) or palpable and visible goitre (grade 2), according to the joint criteria of WHO, United Nations Children's Fund (UNICEF) and the International Council for Control of Iodine Deficiency Disorders (ICCIDD) [7].

Simple random sampling was used to recruit a subsample of 500 (252 boys and 248 girls) from the 1188 children to measure levels of urinary iodine excretion (UIE) and serum level of free thyroxine (T_4), free triiodothyronine (T_3), thyroid-stimulating hormone (TSH) and thyroid peroxidase (TPO) antibodies. All the children accepted. Blood samples were obtained in the early morning and the serum was separated within 1 hour of sampling by centrifugation.

For measurement of UIE levels, urine samples were obtained in the morning and were frozen until analysis by the digestion method. According to WHO/ICCIDD

recommendations, the median UIE for a population should be 10 µg/dL. Mild iodine deficiency is UIE 5.0–9.9 µg/dL, moderate deficiency 2.0–4.9 µg/dL and severe deficiency < 2.0 µg/dL [7]. Not more than 20% of samples from a population should have UIE < 5.0 µg/dL [8].

Free T₄ and T₃ measurements were carried out on serum by radioimmunoassay (RIA-gnost T3 and T4, CIS Bio International, France) and TSH was assayed by an immunoradiometric technique (Biosource Europe, Belgium). The normal ranges for free T₄, free T₃ and TSH were defined as 7–18 pg/mL, 2.00–4.25 pg/mL and 0.3–3.9 IU/mL respectively. Radioimmunoassay was also used for detection of TPO antibodies (TPO antibody kit, Radim, Italy); titres ≥ 50 µg/dL were considered positive.

For statistical analysis, we used SPSS, version 11.5. Data which were normally distributed were expressed as mean and standard deviation (SD) and were compared by *t*-test. Parameters not normally distributed were expressed as median and were compared by Mann–Whitney and Kruskal–Wallis tests. Comparisons between frequencies were made by the chi-squared test. Statistical significance was set at *P* < 0.05.

Results

Prevalence of goitre

Thyroid enlargement of grade 1 was seen in 37.0% and grade 2 in 2.6% of the whole group of students. Among girls 40.1% had goitre (37.6% grade 1, 2.5% grade 2), whereas in boys 39.0% had goitre (36.3% grade 1,

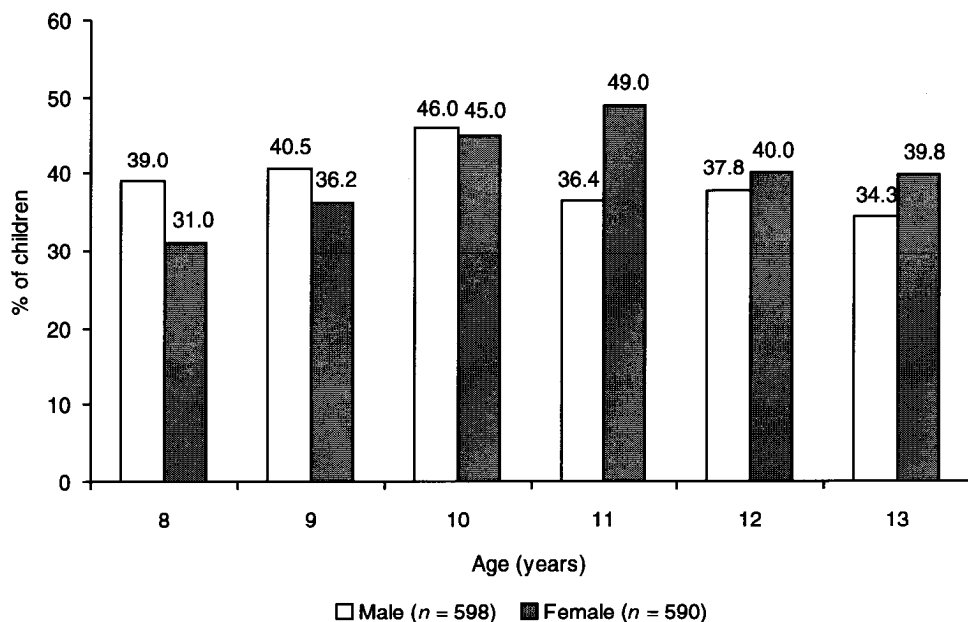


Figure 1 Prevalence of goitre (grade 1 or 2) in male and female schoolchildren in Marvdasht (n = 1188)

2.7% grade 2). No significant difference was observed in goitre prevalence between the age groups and sexes (Figure 1).

UIE

The median UIE of the subsample was 18.8 µg/dL, with no significant difference between boys and girls (17 µg/dL versus 22.4 µg/dL respectively); 12.2% of children had UIE < 5 µg/dL. UIE was not related to age or sex. The median UIE in students who had goitre was 20 µg/dL and in those without goitre was 18 µg/dL, but the difference was not statistically significant (Figure 2).

TSH, T₄, T₃

The mean TSH concentration of the subsample was 2.5 (SD 3.1) IU/mL and mean T₄ and T₃ concentrations were 13.1 (SD 2.9) pg/mL and 3.8 pg/mL (SD 1.0) respectively,

without age- or sex-related differences. In 2.5% of the children, TSH values were > 3.9 IU/mL. A concentration > 10 IU/mL was found in only 0.8% of the children. The prevalence of hyperthyroidism was 0.2%.

TPO antibodies

Positive TPO antibodies were found in 3.7% of the schoolchildren (7.6% in girls versus 0.5% in boys). The mean TPO antibody titres were 26.9 (SD 191) IU/mL and 46 (SD 257) IU/mL in boys and girls respectively ($P < 0.001$).

Of the children with goitre, 5.1% had positive TPO antibody, with mean 38.9 (SD 2.3) IU/mL, whereas in children without goitre, the prevalence of positive TPO antibody was 2.7%, with mean 18.8 (SD 183) IU/mL ($P < 0.001$).

Positive TPO antibody was found in 6.7% of schoolchildren with hypothyroid-

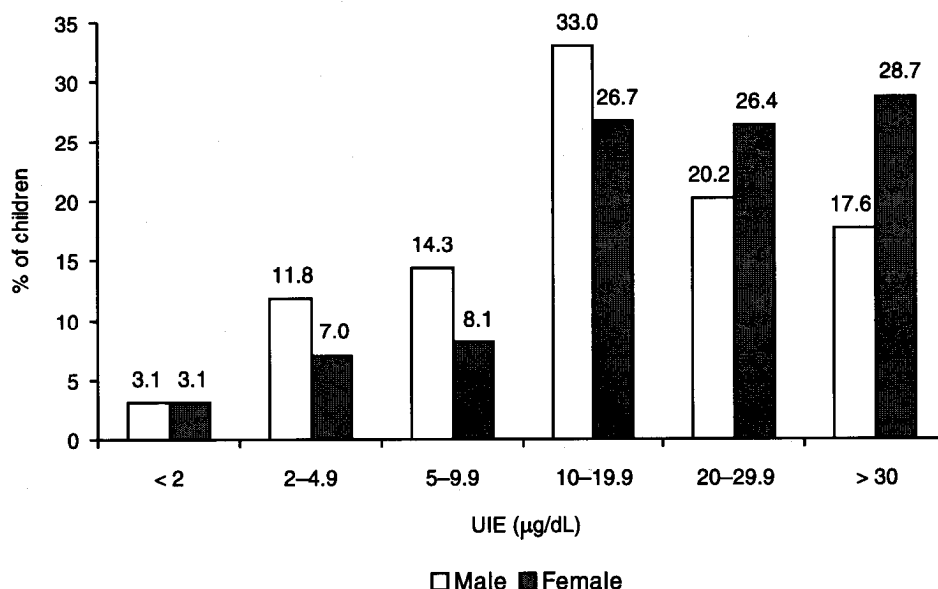


Figure 2 Distribution of urinary iodine excretion (UIE) level in male and female schoolchildren in Marvdasht ($n = 500$)

ism but in euthyroid children the positive rate was 3.4% ($P < 0.001$). There was no significant difference between the presence of thyroid dysfunction and TPO antibody status with level of UIE.

Discussion

There has been remarkable global success in the control of iodine deficiency disorders via iodization of salt [9,10]. Although several national surveys in the Islamic Republic of Iran showed a significant reduction in the prevalence of goitre, it is still endemic, even though the country is no longer considered iodine deficient. Despite this progress, our findings indicate persistence of endemic goitre in 39.6% of schoolchildren more than 10 years after salt iodization began. The same problem has been reported by others, suggesting that there may be goitrogenic factors other than iodine deficiency [11–14]. The most common cause of goitre in juvenile populations with normal iodine intake is autoimmune thyroiditis [15]. Genetic factors [16] as well as environmental factors have been shown to induce thyroid autoimmunity [17–19]. Excess iodine induces thyroiditis in genetically susceptible animals [20,21]. The mechanism may be that excess dietary iodine triggers thyroid autoimmunity by increasing the immunogenicity of thyroglobulin [22] or by production of free radicals [20,23]. After the introduction of iodine, an increase in lymphocytic infiltration in thyroidectomy specimens and in prevalence of positive antithyroid antibodies have been seen [5,6,24].

However, iodization has not always resulted in the development of autoimmune thyroid disease [25,26]. In Indian girls there was no definite correlation between UIE level and thyroid autoimmunity [27]. Ad-

ministration of iodized salt to children in Morocco did not result in any thyroid autoimmunity [28]. We did not find a relationship with the presence or absence of thyroid dysfunction or with thyroid autoantibody status and UIE. It seems that the response of the immune system to iodine intake is heterogeneous, depending on the immunogenic background of individuals. In this study, the prevalence of positive anti-TPO antibody, hypothyroidism and hyperthyroidism were compatible with data reported from an iodine-sufficient area [29].

We should mention that there may be inter- and intra-observer variation with the palpation method, especially in the assessment of smaller sizes of goitre. Determination of thyroid size by ultrasonography is the preferred method but we used palpation because ultrasonography of these numbers of schoolchildren is cumbersome and because, in the absence of ultrasonography, the palpation method is regarded as a simple and acceptable alternative.

To sum up, autoimmunity of the thyroid might explain to some extent the prevalence of goitre in the post-iodization phase in this area of the Islamic Republic of Iran, but it is necessary to consider other goitrogens. High thiocyanide exposure can account for a proportion of residual goitre after salt iodization programmes in some areas [30]; deficiency of iron and iodine are major overlapping health concerns in developing countries, and iron deficiency impairs thyroid metabolism and may limit the effectiveness of iodine intervention programmes [31]; vitamin A may modify thyroid hormone metabolism [32]; and selenium is an integral component of enzyme glutathione peroxidase and is a known contributor to endemic goitre [33]. We suggest further investigations into the role of these factors in the persistence of goitre in this area.

References

1. Hetzel BS. *The prevention and control of iodine deficiency disorders*. Amsterdam, Elsevier, 1993:1–16 (Administrative Committee on Coordination/Subcommittee on Nutrition State of the Art Series Nutrition Policy Discussion Paper No. 3).
2. Azizi F, Navai L, Fattahi F. Goiter prevalence, urinary iodine excretion, thyroid function and anti-thyroid antibodies after 12 years of salt iodization in Shahriar, Iran. *International journal for vitamin and nutrition research*, 2002, 72(5): 291–5.
3. Azizi F, Mehran L. Experiences in the prevention, control and elimination of iodine deficiency disorders: a regional perspective. *Eastern Mediterranean health journal*, 2004, 10(6):761–70.
4. Azizi F et al. Sustainable control of iodine deficiency in Iran: beneficial results of the implementation of the mandatory law on salt iodization. *Journal of endocrinological investigation*, 2002, 25(5):409–13.
5. Boukis MA et al. Thyroid hormone and immunological studies in endemic goiter. *Journal of clinical endocrinology and metabolism*, 1983, 57:859–62.
6. Harach HR et al. Thyroid carcinoma and thyroiditis in an endemic goitre region before and after iodine prophylaxis. *Acta endocrinologica*, 1985, 108:55–60.
7. World Health Organization, United Nations Children's Fund, and International Council for Control of Iodine Deficiency Disorders. *Indicators for assessing iodine deficiency disorders and their control through salt iodization*. Geneva, World Health Organization, 1994 (WHO/NUT 94.6).
8. International Council for Control of Iodine Deficiency Disorders. Indicators for assessing IDD status. *IDD newsletter*, 1999, 15:33–8 (<http://www.iccid.org/media/IDD%20Newsletter/1991-2006/aug1999.htm>, accessed 22 January 2009).
9. *Assessment of iodine deficiency disorders and monitoring their elimination*. Geneva, World Health Organization, 2001 (WHO/NHD/01.1).
10. Hetzel BS. Eliminating iodine deficiency disorders—the role of the International Council in the global partnership. *Bulletin of the World Health Organization*, 2002, 80:410–3.
11. Untoro J, Ruz M, Gross R. Low environmental selenium availability as an additional determinant for goiter in East Java, Indonesia. *Biological trace element research*, 1999, 70:127–36.
12. Doufas AG et al. The predominant form of nontoxic goiter in Greece is now autoimmune thyroiditis. *European journal of endocrinology*, 1999, 140:505–11.
13. Enguix A et al. Efectividad de la yodoprofilaxis en la prevención del bocio endémico en el área suroccidental de Asturias [The efficacy of iodine prophylaxis in the prevention of endemic goiter in the southwestern area of Asturias]. *Anales de medicina interna*, 1995, 12:182–6.
14. Filteau SM et al. Iodine deficiency alone can not account for goiter prevalence among pregnant women in Modhupur, Bangladesh. *European journal of clinical nutrition*, 1994, 48:293–302.
15. Braverman LE. Iodine induced thyroid disease. *Acta medica austriaca*, 1990, 17 (Supl.):129–33.
16. Schleusener H et al. The relevance of genetic susceptibility in Graves disease and immune thyroiditis. *Experimental and clinical endocrinology*, 1991, 97:127–32.
17. Glaser R, Kiecolt-Glaser JK. *Handbook of human stress and immunity*. London, Academic Press, 1994:1–414.

18. Holt PG. Immune and inflammatory function in cigarette smokers. *Thorax*, 1987, 42:241–9.
19. Premawardhana LD al. Increased prevalence of thyroglobulin antibodies in Sri Lankan schoolgirls—is iodine the cause? *European journal of endocrinology*, 2000, 143:185–8.
20. Sundick RS, Bagchi N, Brown TR. The role of iodine in thyroid autoimmunity from chickens to humans: a review. *Autoimmunity*, 1992, 13:61–8.
21. Brown TR, Bagchi N. The role of iodine in the development of autoimmune thyroiditis. *International reviews of immunology*, 1992, 9:167–82.
22. Sundick RS et al. The incorporation of dietary iodine into thyroglobulin increases its immunogenicity. *Endocrinology*, 1987, 120:2078–84.
23. Vitale M et al. Iodide excess induces apoptosis in thyroid cells through a P53-independent mechanism involving oxidative stress. *Endocrinology*, 2000, 141:598–605.
24. Oechsli E, Hedinger C. Thyreoiditis lymphomatosa Hashimoto und endemische Struma [Hashimoto's lymphomatous thyroiditis and endemic struma]. *Schweizerische medizinische Wochenschrift*, 1985, 115:1182–91.
25. Knobel M, Medeiros-Neto G. Iodized oil treatment for endemic goiter does not induce the surge of positive serum concentrations of anti-thyroglobulin or anti-microsomal autoantibodies. *Journal of endocrinological investigation*, 1986, 9:321–4.
26. Lazarus JH et al. Endemic goiter in Senegal: thyroid function, etiological factors and treatment with oral iodized oil. *Acta endocrinologica*, 1992, 126:149–54.
27. Marwaha PK et al. Hashimoto's thyroiditis: countrywide screening of goitrous healthy young girls in postiodization phase in India. *Journal of clinical endocrinology and metabolism*, 2000, 58:3798–802.
28. Zimmermann MB et al. Introduction of iodized salt to severely iodine deficient children does not provoke thyroid autoimmunity: a one-year prospective trial in northern Morocco. *Thyroid*, 2003, 13:199–203.
29. Garcia-Mayor RV et al. Effect of iodine supplementation on a pediatric population with mild iodine deficiency. *Thyroid*, 1999, 9:1089–93.
30. Marwaha RK et al. Residual goiter in the postiodization phase: iodine status, thiocyanate exposure and autoimmunity. *Clinical endocrinology*, 2003, 59:672–81.
31. Zimmermann M et al. Persistence of goiter despite oral iodine supplementation in goitrous children with iron deficiency anemia in Cote d'Ivoire. *American journal of clinical nutrition*, 2000, 71:88–93.
32. Wolde-Gebriel Z et al. Interrelationship between vitamin A, iodine and iron status in schoolchildren in Shoa Region, Central Ethiopia. *British journal of nutrition*, 1993, 70:593–607.
33. Vanderpas JB et al. Iodine and selenium deficiency associated with cretinism in northern Zaire. *American journal of clinical nutrition*, 1990, 52:1087–93.

Prevalence of type 2 diabetes in the Islamic Republic of Iran: systematic review and meta-analysis

A.A Haghdoust,^{1,2} M. Rezazadeh-Kermani,¹ B. Sadghirad³ and H.R. Baradaran⁴

معدّل انتشار النمط 2 من السكري في جمهورية إيران الإسلامية: مراجعة منهجية وتحليل تلوي
علي أكبر حق دوست، محمد رضا زاده كرماني، بهنام صادقي راد، حميد رضا برادران

الخلاصة: قدر الباحثون معدّل انتشار النمط 2 من السكري في جمهورية إيران الإسلامية من خلال مراجعة منهجية لجميع الدراسات المتاحة في القطر في الفترة بين 1996 و 2004 مع تجميع المعطيات واستخدام طرق التحليل التلوي والتحرف التلوي. وقد وجد الباحثون أن معدّل الانتشار بين من يزيد عمره على أربعين عاماً 24٪، وأنه كان يزداد بمقدار 0.4٪ كل عام بعد سن العشرين. وكان معدّل اختطار الإصابة بالنمط 2 من السكري أكبر لدى النساء بمقدار 1.7٪ مما هو عليه لدى الرجال (قيمة الاحتمال أقل من 0.001). ويبدو أن معدّل انتشار النمط 2 من السكري أعلى في جمهورية إيران الإسلامية مما هو عليه في البلدان النامية، وبسبب الاختلاف في الهرم العمرى، فإن معدّل الانتشار الخام لا يظهر في شكل مؤشر ملائم، مما يوجب استخدام معدّل الانتشار المصحح حسب العمر أو الخاص بعمر معيّن.

ABSTRACT We estimated the prevalence of type 2 diabetes in the Islamic Republic of Iran by systematic review of all available studies in the country between 1996 and 2004 and aggregation of the data using meta-analysis and meta-regression methods. In those > 40 years the prevalence was 24% and it increased by 0.4% with each year after 20 years of age. The risk of type 2 diabetes was 1.7% greater in women than men ($P < 0.001$). The prevalence of type 2 diabetes appears higher in the Islamic Republic of Iran than in other developing countries but because of differences in age pyramids, the crude prevalence is not an appropriate indicator and age-adjusted or age-specific prevalences should be used.

Prévalence du diabète de type 2 en République islamique d'Iran : étude systématique et méta-analyse

RÉSUMÉ Nous avons estimé la prévalence du diabète de type 2 en République islamique d'Iran grâce à l'analyse systématique de toutes les études disponibles dans le pays entre 1996 et 2004 et à l'agrégation des données par les méthodes de méta-analyse et de méta-régression. Chez les plus de 40 ans, la prévalence était de 24 % et elle augmentait de 0,4 % par an après l'âge de 20 ans. Le risque de diabète de type 2 était supérieur de 1,7 % chez les femmes que chez les hommes ($P < 0,001$). La prévalence de ce diabète semble plus élevée en République islamique d'Iran que dans les autres pays en développement, mais en raison des différences dans les pyramides des âges, la prévalence brute n'est pas un bon indicateur et il convient d'utiliser la prévalence ajustée sur l'âge ou la prévalence par âge.

¹Physiology Research Centre; ²Kerman Neuroscience Research Centre, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran.

³London School of Hygiene and Tropical Medicine, London, United Kingdom.

⁴Institute of Endocrinology & Metabolism, Iran University of Medical Sciences, Tehran, Islamic Republic of Iran (Correspondence to H.R. Baradaran: Baradaran@iums.ac.ir).

Received: 01/02/07; accepted: 15/05/07

Introduction

Type 2 diabetes mellitus is a common, costly condition associated with significant morbidity and mortality [1]. The number of people with this condition is increasing due to population growth, ageing, urbanization, and increasing prevalence of obesity and physical inactivity. Type 2 diabetes constitutes a growing global public health problem: currently about 135 million people are affected and an estimated 300 million will be affected by 2025. This pandemic involves not only the industrialized world but also less-developed countries where urbanization and industrialization are proceeding rapidly [2]. The populations of developing countries, minority groups and disadvantaged communities in industrialized countries are now at greatest risk [3].

The Islamic Republic of Iran is one of the largest countries in the Middle East, with a population of around 70 000 000. It is a heterogeneous population with many ethnic groups; Turkish in the north-west, Kurdish in the west, Arab in the south and south-west, Pars (Farsi) in the centre, Turkmen in the north-east and Baluch in the east. A number of studies with various sample sizes have estimated the prevalence of type 2 diabetes in different regions of the country. We therefore aimed to conduct a systematic review and meta-analysis of reports of the prevalence of type 2 diabetes to estimate the overall prevalence of the condition in the Islamic Republic of Iran.

Methods

Search strategy

We searched the English-language medical literature published between January 1996 and December 2005 using the Medline database of the National Library of Medicine. The medical subject headings (MeSH)

we searched were “diabetes mellitus” and “hyperglycaemia” combined with “prevalence” and “Iran” including all subheadings. In addition, we searched for all abstracts, conference proceeding, titles of theses, dissertations and reports in other databases in Farsi, such as IranMedex, IranDoc, Iranian Archive for Scientific Documents Center (IASD), Iranian National Library (INL). The keywords used were the Farsi equivalent of the English.

Study selection

All studies carried out to estimate the prevalence of type 2 diabetes in the Islamic Republic of Iran between 1996 and 2005 were included. We excluded studies with fewer than 300 individuals, with non-random sampling methods and mixed type 2 and type 1 diabetes. The criteria for diagnosis of diabetes were based on those of the World Health Organization (WHO). In addition, we included the first national health survey [Iranian Health Profile Survey (IHPS)] .

Data extraction

We categorized citations based on 4 age groups: < 15 years, 15–25, 26–4 and > 40 years. Most of the selected studies reported the prevalence of type 2 diabetes in more than 1 age group; therefore, we entered the age-specific prevalence of these studies in our meta-analysis. In addition, the mean age of subjects, publication date, sample size classified by sex, study location and type of study (IHPS or individual) were entered in our meta-regression analysis to assess trends in the prevalence of type 2 diabetes.

Statistical analysis

The variation of prevalence of type 2 diabetes in each study was computed based on the binomial distribution formula. After using the heterogeneity test, we found significant variation between study findings, therefore

we used a random effect model to estimate the overall prevalence. In addition, in order to minimize the random variation between point estimates of the studies, we adjusted the findings from every study using Bayesian analysis. In this adjustment, the overall point estimate based on the random effect model was used as prior prevalence. Having described the findings in forest plots, the point estimates and their 95% confidence interval (CI) were computed accordingly.

We used meta-regression to assess the effect of age, sex, type of study and publication date as possible sources of the heterogeneity among the studies' findings and to estimate the stratum-specific prevalence. We estimated tau-squared (τ^2) using a restricted likelihood method, as the indicator of heterogeneity. All of the analysis was done in *STATA*, version 8.

Results

The findings of this review are summarized in Table 1. We used the IHPS data for 27 provinces as well as 20 individual studies (17 papers, 1 unpublished research project and 2 congress proceedings) from 14 provinces across the country. Studies performed in Isfahan and Markazi provinces had the largest sample size with 12 494 individuals [17] and Sabzevar district had the smallest sample with 450 subjects [11].

The overall estimates of the prevalence of type 2 diabetes based on the IHPS and the individual studies were 2.3% and 9.34% respectively (Table 2); however, the findings of the latter category had substantial heterogeneity ($P < 0.001$).

To assess the source of heterogeneity and the difference in the estimations of the

Table 1 Description of the studies included in the meta-analysis

First author	Publication year	Sample size	Criteria prevalence were based on		Age group (years)	Sex
			WHO	ADA		
F. Sharifi [4]	1999	1 977	+	–	30–92	Both
B. Larijani [5]	2002	982	+	+	30–64	Both
P. Bastanagh [6]	1996	2 800	+	–	> 30	Both
E. Osfour [7]	1998	1 036	+	–	30–64	Both
F. Sajadi [8]	2003	800	+	–	> 19	Both
K. Yazdanpanah [9]	2000	2 000	+	–	> 10	Both
M. Afkhamiardakani [10]	2002	2 795	+	–	> 30	Both
M. Jafarzadehfakhari [11]	2000	450	+	–	19–80	Both
F. Azizi [12]	2003	1 603	+	–	> 60	Both
F. Azizi [13]	2002	6 899	+	–	30–69	Both
H. Fakhrzadeh [14]	2002	1 255	+	–	> 30	Male
B. Larijani [15]	2003	950	+	+	> 25	Both
Z. Salem [16]	2003	756	+	+	> 30	Both
M. Sadeghi [17]	2003	12 494	–	+	> 20	Both
L. Navaee [18]	2002	2 033	+	+	> 30	Both
M. Gharipour [19]	2003	3 694	–	+	19–64	Both
N. Saadat [20]	2002	9 229	+	+	> 20	Both
A. Hoseinianamiri [21]	2000	2 755	+	–	> 30	Both
A. Barzigar [22]	1996	2 384	+	–	> 30	Both

WHO = World Health Organization; ADA = American Diabetes Association.

Table 2 Adjusted prevalence of type 2 diabetes in the individual studies and the Iranian Health Profile Survey by province

Province	Prevalence in the Iranian Health Profile Survey % (95% CI)	Prevalence in individual studies % (95% CI)
Ardabil	1.8 (0–7.72)	–
Bushehr	2.0 (0–8.48)	12.62 (7.62–17.63) 12.58 (7.47–17.69)
Chahar Mahall va Bakhtiari	1.5 (0–8.06)	–
East Azarbaijan	1.8 (0–5.11)	–
Fars	2.0 (0–5.23)	–
Qazvin	1.6 (0–7.95)	13.09 (7.93–18.25)
Gilan	2.1 (0–6.2)	5.45 (1.78–9.13)
Golestan	3.1 (0–8.17)	–
Hamadan	1.0 (0–5.74)	–
Hormozgan	1.0 (0–6.56)	–
Ilam	0.7 (0–6.87)	–
Isfahan	2.3 (0–5.45)	8.20 (5.23–11.17) 12.19 (6.67–17.72) 2.69 (0.98–4.39)
Kerman	1.8 (0–6.24)	13.16 (7.55–18.77)
Kermanshah	1.7 (0–6.33)	–
Khuzestan	2.2 (0–5.37)	–
Khorasan	1.7 (0–4.26)	9.09 (2.28–15.89)
Kohgiluyeh va Buyer	0.6 (0–6.82)	–
Kordestan	1.3 (0–6.89)	3.35 (0–7.36)
Lorestan	–	3.62 (0.14–7.10)
Mazandaran	3.2 (0–7.38)	–
Markazi	1.9 (0–7.64)	–
Qom	3.7 (0–10.46)	–
Semnan	1.8 (0–9.41)	–
Sistan va Baluchestan	0.7 (0–5.34)	–
Tehran	4.1 (2.27–5.93)	7.43 (4.04–10.81) 6.12 (4.17–8.06) 8.52 (3.77–13.26) 6.39 (2.47–10.31) 10.54 (8.36–12.73) 23.82 (19.9–27.73)
West Azarbaijan	1.1 (0–4.93)	–
Yazd	4.7 (0–10.96)	14.01 (10.75–17.27)
Zanjan	1.3 (0–7.71)	4.62 (0.61–8.63)
Overall	2.3 (1.30–3.10)	9.34 (6.74–11.74)
Heterogeneity test	Q = 7.5; P = 0.94	Q = 172; P < 0.001

Bayesian method was used to adjust the point estimates of each study.

CI = confidence interval.

2 categories (IHPS and individual studies) adjusted for other potential confounders, we entered the data in a meta-regression model. Based on the results, the difference in the crude estimates of the prevalence of type 2 diabetes in IHPS and individual studies (2.3% versus 9.34%) decreased to 0.16%, but this was not statistically significant ($P = 0.94$) (Table 3). This means that the observed difference in the crude analysis was mainly due to a difference in the mean age of the subjects. Overall, the meta-regression results show that with each year increase in the mean age of subjects over 20 years old, the estimated prevalence increased 0.4% ($P = 0.0001$). The publication year, however, did not have any significant effect on the estimated prevalence (Table 3).

After weighting for sample size, the age-stratified prevalence of type 2 diabetes in subjects > 40 years was computed at just over 24% (Figure 1).

Only 13 studies reported the prevalence in females and males separately. Using their data, the weighted prevalence of type 2 diabetes was 9.84% in males and 10.68% in females ($P < 0.001$). The meta-regression analysis showed the estimated prevalence of type 2 diabetes in females at around 1.7% greater than that of males ($P < 0.0001$).

Table 3 Results of meta-regression model assessing the effects of mean age of subjects, publication year and the type of study [individual studies versus the Iranian Health Profile Survey (IHPS)]

Variable	Coefficient	Standard error	P-value
Age (years)	0.40	0.09	< 0.0001
Publication date	0.06	0.39	0.87
Type of study (IHPS as baseline)	0.16	1.98	0.94

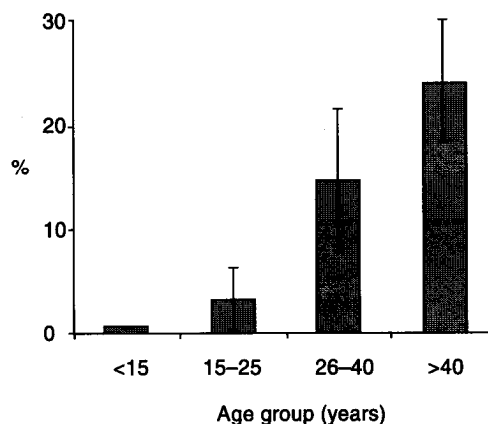


Figure 1 Prevalence of type 2 diabetes in different age groups and their 95% confidence intervals (numbers weighted based on sample sizes of the studies)

However, there was considerable heterogeneity among the study findings ($Q = 129.3$, $P < 0.0001$) (Figure 2).

Discussion

This meta-analysis provided evidence that the overall prevalence of type 2 diabetes in the Iranian population depends on age, and, after the age of 20 years, for each year increase in age, the prevalence increases around 0.4%. In those over 40 years of age, our estimation of the prevalence was around 24%. However, we did not find any explicit evidence that the prevalence varied significantly between 1996 and 2004.

A wide range in prevalence of type 2 diabetes has been reported from around 3% up to 20% [23]. In northern parts of Sudan the prevalence of type 2 diabetes and impaired glucose tolerance (IGT) was 3.4% and 2.9% respectively [24]. In 2005, Malik et al. reported prevalence of type 2 diabetes about 20%, and prevalence of IGT about

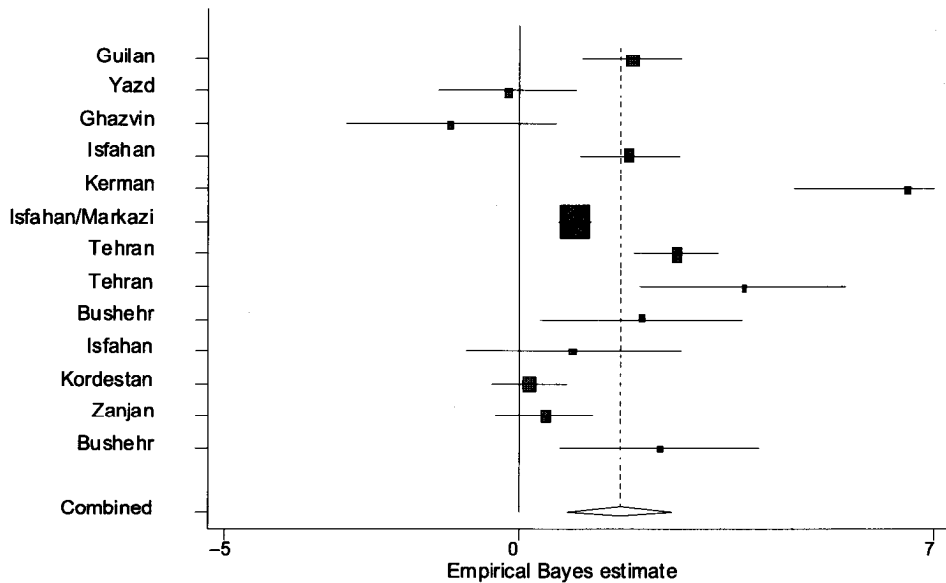


Figure 2 Difference between estimated prevalence of type 2 diabetes in each province

5% in men and 7% in women in the United Arab Emirates [25]. Musaiger reported a prevalence of 8.5% in Bahrain [26]. Ramachandran et al. reported a prevalence of 12.1% in an urban population of India, with prevalence of IGT 14% [27,28].

Although the interpretation of the trend of diabetes over time in a country is difficult when different sample sizes were used, it seems that the prevalence of type 2 diabetes in the Islamic Republic of Iran is greater than the average prevalence in other developing countries. This may be because the samples in most of these studies were collected in a small area or one city, therefore the estimated prevalence could not be generalized. In addition, there is very strong evidence to show that type 2 diabetes is highly age-dependent. In other words, the estimated prevalence greatly depends on the age group of the sample. Therefore, even population-based sampling from com-

munities with different age pyramids could show quite varied prevalence, even with similar risk of the condition. This issue is very important in explaining the difference in type 2 diabetes prevalence in developed and developing countries.

Based on the above explanations, we would suggest that meta-analysis and meta-regression methods could adjust the data for important confounding factors such as age and thus help us to generate more reliable hypotheses about the time and location variations of type 2 diabetes between, and even within, countries.

In our analysis, the prevalence of type 2 diabetes in women was 1.7% higher than that in men in the Iranian population. Greater prevalence of type 2 diabetes in women has been reported in other studies as well [24–26]. Because of data limitations and also the risk of ecological fallacy, we could not assess the reasons for such a difference.

However, greater body mass index among women and also their lifestyle are possible factors reported in other studies [29].

The main limitation of our study was that the estimated prevalence was not adjusted according to the size of the target population of each study. Obviously the results of a cluster analysis are more reliable, but conducting a large study with perfect cluster sampling at the national level is very difficult, costly and impractical. Therefore, it seems that meta-analysis is a more feasible alternative method.

Conclusion

We conclude that the rate of type 2 diabetes has increased in the Islamic Republic of

Iran and there is a strong association between age and diabetes. Also the findings show that the prevalence of type 2 diabetes is more common in women than men. Therefore it is recommended that Iranian health policy-makers initiate and launch more health promotional programmes and effective interventions.

Acknowledgements

This project was financially supported by Kerman University of Medical Sciences; we would like to acknowledge the contribution of the Deputy for Research. In addition, we thank those researchers who generated useful findings for our meta-analysis.

References

1. Economic consequences of diabetes mellitus in the US in 1997. *Diabetes care*, 1998, 21:296–309.
2. Amos AF, McCarty DJ, Zimmet P. The rising global burden of diabetes and its complications: Estimates and projections to the year 2010. *Diabetic medicine*, 1997, 14:S7–85.
3. Zimmet P. Globalization, coca-colonization and the chronic disease epidemic: can the doomsday scenario be averted? *Journal of internal medicine*, 2000, 247:301–10.
4. Sharifi HA, Azizi F. [Prevalence of diabetes and IGT in population older than 30 years in Zanjan province villages]. *Pajohesh dar Pezeshki [Research in medicine; Journal of Zanjan Medical School]*, 1999, 22(1):55–64 [In Farsi].
5. Larijani B. Prevalence of type 2 diabetes mellitus and IGT in 30–64 years old population of Booshehr city according to ADA and WHO criteria. *Iranian journal of diabetes & lipid disorders*, 2002, 1(2):119–22.
6. Bastanhagh P, Larijani B, Sajadi F. [Comparison of the prevalence of type 2 diabetes in Bushehr and Tehran in urban population]. Abstract presented at the Iranian Endocrinology & Metabolism National Conference, Tehran, 1996 [In Farsi].
7. Osfouri E et al. [Diabetes mellitus and impaired glucose tolerance (IGT) in 30–64 years old population of Booshehr Harbor]. *Tebb-e-Jonoob [South medicine journal]*, 1998, 3(1):209–16 [In Farsi].
8. Sajadi F et al. [Prevalence of type II diabetes mellitus and its association with cardiovascular risk factors in Isfahan population]. *Journal of Isfahan University of Medical Sciences*, 2003, 46(81):68–73 [In Farsi].
9. Yazdanpanah K. [Prevalence of diabetes and its association with hypertension and obesity in population older than 10 years in Sanandaj]. *Journal of Kordestan University of Medical Sciences*, 2000, 4(14):27–32 [In Farsi].

10. Afkhamiardakani M, Vahidi A, Ahmadiéh M. [Evaluation of the epidemiologic indexes of adult diabetes mellitus in population older than 30 years in Yazd province, Iran]. *Journal of Sadoghi [Yazd] University of Medical Sciences*, 2002, 1:22–7 [In Farsi].
11. Jafarzadehfakhari M. [Obesity and cardiovascular risk factors]. *Asrar (Journal of the Sabzevar University of Medical Sciences)*, 2000, 6(3):105–11 [In Farsi].
12. Azizi F. Cardiovascular risk factors in elderly population, Tehran Lipid and Glucose Study (TLGS). *Iranian journal of endocrinology and metabolism*, 2003 5(1):3–14.
13. Azizi F, Salehi P, Emami H. Relation of impaired glucose tolerance test with hypertension indexes, body mass index and waist hip rate in Tehran urban population. *Iranian journal of endocrinology and metabolism*, 2002, (4):247–56.
14. Fakhrzadeh H et al. Disorders of lipid and glucose metabolism in petroleum industry workers of Khark Island. *Iranian journal of diabetes & lipid disorders*, 2002 1(2):123–31.
15. Larijani B et al. [Prevalence of diabetes mellitus and impaired glucose tolerance of population aged over 25 years in Quazvin]. *Journal of Quazvin University of Medical Sciences*, 2003, (26):41–5 [In Farsi].
16. Salem Z et al. [Prevalence of type 2 diabetes mellitus of population over 30 years old in Rafsanjan]. *Journal of Rafsanjan University of Medical Sciences*, 2003, 3(1):9–16 [In Farsi].
17. Sadeghi M et al. [Prevalence of high blood pressure and its relation with cardiovascular risk factors]. *Journal of Qazvin University of Medical Sciences*, 2003, 26:46–52 [In Farsi].
18. Navaee L, Lesankhoshnik R, Azizi F. [Comparison of fasting blood sugar and glucose tolerance test using WHO and ADA criteria in diagnosis of diabetes in Eslamshahr (suburb area of Tehran)]. *Journal of Hammedan University of Medical Sciences*, 2002, 9(3):26–30 [In Farsi].
19. Gharipour M, Asgary S, Naderi G. [The prevalence of obesity and cardiovascular risk factors in Isfahan]. *Journal of Quazvin University of Medical Sciences*, 2003, 26:53–64 [In Farsi].
20. Saadat N, Salehi P, Azizi F. Comparing ADA and WHO criteria in diagnosis of glucose metabolism disorders in Tehran urban Population. *Iranian journal of endocrinology and metabolism*, 2002, 4(1):1–8.
21. Hoseinianamiri A, Niknam H. [Determining the prevalence of diabetes in population older than 30 in Lorestan Province]. Tehran, Ministry of Health and Medical Education, 2000 [In Farsi].
22. Barzigar A et al. [Investigating the prevalence of diabetes mellitus in Some-e-Sara]. Abstract presented at the Iranian Endocrinology & Metabolism National Conference, Tehran, 1996 [In Farsi].
23. Castro-Sánchez H, Escobedo de la Peña J. La prevalencia de la diabetes mellitus no dependiente de insulina y factores de riesgo asociados, en población mazateca del estado de Oaxaca, México [Prevalence of non insulin dependent diabetes mellitus and associated risk factors in the Mazatec population of the State of Oaxaca, Mexico]. *Gaceta médica de México*, 1997, 133(6):527–34.
24. Elbagir MN et al. A population-based study of the prevalence of diabetes and impaired glucose tolerance in adults in northern Sudan. *Diabetes care*, 1996 19(10):1126–8.
25. Malik M, Saab BA, King H. Glucose intolerance and associated factors in the multi-ethnic population of the United Arab Emirates: results of a national survey.

- Diabetes research and clinical practice*, 2005, 69(2):188–95.
26. Musaiger AO. Diabetes mellitus in Bahrain: an overview. *Diabetic medicine*, 1992, 9(6):574–8.
27. Ramachandran A et al. Diabetes Epidemiology Study Group in India (DESI). High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. *Diabetologia*, 2001, 44(9):1094–101.
28. Ramachandran A. Epidemiology of diabetes in India—three decades of research. *Journal of the Association of Physicians of India*, 2005, 53:34–8.
29. Pan WH et al. Prevalence and awareness of diabetes and mean fasting glucose by age, sex, and region: results from the Nutrition and Health Survey in Taiwan, 1993–1996. *Diabetic medicine*, 2003, 20:182–5.

Diabetes in the Eastern Mediterranean Region

It is predicted that between 2000 and 2025, there will be a 60% increase in diabetes in developing countries and more than 75% of the world's diabetic population will be living in developing countries.

In the Eastern Mediterranean Region, the diabetes prevalence rate for adults is 14.5%. While the majority of persons with diabetes mellitus in industrialized countries are in the older age group, many Eastern Mediterranean countries are now reporting the onset of type 2 diabetes mellitus at an increasingly young age, in the second and third decade, and in some countries it is emerging in children. This pattern of onset at a younger age extends the potential burden of therapy and complications to an even younger age group and for a longer period of an individual's lifespan.

Source: WHO/EMRO Noncommunicable diseases website (http://www.emro.who.int/ncd/diabetes_emr.htm).

Incidence of cancer in Gulf Cooperation Council countries, 1998–2001

N. Al-Hamdan,¹ K. Ravichandran,² J. Al-Sayyad,³ J. Al-Lawati,⁴ Z. Khazal,⁵ F. Al-Khateeb,⁵ A. Abdulwahab⁶ and A. Al-Asfour⁷

معدّل وقوع السرطان في بلدان مجلس التعاون الخليجي، 1998–2001

ناصر الحمدان، كاندا سامي رافيشاندان، جمال الصياد، جواد اللواتي، زينب خزعل، فلاح الخطيب، عبد العظيم عبد الوهاب، عادل العصفور

الخلاصة: يصف الباحثون أنماط معدلات وقوع السرطان الأكثر شيوعاً في دول مجلس التعاون خلال الفترة 1998–2001. وقد وجدوا أن 32 291 حالة سرطان قد شُخصت (16 342 لدى الذكور و15 949 لدى الإناث). وقد لوحظ رجحان الذكور في المملكة العربية السعودية وسلطنة عُمان فقط، كما وجدوا أن معدّل الوقوع المصحح بحسب العمر لجميع أنماط الأورام الخبيثة لدى الجنسين محسباً لكل ألف من السكان كان الأعلى في قطر يتلوه في البحرين والكويت وسلطنة عُمان والإمارات العربية المتحدة والمملكة العربية السعودية. كما وجدوا أن سرطانات الطفولة تتراوح بين 9.5% من مجموع حالات السرطان في المملكة العربية السعودية وفي الإمارات العربية المتحدة و4% في البحرين. كما وجدوا أن وسطي العمر عند التشخيص في جميع البلدان كان أعلى في الذكور منه في الإناث، وأن سرطان الرئة وسرطان البروستاتا هما الأشيع عند الذكور، وسرطان الثدي والدرق عند الإناث. ويحتل سرطان الرئة المركز الثاني لدى النساء في البحرين.

ABSTRACT We describe the patterns of cancer incidence for common cancers in Gulf Cooperation Council countries during 1998–2001. A total of 32 291 cases of cancer were diagnosed (16 342 in males; 15 949 in females). Male preponderance was observed only in Saudi Arabia and Oman. The age-standardized incidence of all malignancies per 100 000 in both sexes was highest in Qatar followed by Bahrain, Kuwait, Oman, UAE and Saudi Arabia. Paediatric cancer ranged from 9.5% of total cancers in Saudi Arabia and UAE to 4.0% in Bahrain. In all countries, the mean age at diagnosis was higher in males than females; cancer of the lung and prostate were commonest among males, and cancer of breast and thyroid among females. Lung cancer ranked second among Bahraini women.

Incidence du cancer dans les pays du Conseil de coopération du Golfe, 1998–2001

RÉSUMÉ Nous décrivons les tendances de l'incidence des cancers courants dans les pays du Conseil de coopération du Golfe de 1998 à 2001. Au total, 32 291 cas de cancer ont été diagnostiqués (16 342 chez les hommes et 15 949 chez les femmes). La prépondérance masculine n'a été observée qu'en Arabie saoudite et à Oman. L'incidence normalisée en fonction de l'âge de toutes les affections malignes pour 100 000 personnes chez les deux sexes était la plus élevée au Qatar, suivi de Bahreïn, du Koweït, d'Oman, des Émirats arabes unis et de l'Arabie saoudite. Les cancers pédiatriques représentaient entre 9,5 % du nombre total de cancers en Arabie saoudite et aux Émirats arabes unis et 4,0 % à Bahreïn. Dans tous les pays, l'âge moyen lors du diagnostic était plus élevé chez les hommes que chez les femmes ; les cancers les plus répandus chez les hommes étaient les cancers du poumon et de la prostate et, chez les femmes, les cancers du sein et de la thyroïde. Le cancer du poumon arrivait en deuxième position chez les femmes à Bahreïn.

¹Ministry of Health, Riyadh, Saudi Arabia; ²Ministry of Health, Manama, Bahrain; ³Ministry of Health, Muscat, Oman; ⁴Ministry of Health, Abu Dhabi, United Arab Emirates; ⁵Ministry of Health, Doha, Qatar; ⁶Ministry of Health, Kuwait (Correspondence to N. Al-Hamdan: nhamdan@kfshrc.edu.sa).

⁷Department of Biomedical Statistics and Scientific Computing, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia.

Received: 23/05/06; accepted: 08/06/06

Introduction

Cancer is the second most frequent cause of death in the majority of developed countries and is emerging also as a major public health problem in developing countries. The International Agency for Research on Cancer (IARC) estimated that, globally, nearly 11 million new cases of cancer and more than 6 million deaths from this disease occur annually and approximately 7 million people live with cancer [1] with more than half of the cases arising in developing countries where resources for treatment and prevention are scarce. Rapid improvements in the field of health care, together with the control of communicable diseases, increased life expectancy at birth and rapid socioeconomic changes resulting in modified lifestyles (such as increased prevalence of tobacco use, decrease in physical activity and unhealthy eating habits) are believed to contribute to the increased incidence of cancer in developing countries.

Cancer registries are a unique source of information for any cancer control programme and for developing strategies for cancer health programmes. These data help in the allocation of financial and manpower resources in cost-effective healthcare planning as well as in the design of early detection and prevention programmes. They also facilitate in the detection of carcinogens and monitoring of environmental control programmes and environmental exposure to carcinogens [2].

The geographical location and similarities in culture, lifestyle and environment of the Gulf Cooperation Council (GCC) countries translates into similar health risks. However, it is recognized that there are variations in cancer incidence and frequency in these countries [3–11]. Earlier studies of cancer incidence from this region are either hospital-based, reflecting referral patterns

rather than true incidence, or pertain to one cancer type or country.

We present here the of cancer incidence within the 6 GCC countries, and comparisons with other countries based on National Cancer Registry (NCR) data. The relevant epidemiological factors affecting the most common cancers in this region are also briefly discussed. This information is useful to public health authorities, decision-makers and researchers.

Methods

The Gulf Centre for Cancer Registration (GCCR) was established to create a population-based incidence database for the GCC countries—United Arab Emirates (UAE), Bahrain, Saudi Arabia, Oman, Qatar and Kuwait—and started accumulating data from 1 January 1998. The main office is located at the Research Centre of King Faisal Specialist Hospital and Research Centre in Riyadh. It collates the data collected by the national cancer registry of each GCC country after performing quality assurance. Data are sent to the GCCR in different formats (e.g. *Excel*, *Epi-Info*) and at the GCCR all files are converted to *CanReg* format, validated software for processing cancer data developed by the International Agency for Research on Cancer (IARC), and subsequently analysed.

The NCR in each country is responsible for data collection at the national level from health facilities. To ensure comprehensive data collection, a ministerial decree in each of the GCC countries has rendered cancer a reportable disease by all Ministry of Health hospitals, and government and private hospitals, clinics and laboratories. However, the data for this study were collected by active and passive methods. They included personal identifiers and demographic infor-

mation (name, age, sex, nationality, address, etc.), tumour details (date of diagnosis, basis of diagnosis, histology, topography, stage, etc.), treatment and follow-up information. The *International classification of diseases for oncology* was used to classify the topography and morphology of the cancers [12]. Each registry codes the data and matches patient identifiers to ensure that each case is eligible and registered only once.

Information on prevalence of smoking and reproductive factors of GCC nationals was obtained mostly from the family health surveys (FHS) conducted in all GCC countries [13–18].

The results presented in this report are based on the incidence of cancer cases diagnosed during the period 1998–2001 among nationals of GCC countries. The crude incidence rate and age-standardized incidence rate (ASR), standardized to the world standard population, were used to describe the data. The population by sex was estimated at 1 January 2000 for each country by 5-year age category. The incidence of the 5 most common cancers are shown by their relative frequency in each country and by sex.

Results

During 1998–2001 the total number of cancer cases registered among GCC nationals was 32 291 (males 16 342; females 15 949). Overall, the male:female ratio was 102:100, however, male preponderance was observed only in Saudi Arabia (104:100) and Oman (114:100). The highest frequency of cancer occurred in Saudi Arabia followed by Oman, Kuwait, Bahrain, UAE and Qatar, both in males and females (Table 1). The ASR per 100 000 of all malignancies in both sexes, was highest in Qatar (male

165.5; female 172.4), followed by Bahrain (male 157.7; female 144.6).

Cancers of the lung and prostate among males and cancers of breast and thyroid among females were the most common cancers in almost all the GCC countries (Table 1). Non-Hodgkin lymphoma ranked within the top 5 in all countries except in Bahrain and among women in Oman. Leukaemia ranked within the top 5 in all GCC countries except in Kuwait and among women in Bahrain (Table 1).

A high proportion of cancers in those aged < 15 years was observed in Saudi Arabia, UAE and Oman, at least 2-fold greater, than in Bahrain. The paediatric cancer rates were highest in Saudi Arabia and UAE (9.5%), followed by Oman (9.2%), Qatar (7.0%), Kuwait (5.7%) and Bahrain (4.0%) (Figure 1). The proportion of paediatric cancers in males was higher than in females in all GCC countries except Oman.

In males, the mean age when the diagnosis of cancer was made was higher in Bahrain [60.7, standard deviation (SD) 20.0 years] than Kuwait [55.1 (SD 22.5) years], Qatar [53.6 (SD 21.3) years], UAE [52.7 (SD 23.2) years], Saudi Arabia [52.6 (SD 23.6) years] and Oman [52.2 (SD 21.0) years]. For females the mean age at diagnosis was lower than males in all the countries and was highest in Bahrain [52.7 (SD 18.4) years], followed by Kuwait [50.9 (SD 18.5) years], Qatar [49.2 (SD 17.8) years], Saudi Arabia [47.3 (SD 21.0) years], Oman [46.8 (SD 20.6) years] and UAE [45.8 (SD 20.2) years]. The age-specific incidence rate of all cancers increased with age in males and females (Figures 2 and 3).

Figure 4 depicts the smoking prevalence (current smoker of any tobacco product) among males and females aged 15+ years during the mid-1990s. The highest prevalence among males was in Kuwait (32.4%),

Table 1 Number of malignant cases, mean annual crude incidence rate and age-standardized incidence rate (ASR) per 100 000 population in the Gulf Cooperation Council countries with the most common cancers by sex: 1998–2001

Country	Males			Females		
	Site of cancer	No.	Incidence per 100 000 population	Site of cancer	No.	Incidence per 100 000 population
			Crude			Crude
Bahrain	Total	754	93.0	Total	780	97.9
	Lung	151	18.6	Breast	275	34.5
	Bladder	67	8.3	Lung	53	6.7
	Prostate	65	8.0	Thyroid	45	5.6
	Leukaemia	52	6.5	Ovary	44	5.5
Kuwait	Colon	40	4.9	Cervix uteri	32	4.0
	Total	886	53.4	Total	1 130	66.3
	Non-Hodgkin lymphoma	99	6.0	Breast	374	22.0
	Lung	96	5.8	Thyroid	84	4.9
	Prostate	59	3.6	Colon	60	3.5
Oman	Colon	50	3.0	Non-Hodgkin lymphoma	54	3.2
	Prostate	625	2.0	Colon	413	1.3
	Total	1 900	51.9	Total	1 670	47.1
	Stomach	217	5.9	Breast	258	7.3
	Prostate	165	4.5	Thyroid	131	3.7
Qatar	Lung	159	4.3	Ovary	110	3.1
	Non-Hodgkin lymphoma	155	4.2	Leukaemia	106	3.0
	Leukaemia	148	4.0	Cervix uteri	103	2.9
	Total	294	86.9	Total	309	92.2
	Lung	29	8.6	Breast	72	21.5
Qatar	Liver/bladder	25	7.4	Thyroid	34	10.1
	Leukaemia	23	6.8	Non-Hodgkin lymphoma	18	5.4
	Non-Hodgkin lymphoma	20	5.9	Colon	16	4.8
	Prostate	16	4.7	Leukaemia	15	4.5

Country	Site of cancer	Males			Females		
		No.	Incidence per 100 000 population		No.	Incidence per 100 000 population	
			Crude	ASR		Crude	ASR
Saudi Arabia	Total	11 965	37.7	63.2	11 465	36.2	61.8
	Non-Hodgkin lymphoma	1 078	3.4	5.5	2 346	7.4	13.0
	Liver	1 075	3.4	6.7	1 125	3.6	5.0
	Leukaemia	1 030	3.2	3.8	743	2.4	2.7
	Lung	778	2.5	4.8	726	2.3	3.9
	Liver	47	2.8	6.5	43	2.5	4.7
UAE	Total	543	38.4	70.1	595	42.8	74.2
	Lung	48	3.4	7.2	135	9.7	17.1
	Stomach	46	3.3	6.8	52	3.7	5.1
	Non-Hodgkin lymphoma	45	3.2	5.3	50	3.6	3.6
	Leukaemia	40	2.8	2.8	42	3.0	5.5
	Bladder/prostate	38	2.7	5.4/5.7	34	2.4	4.0

UAE = United Arab Emirates.

followed by Bahrain (25.8%), and Oman (15.5%) had the lowest prevalence. In females, the prevalence in Bahrain (8.8%) was ≥ 6 -fold higher than in other GCC countries (ranging from 0.5% in Qatar to 1.5% in Oman and Kuwait).

Between the late 1970s and the mid 1990s the number of births per woman decreased consistently in all the GCC countries [13–24]. The duration of breastfeeding in Kuwait and Qatar was consistently lower than in other GCC countries and there was a decline in duration of breastfeeding among younger women (15–19 years) compared with older women (45–49 years) in all countries (except Qatar, data not available). Between 3% and 12% of women aged 40–44 years had their first child before the age of 15 years, compared to only around 2% of those aged 15–19 years [13–18].

Discussion

Mean age at diagnosis for cancers in the GCC was higher in males than in females and in both sexes it was about a decade younger than reported in Western populations, similar to the findings in other developing countries [2]. This could partly be explained by the younger population structure, the prevalence of existing environmental factors such as infections, poor hygiene conditions and very recent emission of carcinogens into the environment from industries. Like other developing countries, GCC countries have younger populations, with the proportion aged < 15 years ranging from 36.6% of

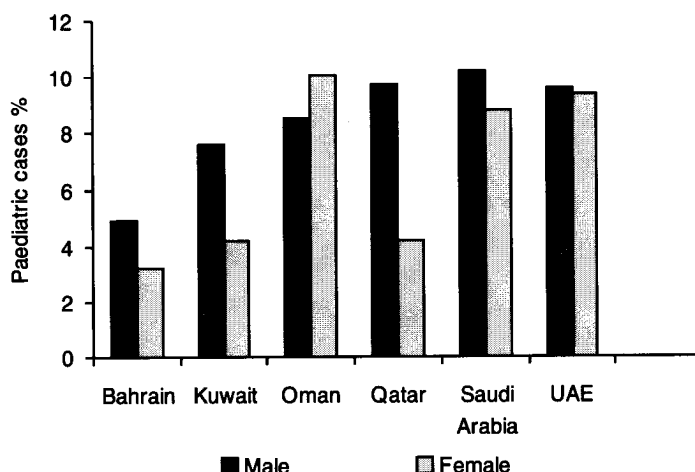


Figure 1 Proportion of paediatric cancers to all cancers by sex in Gulf Cooperation Council countries, 1998–2001

the total population in Bahrain to 45.2% in Saudi Arabia. The high population growth, improved health care programmes and decline in infant mortality are the main contributing factors for the broad base of the population pyramid.

Comparison of the ASR of all cancers within the GCC countries shows that the incidence in Qatar was at least 2.5 times higher than Saudi Arabia for both sexes. In a similar comparison of cancer incidence in countries in 5 continents, the incidence among Qataris and Bahrainis (both males and females) was higher or equal to most of the African and Asian populations and the rate observed among Saudi Arabians was much lower than these populations [25]. The low incidence rate and higher proportion of paediatric cancers in Saudi Arabia can partly be explained by the younger population structure. Similarly, the higher incidence rate and lower proportion of these cancers in Bahrain can also be at-

tributed to the relatively older population structure. The lower ASR may also be due to incomplete registration in the older age groups.

Lung cancer is the most common cancer in the world, comprising 12.4% of all cancers [1]. Within GCC countries lung cancer was the most common cancer in males in Bahrain, Qatar and UAE and ranked 2nd, 3rd and 4th in Kuwait, Oman and Saudi Arabia respectively. A 7-fold difference in ASR (34.3 per 100 000 population in Bahrain and 4.8 per 100 000 in Saudi Arabia) was observed among males. In females it emerged within the top 5 malignancies only in Bahrain and ranked 2nd, next to breast cancer, with an ASR of 12.1 per 100 000. Lung cancer in Bahrain accounted for one-fifth of male cancers and 6.8% of female cancers. The disease was more common in males than females in all GCC countries (74%–81% of lung cancers were among males), a finding consistent with Parkin

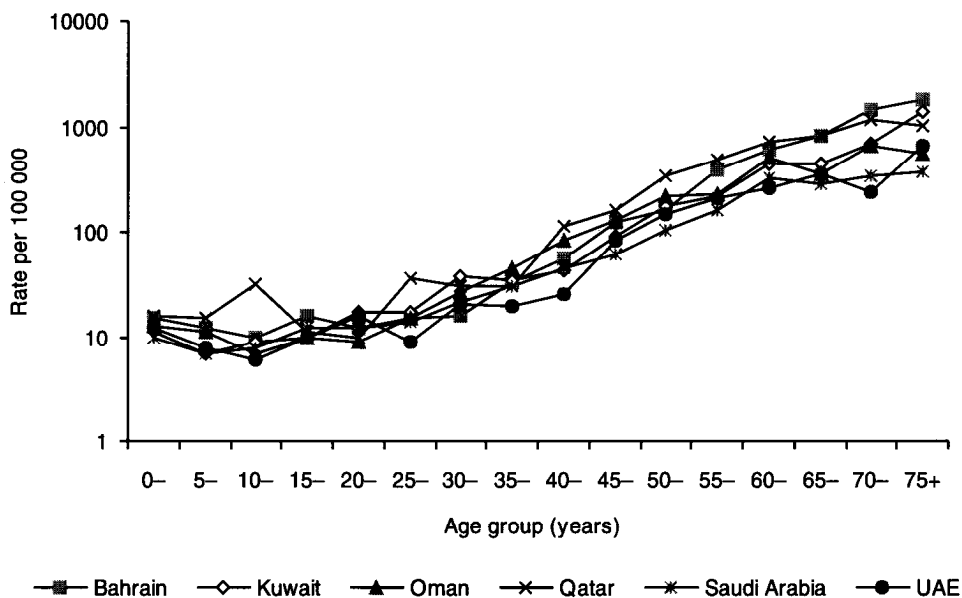


Figure 2 Age-specific incidence rate of all cancers in males in Gulf Cooperation Council countries, 1998–2001

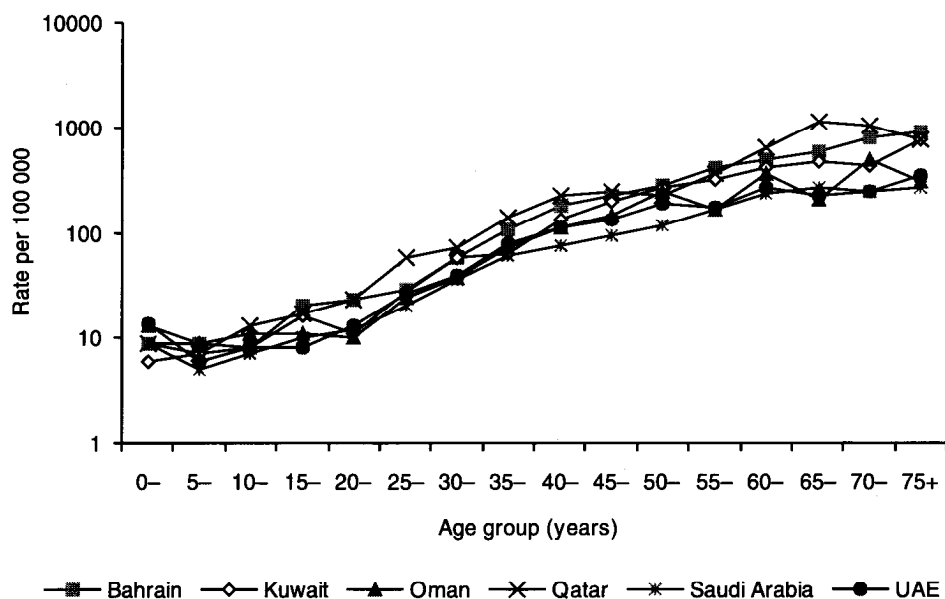


Figure 3 Age-specific incidence rate of all cancers in females in Gulf Cooperation Council countries, 1998–2001

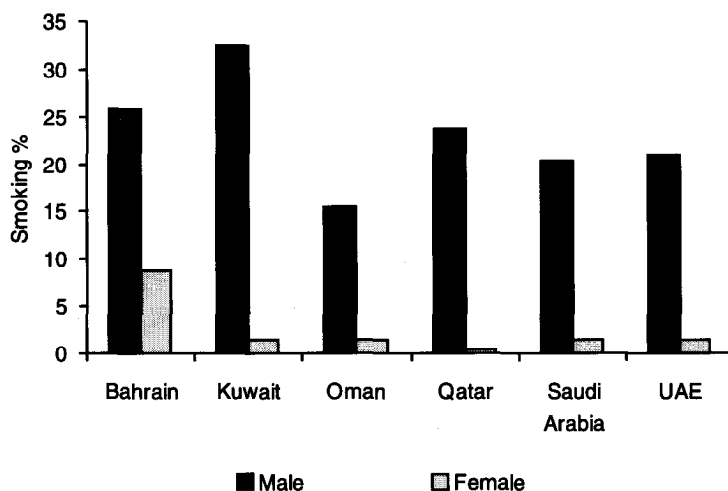


Figure 4 Prevalence of smoking among nationals by sex in Gulf Cooperation Council countries

et al. [26]. The most important risk factor for lung cancer is tobacco smoking and the supportive evidence for this association has been reviewed many times by different scientific groups and institutions [27,28]. Although the periods of collection of cancer incidence and smoking data are too short to attribute the cancer incidence to smoking practice, there has been a longer history of smoking among Bahrainis (both men and women) than in other GCC countries. Similarly, the low incidence in Saudi Arabia can also be attributed to the low prevalence of smoking. The contribution of factors such as occupational exposure to asbestos, metals and ionizing radiation may be nil or very minimal as the process of industrialization has been very recent in all GCC countries.

Breast cancer was the most common cancer among females in all the 6 GCC countries, as in most other countries [25], ranging from 15.4% of female cancers in Oman to almost one-third in Kuwait and Bahrain. Kuwait, Bahrain and Qatar can be classified as high-incidence areas and

the UAE, Saudi Arabia and Oman as low-incidence areas of the GCC region. A comparison of ASR of breast cancer from the high-incidence area of GCC countries with other countries/regions around the world shows the incidence rates are about half those of the UK (high-risk area), and similar to the rates in medium-risk countries such as the Philippines and Singapore [25]. The rates for the low-incidence GCC countries were almost half those in the high-incidence countries. Most of the international and interethnic differences in incidence of breast cancer are the consequence of differing environmental exposures and lifestyles [26]. However, the differences observed within the GCC region can partly be explained by differences in the age distribution of the population (the population aged > 24 years in the high-incidence area ranges from 39%–43% in contrast to 30%–34% in the low-incidence area in addition to other risk factors such as fertility rate and duration of breastfeeding [13–18].

The traditional reproductive pattern observed in GCC countries is characterized by an early start to childbearing, short birth intervals, prolonged breastfeeding and high parity. The fertility rate in the low-incidence area was consistently higher than in the high-incidence area of GCC countries and there has been a considerable decline in all the GCC countries [13–24].

A woman's risk for breast cancer decreases with duration of breastfeeding and with every child born [29]. The duration of breastfeeding in Kuwait and Qatar was lower than in the other GCC countries and there has been a reduction in duration in all the GCC countries along with a steady rise in the age at first childbirth. The decline in early childbearing was more rapid in the high-incidence areas. Future studies could address the gap in understanding the causes of breast cancer in this region.

The incidence of thyroid cancer shows striking differences in different age groups, sexes, ethnic backgrounds and geographical locations [25]. Thyroid cancer ranked 2nd among females in all the GCC countries except in Bahrain where it ranked 3rd. The ASR in these countries ranged from 5 per 100 000 in Saudi Arabia to 15 per 100 000 in Qatar. In males the ASR ranged from 1 to 2 per 100 000 in all GCC countries except in Qatar (4.1) and Kuwait (3.3). Worldwide, the highest incidence rates have been reported from Hawaii, Iceland, Israel and Los Angeles [25]. A comparison of ASR of thyroid cancer in the GCC countries with other countries and regions showed that the incidence rate in Qatar, especially among females, is similar to Hawaii (Filipino) where the highest incidence occurs [25]. The female preponderance of thyroid cancer is a well established fact [30]. In the GCC countries, the male:female ratio ranges from 1:5.6 in Bahrain to 1:2.7 in Kuwait. The incidence was higher among

women aged < 45 years, as also observed by Young et al. [31]. Epidemiological studies have shown an association between seafood consumption and risk of thyroid cancer [32]. The study by Memon et al. from Kuwait supported the hypothesis that reproductive factors and patterns may influence, or contribute to, the risk of thyroid cancer among women [11]. Another study from Kuwait related high consumption of various seafoods to thyroid cancer [33]. There is no documented evidence of high background radiation or exposure to childhood radiation beyond medical procedures in any GCC country. Further research from the other countries should shed more light on the epidemiology of thyroid cancer in this region.

Cancer of the prostate is the third most common cancer among men in the world, accounting for 11.7% of all new male cancers, with a high incidence in Europe, North America and Australia [1]. Prostate cancer, although not a top cancer in any of the GCC countries, ranked within the top 5 malignancies in all countries and ranged from 5.2% of male cancers in Saudi Arabia to 8.7% in Oman. The highest ASR was seen in Bahrain (14.8 per 100 000). The low relative frequency in GCC countries may be related to the male population distribution, with less than 6% reaching the age of 60 years. However, the fact that this is a cancer of the elderly and about three-quarters of cases worldwide occur in men aged 65 years or more [26] was evident in our data from Bahrain, Saudi Arabia and Kuwait. In fact, more than four-fifths of the cases occurred in men aged 60 years or more, except in the UAE (73.7%). Even though the population structure of GCC countries is significantly different from that of the United States of America (USA), the mean age at diagnosis of prostate cancer (Bahrain 72.1 years, Saudi Arabia 71.9 years, Kuwait

71.4 years, Qatar 68.4 years, Oman 66.2 years and UAE 65.9 years) was comparable to the USA where it is 68 years [34].

Despite extensive research, the environmental risk factors for prostate cancer are not well understood [26]. A Western-type diet seems to play a role, but there is no convincing evidence implicating any particular dietary components, although some studies have suggested that consumption of fats, meat and dairy products increases the risk [35]. Despite an influx of affluence foods from developed countries over the last 3 decades in Saudi Arabia, Hanash et al. could not find any difference in the amount of fat in the diet of men with and without prostate carcinoma [36]. This may be due to factors such as the relatively small sample size, genetic and racial factors, under-diagnosis and environmental and hormonal factors. However, protective nutrients, such as a high-fibre diet, cereals, cooked tomatoes, rice, tea, fruits, vegetables, dates and dairy products are consumed in large quantities in the standard Saudi diet and may negate the deleterious effect of a high saturated fat diet. A study in Kuwait and Oman indicated that Arab men had lower prostate-specific antigen levels and prostate volumes than Caucasians. The levels are slightly lower than those reported in Japan and, as in the Japanese, low prostate-specific antigen levels and small prostate volumes might be related to the low incidence of clinical prostate cancer in Arab men [37]. Future genetic studies could further enhance knowledge about the epidemiology in the GCC region.

Non-Hodgkin lymphoma was the commonest cancer in Saudi Arabia and the 2nd commonest in Oman and Kuwait among males. In females it ranked within the top 5 malignancies in all the GCC countries except Bahrain and Oman. The

incidence in GCC countries is between the low European/American and high African rates. Low socioeconomic status, malnutrition and the prevalence of parasitic and viral infections are associated with lymphomas in many developing countries [38]. A higher prevalence of hepatitis C virus infection in Saudi Arabian patients with B-cell non-Hodgkin lymphoma was identified by Harakati et al. [7]. To our knowledge, no relationship to the Epstein-Barr virus has been confirmed so far in GCC countries. Despite the fact that this is a common malignancy in both sexes in the GCC countries, there are gaps in our knowledge about its epidemiology.

The GCC countries share a common geographic location and industrial base and as a result face similar environmental conditions. Furthermore, the similarities in culture and lifestyle resulted in somewhat similar cancer patterns in these countries. However, the magnitude of the cancers was different between the countries. Furthermore, the high incidences of cancer of the stomach among men in Oman and the UAE, and lung cancer among women in Bahrain were specific to these countries. Although the occurrence of lung cancer among Bahraini women can be attributed to tobacco smoking, the real differences in incidence of other cancers are not easy to interpret. This warrants further research to identify the risks associated with each cancer and to establish the environmental causes.

This study demonstrates the similarity in the occurrence of cancer in GCC countries and features pertaining to each country. In addition, our data show the overall lower incidence rate among GCC nationals was similar to many African and Asian populations. The incidence rate for selected cancers was equal to or higher than industrialized countries.

References

1. Ferlay J et al., eds. *GLOBOCAN 2002: cancer incidence, mortality and prevalence worldwide*, version 2.0. Lyon, International Agency for Research on Cancer, 2004 (IARC Cancer Base No. 5).
2. Greenwald P. Principles of cancer prevention: diet and nutrition. In: DeVita VT Jr, Hellman S, Rosenberg SA, eds. *Cancer: principles and practice of oncology*. Philadelphia, JB Lippincott, 1989.
3. Ghafoor M, Schuyten R, Bener A. Epidemiology of prostate cancer in United Arab Emirates. *Medical journal of Malaysia*, 2003, 58(5):712–6.
4. Shome DK et al. Spectrum of malignant lymphomas in Bahrain. Leitmotif of a regional pattern. *Saudi medical journal*, 2004, 25(2):164–7.
5. Qari FA. Pattern of thyroid malignancy at a University Hospital in Western Saudi Arabia. *Saudi medical journal*, 2004, 25(7):866–70.
6. El Hag IA et al. Pattern and incidence of cancer in northern Saudi Arabia. *Saudi medical journal*, 2002, 23(10):1210–3.
7. Harakati MS, Abualkhair OA, Al-Knawy BA. Hepatitis C virus infection in Saudi Arab patients with B-cell non-Hodgkin's lymphoma. *Saudi medical journal*, 2000, 21(8):755–8.
8. Al-Lawati JA et al. Cancer incidence in Oman, 1993–1997. *Eastern Mediterranean health journal*, 1999, 5(5):1030–34.
9. Rasul KI et al. Study of colorectal cancer in Qatar. *Saudi medical journal*, 2001, 22(8):705–7.
10. Makar RR, Saji T, Junaid TA. Epstein-Barr virus expression in Hodgkin's lymphoma in Kuwait. *Pathology and oncology research*, 2003, 9(3):159–65.
11. Memon A et al. Epidemiology of reproductive and hormonal factors in thyroid cancer: evidence from a case-control study in the Middle East. *International journal of cancer*, 2002, 97(1):82–9.
12. *International classification of diseases for oncology*, 2nd ed. (ICDO-2). Geneva, World Health Organization, 1990.
13. Fikri M, Farid SM. *United Arab Emirates family health survey 1996*. Abu Dhabi, United Arab Emirates, Ministry of Health, 2000.
14. Naseeb T, Farid SM. *Bahrain family health survey 1996*. Manama, Ministry of Health, 2000.
15. Khoja TA, Farid SM. *Saudi Arabia family health survey 1996*. Riyadh, Ministry of Health, 2000.
16. Sulaiman AJM, Al-Riyami A, Farid SM. *Oman family health survey 1996*. Muscat, Ministry of Health, 2000.
17. Jaber KA, Farid SM. *Qatar family health survey 1996*. Doha, Ministry of Health, 2000.
18. Alnesef Y, Al-Rashoud R, Farid SM. *Kuwait family health survey 1996*. Kuwait, Ministry of Health, 2000.
19. Al Muhaideb A et al. *United Arab Emirates child health survey 1987*. Abu Dhabi, United Arab Emirates, Ministry of Health, 1991.
20. Yacoub I, Farid S. *Bahrain child health survey 1989*. Manama, Ministry of Health, 1991.
21. Al Mazrou Y, Farid S. *Saudi Arabia child health survey 1987*. Riyadh, Ministry of Health, 1991.
22. Suleiman MJ et al. *Oman child health survey 1988–89*. Muscat, Ministry of Health, 1992.
23. Salman A et al. *Qatar child health survey 1987*. Doha, Ministry of Health, 1991.

24. Al-Rashoud R, Farid S. *Kuwait child health survey 1987*. Kuwait, Ministry of Health, 1991.
25. Parkin DM et al., eds. *Cancer incidence in five continents. Volume VIII*. Lyon, International Agency for Research on Cancer, 2002 (Scientific Publication No. 155).
26. Parkin DM, Bray FI, Devesa SS. Cancer burden in the year 2000. The global picture. *European journal of cancer*, 2001, 37(Suppl. 8):S4–66.
27. *Tobacco smoking: evaluation of carcinogenic risk to humans. IARC monographs on the evaluation of carcinogenic risk to humans*. Lyon, International Agency for Research on Cancer, 1986 (Publication No. 38).
28. *Smoking or health: the third report from the Royal College of Physicians of London*. London, Pitman Medical, 1977.
29. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50 02 women with breast cancer and 96 973 women without the disease. *Lancet*, 2002, 360:187–95.
30. Fraker D. Radiation exposure and other factors that predispose to human thyroid neoplasia. *Surgical clinics of North America*, 1995, 75(3):365–75.
31. Young J Jr, Percy C, Asire A, eds. Surveillance epidemiology and end results: incidence and mortality data (1973–1977). *National Cancer Institute monographs*, 1981, 57:1.
32. Berg JP et al. Long-chain serum fatty acids and risk of thyroid cancer: a population-based case control study in Norway. *Cancer causes and control*, 1994, 5(5):433–9.
33. Memon A, Varghese A, Suresh A. Benign thyroid disease and dietary factors in thyroid cancer: a case-control study in Kuwait. *British journal of cancer*, 2002, 86(11):1745–50.
34. Miller DC et al. Prostate carcinoma presentation, diagnosis, and staging: an update from the National Cancer Data Base. *Cancer*, 2003, 98(6):1169–78.
35. *Diet, nutrition and the prevention of cancer: a global perspective*. Washington DC, World Cancer Research Fund in association with American Institute for Cancer Research, 1997.
36. Hanash KA et al. Prostatic carcinoma: a nutritional disease? Conflicting data from the Kingdom of Saudi Arabia. *Journal of urology*, 2000, 164(5):1570–2.
37. Kehinde EO et al. Age-specific reference levels of serum prostate-specific antigen and prostate volume in healthy Arab men. *British journal of urology*, 2005, 96(3):308–12.
38. De Vita VT Jr et al., eds. Lymphocytic lymphomas. In: DeVita VT Jr, Hellman S, Rosenberg SA, eds. *Cancer: principles and practice of oncology*. Philadelphia, JB Lippincott, 1989

Association of reproductive factors with the incidence of breast cancer in Gulf Cooperation Council countries

K. Ravichandran¹ and A.S. Al-Zahrani¹

الترابط بين العوامل الإنجابية ومعدل حدوث سرطان الثدي في بلدان مجلس التعاون
كاندا سامي رافيشاندران، علي سعيد أحمد الزهراني

الخلاصة: تستعرض هذه الورقة معدل وقوع سرطان الثدي لدى الإناث في بلدان مجلس التعاون، وتستعرض المعطيات المتعلقة بالعوامل الإنجابية الراسخة. وقد شُخصت 4480 حالة سرطان الثدي لدى المواطنات في بلدان مجلس التعاون خلال الأعوام 1998-2002، وكان سرطان الثدي أكثر الأورام الخبيثة شيوعاً في جميع بلدان مجلس التعاون، وتراوح معدل وقوعه بين 16.1٪ من حالات السرطان عند النساء في سلطنة عُمان و35.4٪ من حالات السرطان عند النساء في البحرين. فيما كان معدل الوقوع المصحح حسب العمر، محسوباً لكل مئة ألف أعلى في البحرين (46.4) يتلوها الكويت 44.3 ثم قطر 35.5 ثم الإمارات العربية المتحدة 19.2 ثم سلطنة عُمان 14.4 ثم المملكة العربية السعودية 12.9. وتُعد هذه المعدلات منخفضة إذا ما قورنت بمعظم البلدان الصناعية.

ABSTRACT This article presents the incidence of female breast cancer in the Gulf Cooperation Council (GCC) countries and reviews the data in relation to established reproductive factors. Overall 4480 female breast cancer cases were diagnosed during 1998-2002 among GCC country nationals. Breast cancer was the most common malignancy in all GCC countries, ranging from 16.1% of female cancers in Oman to 35.4% in Bahrain. The age-standardized incidence rate per 100 000 was highest in Bahrain (46.4), followed by Kuwait (44.3), Qatar (35.5), United Arab Emirates (19.2), Oman (14.4) and Saudi Arabia (12.9). These rates are low compared with most industrialized countries.

Lien entre les facteurs liés à la reproduction et l'incidence du cancer du sein dans les pays du Conseil de coopération du Golfe

RÉSUMÉ Cet article décrit l'incidence du cancer du sein féminin dans les pays du Conseil de Coopération du Golfe (CCG) et analyse ces données par rapport aux facteurs liés à la reproduction établis. Au total, 4480 cas de cancer du sein ont été diagnostiqués de 1998 à 2002 chez des ressortissantes des pays du CCG. Le cancer du sein était l'affection maligne la plus courante dans tous ces pays, avec des taux de cancer féminin compris entre 16,1 % à Oman à 35,4 % à Bahreïn. L'incidence normalisée en fonction de l'âge pour 100 000 habitants était la plus élevée à Bahreïn (46,4), suivi du Koweït (44,3), du Qatar (35,5), des Émirats arabes unis (19,2), d'Oman (14,4) et de l'Arabie saoudite (12,9). Ces taux sont faibles comparés à la plupart des pays industrialisés.

¹Department of Biostatistics, Epidemiology and Scientific Computing, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia (Correspondence to A.S. Al-Zahrani: alisaz@kfshrc.edu.sa).

Received: 14/09/06; accepted: 03/12/06

Introduction

Breast cancer is the second most common cancer in the world today and the most frequent malignant neoplasm occurring in women. Worldwide an estimated 1 151 298 women were diagnosed with breast cancer by 2002, accounting for 22.7% of all female cancers. More than half of these occurred in developed countries. The age-standardized incidence rates of breast cancer vary widely throughout the world, the highest being observed in North America. High rates are also observed in Western Europe, Australia and New Zealand. In contrast, low rates are found in most African and Asian populations, although in some Asian populations they are the same as in Southern Europe, and in some cases even higher. There is a large variation (up to 6-fold) in the incidence of breast cancer between different regions [1]. The large difference between industrialized and non-industrialized countries is remarkable. Significant variations in incidence have also been observed within more limited geographic areas [2].

Several studies have shown that breast cancer is the highest incident cancer among women in the Gulf Cooperation Council (GCC) countries [3–9]. However, these data on cancer incidence were hospital-based, and from specialized centres, reflecting referral patterns rather than true incidence.

This population-based study is the first to outline the incidence of breast cancer in GCC countries and review the incidence in relation to aspects of the reproductive history of women that have been established as risk factors for female breast cancer.

Methods

The Gulf Centre for Cancer Registration (GCCR) was established to create cancer incidence databases (including cases

of benign and malignant tumours) for the GCC countries. The GCCR obtains data on cancer incidence and population from the 7 national cancer registries of the United Arab Emirates (UAE), Bahrain, Saudi Arabia, Oman, Qatar, Kuwait and Yemen. Yemen was excluded from this study due to the unavailability of data corresponding to the period of the study, 1988–2002.

The national cancer registry in each country is responsible for data collection from the health facilities of its country. Cancer is a reportable disease in all Ministry of Health hospitals, and government and private hospitals, clinics and laboratories. Data are collected from patients' medical records based on clinical and histological diagnosis of cancer by a registrar in addition to direct reporting of cases to the registry from hospitals/institutions. Efforts are made by each registry to ensure that each case is eligible and registered only once in the registry. The GCCR collates the cancer data collected from all the GCC countries after strict quality assurance [10].

The age-specific rate and age-standardized rate (ASR), standardized to the world standard population, were used to describe the incidence. For each country, the female population (with nationality of that country) in 5-year age categories was estimated on 1 July 2000. We attempted to evaluate the relationship between the incidence of breast cancer and known risk factors related to the reproductive history of the women, obtained from the family health survey (FHS) in all GCC countries [11–16].

Results

Breast cancer incidence

During 1998–2002, a total of 20 547 cases of cancer were registered among women in the GCCR among GCC nationals; 4480 (21.8%) of these were primary breast cancer

(Table 1). Cancer of the breast was by far the most common major malignancy among females, ranging from 16.1% of female cancers in Oman to 35.4% in Bahrain.

The mean age at diagnosis was highest in Kuwait [50.4 [standard deviation (SD) 12.4] years], followed by Bahrain [49.0 (SD 12.5) years] (Table 1).

Overall, only 39 (0.9%) cases (2 UAE, 3 Bahrain, 28 Saudi Arabia and 6 Oman) occurred in women aged < 25 years. However, 2567 (57.3%) cases were in women aged 25–50 years at diagnosis. The incidence of breast cancer increased with the women's age up to 69 years, but the rate of increase slowed at around 50 years (Table 2).

The ASR per 100 000 population was highest in Bahrain (46.4) followed by Kuwait (44.3), Qatar (35.5), UAE (19.2), Oman (14.4) and Saudi Arabia (12.9).

For analysis in this paper, Bahrain, Kuwait and Qatar were classified as "high-incidence countries" and UAE, Saudi Arabia and Oman as "low-incidence countries".

Reproductive history of women

Figure 1 depicts the total fertility rate in the GCC countries during the late 1970s and

1980s as well as the mid 1990s. It can be observed that over the years the number of births per woman consistently decreased in every GCC country. More interestingly, the fertility rate in the low-incidence countries was greater than in the high-incidence countries.

The FHS results indicated that 3%–12% of women aged 40–44 years had their first child before age 15 years, whereas this figure was only around 2% for women currently aged 15–19 years (Figure 2). Similarly, the proportion of women who had their first child between 15 and 19 years of age ranged from 32% to 42% among women aged 40–44 years and (except in the UAE) less than 9% among women currently aged 15–19 years (Figure 3).

The duration of breastfeeding in Kuwait and Qatar was consistently lower than other countries and there was a decline in duration of breastfeeding among younger women (15–19 years) compared with older women (45–49 years) in all the GCC countries except in Qatar, where data were not available (Figure 4).

Table 1 Number, percentage, average annual crude incidence rate (CIR), age-standardized incidence rate (ASR) and mean age at diagnosis of female breast cancer in Gulf Cooperation Council countries, 1998–2002

Country	Total female:				CIR per 100 000	ASR per 100 000	Age at diagnosis (years) Mean (SD)
	Population No.	Cancers No.	Breast cancer No.	%			
UAE	385 392	787	182	23.1	9.4	19.2	47.5 (11.8)
Saudi Arabia	7 418 119	14 694	2 987	20.3	8.1	12.9	48.3 (13.5)
Oman	874 357	2 070	333	16.1	7.6	14.4	48.0 (13.5)
Bahrain	197 318	951	337	35.4	34.2	46.4	49.0 (12.5)
Qatar	88 601	383	90	23.5	20.3	35.5	46.7 (12.8)
Kuwait	418 212	1 662	551	33.2	26.4	44.3	50.4 (12.4)

Source: Five-year cancer incidence report for the GCC countries published in 2006 [10].

UAE = United Arab Emirates; SD = standard deviation.

Table 2 Age-standardized incidence rate (ASR) of female breast cancer in Gulf Cooperation Council countries, 1998–2002

Age group (years)	ASR (per 100 000 population)					
	UAE	Saudi Arabia	Oman	Bahrain	Qatar	Kuwait
15–19	–	< 0.05	0.3	–	–	–
20–24	1.0	0.7	0.8	3.3	–	–
25–29	3.7	4.1	5.2	2.7	8.0	9.7
30–34	14.2	11.7	7.2	29.1	26.6	24.1
35–39	27.1	22.4	22.1	68.7	54.9	35.5
40–44	53.0	30.5	29.7	114.2	64.0	73.9
45–49	37.6	32.4	43.7	120.6	106.4	151.7
50–54	80.4	31.5	52.7	163.3	64.5	123.2
55–59	54.2	32.9	32.5	116.3	76.4	136.9
60–64	49.7	38.7	41.8	97.6	75.3	109.9
65–69	26.6	39.6	21.6	182.6	156.4	210.5
70–74	65.4	28.5	45.1	100.2	149.3	68.6
75+	29.8	26.5	22.9	89.4	140.4	134.4

Source: Five-year cancer incidence report for the GCC countries [10].

UAE = United Arab Emirates.

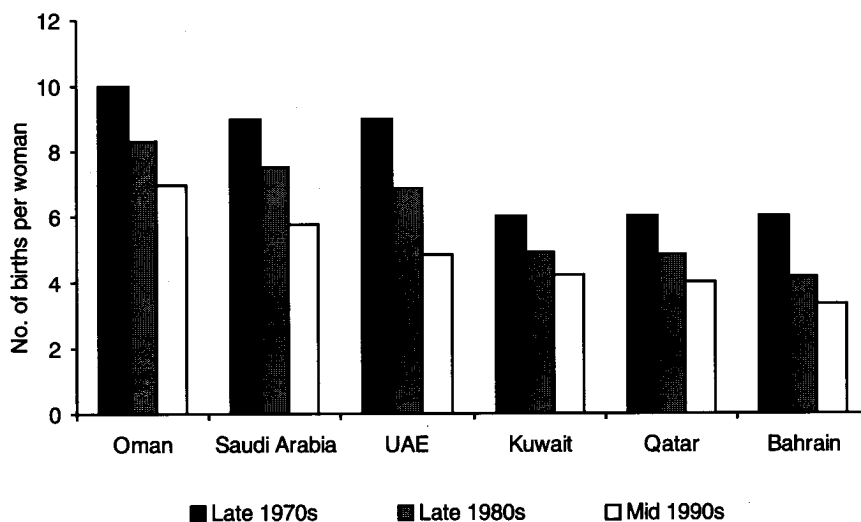


Figure 1 Time trends in total fertility rate in women of Gulf Cooperation Council countries from the late-1970s to the mid-1990s. Source: Family health survey in each GCC country in 1996 [11–16], and child health survey in each GCC country during 1987–89 [22–27]

Discussion

Knowledge of the descriptive epidemiology of breast cancer is useful both in suggesting etiologic hypotheses and, if preventive measures can be identified, in delineating high-risk groups to be targeted for preventive efforts [17]. The most notable characteristic of the descriptive epidemiology of breast cancer in recent years is perhaps the rapidly increasing incidence rates in developing countries that, until recently, had low rates of the disease. In GCC countries breast cancer is the most common malignancy among women of GCC nationality.

The ASR of Bahrain, Kuwait and Qatar was higher than Japan and closer to some European countries [2,10]. However, the rate was much lower than in Australia, New Zealand and the United States of America [2]. The rate for UAE, Saudi Arabia and Oman (low-incidence GCC countries) was almost half that in other GCC countries

(high-incidence GCC countries). These differences between regions are partly explained by changes in the age distribution of the population and partly due to a real increase in risk, although the GCC population is fairly homogeneous with respect to cultural, environmental and lifestyle, especially food, habits. The population aged over 24 years in the high-incidence GCC countries ranged from 39% to 44% in contrast to the low-incidence area (31%–37%).

The age-specific breast cancer rates in GCC countries were different from those observed in a Korean study [18]: a linear increase with age in the industrialized countries and an inverted V-shaped curve. The incidence started to increase among women in their mid-20s and steeply increased for women in their late-40s. Then there was a slow increase during the rest of their lives. Only 4 breast cancer patients in our study were younger than 20 years; 4.5% were in

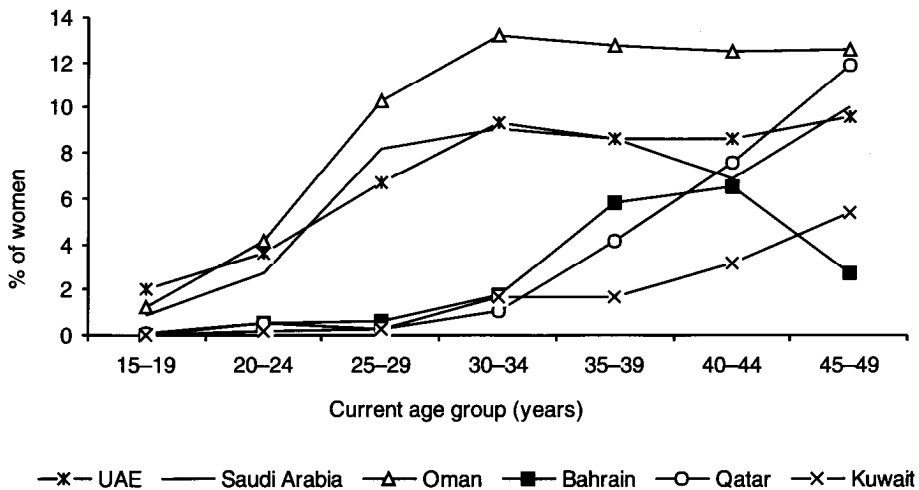


Figure 2 Distribution of women in Gulf Cooperation Council countries who first gave birth before 15 years of age according to current age. Source: Family health survey in each GCC country in 1996 [11–16]

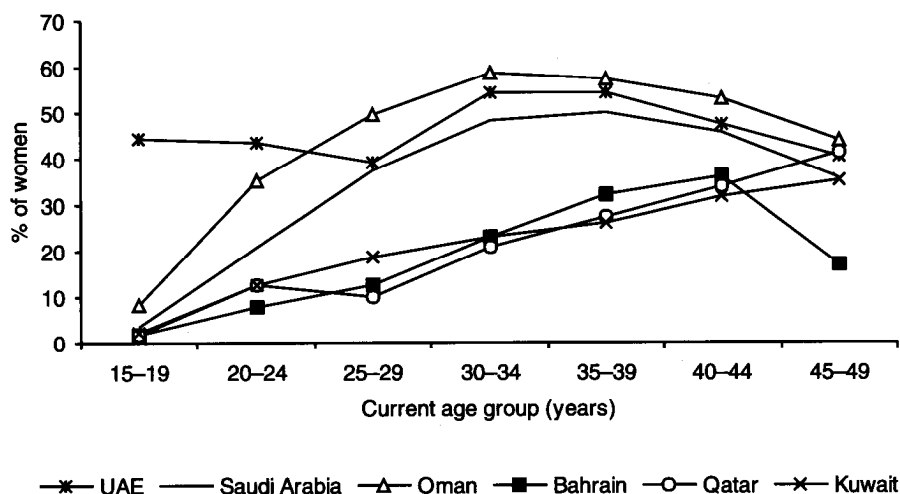


Figure 3 Percentage distribution of women in Gulf Cooperation Council countries who first gave birth between 15 and 19 years of age according to current age. Source: Family health survey in each GCC country in 1996 [11-16]

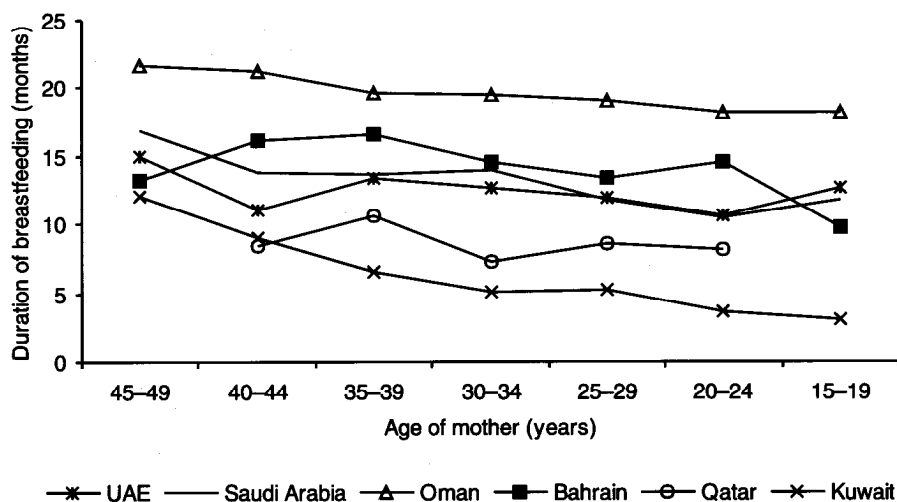


Figure 4 Mean duration of breastfeeding by women in Gulf Cooperation Council countries according to mother's age. Source: Family health survey in each Gulf Cooperation Council country in 1996 [11-16]

their 20s, and 21.6%, 32.0%, 20.8% and 21.0% were in their 30s, 40s and 50s and 60+ years of age respectively.

Geographical variations, time trends and studies on populations migrating from low- to high-risk areas show that the incidence in such populations approaches that of the host country within 1 or 2 generations, clearly suggesting an important role of environmental factors in the etiology of breast cancer [19]. On the other hand, there are large differences in the incidence between populations, which support hypotheses about lifestyle, such as use of oral contraceptives, breastfeeding habits, menstrual cycle characteristics, physical activity and dietary habits, as risk factors for breast cancer. Demographic risk factors, including high socioeconomic status, having never married and urban residence, also support the hypothesis about lifestyle.

Most of the well known risk factors for breast cancer are related to the reproductive life of women: early menarche, nulliparity or number of children, late age at first birth, shorter duration of breastfeeding and late menopause. The role of these factors with respect to GCC nationality women is unknown, as studies on breast cancer risk factors in these countries are lacking. The traditional reproductive pattern observed in GCC countries is characterized by an early start to childbearing, short birth intervals (lengthened primarily by prolonged breastfeeding) and an ultimately high parity.

Nulliparity has been identified as a risk factor for breast cancer and increasing parity has been inversely associated with the risk of breast cancer [20]. Among parous women, an increased number of full-term pregnancies has been associated with a statistically significant decrease in the risk of breast cancer, reducing by 14% for each additional birth [21]. In GCC countries, comparison of FHS results with those from

the child health survey [22–27] and earlier studies confirm that the fertility rate in low-incidence areas was consistently higher than high-incidence areas over time and there has been a considerable decline in fertility levels in all the GCC countries.

The risk of breast cancer in women who had their first child after the age of 30 years has been shown to be about twice that of women who had their first child before the age of 20 years [28]. The highest risk group was those who had a first child after the age of 35 years; these women appeared to be at even higher risk than nulliparous women [28]. In GCC countries, the FHS results indicate that there has been a steady rise in the age at first birth over time. While 3%–12% of women aged 40–44 years had their first child before age 15 years, only around 2% of women currently aged 15–19 years did so. Similarly, the percentage of women who had their first child between 15 and 19 years of age was 32%–42% among women aged 40–44 years and < 9% among women currently aged 15–19 years (except in the UAE where it was 44.2%). Furthermore, the decline in early childbearing was more rapid in the high-incidence areas for breast cancer than in the low-incidence areas; the high-incidence areas started on the path of late childbearing 2 decades before the low-incidence areas and reached the level of no childbirth before age 15 years among women aged 15–19 years (Kuwait and Bahrain 0% and Qatar 0.1%).

Marriage and fertility are interrelated and sequential phases in the lifecycles of GCC nationality women. In these countries, age at marriage is a primary indicator of women's exposure to the risk of pregnancy and therefore of first birth. Comparing FHS results with earlier studies shows an upward trend in age at first marriage among GCC women during the period 1995–98 compared to 1987–89 [11–15, 22–27]. Therefore

the age at first birth is also increasing, which is a risk factor for breast cancer.

According to a 2002 collaborative study, a woman's risk for breast cancer decreased by about 4.3% for every 12 months she breastfed and the risk went down 7% more for every child born [29]. The FHS results in GCC countries indicate that the duration of breastfeeding in Kuwait and Qatar was consistently lower than other countries and there has been a decline in the duration of breastfeeding in the younger cohort than the older cohort in all GCC countries.

Cultural practices, rapidly increasing socioeconomic status and availability of good medical infrastructure are common to the GCC region, in addition to a similar geographic location. Similar changes in lifestyle, especially a declining fertility rate and duration of breastfeeding, have been taking place in all these countries over the period of the study but these declines were earlier in Bahrain, Qatar and Kuwait than in the other countries. Moreover, changes in dietary patterns (towards high-fat consumption), increased obesity and increased smoking are similar in all these countries [author's personal observation]. It is also likely that younger women are benefitting from improved health care and may be more willing to adhere to recommended interventions than older women. The impact of all these factors on the disparities in breast cancer incidence is unknown, as to the best of our knowledge there are no published studies. Previous studies on the descriptive epidemiology of breast cancer from this region were hospital-based [3–9], reflecting referral patterns and inherent selection bias associated with different hospitals rather than the true incidence, and thus preclude any meaningful comparisons of breast cancer incidence within and outside GCC countries.

However, the present study, which is based on population data that are rarely available from this region, has an advantage over the previous studies. Our results provide a comprehensive description of the epidemiology of breast cancer in the GCC region with valid comparisons among countries, and the opportunity to generate clues to the etiology of breast cancer. One weakness of our study is the unknown effect on breast cancer rates of public health interventions such as the stepwise expansion of breast cancer screening programmes for Emirati women (started in 1996), opportunistic breast examinations for Bahraini and Qatari women (started in late 1990) and educational programmes in Oman and Kuwait.

Nevertheless, we found that breast cancer was the leading cancer among GCC nationality women in all GCC countries. The incidence is low compared with industrialized countries in Europe and North America, perhaps due to the higher rates of multiparity, higher fertility rates, earlier childbirth and longer duration of breastfeeding by women in GCC countries. The differences in incidence rates among GCC countries reflect the history of reproductive factors of each country. In all countries in this study, the increase in age-specific incidence after age 50 years is substantially different from that seen in industrialized countries, where the incidence continues to increase with increasing age [2,10]. When women who are currently premenopausal reach the postmenopausal years, however, they will show a greater increase in breast cancer than now due to the cohort effect. Thus we expect an increase in breast cancer incidence in the future, mainly in women above 50 years old. Moreover, the public awareness, educational programmes and screening programmes started in all these

countries (except Saudi Arabia), together with rapidly increasing socioeconomic status, higher life expectancy and availability of good medical infrastructure, will contribute to increases in reported incidence.

With substantial changes occurring in the established risk factors, breast cancer in GCC countries is a growing health problem, suggesting the need for further investigations to disentangle inter-related risk factors and to assist in designing interventions.

The relationship between pregnancy and breast cancer is particularly intriguing, because the incidence of breast cancer during pregnancy is significantly lower but also due to the so-called dual effect of pregnancy on risk. Although a protective effect of

pregnancy is known, this is not true for the first year after birth, and the protection provided by pregnancy is also mitigated by the age of the mother at birth [30].

There is probably much more that can be learned about the role of hormones from studies on the effect of pregnancy on breast cancer. Future epidemiological studies on breast cancer in GCC countries should focus on reproductive factors. This is of particular interest because the classic excess of nulliparous women among breast cancer cases is not seen among the population described here. Such a study would provide new insights into the etiology of breast cancer and assist in planning health interventions for early detection.

References

1. Ferlay J et al. *Cancer incidence, mortality and prevalence worldwide*, 2nd ed. Lyon, International Agency for Research on Cancer, 2004.
2. Parkin DM et al. *Cancer incidence in five continents*. Lyon, International Agency for Research on Cancer, 2002.
3. Mansoor I. Profile of female breast lesions in Saudi Arabia. *Journal of the Pakistan Medical Association*, 2001, 51(7):243–7.
4. Ibrahim EM et al. Breast cancer in the eastern province of Saudi Arabia. *Medical oncology*, 1998, 15(4):241–7.
5. Fakhro AE et al. Breast cancer: patient characteristics and survival analysis at Salmaniya medical complex, Bahrain. *Eastern Mediterranean health journal*, 1999, 5(3):430–9.
6. Ezzat AA et al. Locally advanced breast cancer in Saudi Arabia: high frequency of stage III in a young population. *Medical oncology*, 1999, 16(2):95–103.
7. Anim JT et al. Breast cancer as seen in King Fahd University Hospital, Al-Khobar, 1983–1986. *Journal of the Royal College of Surgeons of Edinburgh*, 1989, 34(4):201–4.
8. Al-Idrissi HY et al. Breast cancer in a low-risk population. The influence of age and menstrual status on disease pattern and survival in Saudi Arabia. *International journal of cancer*, 1992, 52(1):48–51.
9. Al-Idrissi HY. Pattern of breast cancer in Saudi females in eastern province of Saudi Arabia. *Indian journal of medical sciences*, 1991, 45(4):85–7.
10. Al-Zahrani AS, Ravichandran K, Al-Madrouj AN. *Five year cancer incidence report for the Gulf Cooperation Council Countries, 1998–2002*. Riyadh, Gulf Centre for Cancer Registration, 2006.
11. Alnesef Y, Al-Rashoud R, Farid S. *Kuwait family health survey 1996*. Kuwait, Ministry of Health, 2000.
12. Fikri M, Farid S. *United Arab Emirates family health survey 1996*. Abu Dhabi, United Arab Emirates, Ministry of Health, 2000.

13. Jaber KA, Farid S. *Qatar family health survey 1996*. Doha, Ministry of Health, 2000.
14. Khoja TA, Farid S. *Saudi Arabia family health survey 1996: principal report*. Riyadh, Ministry of Health, 2000.
15. Naseeb T, Farid S. *Bahrain family health survey 1996*. Manama, Ministry of Health, 2000.
16. Suleiman MJ, Al-Riyami A, Farid S. *Oman family health survey 1996*. Muscat, Ministry of Health, 2000.
17. Kelsey JL, Horn-Ross PL. Breast cancer: magnitude of the problem and descriptive epidemiology. *Epidemiologic reviews*, 1993, 15(1):7–16.
18. Yoo KY et al. Epidemiology of breast cancer in Korea: occurrence, high-risk groups, and prevention. *Journal of Korean medical science*, 2002, 17(1):1–6.
19. Pisani P. Breast cancer: geographic variation and risk factors. *Journal of environmental pathology, toxicology and oncology*, 1992, 11(5–6):313–6.
20. Kelsey JL, Gammon MD, John EM. Reproductive factors and breast cancer. *Epidemiologic reviews*, 1993, 15(1):36–47.
21. Andrieu N et al. Pregnancies, breastfeeding, and breast cancer risk in the International BRCA1/2 Carrier Cohort Study (IBCCS). *Journal of the National Cancer Institute*, 2006, 98(8):535–44.
22. Al Mazrou Y, Farid S. *Saudi Arabia child health survey 1987*. Riyadh, Ministry of Health, 1991.
23. Al Muhaideb A, Abdul Ghafour A, Farid S. *United Arab Emirates child health survey 1987*. Abu Dhabi, United Arab Emirates, Ministry of Health, 1991.
24. Al-Rashoud R, Farid S. *Kuwait child health survey 1987*. Kuwait, Ministry of Health, 1991.
25. Salman A, Al Jaber K, Farid S. *Qatar child health survey 1987*. Doha, Ministry of Health, 1991.
26. Yacoub I, Farid S. *Bahrain child health survey 1989*. Manama, Ministry of Health, 1991.
27. Suleiman MJ, Al Ghassany A, Farid S. *Oman child health survey 1988–89*. Muscat, Ministry of Health, 1992.
28. McPherson K, Steel CM, Dixon JM. ABC of breast diseases. Breast cancer—epidemiology, risk factors, and genetics. *British medical journal*, 2000, 321(7261):624–8.
29. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50302 women with breast cancer and 96973 women without the disease. *Lancet*, 2002, 360(9328):187–95.
30. Albrektsen G, Heuch I, Kvåle G. The short-term and long-term effect of a pregnancy on breast cancer risk: a prospective study of 802 457 parous Norwegian women. *British journal of cancer*, 1995, 72(2):480–4.

Woman abuse and pregnancy outcome among women in Khoram Abad, Islamic Republic of Iran

N. Khodakarami,¹ H. Naji,² M.G. Dashti³ and M. Yazdjerdi⁴

سوء معاملة النساء ونتيجته على الحمل لدى الحوامل في إيران
ناهيد خداكرمي، هاميون ناجي، مهتاب كودرز دشتي، محسن يزديجدي

الخلاصة: أجرى الباحثون تحليلاً توصيفياً لحصائل الحمل لدى 313 من الحوامل (153 منهن تعرضن لسوء المعاملة و160 لم تتعرض له). واتضح أن سوء المعاملة يرتبط بدرجة يعتد بها إحصائياً مع الزيادة الوسطية للوزن أثناء الحمل، ووسطي تواتر الرعاية السابقة للولادة، والمخاض المديد (عُسر الولادة)، وتمزق الأغشية المبكر، وانخفاض وسطي وزن الوليد، ووسطي العمر الحملي عند الولادة. ونظراً للاحتمال المرتفع بحصول المرأة على خدمات الرعاية الصحية أثناء الحمل، فإن الأطباء القائمين على تقديم الرعاية السابقة للولادة لديهم فرصة سانحة لتحري سوء معاملة الزوج لزوجته.

ABSTRACT We carried out a descriptive analysis on the pregnancy outcome in 313 pregnant women (153 abused, 160 non-abused). Abuse was statistically significantly correlated with mean weight gain during pregnancy, mean frequency of the prenatal care, prolonged labour (dystocia), premature rupture of membrane, low mean birth weight and mean gestational age at birth. Given the high likelihood that a woman will access health care services during her pregnancy, physicians providing prenatal care are in a strategic position to screen for partner abuse.

Violence contre les femmes et issue de la grossesse chez des femmes de Khoram Abad (République islamique d'Iran)

RÉSUMÉ Nous avons réalisé une analyse descriptive de l'issue de la grossesse chez 313 femmes enceintes (153 victimes de violences et 160 qui ne l'étaient pas). Il y avait une corrélation statistique significative entre les violences et une prise de poids moyenne pendant la grossesse, une fréquence de soins prénatals moyenne, un accouchement laborieux (dystocie), une rupture prématurée de la membrane, un poids moyen à la naissance faible et un âge gestationnel moyen à la naissance. Dans la mesure où il existe une forte probabilité qu'une femme se rende dans des services de soins de santé pendant sa grossesse, les médecins dispensant les soins prénatals sont bien placés pour dépister les violences conjugales.

¹Shahid Beheshti Medical University, Reproductive Health Research Centre and Nurisng Midwifery School, Tehran, Islamic Republic of Iran (Correspondence to N. Khodakarami: khodakarami@srbmu.ac.ir).

²Nursing Midwifery School of Isfahan Medical University, Isfahan, Islamic Republic of Iran.

³Asali Hospital, Khoram Abad, Islamic Republic of Iran.

⁴Shahid Beheshti Medical University, Nursing Midwifery School, Tehran, Islamic Republic of Iran.

Received: 25/09/06; accepted: 13/12/06

Introduction

Violence during pregnancy is one of the most tragic and little known aspects of gender-based violence. It has serious effects on the mental and physical health of the women involved. Research indicates the prevalence of intimate partner violence during pregnancy to range from 0.9% to 20.1% [1–3]. The rate of abuse by partners among Iranian women is 17.0%–29.3%, of which the most common forms are verbal and psychological abuse [4,5].

Some authors postulate that pregnancy itself is a risk factor for increased abuse: while some victims of domestic violence experience a decrease in physical abuse during pregnancy, many other women report that the abuse started or increased during their pregnancies [6]. Research on the relationship between violence and adverse pregnancy outcome is sparse and the results are conflicting; however, some studies have reported that women who are abused during pregnancy are at high risk for complications [7,8]. According to the Centers for Disease Control and Prevention, abuse during pregnancy may be more common than gestational diabetes, neural tube defect, and pre-eclampsia [9].

Intimate partner violence during pregnancy has been associated with an increased incidence of abruptio placentae, spontaneous abortion, premature labour and birth, low birth weight, and perinatal death [9–12]. Other negative effects include increased behavioural, somatic and stress-related conditions, such as tobacco, alcohol and drug use; increased use of medications; increased suicide rate, etc. [1,13]. Complications of pregnancy, including low weight gain, anaemia, infections and first/second trimester bleeding, are significantly higher for abused women [13,14]. Additionally, when compared to women abused before pregnancy, those abused during pregnancy had more risk factors for homicide [15]. Clearly, abuse during pregnancy is a major threat to the health and

survival of pregnant women. The purpose of this study was to identify the relation between women abuse and pregnancy outcome.

Methods

This was a cross-sectional study conducted between 10 September 2001 and 25 May 2002.

To be eligible for the study, women had to be of Iranian nationality, speak Farsi and be at least 20 weeks pregnant. Women were approached during presentation at the labour and delivery unit of the Khoramabad Hospitals (Asali and Tamin Ejtemaei). Of the 512 women approached, 419 were eligible for the study; 106 refused to participate, leaving 313 women in the study group.

The study was approved by the institutional review boards at each hospital. Women who were eligible for the study were asked by the research assistant (a qualified midwife) if they would be willing to talk to the research officer/midwife about a study. If the woman agreed, they met in private so that they could fully discuss the study and written informed consent was obtained from the participants. The consent process ensured confidentiality by using study numbers rather than names, keeping all records in a locked filing cabinet; ensuring the information was not made part of the woman's medical record, and through a Certificate of Confidentiality obtained from Isfahan Medical University Ethics Committee. Women were also informed that their medical records would be assessed by the researcher but that the information would only be identified by the study number.

Each woman who agreed was interviewed face-to-face using a validated questionnaire to assess partner abuse. Each was asked if her partner had physically hurt her, insulted her or talked down to her; threatened her with harm; sexually abused her; or

screamed or cursed at her during the current pregnancy. Women answering yes to any question were classified as abused; those answering no to all questions comprised the non-abused group.

The first assessment instrument took approximately 30 minutes to complete and included sociodemographic characteristics and the prenatal care profile. A second assessment was completed in the post-partum ward within 24 hours of the birth to collect information on pregnancy outcome and duration of labour, etc.

Among the women classified as abused, partner abuse was measured via an interview using a questionnaire based on a series of tools: Index of Spousal Abuse [16], Abuse Assessment Screen [17], Woman Abuse Screening Tool [18], Partner Violence Screen [19], and Severity of Violence Against Women Scale [17,20]. Women were also asked whether the husband had behaviour problems, assessed through 5 questions regarding their conduct and relationships (withdrawn, antisocial, having problems at work, with family members or in the community).

All instruments were culturally modified and questions were in Farsi and were administered by the investigators (midwives) in a private room without the male partner present. After these questionnaires were completed, participants completed a confidential self-report on tobacco, alcohol and drug use by herself and her husband. All women who were positive for intimate partner abuse on the Abuse Assessment Screen were administered the Danger Assessment Screen [21].

All analyses evaluating the association between abuse during pregnancy and pregnancy outcome were adjusted for the woman's age at pregnancy, education, family income, parity and characteristics of the husband.

Chi-squared analysis was used for nominal level data and 1-way analysis of variance was used for interval level data (e.g. age or kind of abuse). To explore the relationship of abuse to pregnancy outcome, odds ratios (OR) with 95% confidence intervals (CI) were calculated, and logistic regression was used to perform outcome analysis. Because confounding factors are known to affect outcomes, the ORs were controlled for maternal age, parity, education, prenatal care, partner substance abuse and family income. Additional multivariate logistic regression analysis was performed to assess the association between intimate partner violence and birth weight and mother's weight gain during pregnancy (details obtained from the antenatal clinic records), controlling for gestational age and family income. All analyses were performed using *SPSS*, version 6.1a. Statistical significance was set at 0.05.

Results

Of the 313 women who participated in the study, 153 had experienced some type of violence during the pregnancy. There were significant associations between the experience of partner violence during pregnancy and several sociodemographic characteristics. Women who experienced abuse during pregnancy had a statistically significantly lower level of education and reported lower levels of family income than those who were not abused (Table 1).

There were statistically significant differences between husbands who were abusers and those who were not with regard to age, education, type of work, substance abuse and having behaviour problems (withdrawn, antisocial, having problems at work, with family members or in the community, etc: this item was assessed through 5 questions regarding their conduct and relationships) (Table 2).

Table 1 Demographic characteristics of abused and non-abused pregnant women (n = 313)

Variable	Abused (n = 153)	Non-abused (n = 160)
Mean (range) age (years)	21.3 (16–39)	26.8 (17–40)***
Mean (range) education (years)	8.6 (0–16)	10.3 (3–16)***
Mean (range) monthly family income (R) ^a	750 000 (0–1 200 000)	820 000 (30 000–210 000)***
Married, living with partner (no.)	152	160

^aUS\$ 1 = R 9200 in 2002.

***P < 0.001.

There was a statistically significant difference between the 2 groups of women with regard to frequency of prenatal care, mean maternal weight gain during pregnancy, premature rupture of membranes and dystocia ($P < 0.05$ in all cases) (Table 3).

Mean birth weight was significantly lower among infants of the abused mothers ($P = 0.02$) (Table 4).

Logistic regression analysis indicated that abuse during the pregnancy was significantly associated with both low mean birth weight [adjusted odds ratio (AOR) = 1.6; 95% CI: 1.1–2.3] and mother's weight gain (AOR = 1.7; 95% CI: 1.3–2.6) after adjusting for other covariates. The mean birth weight of infants born to women who were abused was significantly lower (–92 g) ($P = 0.02$) than that of infants of women who were not abused.

Discussion

In this study we found a significant relationship between lower weight gain in mothers and abuse during pregnancy. Johnson, Hellerstedt and Pirie also reported that women with current abuse had 3.1 times the odds of inadequate prenatal weight gain compared to women who reported no abuse [22]. Macaulay et al. considered that low weight gain in women abused during pregnancy could be a result of decrease in appetite: abused women try to prevent weight gain to escape from their husband's violence [23]. As also reported in another study, we found that women who were subjected to abuse made fewer prenatal care visits [24].

It appears that abuse during pregnancy may also affect birth weight. Our findings showed that neonatal birth weight varied

Table 2 Demographic characteristics of partners of participants, abuser and non-abuser husbands (n = 313)

Variable	Partner of:		P-value
	Abused (n = 153)	Non-abused (n = 160)	
Mean (range) age (years)	23.7 (14–44)	26.2 (16–43)	0.01
Mean (range) education (years)	7.2 (0–16)	10.8 (5–16)	0.01
Low income job/no job, no. (%)	67 (43.8)	42 (26.3)	0.001
Drug abuse (tobacco, alcohol, narcotics), no. (%)	102 (66.7)	88 (55.0)	0.001
Behaviour problems, no. (%)	38 (24.8)	18 (11.3)	0.001

Table 3 Selected pregnancy outcome variables in relation to abuse during pregnancy

Variable	Abused (n = 153)	Non-abused (n = 160)	P-value
	Mean (SD)	Mean (SD)	
Mother's weight gain (kg)	9.5 (3.7)	10.9 (3.3)	0.01
Haemoglobin (g/dL)	12.4 (0.7)	12.2 (0.9)	NS
Frequency of prenatal care (no. of visits)	10.3 (2.2)	11.5 (1.9)	0.007
First prenatal care visit (months)	2.3 (1.6)	2.3 (1.8)	NS
	No. (%)	No. (%)	
PROM	48 (31.4)	27 (16.9)	0.006
Dystocia	40 (26.1)	23 (14.4)	0.01

SD = standard deviation; NS = not significant.

PROM = premature rupture of membranes.

according to whether the mother suffered violence during pregnancy. This is in accordance with previous studies indicating that abuse during pregnancy is a significant risk factor for low infant birth weight [25,26]. A 2000 study showed that abuse during pregnancy was significantly associated with an increased risk of preterm, low birth weight and term low birth weight [12].

There was an association between abuse in pregnancy and dystocia during labour. It has been reported that after the first stage, labour may stop in abused women; these women may refuse to push and sometimes they return to the first stage [27]. Lent and Morris noted that labour and delivery can cause problems for women with memories of physical violence, in some instances

resulting in complete interruption of labour and delivery [28].

The characteristics of the participants who reported abuse in this study are consistent with other reports [2,29]. Overall, they were significantly more likely to have low income. Abusive husbands were more likely to be less educated, have no stable job, use tobacco, alcohol or narcotics and have more behavioural problems than husbands of participants who did not report abuse.

Our results show that there is a relationship between the use of violence by men outside the home and abuse of pregnant women. It has previously been reported that taking violent action against pregnant women is 3 times greater among men who use violence in society than among others [30].

Table 4 Selected characteristics of neonates in relation to abuse of the mother during pregnancy

Outcome	Abuse (n = 153)	No abuse (n = 160)	P-value
Pre-term birth, no. (%)	8 (5.2)	5 (3.1)	NS
Mean (SD) birth weight (g)	3112 (384)	3204 (340)	0.02
Mean (SD) gestational age (weeks)	39.7 (1.8)	39.7 (1.3)	NS

NS = not significant; SD = standard deviation.

Conclusion

Violence against pregnant women (physical, psychology and sexual assault) in our region of Islamic Republic of Iran (Khoram Abad) is common. The study shows that exposure to violence during pregnancy results in higher risk of poor outcome.

Knowledge of the prevalence of violence against pregnant women and who is at risk could assist in the planning of services for abuse prevention and for treatment of the health consequences of abuse. Therefore, more information is required concerning the prevalence of violence in pregnancy, including Afghan immigrants and pregnant refugees, and women with disabilities. Further research is also needed to identify

the role of the health care system in prevention, management and rehabilitation as they relate to violence against pregnant women. Additionally, research is warranted on whether the identification of violence during pregnancy and treatment would result in lower use of prenatal care and improved pregnancy outcome.

Acknowledgements

We wish to express our sincere gratitude to Dr Hydar Ali Abedi and the staff of the Khoram Abad hospitals for their help and organization to accomplish this work. Financial support was received from Isfahan University of Medical and Health Sciences.

References

1. Jasinski JL. Pregnancy and domestic violence: a review of the literature. *Trauma violence and abuse*, 2004, 5:47–64.
2. Bullock L et al. Abuse disclosure in privately and medicaid-funded pregnant women. *Journal of midwifery & women's health*, 2006, 51(5):361–9.
3. Henning K, Klesges LM. Prevalence and characteristics of psychological abuse reported by court-involved battered women. *Journal of interpersonal violence*, 2003, 18(8):857–71.
4. Mirzaei H. The prevalence of wife abuse in Isfahan Iran. *Tehran family health journal*, 1999, (19):23–33.
5. Mousavi SM, Eshaghian A. The prevalence of spouse abuse in Isfahan, Iran, 2002. *Scientific Journal of Forensic Medicine (Islamic Republic of Iran)*, 2004, 33(10):41–8.
6. Stark E, Flitcraft A. Killing the beast within: women battering and suicidality. *International journal of health services*, 1995, 25(1):43–65.
7. Curry MA, Perrin N, Wall E. Effects of abuse on maternal complications and birth weight in adult and adolescent women. *Obstetrics & gynecology*, 1998, 4:530–4.
8. Bohn DK, Tebben JG, Campbell JC. Influences of income, education, age, and ethnicity on physical abuse before and during pregnancy. *Journal of obstetric gynecologic & neonatal nursing*, 2004, 33:561–71.
9. National Center for Injury Prevention and Control (NCIPC). *Intimate partner violence: fact sheet*. Atlanta, Georgia, Centers for Disease Control and Prevention (<http://www.cdc.gov/ncipc/factsheets/ipvfacts.htm>, accessed 30 September 2005).
10. Yost NP et al. A prospective observational study of domestic violence during pregnancy. *Obstetrics & gynecology*, 2005, 106(1):61–5.
11. Webster J, Chandler J, Battistutta D. Pregnancy outcomes and health care use: effects of abuse. *American jour-*

- nal of obstetrics & gynecology*, 1996, 174(2):760-7.
12. Coker AL, Sanderson M, Dong B. Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatric & perinatal epidemiology*, 2004, 18(4):260-9.
 13. Goodwin MM et al. Pregnancy intendedness and physical abuse around the time of pregnancy. *Maternal and child health journal*, 2000, 4:85-92.
 14. Murphy CC et al. Abuse: a risk factor for low birth weight? A systematic review and meta-analysis. *Canadian Medical Association journal*, 2001, 164(11):1567-72.
 15. McFarlane J, Parker B, Soeken K. Abuse during pregnancy: frequency, severity, perpetrator, and risk factors of homicide. *Public health nursing*, 1995, 12:284-9.
 16. Hudson WW, McIntosh SR. The assessment of spouse abuse: two quantifiable dimensions. *Journal of marriage & family*, 1981, 43:873-88.
 17. Curry MA, Campbell RA, Christian M. Validity and reliability testing of the prenatal psychosocial profile. *Research in nursing & health*, 1994, 17:127-35.
 18. Brown JB et al. Development of the woman abuse screening tool for use in family practice. *Family medicine*, 1996, 28(6):422-8.
 19. Feldhaus KM et al. Accuracy of 3 brief screening questions for detecting partner violence in the emergency department. *Journal of the American Medical Association*, 1997, 277(17):1357-61.
 20. Marshall L. Development of the severity of violence against women scales. *Journal of family violence*, 1992, 7:103-21.
 21. Reid AJ et al. Using the ALPHA form in practice to assess antenatal psychosocial health. *Canadian Medical Association journal*, 1998, 159(6):677-84.
 22. Johnson PJ, Hellerstedt WL, Pirie PL. Abuse history and nonoptimal prenatal weight gain. *Public health reports*, 2002, 117:148-56.
 23. McCauley J et al. The battering syndrome: prevalence and clinical characteristics of domestic violence in primary care internal medicine practices. *Annals of internal medicine*, 1995, 123(10):737-46.
 24. Newberger EH et al. Abuse of pregnant women and adverse birth outcome. Current knowledge and implications for practice. *Journal of the American Medical Association*, 1992, 267(17):2370-2.
 25. McFarlane J, Parker B, Soeken K. Abuse during pregnancy: associations with maternal health and infant birth weight. *Nursing research*, 1996, 45(1):37-42.
 26. Yost NP et al. A prospective observational study of domestic violence during pregnancy. *Obstetrics & gynecology*, 2005, 106(1):61-5.
 27. Courtois CA, Courtois Riley C. Pregnancy and childbirth as triggers for abuse memories: implications for care. *Birth*, 1992, 19(4):222-8.
 28. Lent B, Morris P. *The effect of domestic violence on pregnancy and labour. Discussion paper*. Ontario, College of Family Physicians of Canada, 2000 (<http://www.cfpc.ca/English/cfpc/programs/patient%20care/maternity/violence/default.asp?s=1>, accessed 19 August 2008).
 29. Curry MA. The interrelationships between abuse, substance use, and psychosocial stress during pregnancy: Women's health violence. *Journal of obstetric gynecologic & neonatal nursing*, 1998, 27:692-9.
 30. Parker B, McFarlane J, Soeken K. Abuse during pregnancy: effects on maternal complications and birth weight in adult and teenage women. *Obstetrics and gynecology*, 1994, 84(3):323-8.

Providing emotional stability through relaxation training

M. Janbozorgi,¹ A. Zahirodin,¹ N. Norri,² R. Ghafarsamar³ and J. Shams¹

توفير الاستقرار العاطفي من خلال التدريب على الاسترخاء
مسعود جان بزركي، علي رضا ظهير الدين، ناهيد نوري، رضا غفار قمر، جمال شمس

الخلاصة: هدف الباحثون إلى التعرف على ما يؤدي إليه التدريب المتكامل على الاسترخاء من تأثيرات على الاستقرار العاطفي، فأجروا اختباراً مسبقاً (PF 16) لـ 32 مريضاً شُخصوا باضطراب القلق، ثم أجروا لهم 12 حصة تدريبية في مجموعات للتثقيف النفسي. وقد قُسم الباحثون المرضى عشوائياً إلى مجموعتين (15 مريضاً للدراسة و17 مريضاً شواهد). وأعطوا مجموعة الدراسة 12 حصة أسبوعية من التدريبات المتكاملة على الاسترخاء في مجموعات. وقُيم الباحثون مستوى القلق بإجراء اختبار تلوّي مستخدمين استبياناً وقائمة تفقدية لحالة ومعالجة القلق (STAI)، واتضح وجود انخفاض يُعَدُّ به إحصائياً في مدى الاستقرار العاطفي، ومستوى القلق بين أفراد مجموعة الدراسة مع ازدياد ملحوظ في الأحراز المخصصة لمن هو مستقر عاطفياً وانطوائي، ونقص في الأحراز المخصصة لمن هو خائف متوتر. أما أحراز القائمة التفقدية لحالة ومعالجة القلق فقد كان لانخفاضها أهمية يُعَدُّ بها إحصائياً في مجموعة الدراسة.

ABSTRACT To determine the effects of integrative relaxation training (IRT) on emotional stability, we exposed 32 patients diagnosed with anxiety disorder to a pre-test (16PF) and to 12 sessions of group psychoeducation training. Patients were randomly assigned to 2 groups (study 17 and control 15 patients). The study group received 12 weekly group sessions of IRT. Level of anxiety was evaluated in a post-test using a questionnaire and the State-Trait Anxiety Inventory (STAI). Emotional stability and level of anxiety were significantly reduced in the study group: there was a marked increase in scores for *emotionally s* and *venturesome* and a decrease in scores for *apprehensive* and *tense*. The STAI score was statistically significantly lower in the study group.

Apporter une stabilité émotionnelle grâce à la relaxation

RÉSUMÉ Afin de déterminer les effets de la relaxation profonde sur la stabilité émotionnelle, nous avons soumis 32 patients atteints de troubles anxieux à un test préliminaire (16 PF) et à 12 séances de psychoéducation de groupe. Ces patients ont été répartis de façon aléatoire dans deux groupes (17 dans le groupe d'étude et 15 dans le groupe témoin). Le groupe d'étude a suivi 12 séances hebdomadaires collectives de relaxation profonde. Leur niveau d'anxiété a ensuite été évalué à l'aide d'un questionnaire et de l'échelle STAI (State-Trait Anxiety Inventory, ou échelle d'anxiété état-trait). La stabilité émotionnelle et le niveau d'anxiété étaient significativement réduits dans le groupe d'étude : on a observé une nette augmentation des scores pour les traits de personnalité émotionnellement stable et téméraire et une diminution pour inquiet et tendu. Le score STAI était significativement moins élevé du point de vue statistique dans le groupe d'étude.

¹Department of Psychiatry and Behavioural Science Research, Medical Science Centre, Shahid Beheshti University of Medical Science, Tehran, Islamic Republic of Iran (Correspondence to M. Janbozorgi: janbozorgi@sbmu.ac.ir).

²Talieh Counselling Centre, Tehran, Islamic Republic of Iran.

³Department of English, Tarbiat Modares University, Tehran, Islamic Republic of Iran.

Received 03/10/06; accepted: 11/12/06

Introduction

Emotional stability is a concept which has always been considered a factor of mental health in psychological evaluations. Previous research has demonstrated that daily levels of stress increase with daily fluctuations in mood and as stress increases, mood tends to become more negative [1]. Emotional instability and neuroticism are dimensions of stress and anxiety disorders [2–4], and many aspects of mental health are related to these conditions.

Emotional instability is one of the essential factors affecting anxiety, and the assumption is that if psychological interventions are able to influence this factor, stress and anxiety will be reduced and psychological organization of the patient will be more integrative. Progressive relaxation training (PRT) (adapted from Jacobson method, including only muscle relaxation) is considered one of the most efficient interventions in this regard [5–8].

Various studies have provided evidence for the effects of relaxation techniques on anxiety control and its dependant areas [9–16]. Janbozorgi studied the effects of PRT on some anxiety-related factors of personality and found that relaxation training was able to decrease anxiety [17]. The only factor unchanged was that related to emotional stability (factor C). Cattell noted: "The essence of factor C appears to be an inability to control one's emotions and impulses, especially by finding for them some satisfactory realistic expression. Looked at from the opposite or positive pole, it sharpens and gives scientific substance to the psychoanalytic concept of 'ego strength', which it (factor C) has come to be called" [18].

In another study Janbozorgi applied a multimodal therapy and found a significant effect on one of the anxiety factors, while

state and trait of anxiety were significantly decreased [19]. When this approach was integrated with religious orientation and accompanied with religious exercises, all anxiety factors were significantly changed. Therefore, integration of cultural factors and adopting culturally modified methods of treatment can have positive effects on training and its outcomes.

The idea of an integrated approach to patient care that connects mind, body and spirit is not new [20]. Current approaches have combined cognitive behaviour treatment with relaxation techniques such as breathing exercises and guided imagery rather than combining it with medication. This new combination seems as effective in reducing anxiety as medication, while empowering the client at the same time [21,22]. It has also been shown that meditation can be an effective addition to the therapeutic process when used alone or in combination with other approaches (e.g. relaxation) [23]. Thus, combining meditation and spiritual practices with relaxation expands the treatment options. Such approaches may bring about healing which is usually seen as restoring a condition of wholeness or harmony [24].

In this study we aimed to explore the effects of progressive relaxation training combined with lifestyle modification and spiritual training and determine their integrated effects on the anxiety factors of personality and emotional stability.

Methods

Participants and study design

This study was carried out from March 2005 to October 2005. Patients with a principal DSM-IV (generalized anxiety disorder) diagnosis referred to a counselling and psychotherapy centre (Talieh Counselling

Centre, a private organization) in Tehran by general practitioners and mental health professionals from both government and private organizations as well as self-referrals were considered for the study. There were a total of 64 referrals to the centre during the study period. We decided to include only those aged 19–35 years because the majority of the referrals were in this age range. Four people were outside the age limit and were excluded and 6 refused to take part in the study, leaving 54 eligible participants who signed the consent form.

The Structured Clinical Interview was used as the basis for DSM-IV (SCID-IV) diagnosis. Whenever ≥ 1 diagnosis was identified, clinical interview was used to determine the primary reason for the visit and the degree of interference in functioning, as recommended in DSM-IV [25]. In 19 individuals a principal diagnosis other than generalized anxiety disorder was indicated, so they were excluded from the study. Individuals were also excluded from the study if they were undergoing concurrent psychological treatment for anxiety disorder (2), had a current diagnosis of schizophrenia (1), an intellectual disability (1), or an organic mental disorder (1).

In all, 35 participants completed post-treatment measures; they were divided randomly into 2 groups: 15 (originally 18, but 3 did not attend the follow-up) were assigned to the study group and 17 to the control group. The psychological variables were measured in the same way for all patients at the first session. We chose a pre-test/post-test design for this study. The experimental procedures to be used were explained to the participants in detail and they were asked about any prior experiences with relaxation training and if they had any motives for learning integrative relaxation training (IRT).

Measures

The following measures were implemented pre- and post-treatment (control group participants completed the measures at intake and then post-test.)

- We used the Farsi version of the 16PF questionnaire, which was provided by Dadsetan and Delkhamosh, who standardized it for the Iranian population [26] to measure 16 personality factors. It is a 187-item self-report measure that assesses 16 primary factors. By factor analysis, these can be reduced to 5 secondary factors: extroversion, anxiety, toughness, independence and self-control. We focused only on anxiety factors, especially factor C (ego strength) in this research. Reported reliability for the 16PF by test-retest is 0.80 short-term and 0.52 long-term [27].
- State-Trait Anxiety Inventory (STAI) (Iranian form) was used in the post-test. The STAI comprises separate self-report psychometric scales for measuring 2 distinct but related anxiety concepts [28]. The internal consistency of the STAI is relatively high as measured by alpha coefficients (0.90 or higher for normative samples) [29,30]. The STAI was also standardized for the Iranian situation [31].

Data analysis was conducted using *t*-tests for independent samples to compare mean differences between study and control groups.

Interventions

The IRT programme is a structured programme attended by participants in groups of 10–15 persons. Participants were also given a weekly task. The interventions applied during the treatment period included 12-weeks of IRT: a combination of progressive relaxation training adapted from

Jacobson's programme (cited in Berenstein et al. [32]), a lifestyle relaxation programme (including: organization of sleep time and limitation of daily sleep; healthy eating and drinking; exercise; increase in and development of awareness and consciousness; training in decision-making processes; leisure time management; and guidance for self-dialogue [33,34]) and spiritual exercises (religious meditation, prayer and mention or remembrance of God in daily activities).

Each session lasted for about 1.5–2 hours and was divided into 4 sections: review of homework, relaxation training, discussion of lifestyle and spiritual dimensions. Our integrative relaxation timetable for the 12 weeks is presented in Table 1.

The control group completed the questionnaires but did not take part in the interventions.

Statistical analysis

Statistical significance was analysed using the Student *t*-test. *P*-value < 0.05 was considered statistically significant.

Results

The mean age of the participants was 24.64 (standard deviation 3.77) years; 35% were married and 87.5% were women.

Table 2 shows the comparison of the means and standard deviations of the effects of interventions on each of the 16 personality factors. The mean differences were statistically significant for 4 factors of the 16PF (*P* < 0.05). For the study group participants: for factor H the mean change was 4.78, for factor O it was -4.72, for factor Q4 it was -6.56 and for factor C 4.12 which indicates that they had improved emotional stability, while in the control group this score did not change significantly (Table 2).

To determine whether the interventions could affect the emotional stability and

anxiety factors of the personality, we used the Student *t*-test to check for differences between pre- and post-tests. Four factors (C, H, O and Q4) of the 16PF scale showed a significant change (Table 3), indicating that participants in study group gained significant stability in their emotions and reduced their anxiety.

The means of variation in factor H in pre-test and post-test show a significant difference ($t = -2.93$, $P < 0.05$) (Table 3). The increase of this score of the subjects of the study group shows that social skills could promote stability of our subjects.

The mean score for factor O, however, decreased significantly for the study group compared to the control group ($t = 3.03$, $P < 0.005$) (Table 3). The mean score of factor Q4 also decreased significantly in the study group ($t = 3.22$, $P < 0.003$). This kind of change means that our study group participants became significantly more relaxed compared to the subjects of the control group.

After administration of the STAI, State-Trait Anxiety in the study group was statistically significantly lower than in the control group (Table 4).

At the end of the treatment, participants in the study group also reported a reduction in sense of insecurity, amnesia and irritability.

Discussion

Our results agree with our preliminary assumption that IRT is able to manage emotional stability and anxiety. The anxiety factors of personality, especially those concerning emotional stability, and State-Trait Anxiety were significantly changed after the treatment. These findings are consistent with some previous studies that have shown that relaxation training may reduce anxiety in patients [7–12,17]. Although previous re-

Table 1 Integrative relaxation timetable

Session	Topic	Description
1	Rationale, targets	Uses of relaxation training, lifestyle intervention and spirituality training; reasons for integrating the 3
2	Description and application of intervention; sleeping	Application and techniques; initiation of the 16MGTR relaxation training; discussion of the changes in the problems of sleeping time, practices and religious rituals before sleep; group workshop; homework
3	Relaxation; eating	Review of homework; repetition of 16MGTR; discussion on eating and drinking behaviours; discussion on prayer before eating; group workshop; homework
4	Relaxation; exercise	Review of homework; initiation of 16MGTR; discussion on exercise and practice of yoga in daily life and its religious impacts; group workshop; homework
5	Relaxation; awareness	Review of homework; initiation of 7MGTR; discussion on awareness in body relaxation during daily activities; hearing cautiousness; remembering God; group workshop; homework
6	Relaxation; conflict resolution	Review of homework; repetition of 7MGTR; discussion on awareness and resolving daily conflicts; religious meditation; group workshop; homework
7	Relaxation; religion orientation; conflict resolution	Review of homework; initiation of 4MGTR, discussion on decision-making; resolving daily conflicts and effects of religious orientation on it; group workshop; homework
9	Relaxation; communication	Review of homework; repetition of 4MGTR, discussion on empathic communication and expressing feelings; discussion on creativity in lifestyle; group workshop; homework
10	Relaxation; leisure time	Review of homework; relaxation through recall; discussion on leisure time and religious orientation
11	Relaxation; time management	Review of homework, relaxation through recall along with counting; discussion on time management and importance of prayer in time management and integration of self
12	Integration	Review of homework, relaxation by counting alone and with religious imagery; review of the sessions; discussion on prevention of relapse

MGTR = muscle group tension-relaxation.

search has shown the effectiveness of PRT (which was one part of our IRT programme) on anxiety factors of personality except for emotional stability (factor C) [17], IRT expands the treatment options and we found that it was effective in increasing factor C as well. Other studies support these findings [19,23,35].

Factor C is related to emotional stability and has a high correlation with other factors

such as H, O, Q3, and Q4 [2]. The increase in the mean scores in factor C in our study group may be a consequence of IRT interventions on enhancing ego strength and feeling of security in the subjects. They, therefore, showed fewer signs of becoming upset or having unusual tenseness after the treatment; they had more self-control and faced life with a realistic approach. They also increased their ability to ignore

Table 2 Mean scores obtained from pre- and post-tests, and mean differences (post-test - pre-test)

Factor	Study group score (n = 17)					Control group score (n = 15)				
	Pre-test	Post-test	Difference			Pre-test	Post-test	Difference		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
A Reserved vs outgoing	10.61	3.26	10.12	2.93		10.07	2.12	11.40	1.99	1.33
B Less intelligent vs more intelligent	6.94	2.33	8.00	1.72		7.27	1.94	7.87	1.96	0.60
C Emotionally less stable, reactive vs emotionally stable	10.94	3.46	15.06	3.98	4.12	12.67	4.10	12.27	4.53	-0.40
E Humble vs assertive, aggressive	12.67	3.38	12.33	3.99	-0.33	12.67	3.39	12.60	4.21	-0.07
F Sober vs happy-go-lucky	12.56	4.57	13.50	4.72	0.94	12.67	4.15	15.00	2.75	0.67
G Expedient vs conscientious	14.06	2.39	12.89	2.59	-1.17	13.00	3.27	14.07	2.94	1.07
H Shy vs venturesome	13.22	5.52	18.00	5.82	4.78	13.93	3.92	13.53	5.51	-0.40
I Tough-minded vs tender-minded	12.78	3.10	12.06	3.70	-0.72	12.20	3.12	12.27	3.71	0.07
L Trusting vs suspicious	11.56	3.75	9.94	2.44	-1.62	11.33	2.85	11.13	2.56	-0.20
M Practical vs imaginative	12.33	3.48	13.17	2.79	0.84	12.20	3.38	12.33	3.22	0.13
N Forthright vs astute	10.76	3.47	10.33	2.49	-0.45	10.80	3.84	9.87	2.97	-0.93
O Self-assured vs apprehensive	13.22	3.75	8.50	3.49	-4.72	11.27	3.43	11.00	3.48	-0.27
Q1 Conservative vs experimenting	7.80	3.62	8.17	2.64	0.39	8.83	3.47	7.73	2.66	-1.10
Q2 Dependent vs self-sufficient	11.00	2.59	11.00	3.01	0.00	8.30	3.26	8.70	3.24	0.40
Q3 Undisciplined, self conflict vs controlled	10.90	2.22	12.22	2.58	1.33	8.50	2.10	10.17	3.21	1.67
Q4 Relaxed vs tense	17.86	4.44	11.30	6.00	-6.56	16.60	5.25	17.40	3.91	0.80

SD = standard deviation.

Table 3 Comparison of means of personality factors in the study group and the control group

Factor	Mean difference (post – pre)	
	t-value	P-value
C	-2.61	0.014
G	2.06	0.048
H	-2.93	0.006
O	3.03	0.005
Q4	3.22	0.003

frustration and felt less tired. These findings are consistent with the interpretation for factor C, suggesting all of above are components of C factor [2,3]. Altogether these variations indicate emotional stability as an indicator of psychological health. We saw the same results in the subjects' daily report and their homework during the treatment. Interestingly enough, this factor did not show a significant change after PRT interventions.

Factor O is the 2nd factor that significantly changed in this study. The presence of a high score in factor O in a 16PF profile suggests psychological distress (anxiety/depression). High score subjects needlessly worry, are depressed, feel worthless and inadequate, feel a vague sense of dread, have low self-esteem and are emotionally unstable. Significant decrease in our sub-

jects' scores in the study group compared to the control group indicates that there had been some increase in self-esteem, self confidence, and self-sufficiency.

The similarity of variations in factors Q4, C and O in their tendency to reduce anxiety supports the objective of our study. The reduction of scores in factor Q4 for our study group indicates the transition of subjects from free-floating anxiety, being tense, restless and emotionally volatile and having a poorly controlled libido to relaxed, easygoing and "un-frustrated" people. Moreover, high scores in Q4 indicate negative correlation with self-control [2,3]. Self-control includes well-being, positive analysis and impression of self; any change in this factor affects the functions of the individual. Someone who cannot manage his/her psychological energy does not have stability in his/her emotions. Successful management of anxiety results in increasing emotional stability and improving quality of life and feeling healthy [36].

Another factor in 16PF that changed after treatment was factor H. This factor correlates with anxiety factors of personality [2]: a low score in factor H indicates anxiety. Inhibition and shyness make individuals emotionally careful, sensitive to perceived threats and lacking in self-esteem. They seem to suffer silently

Table 4 Mean scores of the study group and control group on the State-Trait Anxiety Inventory

Factor	Post-test score		t-value	P-value
	Mean	SD		
<i>State anxiety</i>				
Study group	31.87	8.53	4.00	< 0.0001
Control group	52.32	10.57		
<i>Trait anxiety</i>				
Study group	29.81	8.75	4.20	< 0.0001
Control group	44.14	10.96		

SD = standard deviation.

in their own self-imposed restrictions: the prototypical wallflowers [3]. Our findings with respect to factor H indicate that the participants could manage themselves in this area as well. They could communicate successfully and manage shyness and inhibition.

The change in factor G (expedient versus conscientious), although not a very large change in our study group, is not interpretable in the framework of our hypothesis. This change may indicate a kind of decrease in the forces of super-ego, since the increase in the scores of factor C (ego strength) may increase flexibility, social adaptation and rational decision-making [2], and this may support our findings too. This change may also be related to other variables such as the effect of instrumentation rather than the treatment applied.

Study limitations

This study suffers from some limitation with regard to the number and selection of participants and the nature of the interventions. The participants were selected from among individuals referred to the clinic, thus we cannot generalize the findings to others who did not volunteer to receive the intervention. Increase in emotional stability and reduction in anxiety may also have been influenced by factors other than the content of the intervention.

The study could have been extended in some ways to include other comparison groups with variations in the level of intervention. Using a larger sample and careful instrumentation would have increased the validity of the study.

Conclusion

Our findings indicate that integrative relaxation leads to emotional stability and reduction in anxiety. Emotional stability by itself results in success and happiness, 2 very important elements of a happy and healthy life. The changes observed in the state, and especially trait, of anxiety scores in the study group and the subjective feelings of the subjects provide more support for the effectiveness of our interventions.

Practical implications

The findings of this study can be applied to solve the difficulties that individuals with anxiety symptoms and emotional instability encounter in their daily lives. By paying more attention to the ability of patients to learn to self-manage their psychological problems through integrative relaxation, patient educators may be able to increase the effectiveness of their activities; at same time they can help their patients to be more independent in the treatment of their illnesses. Further research into the efficacy of programmes such as IRT is necessary from both the scientific and economic viewpoint.

Acknowledgements

We would like to thank Professor Dadsetan for her comments on the earlier versions of the study and Thalieh Counselling Centre in Tehran for financing this research.

References

1. Weiten W. *Psychology: themes and variations, briefer version*, 4th ed. Pacific Grove, California, Brooks/Cole, 2000:384.
2. Cattell HB. *The 16PF personality in depth*. Champaign, Illinois, Institute for Personality and Ability Testing Inc., 1989.

3. Craig RJ. *Interpreting personality tests: a clinical manual for the MMPI-2, MCMI-III, CPI-R, and 16PF*. New York, John Wiley & Sons, 1999.
4. McCrae RR, Costa PT. The stability of personality: observations and evaluations. *Current directions in psychological science*, 1990, 3:173-5.
5. Davis M, Eshelman ER, McKay M. *The relaxation & stress reduction work book*, 5th ed. Oakland, California, New Harbinger Publications, Inc., 2000.
6. Janbozorgi M, Noori N. [Anxiety and stress psychotherapy]. Tehran, SAMT, 2003 [in Farsi].
7. Dadsetan P, Janbozorgi M, Noori N. [The effectiveness of progressive relaxation training on child anxiety, academic performance and memory]. *Journal of psychology (Tehran)*, 2001, 5(1):4-30 [in Farsi].
8. Schneider RH et al. A randomized controlled trial of stress reduction for hypertension in older African Americans. *Hypertension*, 1995; 26(5):820-9.
9. Borkovec TD, Sides K. Critical procedural variables related to the physiological effects progressive relaxation: a review. *Behavioral research and therapy*, 1979, 17:119-26.
10. Borkovec TD, Costello E. Efficacy of applied relaxation and cognitive behavioral therapy in the treatment of generalized anxiety disorder. *Journal of consulting and clinical psychology*, 1993, 61(4):611-9.
11. Rasid M, Parish TS. The effects of two types of relaxation training on student levels of anxiety. *Adolescence*, 1998, 33(129):99-101.
12. Ost LG, Westling BE. Applied relaxation vs cognitive behavior therapy in the treatment of panic disorder. *Behavior research and therapy*, 1995, 33:145-58.
13. Clum GA, Surls R. A meta-analysis of treatments for panic disorder. *Journal of consulting and clinical psychology*, 1993, 61(2):317-26.
14. Lehrer PM, Woolfolk RL. *Principles and practice of stress management*, 2nd ed. New York, Guilford Press, 1993.
15. Heimberg RG. Cognitive and behavioral treatment for social phobia: a critical analysis. *Clinical psychology review*, 1989, 9:107-28.
16. Deffenbacher JL, Stark RS. Relaxation and cognitive relaxation treatments of general anger. *Journal of counseling psychology*, 1992, 39(2):158-67.
17. Janbozorgi M. [The study of the effect of progressive relaxation training on anxiety factor of personality] [MA thesis]. Tehran, Tarbiat Modares University Press, 1992 [in Farsi].
18. Cattell RB. *The scientific analysis of personality*. Baltimore, Penguin, 1965.
19. Janbozorgi M. [The effects of short-term group psychotherapy (multimodal approach) with and without religious orientation on anxiety and stress] [PhD thesis]. Tehran, Tarbiat Modares University, 2000 [in Farsi].
20. Latorre MA. A holistic view of psychotherapy: connecting mind, body and spirit. *Perspectives in psychiatric care*, 2000, 36(2):67-8.
21. Stephens R. Imagery: strategic intervention to empower clients. *Clinical nurse specialist*, 1993, 7:170-4.
22. Ost LG, Breitholtz E. Applied relaxation vs. cognitive therapy in the treatment of generalized anxiety disorder. *Behavioral research and therapy*, 2000, 38:777-90.
23. Kabat-Zinn J et al. Effectiveness of a meditation-based stress reduction program. *American journal of psychiatry*, 1992, 149:936-43.

24. Carlson R, Shield B, eds. *Healers on healing*. Los Angeles, California, Jeremy P. Tarcher, 1989.
25. *Diagnostic and statistical manual of disorders* ((DSM-IV), text revision. Washington DC, American Psychiatric Association, 2000.
26. Dadsetan P, Delkhamosh MT. *Standardization of 16PF questionnaire for Iranian Community*, 4th ed. Tehran, Tehran University, Samt Ltd, 2008.
27. IPAT Staff. *Administrators manual for the 16PF*. Champaign, Illinois, Institute for Personality and Ability Testing, 1991 (<http://WWW.16pfew.com>, accessed 24 January 2005).
28. Spielberger CD, Gorsuch RL, Lushene RD. *Manual for the State-Trait Anxiety Inventory (self-evaluation questionnaire)*. Palo Alto, California, Consulting Psychologists Press, 1970.
29. Spielberger CD. *Manual for the State-Trait Anxiety Inventory* (revised ed.). Palo Alto, California, Consulting Psychologists Press, 1983.
30. Spielberger CD. Assessment of state and trait anxiety: conceptual and methodological issues. *The southern psychologist*, 1985, 2:6–16.
31. Panahi SM. [Survey of validity and reliability of State-Trait Anxiety Inventory in Iran] [MA thesis]. Tehran, Tarbiat Modares University, 1991 [in Farsi].
32. Berenstein DA, Borkovec TD, Hazlett-Stevens H. *New directions in progressive relaxation training*. Westport, Praeger, 2000.
33. Palmer S, Dryden V. *Counseling for stress*. London, Sage, 1995.
34. Meichenbaum DH. *Stress inoculation training*. New York, Pergamon Press Inc., 1990.
35. Olson M, Sneed N. Anxiety and therapeutic touch. *Issues in mental health nursing*, 1995, 16:97–108.
36. Vaillant GE. *Aging well*. Boston, Little Brown, 2002.

Effect of music on anxiety, stress, and depression levels in patients undergoing coronary angiography

F. Moradipناه,¹ E. Mohammadi¹ and A.Z. Mohammadi²

تأثير الموسيقى على مستويات القلق والكرب والاكتئاب لدى المرضى الذين يُجرى لهم تصوير الأوعية التاجية
فرشته مرادي بناء، عيسى محمدي، علي زاده محمدي

الخلاصة: يُعدُّ التحكم بالكرب والقلق وبث الشعور بالارتياح بين المرضى من التحديات التي يواجهها الأطباء أثناء القنطرة التاجية. وتهدف هذه الورقة لعرض دراسة حالات وشواهد استقصت تأثير الموسيقى على مستويات القلق والكرب والاكتئاب الذي يعاني منه المرضى أثناء إجراء تصوير الأوعية التاجية، وذلك باستخدام سلم قياس الاكتئاب والقلق والكرب الذي يتكون من 21 بنداً وقد أظهرت الفروق بين الأحرار المسجلة قبل وبعد التدخل أن هناك نقصاً يُعتمد به إحصائياً في الأحرار الخاصة بالقلق لدى الرجال (قيمة الاحتمال 0.0006) وبالكرب لديهم (قيمة الاحتمال 0.001) وبالاكتئاب لديهم (قيمة الاحتمال 0.02) في مجموعة التدخل، ممن استمعوا إلى 20 دقيقة من الموسيقى التي تبعت على الاسترخاء، وذلك بالمقارنة مع مجموعة شاهدة ممن سمح لهم بالخلود للراحة لمدة عشرين دقيقة.

ABSTRACT Control of stress and anxiety and the promotion of comfort are challenges facing health practitioners involved in catheterization. The aim of this case-control study was to examine the effect of music on the levels of anxiety, stress, and depression experienced by patients undergoing coronary angiography, as measured by the 21-item Depression Anxiety Stress Scales. Differences in pre- and post-intervention scores demonstrated that there were significant decreases in mean scores of state anxiety ($P = 0.006$), stress ($P = 0.001$) and depression ($P = 0.02$) in the intervention group, who listened to 20 minutes of relaxing music, as compared with the control group who had 20 minutes of bed rest.

Effets de la musique sur les niveaux d'anxiété, de stress et de dépression chez des patients subissant une angiographie coronarienne

RÉSUMÉ Le contrôle du stress et de l'anxiété et les mesures visant à assurer le confort sont des défis que doivent relever les professionnels de la santé concernés par le cathétérisme. L'objectif de cette étude cas/témoins était d'examiner les effets de la musique sur les niveaux d'anxiété, de stress et de dépression ressentis par les patients subissant une angiographie coronarienne, en les mesurant à l'aide de l'échelle DASS (*Depression Anxiety Stress Scales*) composée de 21 items. Les différences entre les scores avant et après l'intervention ont montré une baisse significative des scores moyens d'anxiété-état ($P = 0,006$), de stress ($P = 0,001$) et de dépression ($P = 0,02$) dans le groupe qui avait écouté une musique relaxante pendant 20 minutes, par rapport au groupe témoin qui était simplement resté allité pendant 20 minutes.

¹Department of Nursing, Tarbiat Modares University, Tehran, Islamic Republic of Iran (Correspondence to E. Mohammadi: mohamade@modares.ac.ir).

²Department of Social Medicine, Shahid Beheshti Medical Sciences University, Tehran, Islamic Republic of Iran. Received: 20/11/06; accepted: 11/01/07

Introduction

Coronary angiography is a common invasive procedure for diagnosis of cardiovascular diseases which can be acutely stressful for many patients [1].

The current study investigated a safe and noninvasive nursing intervention [2] to reduce stress and anxiety in patients undergoing coronary angiography. Art, dance and music therapy are becoming an important part of complementary medicine. These creative arts therapies can contribute to all areas of health care and most psychological and physiological illnesses [3]. Music therapy is the therapeutic use of music and musical activities in the treatment of somatic and mental diseases. In the past few decades it has developed from a quasi-professional working field into an increasingly evidence-based treatment for various diseases [4]. Application of music therapy is based on Rogers' Science of Unitary Human Beings theory [5].

Studies exploring the effectiveness of music therapy have produced different results. Some have indicated that music therapy reduced stress and anxiety in the patients [6–10], but others have found no effect of music intervention on post-procedural pain and anxiety, although music therapy improved the level of comfort in patients [1,11]. Gallagher et al. indicated that music therapy is invaluable in palliative medicine [12]. The existing studies are difficult to interpret since some of them provided conflicting results. Furthermore, most of the studies did not examine the levels of anxiety and stress on pre-operative patients, whereas much of the research over the past decades has shown that anxiety and stress levels are raised before surgery.

Therefore, the present study in the Islamic Republic of Iran examined the following question: Do patients undergoing

coronary angiography who listen to music for 20 minutes have less stress, anxiety and depression prior to and after angiography than those who do not listen to music?

Methods

Study design

This study was a randomized controlled trial with a pre-intervention–post-intervention design with a music therapy intervention group ($n = 37$) and a control group ($n = 37$). The study was conducted as a randomized clinical trial to limit sampling errors. The study was conducted in 2005.

Sample

The study sample was patients who were scheduled for coronary angiography at a university hospital in Tehran. Patients who were undergoing angiography and met the inclusion criteria were invited to participate. All participants gave their informed consent prior to entering the study. Patients with the following characteristics were eligible for inclusion in the study: aged 40–60 years; scheduled for angiography for the first time; had no auditory deficits or psychological disorders; able to hear music; able to use a cassette player independently; and interested in listening to music. Using a wristwatch the Tick-Tock test was carried out to diagnose hearing impairments, and psychological disorders were detected by a neurologist. Patients were excluded from the study if they were receiving narcotic analgesics, antidepressants or antianxiety drugs, as these may decrease cognitive ability and inhibit the ability to use a cassette player, thereby diminishing accurate measurement of the independent variable. Furthermore, these drugs reduce stress, anxiety and depression, and might influence the exact measurement of the dependent vari-

able. Respondents were asked to document the use of analgesic agents administered in conjunction with the procedure.

By using Altman's nomogram, a sample size of 74 (37 patients in each group) was necessary to give the study 90% power to detect a clinical difference of 3 points with a standard deviation (SD) of 1 in each of the groups. A nonprobability convenience sample of 74 patients was obtained and participants were randomly allocated to the music intervention or control group depending on the admission date for angiography. Patients admitted on even-numbered days were allocated to the music group and patients admitted on odd-numbered days were assigned to the control group. It should also be noted that hospital admissions were offered randomly throughout the days of the week and there was no specific day allotted to certain patients. The nursing staff and the shift work system were not changed during the study period. Admissions to the catheterization laboratory were capped at 4 to 5 patients per day and patients were discharged 24 hours after completion of the procedure.

Data collection

The short-form of the Depression Anxiety Stress Scales (DASS-21) was used to measure the level of depression, anxiety and stress. DASS is a reliable and valid method of assessing features of depression, anxiety and stress in clinical and nonclinical groups. It includes items that measure symptoms typically associated with dysphoric mood (e.g. sadness or worthlessness). The DASS-21 consists of 21 items, 7 in each of the subscales: depression (DASS-21-D), anxiety (DASS-21-A) and stress (DASS-21-S), rated on a 4-point scale from 3 "applied to me very much or most of time" to 0 "did not apply to me". Antony et al.'s estimates of the reliability of the DASS-21 gave Cron-

bach alpha scores of 0.94, 0.87 and 0.91 for the depression, anxiety and stress sub-scales respectively [13]. Our computed values of Cronbach alpha were considered adequate with 0.94, 0.92 and 0.89 for depression, anxiety and stress respectively.

The music group was given a tape player and a music cassette which was prearranged by the researcher; all the participants affirmed that they took pleasure from music. The 20-minute tape consisted of 3 relaxing pieces of music: "*Canon in D*" composed by Johann Pachelbel; the theme from "*Love story*" played by Richard Clayderman and "*Dance of the iguana*" by Stevan Pasero. All the 3 pieces of music had 70–80 beats per minute and were based on slow and steady rhythms. The most relaxing music had a tempo of approximately 60–80 beats per minute [14]. The tape was played through earphones from a cassette player.

The patients were required to arrive at the hospital at least 1.5 hours before the angiography procedure. Before angiography, all participants completed the pre-intervention DASS-21. Then participants in the music group were asked to sit in a comfortable bed and avoid any distractions such as reading, speaking on the telephone, listening to the radio or watching television. They were instructed to listen to the 20-minute music tape and then complete the post-intervention DASS-21. Instead of the music intervention, the control group was asked to sit in a relaxed position in a quiet comfortable bed for 20 minutes and avoid distractions including telephones, radio and television; however they were allowed to read newspapers, books or magazines. After 20 minutes of music or 20 minutes of bed rest all participants completed the post-intervention DASS-21 before undergoing angiography. After the angiography, all participants repeated the pre-intervention DASS-21 immediately after transferring to

the recovery ward. Then the music group listened to the same music tape and repeated the post-intervention DASS-21, while the control groups had 20 minutes of bed rest before repeating the post-intervention DASS-21.

Patient's stress, depression and anxiety levels might be influenced by sudden changes in haemodynamics and psychological status. Therefore, while participants were receiving needed routine care, any homodynamic and psychological changes affecting the patient's stress, depression and anxiety levels were observed and if there was excessive emotional tension or unpleasant news the patient was excluded from the study.

Because some physicians informed their patients about the angiography results and this could have influenced the level of stress, anxiety and depression, we added a question about whether the patient had received the result of the angiography test, and if so, whether the test result was normal or abnormal.

Ethical considerations

Ethical approval for the study was obtained from the institutional review board to ensure protection of human subjects. All participants gave written informed prior to their participation.

With respect to patient's confidentiality, numbers were used to identify participants rather than names. Participants were informed that their participation was voluntary, they had the right to withdraw at any time without needing to give a reason and that their care would not be affected whether or not they took part.

Data analysis

Data were analysed using *SPSS*, version 11. The independent sample *t*-test and chi-squared tests were calculated to determine

any significant differences in the demographic distributions of the 2 groups.

For each patient, the pre-intervention score was subtracted from post-intervention score and the mean values of the resulting scores were calculated to verify if these mean values were significantly different between the intervention and control groups. The pre-intervention group mean scores were also compared to the post-intervention group mean scores to determine if there was a difference between the group mean test scores. *t*-tests were conducted to determine whether there was a significant difference between pre- and post-intervention scores of individuals in both groups before and after angiography.

Results

The difference in the distribution of demographic characteristics between the 2 groups was not statistically significant (Table 1). The control and music groups had the same mean age: 50.6 (SD 7.1) years versus 50.6 (SD 5.8) years. There was no significant difference in the sex distribution (15 men and 22 women in the control group and 22 men and 15 women in the music group).

The findings and *t*-test results are summarized in Table 2 for the control and intervention groups before and after angiography. Before angiography, descriptive statistics showed that the pre-intervention mean scores were similar in the music intervention group and the control group for stress [11.35 (SD 4.31) versus 11.00 (SD 4.94)], for anxiety [6.83 (SD 4.14) versus 6.81 (SD 4.29)] and for depression [6.59 (SD 4.55) versus 5.86 (SD 4.19)]. The post-intervention mean scores after the music intervention, however, were lower in the music group than the control group for stress [6.16 (SD 4.98) versus 8.7 (SD 4.89)],

Table 1 Demographic characteristics of patients in the music intervention and control (no intervention) groups

Characteristic	Control group (n = 37)		Intervention group (n = 37)	
	Mean	SD	Mean	SD
Age (years)	50.6	7.1	50.6	5.8
Duration of disease (months)	15.2	15.1	12.2	14.9
Daily use of music (min/day)	49.4	62.4	69.4	80.2
	No.	%	No.	%
Sex				
Male	15	40.5	22	59.5
Female	22	59.5	15	40.5
Marital status				
Married	330	89.2	4	10.8
Single	31	83.8	6	16.2
Literacy				
Illiterate	12	32.4	12	32.4
Diploma and below	22	59.4	20	54.0
Higher education	3	8.1	5	13.5
History of hospitalization				
Yes	29	78.4	27	73.0
No	8	21.6	10	27.0

Because of rounding, not all percentages total 100.

SD = standard deviation.

for anxiety [4.13 (SD 3.81) versus 6.10 (SD 3.71)] and for depression [4.40 (SD 4.42) versus 5.02 (SD 3.79)]. These differences in mean values of pre- to post-intervention changes between both groups before angiography were statistically significant: for stress ($P = 0.001$), for anxiety ($P = 0.006$) and for depression ($P = 0.02$). Anxiety, depression and stress scores among the music group were significantly reduced pre- to post-intervention, while the control group reported about the same level of pre-intervention and post-intervention stress, anxiety and depression on the DASS-21 administered before angiography.

After angiography, mean scores for stress, anxiety and depression were lower in both groups and these were similar comparing the music intervention and control

groups (Table 2). The results of the t -test showed no statistically significant differences between the music and control groups with respect to the changes between pre- and post-intervention mean scores on the stress ($P = 0.14$), anxiety ($P = 0.94$) and depression ($P = 0.48$) scales.

The data showed no relationship between the demographic characteristics of the groups and the stress, anxiety and depression levels (data not shown).

The results showed that the group that was informed of the angiography results experienced lower stress, anxiety and depression levels than the group that was not informed. There was a significant difference between the informed group and the non-informed group in the mean scores after angiography for stress ($t = -2.4$, $df =$

with the control group. However, no significant differences were found with either the music intervention or the control group after angiography. On the basis of these findings, listening to 20 minutes of relaxing music prior to angiography resulted in less stress, anxiety and depression in patients undergoing angiography than did scheduled bed rest.

Prior to angiography patients are especially prone to anxiety or even panic caused by signing a consent form for the procedure, the knowledge of possible progression to surgery if serious coronary artery disease is detected and the lack of sufficient information about the planned procedure. Before the coronary angiographic procedure and the intervention, the levels of anxiety, stress and depression were high in both groups. However, after the intervention these levels decreased in the experimental group, with a significant difference in the amount of the decrease. This randomized clinical trial has provided evidence that, before coronary angiography, the patients who listened to music in a relaxed atmosphere reported less stress, anxiety and depression when compared with those who did not listen to music.

Our findings support previous studies on this topic that having an angiographic procedure is a stressful event for many patients. Numerous studies have shown that music is effective in reducing stress or anxiety [2,6,8,15–20]. McCaffrey and Locsin presented the use of music listening as an effective, noninvasive intervention designed to assist nurses in creating a healing environment to promote health and well-being. The study demonstrated the effectiveness of music in reducing pain, decreasing anxiety and increasing relaxation [2]. Winter et al. demonstrated music's ability to reduce stress and anxiety in patients in the surgical holding area [6]. Good et al., assessing the effects of music and jaw relaxation on post-

operative pain relief in 500 patients, found that listening to music could decrease arthritis pain in women [15]. Listening to music has been effective in reducing pre-operative anxiety [16] and reducing stress [17]. The impact of music on anxiety associated with diagnostic procedures has also been examined by Hamel [8] and Vahhabi [18], who demonstrated that patients waiting for their cardiac catheterization benefited from music therapy. Dubois et al. concluded that music during bronchoscopy is a simple and inexpensive nonpharmacological way to improve patients' comfort [19]. Palakanis et al. reported that patients who listened to self-selected music tapes during flexible sigmoidoscopy experienced a reduction in anxiety level [20].

Our study was not able to demonstrate that music was effective in reducing anxiety, stress and depression of patients after cardiac angiography. After the procedure, these levels decreased in both groups, with no significant difference in the amount of the decrease. This might be related to the fact that the successful completion of an invasive procedure is stress reducing in itself. Bally et al. also found that a patient-controlled music intervention had no effect on post-procedural anxiety [1]. McRee et al. failed to demonstrate that massage and music therapy can decrease post-operative anxiety scores. The decreased level of anxiety in the control group could have been related to a sense of relief that the surgery was finished [21].

As indicated by our results, listening to relaxing music, a noninvasive and inexpensive intervention, can allay patients' anxiety, stress and depression. These results have implications for nursing practice. Nurses must have an understanding of the need to provide nonpharmacological, cost-effective approaches to improving patients' surgical experiences and pre-operative and

post-operative outcomes. If nurses had the knowledge and ability to use music therapy to alleviate patients' mood, this would increase the capability of the stress management team to decrease stress, anxiety and depression. The nurse can assist the anxious and depressed client by implementing interventions that maintain or restore a sense of calm.

A limitation of this study is that we did not evaluate the patients' preferences for music; ideally, patients should be invited to choose the music that they wish to listen to. Furthermore, our study was based on the use of a questionnaire and we therefore did not attempt to measure levels of anxiety, stress and depression during the procedure

itself. Further research is needed to cover these limitations.

Conclusions

According to the results of this study, listening to music significantly lowers anxiety, stress and depression of patients before undergoing an invasive procedure. Patients undergoing angiography who listened to 20-minute relaxing music tape had a marked reduction in anxiety, stress and depression. Because music is noninvasive and free of side-effects, it can be used as an effective nursing intervention for those undergoing coronary angiography procedures.

References

1. Bally K et al. Effects of patient-controlled music therapy during coronary angiography. *Critical care nursing*, 2003, 23(2):50–5.
2. McCaffrey R, Locsin RC. Music listening as a nursing intervention: a symphony of practice. *Holistic nursing practice*, 2002, 16(3):70–7.
3. Pratt RR. Art, dance, and music therapy. *Physical medicine and rehabilitation clinics of North America*, 2004, 15(4):827–84.
4. Nickel AK et al. Outcome research in music therapy—a step on the long road to an evidence-based treatment. *Annals of the New York Academy of Sciences*, 2005, 1060:283–93.
5. Rogers ME. Nursing: a science of unitary human beings. In: Riehl-Sisca JP, ed. *Conceptual models for nursing practice*, 3rd ed. Norwalk, Connecticut, Appleton and Lange, 1980:181–8.
6. Winter MJ, Paskin S, Baker T. Music reduces stress and anxiety of patients in the surgical holding area. *Journal of post anesthesia nursing*, 1994, 9(6):340–3.
7. Brunges N, Aringe G. Music therapy for reducing surgical anxiety. *AORN journal*, 2003, 78(5):816–8.
8. Hamel WJ. The effects of music intervention on anxiety in the patient waiting for cardiac catheterization. *Intensive and critical care nursing*, 2001, 17(5):279–85.
9. Svansdottir HB, Snaedal J. Music therapy in moderate and severe dementia of Alzheimer's type: a case-control study. *International psychogeriatrics*, 2006, 18(4):613–21.
10. Sendelbach SE et al. Effects of music therapy on physiological and psychological outcomes for patients undergoing cardiac surgery. *Journal of cardiovascular nursing*, 2006, 21(3):194–200.
11. Cevalasco AM, Kennedy R, Generally NR. Comparison of movement-to-music, rhythm activities, and competitive games on depression, stress, anxiety, and anger of females in substance abuse reha-

- bilitation. *Journal of music therapy*, 2005, 42(1):64–80.
12. Gallagher LM et al. The clinical effects of music therapy in palliative medicine. *Supportive care in cancer*, 2006, 14(8):859–66.
 13. Antony MA et al. Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scale in clinical groups and a community sample. *Psychological assessment*, 1998, 10(2):176–81.
 14. Ortiz J. *The Tao of music: sound psychology*. York Beach, Massachusetts, Samuel Weiser Inc., 1998.
 15. Good M et al. Relief of postoperative pain with jaw relaxation, music and their combination. *Pain*, 1999, 81:163–72.
 16. Augustin P, Hains A. Effect of music on ambulatory surgery patients' pre-operative anxiety. *AORN journal*, 1996, 63(4):750–8.
 17. Burns JL et al. The effects of different types of music on perceived and physiological measures of stress. *Journal of music therapy*, 2002, 39:101–16.
 18. Vahhabi SY. *The effect of music therapy and relaxation on anxiety of patients with cardiovascular diseases* [MSc thesis]. Tehran, Department of Nursing, Iran University of Medical Sciences, 1998.
 19. Dubois JM, Bartter T, Pratter MR. Music improves patient comfort level during outpatient bronchoscopy. *Chest*, 1995, 108(1):129–30.
 20. Palakanis KC et al. Effect of music therapy on state anxiety in patients undergoing flexible sigmoidoscopy. *Diseases of the colon and rectum*, 1994, 37(5):478–81.
 21. McRee LD, Noble S, Pasvogel A. Using massage and music therapy to improve postoperative outcomes. *AORN journal*, 2003, 78(3):433–47.

Cardiovascular diseases

The Eastern Mediterranean Region is facing a growing epidemic of cardiovascular diseases provoked by an ageing population and socioeconomic changes.

The WHO programme on cardiovascular diseases aims to develop global strategies to reduce the incidence, morbidity and mortality of cardiovascular diseases by:

- effectively reducing cardiovascular disease risk factors and their determinants
- developing cost-effective and equitable health care innovations for management of cardiovascular diseases
- monitoring trends of cardiovascular diseases and their risk factors

Further information can be found at: http://www.emro.who.int/ncd/cardiovascular_diseases.htm

Publications indexed in *Medline* and *Embase* originating from the Syrian Arab Republic: a survey

H.E. Matar,¹ M.Q. Almerie,¹ C.E. Adams² and A. Essali³

المطبوعات المفهرسة في ميدلاين وإمباس والمستمدّة من الجمهورية العربية السورية: دراسة مسح
حسام الدين مطر، محمد قتيبة المر، كلايف آدامز، أديب العسالي

الخلاصة: يواجه الباحثون الصحيون في الجمهورية العربية السورية الكثير من الصعوبات، منها محدودية الموارد، والبنية التحتية، ووسائل التواصل. وقد أجرى الباحثون في شهر آذار/ مارس 2006 بحثاً في قواعد معطيات ميدلاين وإمباس لاستخلاص المعطيات حول 386 من الأوراق المنشورة في مجال الطب والبيولوجيا والتي صدرت من الجمهورية العربية السورية. وقد كان لإمباس قدر رفيع من التغطية، وكان 64 من إجمالي الأوراق منشوراً في مجلات تصدر في أوروبا، و22٪ منها منشوراً في مجلات تصدر في أمريكا الشمالية، و12٪ منها منشوراً في دوريات تصدر في الشرق الأوسط. وقد زاد إنتاج أوراق البحوث بمقدار 1.4 مقالة نسبته منذ عام 1979. وكانت المواضيع التي تتناولها 57٪ من أوراق البحث طبية بيولوجية، أما ما تبقى منها فكان بحثاً في العلوم البحتة أو قضايا الزراعة والطب البيطري. وكان طب الأسنان والصحة العمومية والجراحة أكثر المواضيع شيوعاً في الأوراق الطبية البيولوجية. أما التمويل فكان في معظم الحالات من الحكومة.

ABSTRACT Health research in the Syrian Arab Republic faces many difficulties, including limited funds, infrastructure and means of dissemination. In a search of *Medline* and *Embase* databases in March 2006 we extracted data on 386 biomedical papers originating from the Syrian Arab Republic. *Embase* had the superior coverage. A total of 64% were published in journals from Europe, 22% from North American journals and 12% in periodicals from the Middle East. Output of papers increased by 1.4 articles/year since 1979. The topics of 57% of papers were biomedical, with the remainder being pure science or agricultural/veterinarian issues. Dentistry, public health and surgery were the commonest subjects of the biomedical papers. Funding was largely from government.

Étude sur les publications indexées dans *Medline* et *Embase* provenant de la République arabe syrienne

RÉSUMÉ La recherche en santé en République arabe syrienne est confrontée à de nombreuses difficultés, notamment au caractère limité des ressources financières, de l'infrastructure et des moyens de diffusion. Lors d'une recherche dans les bases de données *Medline* et *Embase* en mars 2006, nous avons extrait des références relatives à 386 articles biomédicaux provenant de ce pays. La base *Embase* était celle qui en contenait le plus. Au total, 64 % des articles étaient publiés dans des revues d'Europe, 22 % dans des revues d'Amérique du Nord et 12 % dans des périodiques du Moyen-Orient. Le nombre d'articles publiés avait augmenté de 1,4 article/an depuis 1979. Pour 57 % des articles, le sujet était biomédical, alors que les autres articles traitaient de science pure ou de questions agricoles ou vétérinaires. Les sujets les plus courants des articles biomédicaux étaient la médecine dentaire, la santé publique et la chirurgie. Leur financement provenait en grande partie des pouvoirs publics.

¹Faculty of Medicine, University of Damascus, Damascus, Syrian Arab Republic.

²Department of Adult Psychiatry, University of Leeds, Leeds, United Kingdom (Correspondence to C.E. Adams: clive.adams@nottingham.ac.uk).

³Centre of Psychiatry, Damascus, Syrian Arab Republic.

Received: 13/10/06; accepted: 10/12/06

Introduction

The Syrian Arab Republic has a population of 18.8 million with a median age of 21 years (compared with 39 years in the United Kingdom) and a growth rate of 2.3% (UK 0.28%). The infant mortality rate is 28.6 deaths/1000 live births (UK 5.1) and the life expectancy at birth is 70.3 years (UK 78.5). The gross domestic product is estimated at US\$ 73.33 billion (UK \$1.83 trillion).

The structure of modern scientific research in the Syrian Arab Republic started to take shape in 1958 when the Higher Council of Science was established [1]. Research work in this country, however, faces difficulties such as low budgets and limited research capacity. Nevertheless, single centres have conducted research, although collaborative work between Arab universities or with international organizations is also evident [2,3].

Wide dissemination of research is a problem. Much biomedical research is published in specialist periodicals produced by local universities and not covered by bibliographic databases such as *Medline*, the most widely accessible database, produced by the National Library of Medicine in the United States of America [4]. Coverage is worldwide, but most records are from English language sources or have English abstracts. *Embase* is a European-based general biomedical database containing records of the contents of over 5000 international biomedical journals. It has been claimed that *Embase* provides greater coverage of non-English language publications and broader coverage of pharmaceuticals, psychiatry, toxicology and alternative medicine than *Medline* alone. The estimated overlap between *Medline* and *Embase* is only 30%–50%, and searchers comparing the 2 databases concluded that relevant information would be missed if only one of the databases was searched [5].

The objectives of the study were to produce a survey of widely accessible research publications from the Syrian Arab Republic.

Methods

We searched *PubMed* (<http://www.ncbi.nlm.nih.gov/entrez/>) in March 2006 using the search phrase "Syria\$" in the affiliation field. This same search was then repeated for *Embase* (Ovid). Downloaded data from both databases were then merged in a bibliographic citation program (*ProCite*). Two authors (M.Q.M., H.E.M.), working independently, discarded duplicates, inspected all electronic records and extracted data on source database, periodical and research centre, the broad category of study methodology, biomedical specialty, source of funding and year of publication. Disagreement was resolved by discussion.

Results

The initial search resulted in a total of 492 records (163 duplicates). Duplicated records were removed, 17 other papers were excluded because they were not conducted in the Syrian Arab Republic, and another 7 records were discarded as they had been conducted by Syrian researchers outside of the country. Finally, 386 *Medline* or *Embase* reports seemed to be papers genuinely originating in the Syrian Arab Republic. Of these 47% were exclusively from *Embase*, 32% from *Medline* alone and 21% were cited in both databases.

The first publication we identified was in 1979. Thereafter the number of publications from the Syrian Arab Republic accessible in these widely used databases has increased sharply, particularly in recent years, with an overall rate of increase of 1.4 articles/annum since 1979 (Figure 1).

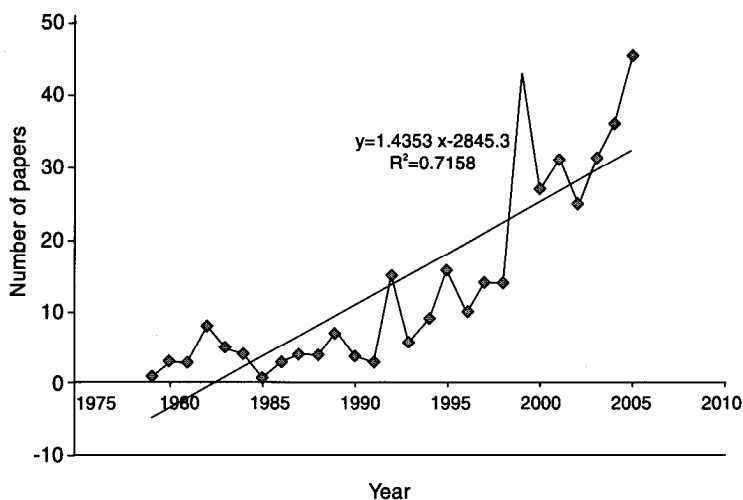


Figure 1 Research papers indexed in *Medline* and *Embase* originating from the Syrian Arab Republic over time

Most papers (247, 64%) were published in journals clearly originating from Europe. Within Europe, Syrian papers were most commonly found in British (110), Dutch (32), German (32) or Hungarian (30) periodicals. About a quarter (22%) of the papers were published in North American journals. Periodicals from the Middle East had published 12% of the papers and journals from Asia, Australia and New Zealand only 2%. Overall, the papers were published in 185 different journals; the medical journals that most commonly published work from the Syrian Arab Republic were the *Eastern Mediterranean health journal* (15 papers) and the *Saudi medical journal* (13 papers).

The majority of contact addresses were in the capital, Damascus (68%), but Aleppo, the industrial capital, was the source of 25% of papers. The remainder gave an address in Homs (3%), Lattakia (2%) and Hama (1%); 1% did not name a specific city.

When classified by the methods or type of paper, 6% seemed to be randomized

or possibly randomized clinical trials and another 5% were non-randomized clinical studies, 10% of papers seemed to be surveys and 13% were case reports and case series, but 38% seemed to be purely descriptive. Reviews and editorials made up 16% and 2% of papers respectively. It was difficult to classify the methods or type of paper for 9% of papers.

The biomedical field was heavily represented in our sample (219 of the 386 papers, 57%) (Table 1), although 31% were papers on pure science and 11% were on topics of agricultural or veterinarian interest.

Most papers acknowledged funding from government ministries (Ministry of Higher Education 144 papers, Health 54 papers, Agriculture 43 papers and Defence 17 papers, and the Atomic Energy Commission 114 papers) and 40 acknowledged support from other sources including the private sector.

Table 1 Numbers of research papers indexed in Medline and Embase originating from the Syrian Arab Republic by biomedical specialty

Specialty	No. of papers	% of all papers (n = 386)
Dentistry	41	11
Public health	36	9
Surgery	28	7
Dermatology	15	4
Cardiology	14	4
Laboratory	11	3
Urology	11	3
Gastroenterology	7	2
Medical history	7	2
Genetics	7	2
Obstetrics & gynaecology	7	2
Ophthalmology	6	2
Rheumatology	6	2
Chest medicine	5	1
Microbiology	5	1
Paediatrics	5	1
Anaesthesia	3	1
Neurology	2	1
Otology	1	0
Oncology	1	0
Psychiatry	1	0

Discussion

Medline searches inadequately reflected the extent of biomedical publications originating

from the Syrian Arab Republic, and *Embase* had the superior coverage, but it is likely that our simple search has failed to identify other work from this region. No local bibliographic databases are available for comparison.

Nevertheless, this study highlights the wide publishing activity that is burgeoning in the Syrian Arab Republic. This is a growing research community that repeatedly succeeds in overcoming considerable difficulties and barriers to publish in widely disseminated journals. Although this activity is still largely focused in centres in Damascus, work from other cities is also evident. The majority of these published studies were discursive, but we found numbers of case series, cohort surveys and controlled trials. It is clear that researchers in the Syrian Arab Republic do have experience in all the key epidemiological methodologies and it seems likely that future years will bring yet more studies undertaken locally with, hopefully, findings clearly applicable to people in the Syrian Arab Republic.

Acknowledgements

We would like to thank Dr Naser Al-Merie, Dr Najwa Hakim, Mr Yahya Matar and Mrs Hind Al-Halabi for their support.

References

1. Kharouf H. *Report on scientific research in the Syrian Arab Republic*. Damascus, Syrian Arab Republic, Ministry of Higher Education, 1997.
2. *Statistics on Scientific Research in the Syrian Arab Republic*. Damascus, Syrian Arab Republic, Ministry of Higher Education, 1998.
3. Moufti A. *Exchange of information about scientific research in the Arab world: the Syrian paper*. Paper presented at the Economic and Social Commission for Western Asia (ESCWA) Meeting on Management of Science and Research Programs, Damascus, Syrian Arab Republic, 1998.

4. *Fact Sheet MEDLINE®*. United States National Library of Medicine [website] (<http://www.nlm.nih.gov/pubs/factsheets/medline.html>), accessed 18 August 2008).
5. Wong SS, Wilczynski NL, Haynes RB. Developing optimal search strategies for detecting clinically sound treatment studies in *Embase*. *Journal of the Medical Library Association*, 2006; 94:41–7.

Eastern Mediterranean Advisory Committee for Health Research

The Eastern Mediterranean Advisory Committee for Health Research (EM ACHR) comprises senior and outstanding researchers from the Region and represents a balanced disciplinary and geographical distribution. They serve in their individual capacity for a term of three to four years (sometimes extendable). The Committee has the mandate to provide advice to the Regional Director (as deemed necessary by him) on all issues and matters related to health research and development in the Region. The Committee performs its consultative mandate in accordance with its terms of reference, given to it by the Regional Director.

Further information can be found at the Research Policy and Cooperation website: <http://www.emro.who.int/rpc/ACHR.htm#section3>

تدريس اللغة الإنكليزية بكلية الطب، جامعة دمشق

قاسم طه السارة

الخلاصة: تولي منظمة الصحة العالمية أهمية خاصة لإعداد وتدريب الموارد البشرية الصحية ولتحسين فرص وصولهم إلى المصادر العلمية الموثوقة والمحدثة، وتهدف هذه الدراسة إلى التعرف على قدرات طلاب الطب في جامعة دمشق على الاستفادة من مصادر المعلومات المتاحة باللغة الإنكليزية، ولأسيماً أنهم يدرسون العلوم الطبية باللغة العربية، ويخصّصون 4 ساعات كل أسبوع لدراسة اللغة الإنكليزية. وخلصت الدراسة إلى أن استفادة الطلاب من دراسة اللغة الإنكليزية محدودة جداً، وأن مستوى كفاءتهم في اللغة الإنكليزية بقي كما كان عليه منذ التحاقهم بالسنة الأولى للدراسة في الكلية (المستوى B1 المستخدم المستقل وفقاً للإطار الأوروبي العام) واستمروا على ذلك المستوى حتى تخرجهم. إن هذه النتيجة توضح ضرورة تعديل منهج تدريس اللغة الإنكليزية في كلية الطب، جامعة دمشق. وللدراسة جوانب مهمة للتعرف على دور أساتذة اللغة الإنكليزية وعلى تأهيل الطلاب للوصول إلى المعلومات ولاجتياز الامتحانات الدولية.

Teaching English at Damascus University Medical School

ABSTRACT The World Health Organization gives special attention to developing and training human resources and improving their accessibility to reliable and updated scientific resources. This study aims to determine the ability of students in Damascus University Medical School to benefit from English sources of information: they study medical sciences in Arabic but 4 hours per week are allocated for the study of English. The study shows that the benefit to the students from these classes is minor: their proficiency remains at level B1 (according to the General European Framework). This makes it essential to modify the English classes. It is important to determine the role of medical sciences teachers and to qualify students to be able to pass international examinations.

Enseignement de l'anglais à la faculté de médecine de Damas

RÉSUMÉ L'Organisation mondiale de la santé accorde une attention particulière à la valorisation et à la formation des ressources humaines ainsi qu'à l'amélioration de leurs possibilités d'accès à des ressources scientifiques fiables et actualisées. Cette étude vise à déterminer la capacité des étudiants de la faculté de médecine de Damas à tirer parti des sources d'information en anglais. En effet, l'enseignement de la médecine leur est dispensé en arabe, mais quatre heures par semaine sont consacrées à la langue anglaise. Cette étude montre que les étudiants ne retirent pas un grand bénéfice de ces cours : leur maîtrise de la langue ne dépasse pas le niveau B1 (selon le Cadre européen commun de référence). Changer les cours d'anglais est donc indispensable. Il est important de définir le rôle des professeurs de médecine et de permettre aux étudiants d'acquérir les compétences requises pour réussir des examens internationaux.

قسم الإعلام الطبي والصحي، المكتب الإقليمي لشرق المتوسط لمنظمة الصحة العالمية، القاهرة، مصر
(البريد الإلكتروني: sarak@emro.who.int)
الاستلام: 08/10/05، القبول: 08/10/13

K. Sara. Health & Biomedical Information Unit, World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt.

1. مقدمة

يعرض هذا التقرير نتائج البحث الذي أُجري لبرنامج تعليم اللغة الإنكليزية في كلية الطب، جامعة دمشق. وقد أُجري هذا البحث بإشراف منظمة الصحة العالمية و المجلس الثقافي البريطاني في سورية وعمادة الكلية.

وتعتبر منظمة الصحة العالمية السلطة المسؤولة عن تنسيق الأنشطة المتعلقة بالصحة في منظومة الأمم المتحدة، وأحد أهدافها الاستراتيجية تحسين مهارات التواصل بين العاملين الصحيين. وقد سعت المنظمة إلى تنفيذ مشروع ارتيادي في سورية لوضع استراتيجيات لتقييم تلك المهارات. ويعتبر هذا البحث المرحلة الأولى لهذا المشروع الارتيادي. وقد حرصت المنظمة على تنفيذ المشروع في سورية نظراً لأن العلوم الطبية والصحية تُدرّس فيها باللغة العربية، ولأن الدروس المستفادة من هذا المشروع سيسهل نقلها إلى بلدان أخرى. كما حرصت المنظمة على الشراكة مع المجلس البريطاني في هذا المشروع، نظراً لأن للمجلس البريطاني نشاطاً في بلدان الشرق الأوسط.

ويوضح هذا التقرير المعلومات الأساسية للبحث الذي أُجري في سورية، والمنهجية المتبعة فيه، والأساس المنطقي له، ونتائج البحث وتحليل النتائج. كما يعرض التقرير مجموعة من التوصيات التي تعتبر دليلاً إرشادياً للمنظمة ولكلية الطب والمهتمين بالتعليم العالي في البلدان العربية بشكل عام حول كيفية تحسين طرق تعليم وتعلم اللغة الإنكليزية في كليات الطب والعلوم الصحية.

2. المعلومات الأساسية

عُقد في 20 تشرين الثاني/ نوفمبر 2006 اجتماع في كلية الطب، جامعة دمشق، شارك فيه عمادة الكلية، والمستشار الإقليمي للإعلام الطبي والصحي، بالمنظمة، ونائب مدير المجلس البريطاني في سورية. وكان الهدف من الاجتماع تنفيذ مشروع ارتيادي في كلية الطب لتقييم وتحسين مهارات التواصل وإتقان اللغة الإنكليزية لدى الطلاب، وتأثيره على الالتحاق ببرامج الدراسات العليا وعلى إجرائهم لمزيد من البحث عن المعلومات عن طريق الإنترنت أو التعلم عن بُعد. وقد اتفق المجتمعون على تحديد مستوى النظام الدولي لاختبارات اللغة الإنكليزية بوصفه المستوى المطلوب بلوغه من قِبَل الطلاب لدى استكمالهم درجاتهم العلمية في الطب. واتفقوا على منهجية البحث.

3. منهجية البحث

1.3 الطلاب

هدفت منهجية البحث إلى فهم منحنى مستوى الطلاب وخبرتهم في اللغة الإنكليزية، وذلك بتنظيم امتحان لتحديد مستوى الطلاب لنسبة 10٪ من الطلاب (حوالي 50 طالباً) من كل عام دراسي، وذلك باستخدام اختبار تحديد المستوى الخاص بالمجلس الثقافي البريطاني، والذي يتوافق مع الإطار الأوروبي العام. فمن شأن هذا الاختبار أن يقدم بعض المعطيات الكمية.

كما اتفق على تنظيم فرق مناقشة مع عينة من الطلاب من كل سنة دراسية، بغية الحصول على معطيات وصفية حول خبرة الطلاب في تعلم اللغة الإنكليزية. ولضمان أن تكون عينات الطلاب ممثلة لجميع الطلاب، وقد تم انتقاء الطلاب عشوائياً من قِبَل عمادة الكلية.

- أهداف فرّق المناقشة
 - استطلاع رأي الطلاب حول الأساليب الحالية لتدريس اللغة الإنكليزية في كلية الطب.
 - استطلاع رأي الطلاب حول موارد اللغة الإنكليزية المتاحة في الكلية (الموارد المادية والموارد المتاحة على الإنترنت).
 - استكشاف الموارد الخارجية ومصادر الدعم الخارجي المتاحة والمستخدمة من قِبَل الطلاب لدعم تعلمهم للغة.
- المدة
 - ساعة إلى ساعة ونصف لكل فريق مناقشة.
- المشاركون
 - 15 طالباً من السنة الدراسية الأولى (8 إناث و7 ذكور).
 - 9 طلاب من السنة الثانية (5 إناث و4 ذكور).
 - 20 طالباً من السنتين الثالثة والرابعة (12 إناث و8 ذكور).
 - 12 طالباً من السنة الخامسة (9 ذكور و3 إناث).
- المكان
 - عُقدت جميع اجتماعات فرّق المناقشة في كلية الطب.

2.3 المدرّسون

وبُغية فهم مستوى اللغة والقدرة على التدريس لدى مدرّسي اللغة الإنكليزية الأربعة في الكلية اتُفق على إجراء اختبار تحديد المستوى لكل مدرس، مع ملاحظة كل مدرّس بشكل رسمي أثناء تدريسه محاضرتين. أما بالنسبة للسنة الثالثة في الكلية حيث يتم تدريس عدد محدود من المواد الطبية باللغة الإنكليزية، فقد اقترح ملاحظة ثلاثة من هذه الدروس. إضافة إلى ذلك، اقترح مقابلة المدرّسين لاستطلاع مؤهلاتهم وخبراتهم في تدريس اللغة الإنكليزية.

- أغراض المقابلات للمدرّسين
 - معرفة معلومات عامة عن المدرّسين من النواحي العلمية والعملية.
 - التعرّف على الموارد المستخدمة في تحضير الدروس.
 - التعرّف على الموارد التي يشعر المدرّسون أنهم بحاجة إليها لدعم عملية التدريس.
- المدة
 - ساعة واحدة لكل مقابلة.

- المشاركون
 - مدرّس اللغة الإنكليزية (السنة الأولى).
 - مدرّسة اللغة الإنكليزية (السنة الأولى والسنة الثانية).
 - مدرّس اللغة الإنكليزية (السنة الأولى والسنة الثانية).

- مدرّسة اللغة الإنكليزية (السنة الثالثة والسنة الرابعة).

• تاريخ ومكان المقابلة

تمت جميع المقابلات في المجلس البريطاني في المدة 8 إلى 14 أيار/ مايو 2007. كما اتفق على إجراء اختبار لتحديد مستوى عدد من أساتذة الكلية، لقياس قدراتهم على الوصول إلى النصوص الإنكليزية المستخدمة في البحوث، وقدرتهم على متابعة التطورات الحديثة في مجالهم.

3.3 هيكل المناهج والمقررات الدراسية

اتفق الباحثون على أن يقوم المجلس البريطاني بمراجعة هيكل المقررات الدراسية الحالية، لتحديد المجالات التي يمكن تحسينها. ويمكن القيام بذلك عن طريق المعلومات التي تجمع من الطلاب والمدرّسين ومن مراجعة مواد التعليم.

وقد صُمّم الهيكل البحثي المذكور لتمكين المجلس البريطاني من إعداد مقترح للمرحلة الثانية التي ستشمل ما يلي:

1. وضع تصور عام لبرنامج تدريب مدرّسي اللغة الإنكليزية.
2. وضع تفاصيل برنامج اللغة الإنكليزية لأساتذة الكلية.
3. وضع توجيهات لتطوير المقررات والمناهج الدراسية للغة الإنكليزية.

4. النتائج

1.4 تعريف الإطار الأوروبي العام

يتوافق امتحان المجلس البريطاني لتحديد المستوى مع الإطار الأوروبي العام. وهذا الإطار أداة مهنية أعدها المجلس الأوروبي من أجل وضع معايير واضحة يمكن تحقيقها في مختلف مستويات تعلم اللغة، وهو حصيله بحوث استمرت عشر سنوات. ويمثل هذا الإطار كذلك نموذجاً مفصلاً لوصف وتنظيم استخدام اللغة ومختلف أنماط المعارف والمهارات اللازمة، مما يتيح سهولة المقارنة بين المعايير المختلفة على المستوى الدولي. ومن المقرر استخدام هذا الإطار كأساس عام لوضع المناهج والمقررات، وتحديد الاختبارات والمؤهلات، وللتدريب وتصميم الاختبارات.

ويحدد الإطار الأوروبي العام ثلاث مراحل رئيسية لمستوى الكفاءة في اللغة: المستوى A (للمستخدم الأساسي)، المستوى B (للمستخدم المستقل)، المستوى C (للمستخدم المتقن). وتُقسّم كل مرحلة إلى مستويين: A1، A2، B1، B2، C1، C2. وقد صُمّم هذا المقياس العالمي للاستخدام مع أية لغة، مما ييسر استخدام هذا المقياس في جميع اللغات وفي مختلف البلدان. ويتوافق مع كل مستوى وصف مفصل لما يمكن لكل دارس أن يقوم به لاكتساب مختلف المهارات والاستراتيجيات، وممارستها في مختلف مواقف الحياة الواقعية. ويوضح ذلك بشكل جلي في قوائم "ما يمكن عمله" في الإطار الأوروبي العام. ويبين الجدول التالي المقياس العالمي للإطار الأوروبي العام الذي يستند إليه اختبار تحديد المستوى للمجلس البريطاني.

المستويات المرجعية العالمية العامة لتعلم اللغات، المحددة في الإطار الأوروبي العام والمعتمدة من قبل المجلس الثقافي البريطاني

المستخدم المُتقِن	C2	يمكن أن يفهم بسهولة كل ما يسمعه أو يقرأه. ويمكنه أن يلخص المعلومات الآتية من مصادر مكتوبة أو منطوقة، وأن يعيد بناء المناقشات بطريقة متناسقة. ويمكنه التعبير عن نفسه تلقائياً، بطلاقة ودقة عاليتين، وأن يفرق بين الظلال الدقيقة للمعاني حتى في الأوضاع الأكثر تعقيداً.
	C1	يمكنه أن يفهم طيفاً عريضاً من النصوص الطويلة التي تتطلب جهداً لفهمها، وأن يدرك المعنى الضمني للنص. ويمكنه التعبير عن نفسه بطلاقة وتلقائية دون بحث كثير عن الجمل والتعبيرات. ويمكنه كذلك أن يستخدم اللغة بمرونة وفعالية للأغراض الاجتماعية والأكاديمية والمهنية. وبمقدوره أن يكتب نصوصاً واضحة وجيدة الصياغة ومفصلة حول مواضيع معقدة، وأن يُظهر مهارة في استخدام التراكيب المختلفة للجمل وأدوات الربط وأدوات تناسق النص.
المستخدم المستقل	B2	يمكنه أن يفهم الأفكار الرئيسية للنصوص المعقدة حول مواضيع ملموسة أو مجردة، بما في ذلك المناقشات التقنية في مجال تخصصه. ويمكنه أن يتفاعل بسهولة مع أهل اللغة بدرجة من الطلاقة والتلقائية، دون عناء من أي من الطرفين. وبمقدوره كذلك أن يكتب نصوصاً واضحة ومفصلة حول طيف عريض من المواضيع، وأن يشرح وجهة نظره حول موضوع محدد، وأن يحدد مزايا ومساوئ خيارات متنوعة.
	B1	يمكنه أن يفهم النقاط الرئيسية لنصوص معيارية واضحة حول أمور مألوفة يصادفها عادة في العمل أو المدرسة أو في أماكن قضاء وقت الفراغ، وما إلى ذلك. ويمكنه أن يتعامل مع معظم الأوضاع التي من الأرجح أن يصادفها أثناء السفر في مكان يتحدث فيه الناس هذه اللغة. ويمكنه كذلك أن يكتب نصوصاً بسيطة ومتراكبة حول مواضيع مألوفة أو تنال اهتمامه الشخصي. كما يمكنه أن يصف التجارب والأحداث التي يصادفها، وأن يعبر عن أحلامه وآماله وتطلعاته، وأن يعبر بإيجاز عن أسباب ومبررات خياراته وخططه.
المستخدم المبتدئ	A2	يمكنه أن يفهم الجمل والتعبيرات التي يتكرر استعمالها في المجالات ذات العلاقة المباشرة به (مثل المعلومات الشخصية الأساسية عنه وعن أسرته، وعن التسوق والجغرافية المحلية والعمل). كما يمكنه التواصل حول المهام الروتينية والبسيطة التي تتطلب تبادلاً بسيطاً ومباشراً للمعلومات حول أمور مألوفة وروتينية. ويمكنه كذلك أن يقدم بالفاظ بسيطة معلومات أساسية عن نفسه وعن البيئة المباشرة المحيطة به، وعن الأمور المتصلة بمجالات احتياجاته المباشرة.
	A1	يمكنه فهم واستخدام التعبيرات اليومية الشائعة والتراكيب الأساسية جداً التي تلبي احتياجات ملموسة. كما يمكنه أن يقدم نفسه والآخرين، وأن يطرح ويحجب عن أسئلة حول المعلومات الشخصية، مثل مكان سكناه، والناس الذين يعرفهم، والأشياء التي يمتلكها. ويمكنه كذلك أن يتفاعل بطريقة مبسطة، شريطة أن يتحدث ويحادثه ببطء ووضوح، وأن يكون محادثه مستعداً لمساعدته.

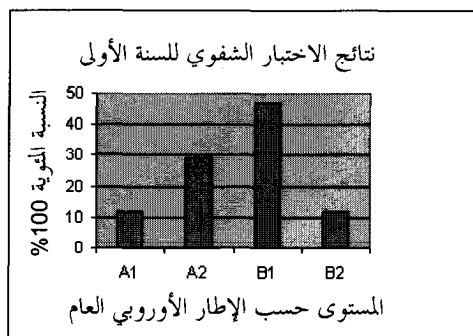
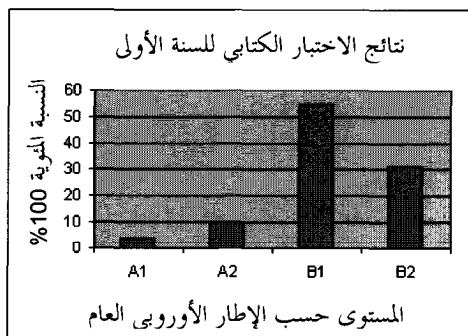
2.4 الربط بين أحرار (درجات) النظام الدولي لاختبارات اللغة الإنكليزية وبين الإطار الأوروبي العام لمجلس أوروبا

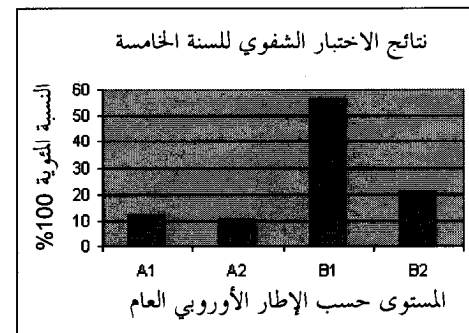
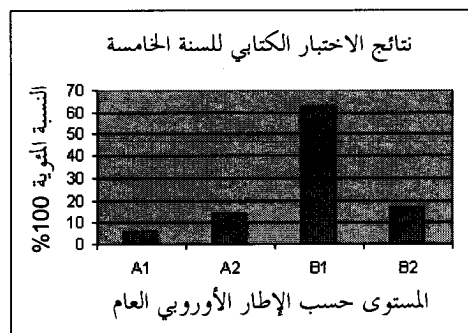
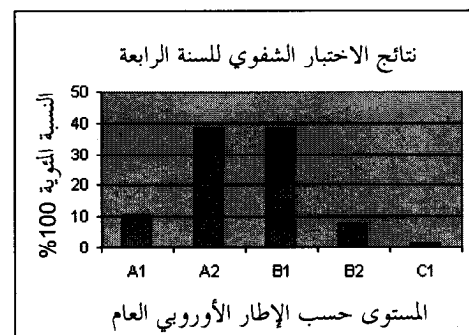
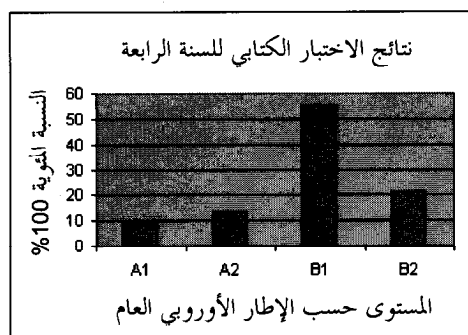
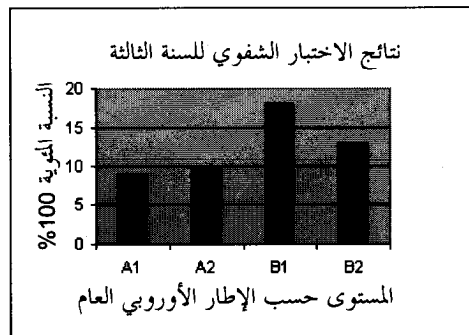
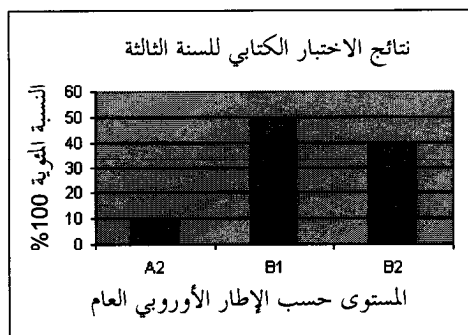
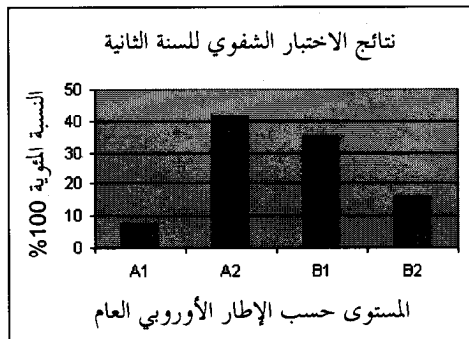
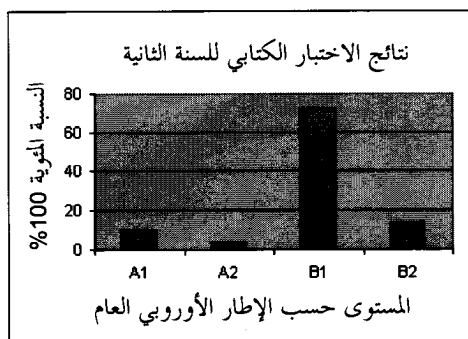
يبين الرسم التخطيطي الوارد أدناه العلاقة بين أحرار (درجات) النظام الدولي لاختبارات اللغة الإنكليزية وبين مستويات الإطار الأوروبي العام. تعتمد هذه العلاقة على تزايد حجم البحوث، وتقترن بالخبرات المعتمدة الطويلة في الاختبارات في إطار التعليم والمجتمع، كما تعتمد على المعلومات المرتجعة من طيف كبير من المعنيين بالاختبارات في ما يتعلق باستخدام نتائج الاختبارات لأغراض محددة.

الإطار الأوروبي العام	النظام الدولي لاختبارات اللغة الإنكليزية
	9
C2	8
C1	7
B2	6
B1	5
A2	4
A1	3

3.4 نتائج اختبارات تحديد مستوى الطلاب

تبين الرسومات البيانية التالية نتائج اختبارات تحديد مستوى الطلاب لكل سنة دراسية. وقد وُضعت نتائج الاختبارات التحريرية والشفوية في رسومات مستقلة حتى يتسنى لنا التعرف بشكل أفضل على الأنماط المختلفة.





4.4 نتائج مجموعات المناقشة مع الطلاب

• آراء الطلاب تجاه الطرق الحالية لتدريس اللغة الإنكليزية في الكلية

لوحظ تشابه كبير بين الطلاب في السنوات الأكاديمية الخمس. فلم يتعامل الطلاب مع دروس اللغة الإنكليزية على أنها ذات أولوية، كما أفاد عدد من الطلاب بأنهم لا يحضرون هذه الدروس، لعدة أسباب، هي العدد الكبير للطلاب في حصص اللغة الإنكليزية، والشعور العام بأن الكتب المستخدمة ومستوى التدريس أقل من مستواهم في اللغة، وعدم وجود فرصة كبيرة لممارسة مهارات المحادثة. وفي ما يتعلق بتقييم الطلاب، فإنهم يرون أن بإمكانهم الحصول على درجات عالية دون مجهود كبير، إذ إن حفظ المصطلحات والفردات يكفي للنجاح، برغم عدم حدوث أي تحسن في قدرتهم على التواصل باللغة الإنكليزية.

وبالنسبة لآراء الطلاب حول المدرسين، يرى الطلاب أن مدرّسهم يتفاوتون في مستوى اللغة والقدرة على التدريس والنطق. وفي ما يخص التدريس، يرى الطلاب أن التدريس يتم بطريقة تقليدية ومملة. وقد ذكر طالب "أن المدرّس يطلب من أحد الطلاب أن يقرأ من الكتاب، وهذا هو الدرس". وقال طالب آخر "إن الطلاب يعرفون آلاف المفردات الطبية ولكن لا يستطيعون استخدامها". وقد اقترح الطلاب التغييرات التالية لتحسين تدريس اللغة الإنكليزية في الكلية:

- ضرورة تحديث وتحسين مقرّر ومواد اللغة الإنكليزية.
- ضرورة تركيز أساليب التدريس على المحادثة.
- ضرورة تدريس جميع المواد في الكلية باللغة الإنكليزية بداية من السنة الرابعة
- تغيير مدرّسي اللغة أو تدريبهم
- تقسيم طلاب كل سنة دراسية إلى مستويات
- آراء الطلاب حول موارد اللغة الإنكليزية المتاحة في الكلية (الموارد المادية والموارد المتاحة على الإنترنت)

وقد أفاد الطلاب بوجود نقص في موارد اللغة الإنكليزية الجيدة، إضافة إلى أن معظم الموارد المتاحة يعود تاريخها إلى ثمانينات القرن الماضي. كما أن حجرة الإنترنت نادراً ما تُستخدم، ويصعب حجزها، وأن المكتبة تفتقر إلى أمناء المكتبة المؤهلين الذين يمكنهم مساعدة الطلاب، وتفتقر كذلك إلى معدّات التدريس والمواد السمعية الحديثة.

• الدعم الخارجي وموارد اللغة الإنكليزية المتاحة

تبين بوضوح أن الطلاب لا يبدأون التفكير الفعلي في تحسين لغتهم الإنكليزية إلا بعد التخرج. وعند ذلك يبذل بعضهم جهداً لقراءة الكتب أو المواد المنشورة على الإنترنت، أو يشتركون في مكتبة، أو يحضرون دورات لتعلم اللغة الإنكليزية في مركز تدريس اللغة الإنكليزية للأغراض الخاصة، أو في المجلس البريطاني، أو في مركز تعليم الكبار. ولا يحاول الطلاب قبل هذه المرحلة تحسين مهاراتهم عن طريق الموارد الخارجية.

5.4 نتائج استطلاع الآراء حول الدروس والتدريس

كشفت ملاحظات الطلاب حول مدرّسي اللغة الإنكليزية ما يلي:

- عدم تخطيط الدروس؛
- ميل المدرّسين إلى تقليب صفحات كتب الدراسة، وليس التفكير في اختيار الأنشطة المناسبة؛
- تدريس المفردات والقواعد بعيد عن الإطار التطبيقي، كما أن المدرّسين يميلون إلى تفسير اللغة تفسيراً لفظياً دون استخدام أسلوب استكشافي أو استطلاعي؛
- لا يوجد سجل مكتوب لقواعد اللغة أو أمثلة هادفة؛
- لا توجد ممارسة هادفة؛
- المدرّسون يطلبون من الطلاب القراءة بصوت عال؛
- لا يتم تقديم التدريبات قبل تمارين القراءة، ولا توجد استراتيجيات لمساعدة الطلاب على القراءة؛
- لا توجد عموماً استراتيجيات لمساعدة الدارسين على الاستقلالية؛
- لا توجد طرق لاختبار المفاهيم؛
- لا توجد طرق واضحة لتدريس النطق والمحاكاة والتدريبات؛
- المدة التي يقضيها المدرّس في الحديث طويلة، والمدرّسون يحاضرون ولا يهيئون بيئة تواصلية للتعلم؛
- المعلومات الاجتماعية تقتصر على المدرّس فقط؛
- قلة فرص العمل الجماعي أو في أزواج، ومعظم التفاعل يكون بين المدرّس والطلاب.
- لا تنطبق الملاحظات الواردة أعلاه على جميع مدرّسي اللغة، فبعضهم أثبت قدرة فنية وتدرسية أفضل من غيره.

6.4 نتائج المقابلات مع المدرّسين

- الخلفية الأكاديمية والتدريبية العملية للمدرّسين

من بين مدرّسي اللغة الأربعة في الكلية، حصل اثنان منهم على دبلوم في التربية من جامعة دمشق. أما المدرّسان الآخران فقد حصلوا على تدريب في مركز تدريس اللغة للأغراض الخاصة في جامعة دمشق، وشاركوا أيضاً في حلقات دراسية تدريبية للمدرّسين في جامعتي دمشق وحلب، وشاهدوا غيرهم من المدرّسين أثناء التدريس.

- الموارد المستخدمة في إعداد الدروس

يعتمد المدرّسون على المواد الواردة في كتاب التدريس، وأفاد بعض المدرّسين بأنهم يبحثون عن مواد ذات صلة على الإنترنت وأنهم يتبادلون الآراء مع زملائهم. غير أن المدرّسين يشعرون بأن الموارد المتاحة لهم عفا عليها الزمن ولا تناسب احتياجات الطلاب. كما يرى المدرّسون أن هناك مشكلات تتعلق

بالتقييم، فأسئلة الامتحان بالغة السهولة مما لا يشجع الطلاب على حضور الدروس، نظراً لشعورهم بأنهم سيجتازون الامتحانات بغض النظر عن الحضور.

- الموارد التي يشعر المدرسون بفائدتها لعملهم
- الكتب والمجلات المعنية بتدريس اللغة الإنكليزية
- المجلات والصحف
- المعاجم
- موسوعة المعارف البريطانية
- أجهزة الفيديو
- أجهزة تسجيل الكاسيت
- الاتصال المجاني بالإنترنت
- معلومات عن المملكة المتحدة
- المجلات الطبية
- المراجع المتعلقة بالتاريخ والأدب والكيمياء

7.4 هيكل المناهج والمقرر الدراسي

- عدد ساعات تدريس اللغة الإنكليزية
- يدرس طلاب السنتين الأولى والثانية أربع ساعات أسبوعية. وتدرس هذه المقررات من قبل مدرّسين للغة الإنكليزية وليس من قبل إخصائيين في مواد التدريس.
- كما سيدرس طلاب السنوات الثالثة والرابعة والخامسة أيضاً أربع ساعات أسبوعية. ولاتركز الدراسة على تنمية مهارات اللغة الإنكليزية، وإنما يتم تدريس مواد تخصصية، مثل طب الأعصاب، باللغة الإنكليزية على يد أساتذة في الطب.

- الكتب الدراسية

يستخدم طلاب السنة الأولى كتاب New English File Intermediate

أما طلاب السنة الثانية فيستخدمون كتاب Language of Medicine in English

وهو كتاب لناشر أمريكي. وهناك خطط لتغيير الكتب. وأما طلاب السنوات الثالثة والرابعة والخامسة فلا يستخدمون كتاباً دراسياً، وإنما توزع عليهم نشرات من محاضري المواد التخصصية.

- المقرر الدراسي

لا يوجد مقرر دراسي، ولا أهداف ولا نتائج للتعليم.

- التقييم

يجري المدرّسون للغة الإنكليزية بعض التقييم غير الرسمي أثناء وجود الطلاب في قاعة المحاضرات. وهذا الأمر يعتمد على الانطباع الشخصي ويواجه صعوبة بالغة في ظل وجود حوالي 500 طالب في المحاضرات. وعادة ما يهتم الطلاب بالنجاح في الامتحانات وليس التقدم في مستوى اللغة. ويضع مركز

تعليم اللغة للأغراض الخاصة اختبارات اللغة الإنكليزية لطلاب السنة الأولى، وطلاب السنة الثانية أيضاً. غير أن الملاحظ أن حضور الطلاب للدروس بالغ الضعف، إذ يحرص الطلاب على الحضور عندما يشعرون فقط بأن محتوى الدرس ذو صلة بالامتحانات، وهو أمر غير صحيح. فمعظم الامتحان ينصب على القواعد، فهو يختبر معرفة الطلاب بتراكيب اللغة (عن طريق الاختبارات المتعددة) مع إيلاء أهمية قليلة للمعنى. كما يحتوي الاختبار على جزء صغير للمفردات، ويتم الاختبار عن طريق ملء المسافات الفارغة بالكلمات.

ولا يوجد في الاختبار شيء ذو علاقة مباشرة بكتاب الدراسة، ولا بالمهام التواصلية، وإنما ينصب التركيز في المقام الأول على الدقة.

5. الاستنتاج

1. تبين نتائج امتحان تحديد مستوى الطلاب صورة "سطحية". فمعظم الطلاب في السنوات الخمس متركزون في المستوى B1 (المستخدم المستقل). بالإضافة إلى ذلك، لا يبدو أي تحسن في مستوى اللغة مع تقدم الطلاب في السنوات الدراسية. وبين ذلك عن عدم استفادة الطلاب كما ينبغي من دروس اللغة في الكلية. ويُعزى ذلك إلى ضعف نسبة الحضور بسبب تدني جودة التدريس، وكبر حجم الفصول، وتعدد المستويات في الفصول؛
2. يتطلب تدريس اللغة الإنكليزية إجراء بعض التحسينات في الكم والكيف، مع توجيه عملية التدريس نحو تنمية مهارات الاتصال الفعلي وإجراء التقييم بناءً على ذلك. والواقع أن المقررات الحالية تفتقد المنهج ولا تركز على الاستخدام الفعلي للغة. ويؤدي ذلك إلى ضعف حضور الطلاب وضعف الدوافع لديهم؛
3. يتفاوت مستوى المدرسين في الكلية من حيث قدراتهم الفنية وخلفياتهم التدريسية والتعليمية. ومع ذلك، نجد أن التدريس الذي لاحظناه لم يكن على المستوى المطلوب، ولم يساهم في توفير بيئة تواصلية تتيح للطلاب ممارسة اللغة الإنكليزية فيها؛
4. الموارد المتاحة للمدرسين والطلاب، للمساعدة في عملية التعلم شديدة المحدودية ومتخلفة.

6. التوصيات

التوصية الأولى:

يحتاج المدرسون في الكلية إلى مزيد من التطوير لمهاراتهم التدريسية. وتقتصر الدراسة أن يحضر المدرسون مقرراً تمهيدياً لاختبار معارفهم التدريسية، ثم حضور اختبارات هذا المقرر المعتمدة من مركز لتعليم اللغة لتحديث اللغات الأخرى ESOL. على أن يغطي المقرر الدراسي والاختبار المواضيع والوحدات التدريسية التالية:

الوحدة التدريسية الأولى: اللغة وخلفية عن تعلم اللغة وتدريسها

- وصف اللغة والمهارات اللغوية.
- معلومات أساسية عن تعلم اللغة.
- معلومات أساسية عن تدريس اللغة.

الوحدة التدريبية الثانية: تحضير الدروس واستخدام الموارد في تدريس اللغة

- تخطيط وتحضير درس أو سلسلة من الدروس.
- اختيار واستخدام الموارد والمواد.

الوحدة التدريبية الثالثة: إدارة عملية التدريس والتعلم

- لغة المدرّسين والطلاب في قاعة الدرس.
- إدارة قاعة الدرس.

هذا المقرر الدراسي يعرف المدرّسين بالنظرية الأساسية لتدريس اللغة الإنكليزية. ويمكن أن يلي ذلك حضور مقرر لنيل شهادة تدريس اللغة الإنكليزية ICALT، والذي يتم تقييمه من قبل المدرّسين أنفسهم. وينقسم مقرر نيل شهادة تدريس اللغة الإنكليزية إلى وحدتين تدريبيتين، هما:

الوحدة الأولى: لغة المدرّسين:

- يستكمل المدرّسون 4 إلى 6 مهام مصممة لتحسين استخدام اللغة لأغراض التدريس. ويعتمد عدد المهام على ما إذا كان الدارس سيحضر الوحدة الأولى فقط أم الودحتين الأولى والثانية معاً.

الوحدة الثانية: التدريس والمنهجية:

- يقوم المدرّسون بتخطيط وتدريس وتقييم أربعة دروس، ويتم تقييمها من قبل الموجه المسؤول عن المقرر الدراسي؛
- يستكمل المدرّسون أربعة واجبات دراسية كتابية.

التوصية الثانية:

إنشاء مركز لموارد اللغة الإنكليزية ذاتي الاستخدام في الكلية، يسهل استخدامه من قبل المدرّسين والطلاب على السواء من أجل تطوير وتنمية قدراتهم. وينبغي أن يشمل هذا المركز ما يلي:

- دلائل مرجعية للغة الإنكليزية؛
- مجلات معنّية بتدريس اللغة الإنكليزية؛
- معاجم؛
- مجلات وصحف؛
- معدات ومواد سمعية؛
- أجهزة للاتصال السريع بالإنترنت.

التوصية الثالثة حول المقررات والمناهج:

- ينبغي زيادة مقدار التدريب على اللغة زيادة كبيرة؛
- ينبغي إعداد مقررات دراسية لكل سنة دراسية؛
- ينبغي أن يركّز التقييم على قياس الاستخدام الفعلي للغة، وليس المعرفة باللغة. من شأن ذلك أن يؤدي إلى نتائج إيجابية في قاعة الدراسة؛
- ينبغي تقليل عدد الطلاب في الفصول لتيسير عملية التعلم التواصلي للغة. وقد يستلزم الأمر تقسيم الطلاب في السنوات الدراسية أيضاً بحسب مستواهم في اللغة.

دور منظمة الصحة العالمية وبرنامجها العربي في النهوض باللغة العربية

قاسم طه السارة

الملخص: البرنامج العربي لمنظمة الصحة العالمية برنامج عالمي يستضيفه المكتب الإقليمي لشرق المتوسط في المنظمة منذ الثمانينيات من القرن المنصرم، يُعنى بتقديم صورة صحيحة وواضحة للقارئ العربي عن منظمة الصحة العالمية وجهودها في النهوض بالوضع الصحي في العالم، من خلال ترجمة الوثائق الأساسية للمنظمة وعرض أنشطتها باللغة العربية، إلى جانب تلبية احتياجات البلدان من المعلومات المستجدة والموثوقة في شتى المجالات الصحية، ووضع المصطلحات العلمية وتوطين التكنولوجيا الصحية في البلدان العربية، وقد عمل بالتعاون مع اتحاد الأطباء العرب، ومع مجلس وزراء الصحة العرب والمجامع اللغوية في البلدان العربية والاتحادات المهنية الصحية من الأطباء وأطباء الأسنان والصيدلة والمرضات والجامعات ومعاهد التعليم للعلوم الصحية والمجامع اللغوية، وتوضح الورقة دور البرنامج العربي لمنظمة الصحة العالمية في تطوير اللغة العربية بين أوساط العاملين في الطب والصحة.

Role of WHO Arabic Programme in scaling up the Arabic language

ABSTRACT The World Health Organization Arabic Programme (WAP), a global programme hosted by the Eastern Mediterranean Regional Office (EMRO) since the 1980s, is concerned with presenting a clear and sound view of WHO and its efforts to promote health throughout the world. This is achieved through translating WHO basic documents, presenting WHO activities in Arabic, meeting the needs of countries for new and reliable information in all areas of health, developing scientific terminology, and institutionalizing health technology in the Arab countries. WAP has collaborated with the Arab Medical Union, the Arab Health Ministers Council, Arabic language academies and unions of health professions, as well as universities and health science teaching institutes. This paper details the role of WAP in promoting Arabic in the field of health.

Rôle du Programme OMS en langue arabe dans le renforcement de l'utilisation de la langue arabe

RÉSUMÉ Le Programme en langue arabe (WAP) de l'Organisation mondiale de la Santé, qui est un programme mondial installé au Bureau régional de la Méditerranée orientale depuis les années 1980, s'efforce d'offrir une image claire et juste de l'OMS et de son action en faveur de la santé dans le monde entier. L'accomplissement de sa mission passe par la traduction des documents essentiels de l'OMS, la présentation des activités de l'OMS en arabe, la réponse aux besoins des pays en matière d'informations nouvelles et fiables dans tous les domaines de la santé, l'élaboration d'une terminologie scientifique et l'institutionnalisation de la technologie sanitaire dans les pays arabes. Ce programme collabore avec l'Union des médecins arabes, le Conseil des ministres de la Santé arabes, les écoles de langue arabe et les syndicats de professionnels de la santé, ainsi qu'avec les universités et les établissements d'enseignement des sciences de la santé. Le présent article décrit le rôle du Programme OMS en langue arabe du point de vue de la promotion de l'arabe dans le domaine de la santé.

قسم الإعلام الطبي والصحي، المكتب الإقليمي لشرق المتوسط لمنظمة الصحة العالمية، القاهرة، مصر
(البريد الإلكتروني: sarak@emro.who.int)
الاستلام: 08/10/05، القبول: 08/10/13

K. Sara. Health & Biomedical Information Unit, World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt.

المقدمة

عانت اللغة العربية من الجمود الذي سيطر على الساحة المعرفية في البلدان العربية لقرون عدة، ومع بزوغ بشائر النهضة في مطلع القرن العشرين أصبح التعريب سمة لازمة للناشطين العرب الساعين إلى النهوض بأمتهم للحاق بالركب الحضاري المتسارع الخطى. وتفاوتت المعاني التي تحملها كلمة التعريب في الأذهان بين مقام وآخر، فقد تضيق لتدل على إبدال اللفظة من حروفها الأعمجية وإلباسها حروفا عربية مقابلة لها [1]، وقد تتسع لتصبح «التجانس الاجتماعي لفئات الشعب للتعبير الحر بلغتهم... لأن استعمال لغة واحدة يؤدي إلى وحدة الرأي والشعور» [2]، أما في حديثنا هذا فنعني به ما اتفق عليه في مؤتمر التعريب الأول المنعقد في الرباط عام 1961 وهو «إحلال اللغة العربية في التعليم محل اللغات الأجنبية وتوسيع اللغة العربية بإدخال مصطلحات جديدة عليها وإلزام الإدارة بعدم استخدام لغة دون اللغة العربية والعمل على أن تكون لغة التخاطب اللغة العربية وحدها» [3].

وعلاقة التعريب بمنظمة الصحة العالمية علاقة وثيقة [4]، فمنظمة الصحة العالمية وكالة متخصصة ضمن منظومة الأمم المتحدة، ورسالتها التي حددتها بوضوح ديباجة دستورها عام 1948 هو البلوغ بجميع الناس، أفراداً وجماعات، أرفع مستوى صحي ممكن. ولتحقيق تلك الرسالة تعمل المنظمة على قيادة العمل الصحي الدولي [5] والتنسيق بين البلدان بوضع المعايير الصحية وتوحيد الرواميز والتسميات والتصنيفات والمصطلحات، وفرض استعمالها وإشاعتها [6].

كما تعمل المنظمة على نشر الوعي الصحي وترسيخ الممارسة الطبية المُسندة بالبيّنات، وما يستلزمه ذلك من جمع للمعطيات وتخزينها ومعالجتها وتحليلها واستخلاص النتائج وإاحتها لمن يحتاج إليها بالطرق والوسائل التي يسهل تناوّلها وباللغة التي يفهمونها ويتعاملون بها في حياتهم العملية وأنشطتهم اليومية، وإدماج ذلك في مقررات ومناهج التدريس والتعليم الطبي والصحي. وتحرص المنظمة في عملها هذا على احترام ما لكل مجتمع من خصوصية ثقافية وتاريخية لضمان قبول الأفراد والجماعات فيه للرسائل الصحية التي ترسلها المنظمة والعمل بها ونقلها للأجيال اللاحقة وترسيخها بينهم، وتعزيز التعليم والتعلم للعلوم الصحية باللغات الوطنية [7].

ولا يخفى من هذه المقدمة الموجزة ما للغة الوطنية عامة، واللغة العربية خاصة، من أهمية في تحقيق رسالة منظمة الصحة العالمية، واللغة العربية اليوم هي إحدى لغات العمل الثلاث في المكتب الإقليمي لشرق المتوسط، إلى جانب الإنكليزية والفرنسية، وهي اللغة الرسمية في ثمانية عشر بلداً من بلدان الإقليم الاثنى والعشرين.

شيء من التاريخ:

اللغة العربية في منظومة الأمم المتحدة وفي منظمة الصحة العالمية

منظمة الصحة العالمية هي السلطة التوجيهية والتنسيقية ضمن منظومة الأمم المتحدة فيما يخص المجال الصحي. وهي مسؤولة عن تأدية دور قيادي في معالجة المسائل الصحية العالمية، وتصميم برامج البحوث الصحية، ووضع القواعد والمعايير، وتوضيح الخيارات السياسية المسندة بالبيّنات، وتوفير الدعم التقني

للبلدان، ورصد الاتجاهات الصحية وتقييمها. وللمنظمة مقر رئيسي في جنيف، سويسرا، وستة أقاليم [8]، وأحدها، وهو موضوع بحثنا اليوم، هو إقليم شرق المتوسط الذي أنشئ عام 1949 [9]، وشغل الدكتور علي توفيق شوشة باشا منصب أول مدير إقليمي له، وكانت لغتنا العمل به الإنكليزية والفرنسية، ثم أضيفت العربية بدءاً منذ عام 1956. أما في المقر الرئيسي للمنظمة، ففي عام 1971 اعتمدت اللغة العربية لغة رسمية في جمعية الصحة العالمية، إلى جانب الأسبانية والإنكليزية والروسية والصينية والفرنسية، ثم أصبحت من عام 1973 إحدى اللغات الرسمية الست في منظومة الأمم المتحدة، وقد تطور القسم العربي في الأمم المتحدة تطوراً مطرداً حتى أصبح يضم اليوم ما يقرب من مئتي مترجم ومصطلحي ولغوي.

وقد أصبحت اللغة العربية عام 1975 لغة عمل في منظمة الصحة العالمية وأصبحت تُستخدم في جمعية الصحة العالمية، والمجلس التنفيذي واللجان الرئيسية والفرعية، كما تُستخدم في التراسل مع الدول العربية [10]، وبدأ العمل بتعريب وثائق جمعية الصحة العالمية والتقارير الفنية التي تصدرها المنظمة. كما بدأ العمل أيضاً بإعداد معجم للمصطلحات الطبية العربية، واعتماد ترجمة المادة الأولى من دستور المنظمة، وتبنيها بعد ذلك على واجهة مبنى المقر الرئيسي للمنظمة في جنيف، ثم ترجمة واعتماد نص عربي لدستور المنظمة كنص قانوني له نفس حجية النصوص الخمسة باللغات الأخرى عام 1977 [11]، وقد اعتمد هذا النص من اللجنة الإقليمية لشرق المتوسط ومن المجلس التنفيذي لمنظمة الصحة العالمية ومن جمعية الصحة العالمية الحادية والثلاثين في أيار/ مايو 1978 ليصبح النص العربي الرسمي [12].

وفي إطار الجهود المخلصة لتلبية احتياجات ومطالب البلدان العربية المتزايدة عاماً بعد عام من العلوم والمعارف الصحية باللغة العربية، نشأ تعاون وثيق بين المكتب الإقليمي والمقر الرئيسي لمنظمة الصحة العالمية، فأنشئ في المكتب الإقليمي عام 1979 برنامج عربي لتعزيز استخدام اللغة العربية في الإقليم كوسيلة للتفاهم والتواصل، ولاسيماً فيما يتصل بخدمات الرعاية الصحية الأولية وإعداد العاملين الصحيين.

وقد أعطى البرنامج العربي للمنظمة الأولوية لترجمة الدلائل التدريبية والإرشادات العملية ذات الأهمية التطبيقية لأعداد كبيرة من العاملين الصحيين، ولترجمة ما يصدر من المنظمة من دوريات مثل مجلة وقائع منظمة الصحة العالمية ومجلة الصحة العالمية ومجلة دراسات الصحة العامة، وعدد من الكتب المرجعية الدراسية والمواد التعليمية، كما ترجم البرنامج العربي للمنظمة عشرات المنشورات تلبية لطلب الأقطار العربية، هذا بالإضافة إلى عنايته بإعداد المعجم الطبي الموحد والمعجمات الطبية المتخصصة.

وما زاد من أهمية البرنامج العربي لمنظمة الصحة العالمية أنه أنشئ بالمكتب الإقليمي في سنة 1986 برنامج للإعلام الصحي، وقد أدى ذلك إلى الاتفاق على توسيع مسؤوليات البرنامج العربي ليكون برنامجاً عالمياً (البرنامج العربي لمنظمة الصحة العالمية) يتخذ من المكتب الإقليمي لشرق المتوسط (وهو اليوم في القاهرة، مصر) مقراً له، على أن تبقى في المقر الرئيسي خدمات جمعية الصحة العالمية والمجلس التنفيذي والمراسلات المتبادلة مع البلدان العربية الأعضاء وفقاً لنص قرار جمعية الصحة العالمية رقم ج ص ع 28-34 الذي سبقت الإشارة إليه [10]، وكان من مزايا هذه الخطوة تيسير التشاور المستمر بين المنظمة والبلدان العربية، وتوافر خبرات الترجمة التي يمكن حشدتها عند اللزوم بتكاليف أقل وفي وقت أقصر، ومراجعة الترجمات وتصحيح التجارب الطباعية في داخل المكتب الإقليمي، الأمر الذي يوفر النفقات ويضمن توحيد الأسلوب والمصطلحات، والاستفادة من رخص تكاليف الطباعة في الإقليم.

دور البرنامج العربي لمنظمة الصحة العالمية في صوغ وتوحيد المصطلحات الصحية وإعداد وتطوير المعجم الطبي الموحد

كانت المصطلحات الطبية والصحية في السبعينيات شحيحة [13]، إلى جانب تعدد المقابلات للمصطلح الأجنبي الواحد [14]، فلم يكن يتوافر منها للعاملين في منظمة الصحة العالمية سوى مجموعة مصطلحات المؤتمرات والاجتماعات التي كان قد ترجمها للعربية الدكتور علي توفيق شوشة، عضو المجمع [15]، إلى جانب قوائم المصطلحات المتاحة لدى منظمات الأمم المتحدة الأخرى ومجامع اللغة العربية بالقاهرة ودمشق وعمان وبغداد، وقد نشطت وحدة اللغة العربية في المنظمة منذ إنشائها في المقر الرئيسي للمنظمة بإعداد بطاقات تجمع فيها ما يُتفق عليه من مصطلحات أثناء أعمالها اليومية، حيث لم تكن خدمات الحاسوب متاحة لها في ذلك الوقت، وعندما تجمّع قدر كاف من المصطلحات طبعت في ملزمة تم توزيعها على وزارات الصحة في البلدان الأعضاء تحت عنوان المصطلحات المستعملة في منظمة الصحة العالمية، وطلب إلى الوزارات إبداء رأيها في تلك المصطلحات، حتى يتم الاتفاق على قائمة موحّدة في نهاية الأمر يلتزم بها الجميع في داخل المنظمة وخارجها، وأدى ذلك إلى تسهيل العمل في وحدة الترجمة، واستمر العمل على ذلك حتى صدور المعجم الطبي الموحد.

وعند الحديث عن المعجم الطبي الموحد لابد من القول بأنه كان لاتحاد الأطباء العرب فضل كبير على المعجم الطبي الموحد، فقد بدأ المعجم بمبادرة من اتحاد الأطباء العرب في ستينيات القرن الماضي [16]، ليكون تنويعاً لجهود سلسلة متصلة الحلقات، بدأت منذ العصور الأولى للتدوين ولا تزال مستمرة حتى اليوم، فقد جُمع فيه ما اُطرِد استعماله من المصطلحات التي وردت في أمهات الكتب الطبية والمعاجم، وما استخدمه وأثبتته الأطباء العرب في ممارساتهم وكتاباتهم، وما استعملته المدارس الطبية العثمانية، ثم ما ذهب إليه المدرسون في مدرسة القصر العيني والكلية الإنجيلية السورية التي أصبح اسمها اليوم الجامعة الأمريكية في بيروت، وما هو مستخدم في التدريس في كليات الطب والعلوم الصحية في الوطن العربي حتى اليوم [17].

والمعجم كما وصفه الدكتور عزت مصطفى [18] الذي كان الأمين العام المساعد لاتحاد الأطباء العرب آنذاك هو خطوة متواضعة على درب الوحدة العربية الحقيقية، وحدة الفكر وأداة التفكير، عزّم اتحاد الأطباء العرب أن يقوم بها، وفاءً بحاجة ماسة لوجود مصطلحات طبيّة عربيّة موحّدة تُستعمل في المؤسسات العلميّة في سائر الأقطار العربيّة، يُكون التعبيرُ بها عن المعاني والأفكار العلميّة سهلاً ميسوراً على أبناء هذه الأمة في كل مكان، ويتم باستخدامها التفاهم العلمي على وجه من الدقة والضبط الذي يلزم لمثل هذه الدراسة، وتلك إحدى غايتين رمى إليهما "اتحاد الأطباء العرب" من وراء هذا العمل العلمي، أما الغاية الأخرى، فهي الخلاص من واقع مؤلم في المؤسسات الثقافية العليا في كثير من بلادنا العربية، يتمثل في اتّخاذها من اللغات الأجنبية وسيلة للتدريس والعمل، وهكذا خطا اتحاد الأطباء العرب في أواخر الستينات وأوائل السبعينات الخطوة الحقيقية الأولى على درب توحيد المصطلح الطبي العربي، فأصدر الطبعة الأولى للمعجم الطبي الموحد، بعد أن عملت بها، سبع سنين دأباً، لجنة توحيد المصطلحات الطبية، وقد تقبلها الأطباء العرب في أقطارهم كافة بقبول حسن وأنزلوها منزلة حسنة، ووضعوها من فورهم موضع التداول، فأحلّوا بذلك اللغة الواحدة محل اللغيات المتفرقة، وبدأ في حقل التعليم الطبي والكتابة الطبية عهد جديد في أقطار العرب.

وسرعان ما تبين لاتحاد الأطباء العرب، أن من الضروري أن يُشَفَّعَ هذا المعجم الانكليزي العربي بمعجم فرنسي عربي، فدعا الغُيرَ على مصلحة التعليم الطبي باللغة العربية إلى النهوض بهذا الواجب، وقد لَبَّى مجلس وزراء الصحة العرب مشكوراً هذه الدعوة المباركة، وعهد إلى المكتب الإقليمي لمنظمة الصحة العالمية بشرق المتوسط أن يتولى إقامة سلسلة من الجلسات الجديدة، لإنشاء المعجم الفرنسي العربي، ولإعادة النظر في الوقت نفسه في الأصل الانكليزي العربي، بعد أن حَكَمَ التَدَاوُلُ على تعابيره لتعديل ما أظهر الاستعمال جدوى تعديله، ثم لإضافة عديد من المصطلحات التي لم يشتمل عليها المعجم في طبعته الأولى وهي كثيرة ومتنوعة، وذلك أمرٌ أشير إليه في مقدمة الطبعة الأولى للمعجم بأنه "لا بد أن يُصار إلى ملاحقة التطور في العلوم الطبية وما يجد فيها كل فترة من الزمن تبعاً لما يقضي به التطور والاستعمال وطول الممارسة والنقد البناء" [19].

وهكذا صدرت الطبعة الورقية الأولى للمعجم عن مطبعة المجمع العراقي في بغداد عام 1973، ثم أعيد طبعه بالأوفست في القاهرة عام 1977، ثم صدرت الطبعة الثانية مصحّحة ومطبوعة بالأوفست عن مطبعة جامعة الموصل عام 1978.

ومن جميل التقدير أن الدكتور عبد الحسين طابا، المدير الإقليمي لشرق المتوسط، دعا المجموعة الاستشارية للترجمة العربية للاجتماع بالمكتب الإقليمي بالإسكندرية عام 1977، وذلك لتزويده بالمشورة اللازمة لإعداد معجم طبي موحد باللغات العربية والإنكليزية والفرنسية، وكانت هذه المجموعة تتألف من أعضاء لجنة توحيد المصطلحات الطبية التي ألفها اتحاد الأطباء العرب لإعداد المعجم الطبي الموحد، وهم الدكتور حسني سبيح، رئيس مجمع اللغة العربية بدمشق؛ والدكتور محمد أحمد سليمان، أستاذ الطب الشرعي بكلية الطب بجامعة الرياض؛ والدكتور محمود جليلي، رئيس جامعة الموصل؛ والدكتور عادل لطفي ممثلاً عن اتحاد الأطباء العرب؛ بالإضافة إلى مسؤولين من المكتب الإقليمي والمقر الرئيسي للمنظمة، وقد أوصت المجموعة الاستشارية بتشكيل لجنة العمل الخاصة بالمصطلحات الطبية العربية التي ستولى إعداد المعجم الطبي الموحد الجديد انطلاقاً من الطبعة التي سبق أن نُشرت من قبل.

وتشكلت لجنة العمل الخاصة بالمصطلحات الطبية العربية من السادة: الدكتور حسني سبيح (سورية)، الدكتور سعيد شيبان (الجزائر)، الدكتور الصديق الجدي (تونس)، الدكتور عبد اللطيف البدري (العراق)، الدكتور عبد اللطيف بن شقرون (المملكة المغربية)، الدكتور محمد أحمد سليمان (مصر)، الدكتور محمد هيثم الحياط (مقرر اللجنة، سورية)، الدكتور محمود الجليلي (العراق)، الدكتور مروان محاسني (سورية)، الدكتور أحمد عبد الستار الجواري (العراق)، وصرّح للمكتب الإقليمي بأن يدعو بالإضافة إليهم من يراه مناسباً.

وقد سارت اللجنة الجديدة الموسعة على هدي ما سارت عليه اللجنة السابقة [20] وقد استغرق إعداد الطبعة الثالثة للمعجم الطبي الموحد أربع سنوات، عَقَدَت اللجنة فيها ثلاثة عشر اجتماعاً في الإسكندرية وبغداد وتونس ودمشق والرباط وعمان والجزائر وكانت خاتمتها في أواخر كانون الأول (ديسمبر) من سنة إحدى وثمانين وتسعمئة وألف، ثم صدرت في سويسرا عام 1983.

وتتابع العمل المنهجي في المكتب الإقليمي للمنظمة في خدمة المعجم الطبي الموحد بعد تأسيس وحدة المصطلحات عام 1998، فصدرت إخراجات إلكترونية سنوية من المعجم، بدأت أولها عام 1998، وزُعت على أقراص حاسوبية للمهتمين بأمور المصطلح الطبي والصحي، ونُشرت على صفحات الشبكة

(الإنترنت) على موقع المكتب الإقليمي للمنظمة، وكانت كل إخراجة تتميز عن الإخراجة التي سبقتها بما أضيف إليها من حصيلة ما يرد من المهتمين بأمور المصطلح الطبي وما أقرته المجامع في دمشق والقاهرة وبغداد وعمان، بعد أن عمل البرنامج العربي للمنظمة مع مجمع اللغة العربية في القاهرة على تجميع هذه المصطلحات التي أصدرها المجمع منذ إنشائه عام 1934 وحتى اليوم، هذا إلى جانب الأخذ بأحسن ما يلبي به مستخدمو المعجم من اقتراحات عبر خدمة التراسل الإلكترونية لشبكة تعريب المصطلحات الصحية "أحسن" التي أنشئت في المكتب الإقليمي عام 2003، وعبر المراسلات الخطية والإلكترونية التي ترد إلى وحدة المصطلحات في المكتب الإقليمي، وعبر رصد ما ينشر في الدوريات والكتب حول المصطلحات، ولا سيما مجلة العلوم التي تصدرها مؤسسة الكويت للتقدم العلمي ترجمة للمجلة العلمية الأمريكية "Scientific American"، وما انتهى إليه العمل في إعداد معجم "الإفصاح" وهو معجم مُحَوَّسَب للموضوعات، يتضمن جُلَّ ما في معجم المخصص الذي ألفه ابن سيده الأندلسي.

وقد ظهرت إخراجات ورقية لبعض المعاجم الموحدة التخصصية أو الفرعية المستفردة من المعجم الطبي الموحد الأم، فظهر معجم التشريح الموحد عام 2004، ومعجم طب الأسنان الموحد بإصدارته العربية - الإنكليزية والإنكليزية - العربية، ومعجم الصيدلة الموحد عام 2005، ثم صدرت الطبعة الورقية الرابعة عن مكتبة لبنان ناشرون، بيروت، لبنان عام 2006. واليوم تضم قاعدة المعطيات للمعجم الطبي الموحد قرابة مئة وخمسين ألف مصطلح، تتوافر لمعظمها المقابلات الإنكليزية والفرنسية والإسبانية والألمانية، والشروح، والصور، والبحث الصرفي في المصطلحات وفي الشروحات.

وما هو جدير بالذكر أن الجهود الكبيرة التي بذلت في وضع المصطلح الطبي وتوحيده [21] قد تكلفت بوضع منهجية واضحة لصوغ المصطلحات قبل إدراجها في المعجم الطبي الموحد، ولئن بدت بوادر هذه المنهجية متواضعة في الطبعة الأولى والثانية من المعجم، فإنها أصبحت أكثر تبلوراً ووضوحاً في الطبعة الثالثة، ثم أصبحت تامة النضج في الطبعة الرابعة، حتى ذهب بعض الباحثين للزعم أن قيمتها لا تكاد تقل بحال من الأحوال عن قيمة متن المعجم [22]، وقد تصدر النص الكامل لهذه المنهجية المعجم الطبي الموحد والمعاجم الفرعية التخصصية المستفردة منه.

تعريب التعليم الطبي

ساهمت منظمة الصحة العالمية في الدعوة للتعليم الصحي باللغة الوطنية، ومن منطلقات علمية مُسندة بالبيّنات [23]، واستجابة لقرار اتخذ مجلس وزراء الصحة العرب عام 1987 في دورته الثانية عشرة بالخرطوم [24]، والذي أدى لتشكيل فريق عمل يضم ممثلين للمكتب الإقليمي لشرق المتوسط والمنظمة العربية للتربية والثقافة والعلوم والمجلس العربي للاختصاصات الطبية والمركز العربي للوثائق والطبوعات الصحية (والذي أصبح اسمه اليوم مركز تعريب العلوم الصحية، أكمل، ومقره في دولة الكويت)، مهمته وضع خطة تنفيذية واقعية لتعريب التعليم الطبي في الوطن العربي، وتنظيم اجتماع مشترك بين وزراء التعليم العالي العرب ووزراء الصحة العرب للاتفاق على الخطة الزمنية ومراحل تطبيقها للبدء في تعريب التعليم الطبي في كليات الطب العربية، وتشكيل هيئة من وزراء التعليم العالي ووزراء الصحة العرب للإشراف على متابعة تنفيذ المشروع [25].

وفي كانون الثاني/يناير 1988 عقد اتحاد الأطباء العرب مؤتمره الرابع والعشرين بالقاهرة، وقرّر تأييد قرار مجلس وزراء الصحة العرب المشار إليه بشأن التعريب [26]، وقرّر اعتبار عام 1988 عام بدء التعريب في كليات الطب والعلوم الصحية في الوطن العربي، ودعا إلى إعلان السنوات العشر التي تبدأ بعام 1988 عقداً عربياً لتعريب الطب والعلوم الصحية، وأكد ضرورة اعتماد المعجم الطبي الموحد مرجعاً وحيداً لتعريب المصطلحات الطبية والصحية، ومما يذكر أن هذا القرار المفصل قد صيغ بالتعاون الوثيق بين اتحاد الأطباء العرب وبين المكتب الإقليمي لشرق المتوسط.

وفي أيار/مايو 1988 قرّر المكتب التنفيذي لمجلس وزراء الصحة العرب تنظيم ندوة في دمشق حول تعريب التعليم الطبي بالتعاون بين مجلس وزراء الصحة العرب والمكتب الإقليمي لشرق المتوسط، للاطلاع على تجربة الجمهورية العربية السورية في مجال تعريب التعليم الصحي، وعُقدت في دمشق بعد ذلك من 5 إلى 7 كانون الأول/ديسمبر 1988، ندوة تعريب التعليم الطبي والصحي في الوطن العربي، وأسفرت عن 11 توصية بإعداد خطة تنفيذية للتعريب تعرض على الاجتماع المقبل لمجلس وزراء الصحة العرب ومؤتمر التعليم العالي الذي سيعقد في الجماهيرية العربية الليبية خلال شهر آذار/مارس 1989 للمصادقة عليها واتخاذ الإجراءات التنفيذية بشأنها، وفي آذار/مارس 1989 قرّر مجلس وزراء الصحة العرب المنعقد في الجماهيرية العربية الليبية تشكيل لجنة مشتركة من وزراء الصحة والتعليم العالي وعمداء كليات الطب وطب الأسنان وكليات الصيدلة وكليات العلوم الصحية لتضطلع بمهمة استكمال سبّر الآراء ووضع وإقرار سياسة تعريب التعليم الصحي، واتخاذ الخطوات التنفيذية الكفيلة بتحقيق التعريب وما يتعلق به من خطط وبرامج ومشروعات، ووضع وإقرار التمويل اللازم لذلك، والإشراف على التنفيذ.

وفي نيسان/أبريل 1989 ناقشت الشعبة الصحية بالمجالس القومية المتخصصة في مصر [27] موضوع تعريب التعليم الطبي مناقشة موسّعة شارك فيها الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي للمنظمة والدكتور محمد هيثم الخياط، نائب المدير الإقليمي للمنظمة ومدير البرنامج العربي لمنظمة الصحة العالمية، وآخرون من المسؤولين بالمكتب الإقليمي، إلى جانب عشرات من أساتذة الطب المصريين المؤيدين والمعارضين للتعريب، وأسفرت المناقشات عن عدد من التوصيات ذات الأهمية لمسيرة التعريب في مصر.

وفي المدة من 17 إلى 20 حزيران/يونيو 1990 عقد المكتب الإقليمي لشرق المتوسط مؤتمراً إقليمياً حول تعريب التعليم الطبي في البلدان العربية، وحضر هذا المؤتمر ستة وثلاثون من السادة عمداء وأساتذة العلوم الصحية والطبية في العالم العربي، ومن ممثلي المؤسسات والهيئات العربية المعنية باستعمال العربية في التعليم الصحي والطبي، وكانت أهداف المؤتمر: تدارس الحالة الراهنة للتعريب في جميع كليات الطب في العالم العربي، وبحث ومناقشة متطلبات عملية التعريب وتحديد الاحتياجات والإمكانات والتوجّهات بالتفصيل في كليات الطب مجتمعة، وتأكيد التآزر والتعاون بين جميع المعنيين في سبيل إعداد أطباء المستقبل ووضع خطة عمل لأعمال التعريب في السنوات المقبلة يمكن تطبيقها في كل كلية على انفراد. وانطلاقاً من مفهوم هذه الأهداف اتفق الرأي على أن التطبيق يمكن أن يبدأ على الفور بالإمكانات المتاحة في كل البلدان العربية، قليلة كانت أم كثيرة، ولا يهم أن تكون البداية متواضعة أو متطورة، بحسب ما هو متاح هنا أو هناك من عزم سياسي، ودعم مالي، واقتناع لدى رجال العلم والتعليم والخدمة الصحية، وانتهى المؤتمر إلى إصدار مجموعة من القرارات وخطة تنفيذية مفصلة.

ومن معالم مسيرة التعريب ذلك القرار المهم الذي اتخذته اللجنة الإقليمية لشرق المتوسط عام 1990 حول استخدام اللغات الوطنية في التعليم الصحي والطبي [28]، ففي ذلك القرار أكدت اللجنة الإقليمية أهمية استعمال اللغات الوطنية في مختلف أنشطة الإعلام والتعليم والتعلم والتثقيف الصحي والطبي في الدول الأعضاء، وسانددت سياسة المدير الإقليمي الرامية إلى تعزيز استعمال اللغات الوطنية على أوسع نطاق ممكن في جميع بلدان الإقليم، وشجعت التعاون المستمر بين المكتب الإقليمي والدول الأعضاء والمؤسسات الوطنية في ترجمة وتوزيع المواد الإعلامية والمنشورات باللغات المحلية وتعزيز استعمالها في أغراض التعليم الصحي والطبي، وشجعت اللجنة الإقليمية التعاون المستمر بين المكتب الإقليمي والدول العربية الأعضاء والمؤسسات الوطنية من أجل تعزيز البرنامج العربي لمنشورات المنظمة دعماً لاستعمال اللغة العربية في أنشطة الإعلام والتعليم والتعلم والتثقيف الصحي والطبي في البلدان العربية، ودعت اللجنة الإقليمية المدير الإقليمي والدول الأعضاء إلى تخصيص خمسة بالمئة من الميزانيات القطرية المعتمدة لبرنامج تنمية الموارد البشرية من أجل النهوض باستعمال اللغات الوطنية في التعليم الصحي والطبي [28].

وقد أدّى تطبيق هذا القرار، مع توافر الاعتمادات المالية المخصصة بموجبه إلى إنجاز عديد من الأنشطة الداعمة لمسيرة التعريب، ومن أهم تلك الأنشطة: إنتاج وترجمة عدد من الكتب المرجعية الطبية ضمن سلسلة الكتاب الطبي الجامعي وسلسلة المنشورات التقنية، وتوفير التدريب في ممارسات التعليم والتعلم، وتبادل المعلومات والخبرات بين البلدان المعنية، وتنظيم زيارات متبادلة بين أعضاء الهيئات التدريسية في كليات الطب والعلوم الصحية للاطلاع على تجارب التعريب الناجحة في الجامعات السورية، وشراء وتوزيع آلاف من المراجع الطبية العربية، وتقديم منح مالية لدعم الاجتماعات الخاصة بالتعريب وتمويل أنشطة تتعلق بالتعريب.

وقد شارك مندوبون من المكتب الإقليمي في أعمال المؤتمر الطبي السابع والعشرين الذي عقده اتحاد الأطباء العرب في تونس عام 1991، وفي البحرين [29]، عام 1993 وفي السودان عام 1994، وفي المؤتمرات التي عقدتها الجمعيات والاتحادات والنقابات المهنية في البلدان العربية مثل النقابة العامة للأطباء في مصر عام 1989، والمؤتمر العلمي السنوي لكلية الطب، جامعة الإسكندرية، أيضاً عام 1989، وندوة المجلس القومي للتعليم العالي، الهيئة العليا للتدريس، في السودان، عام 1990، وندوة المؤتمر القومي السابع للجمعية المصرية لطب المجتمع عام 1991، وندوة المجلس العربي للاختصاصات الطبية للسادة عمداء كليات الطب العربية في دمشق عام 1993. وفي الحقيقة لا يكاد يخلو برنامج أي اجتماع للمنظمات والهيئات والاتحادات المهنية العربية من ندوة لمدارسة التعريب وعوائق تعميمه والحلول المقترحة لتطبيقه [30].

ومما سبق نلمس وبوضوح تام أن قضية تعريب التعليم الطبي قد حظيت بقدر وافر من العناية والاهتمام، فقد عُقدت لها عشرات المؤتمرات والندوات، وصدرت حولها عشرات القرارات والتوصيات التي حددت خطوط السير التي ينبغي سلوكها من أجل الوصول إلى هدف التعريب، وربما كان الأمر يحتاج إلى توحيد الخطط التنفيذية المتعددة في خطة واحدة تلتزم بها جميع الجهات المعنية في جهد موحد بدلا من تلك الجهود الفردية التي لا تحقق الغرض المرجو [31].

المجلة الصحية لشرق المتوسط

صدر العدد الأول من المجلة الصحية لشرق المتوسط في آب/ أغسطس 1995 لتحل محل النشرة الوبائية لشرق المتوسط ومجلة الخدمات الصحية لشرق المتوسط اللتين استمر صدورها لمدة عشر سنوات، أي منذ 1985. وفي تقديم المجلة الجديدة إلى قرائها أشار السيد الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي، في صدر العدد الأول من المجلد الأول إلى أهمية الاطلاع على التطورات التي تحدث في بيئتنا المحلية وفي العالم، وإلى ضرورة تبادل المعلومات حول التطورات الجديدة والمشكلات الملحة والحلول الناجحة والاتجاهات السائدة في مختلف مجالات الصحة العمومية.

ويُنشر في المجلة الصحية لشرق المتوسط مع كل بحث خلاصة وجيزة ووافية باللغات العربية والإنكليزية والفرنسية، ويُفَسَّح المجال في كل عدد من أعداد المجلة لنشر مقالة واحدة أو مقالتين بكل من اللغتين العربية والفرنسية، وأعداد المجلة توزع بإخراجة ورقية على المؤسسات المهتمة بالبحوث الصحية في العالم، كما متاح على موقع المكتب الإقليمي للمنظمة على الشبكة [32].

سلسلة الكتاب الطبي الجامعي

تنص جميع دساتير الدول العربية، وجميع قوانين تنظيم الجامعات في الوطن العربي، على أن لغة التعليم هي اللغة العربية [33]. ورغم ذلك فقد تواصل الاعتماد على اللغات الأجنبية في تعليم العلوم الصحية في معظم البلدان العربية. وعدم توافر الكتب الدراسية باللغة العربية من أهم الحجج التي يتقوّلها من يتعمّد التعليم باللغات الأجنبية وإقصاء اللغة العربية [34]. وسلسلة الكتاب الطبي الجامعي محاولة جادة لتلبية احتياجات الطلاب من هذه الكتب، وتقوية الفرصة على من يدعي عدم توافر الكتب الدراسية، وهم الذين يعتبرون معارضين استراتيجيين للتعليم باللغة العربية [35].

وقد ضُمّت سلسلة الكتاب الطبي الجامعي كتباً مترجمة عن اللغات الأجنبية وأخرى مؤلفة بالعربية، وقد ساهم في إعدادها مجموعات متخصصة من أساتذة كليات الطب في البلدان العربية، ويتبع البرنامج العربي للمنظمة خطة محكمة لإنتاج كل كتاب، تبدأ باختيار العناوين، ثم دعوة مجموعة من أساتذة كليات الطب المتخصصين بالموضوع إلى اجتماع يحددون فيه ملامح الكتاب الدراسي المنشود، ويوزعون فصوله بينهم، ثم يتبادلون مع زملائهم مراجعة تلك الفصول، ثم تعهد المنظمة بالمخطوطة إلى من يراجعها وينقحها ويبعث فيها روح الكاتب الواحد.

وقد صدر من سلسلة الكتاب الطبي الجامعي عدد من الكتب المترجمة عن أصول أجنبية نذكر منها كتاب الموجز في الفيزيولوجيا الطبية المنسوب لغايتون وهيل، وعلم الأدوية السريري المنسوب لسينيت وبراون، وكتاب البيولوجيا المنسوب إلى كامبل وريس، وكتاب الأسس الباثولوجية للأمراض المنسوب لروبنز وقطران، وكتاب طب النساء المنسوب لستيوارت كامبل وآش مونجا، وكتاب طب التوليد المنسوب لستيوارت كامبل وكريستوف ليز، وكتاب التسميات التشريحية، وكتاب أساسيات علم الوبائيات المنسوب لبونيتا وبيغلهور كجيل شتورم بطبعته الأولى والثانية.

ومن الكتب التي قام بتأليفها مجموعة من أساتذة الجامعات العربية وفق المنهجية المذكورة سابقاً؛ كتاب الطب الشرعي بطبعته الأولى والثانية، وكتاب الطب النفسي، وكتاب طب المجتمع بطبعته الأولى والثانية، وكتاب الغذاء والتغذية بطبعته الأولى والثانية، وكتاب التخدير وتاريخه، وكتاب صفحات من

تاريخ التراث الطبي العربي والإسلامي، وكتاب أطلس الباثولوجيا، وكتاب الإدارة الصحية، وكتاب تمرير صحة المجتمع، وكتاب علم المصطلح لطلبة كليات الطب والعلوم الصحية، والكتب الثنائية اللغة في التشريح وعلم الجنين وعلم النسيج، ونتوقع صدور المزيد من هذه السلسلة قريباً، مثل كتب الميكروبيولوجيا وفروعها المختلفة من طفيليات وفيروسات وجراثيميات ومناعيات، وكتب الكيمياء الحيوية والعضوية.

وما يبعث الأمل في النفوس أن كل كتاب من هذه الكتب قد ساهم في إعداد فريق من المدرّسين من عدد من البلدان العربية، تضافرت جهودهم للعمل على إخراج الكتاب بعد أن شاعت بينهم روح واحدة لخدمة قضية التعريب للتعليم الطبي والصحي [36]، ومن الأمثلة على ذلك أن أعضاء الفريق الذي ترجم كتاب علم الأدوية السريري ينتمون إلى السودان والجزائر وفلسطين وسورية والسعودية، فيما ساهم في إنتاج ومراجعة كتاب الطب الشرعي فريق ينتمي أفراداه إلى أحد عشر بلداً عربياً، وينطبق ذلك أيضاً على ما ألف من الكتب الأخرى في هذه السلسلة.

إغناء المحتوى العربي لموقع المنظمة على الشبكة (الإنترنت)

تعتمد منظمة الصحة العالمية وغيرها من المؤسسات الدولية اعتماداً كبيراً على نشر المعلومات عبر الشبكة أو الإنترنت أو شبكة المعلومات الدولية، وقد أصبح مفهوم التعدد اللغوي سائداً في المنظمات الدولية كافة، وهو مفهوم يتوخى تحقيق العدالة في إتاحة المعلومات للناس باللغات التي يتكلمون بها، مما يوجب على المنظمات إيلاء أهمية بالغة لإنتاج الإخراجات المتعددة اللغات من النصوص ذات الأهمية في اتخاذ القرارات السياسية، ومن المعلومات التي ينبغي أن تطبقها المجتمعات للوقاية من الأمراض أو لتغيير أنماط الحياة.

وللمقر الرئيسي للمنظمة في جنيف، سويسرا، موقع غني بالمعلومات الصحية القيّمة والمحدّثة وذات الأهمية على الصعيد الدولي والإقليمي والمحلي والشخصي، وعنوان هذا الموقع هو: www.who.int ويتضح لمن يزور هذا الموقع ومنذ الوهلة الأولى أنه متعدد اللغات، ففيه الكثرة الكاثرة من المضمون باللغة الإنكليزية، ونسب متفاوتة منها باللغات الرسمية الخمسة الأخرى وهي العربية والفرنسية والروسية والصينية والإسبانية.

أما المكتب الإقليمي لشرق المتوسط، ومقره القاهرة، مصر، ويضم اثنتين وعشرين دولة من بينها ثماني عشرة دولة عربية، فله موقع على الشبكة عنوانه هو: www.emro.who.int وهو غني باللغة العربية التي يكاد مضمونها يعدل ثمانين بالمئة من مضمون اللغة الإنكليزية فيه.

ويستهدف موقع المنظمة على الشبكة، وفق ما توضحه رسالة المدير الإقليمي الدكتور حسين عبد الرزاق الجزائري المنشورة على الصفحة الرئيسية للموقع، إتاحة سائر منشورات المكتب الإقليمي العلمية والتقنية؛ وزيادة كفاءة إنتاج وتوزيع المعلومات بأقل قدر من النفقات؛ وإيصال المعلومات الواردة من منظمة الصحة العالمية ومن المؤسسات العلمية العالمية إلى الناس، ولاسيما قواعد المعطيات المكتبية والفهارس الإقليمية؛ وتعزيز الوعي بمنظمة الصحة العالمية بصفة عامة وبالمكتب الإقليمي لشرق المتوسط وأنشطته بصفة خاصة، بنشر وقائع الاجتماعات العلمية والتقنية التي ينظمها المكتب الإقليمي، وتقديم المعلومات الإحصائية والمعلومات الخاصة ببلدان الإقليم.

وهكذا أصبح الموقع قبلة يتوجه إليها العاملون الصحيون ومتخذو القرارات وأرباب المهن الصحية من أطباء وأطباء أسنان وصيادلة وممرضات وقابلات، إلى جانب العاملين في وسائل الإعلام الجماهيرية وعامة الناس في أوسع نطاق ممكن.

برنامج تبادل الزيارات بين أساتذة البلدان العربية للتشارك في التجارب والخبرات المستفادة في تدريس العلوم الصحية باللغة العربية

كان برنامج تبادل الزيارات من الثمرات الياقة التي نتجت عن المؤتمرات الطبية العربية المؤيدة لتعريب التعليم الصحي، وحظي بمساندة وزراء الصحة العرب الأعضاء في اللجنة الإقليمية التي أوصت عام 1990 بتخصيص قسط من مساهمات الدول الأعضاء لدعم اللغات الوطنية.

وقد استهدف برنامج تبادل الزيارات في البدء عمداً وأساتذة كليات الطب والعلوم الصحية ممن كانوا يتخوفون من ممارسة التعليم باللغة العربية [37]، ويعززون ذلك التهيّب إلى عدم ألفتهم لمحاضر باللغة العربية، إما لأنهم لم يتعلموا أصلاً بها أو لأنهم ينظرون إليها نظرة تقديس وتبجيل. وقد قدم المكتب الإقليمي لهذا البرنامج الدعم المالي والإداري اللازم، واستعان بخبرات العمداً والمدرسين في الجامعات السورية لتمكين الأساتذة الزائرين من المراقبة الميدانية للدروس تلقى على الطلاب باللغة العربية، ومدى تجاوب الطلاب واستيعابهم لها، وتشجيعهم على إلقاء الدروس باللغة العربية.

وقد نجحت تلك الزيارات نجاحاً باهراً سهّل على الأساتذة الزائرين تطبيق التعليم باللغة العربية في جامعاتهم التي قدموا منها أو الدفاع عنه عن قناعة وإصرار، ولا سيما أن أغلبهم عاد إلى بلاده محملاً بما راق له حمله من الكتب الدراسية المعتمدة للتدريس في الجامعات السورية باللغة العربية، إلى جانب بناء علاقات حميمة مع المدرسين السوريين.

وبالمقابل فقد لّبي أعضاء هيئات التدريس في الجامعات السورية طلبات دعوة زملائهم من الأقطار العربية للتدريس باللغة العربية. وتكللت هذه التجربة بمزيد من النجاح بإنتاج كتب دراسية باللغة العربية ساهم في إعدادها فريق من الأساتذة السوريين وأصحاب البلد المضيف لهم، وهو أمر أغنى المكتبة العربية وزاد من الثروة المصطلحية وقرب من لغة التواصل بين بلدان عربية متعددة.

شبكة تعريب العلوم الصحية (أحسن)

إن شبكة تعريب العلوم الصحية هي شبكة معلومات تضم مجموعة من المهتمين بترجمة العلوم الصحية والطبية من المترجمين المحترفين المتفرغين للترجمة، والهواة غير المتفرغين لها، ومن يتعامل مع المواد بلغاتها الأصلية، ومع تلك المواد بعد ترجمتها من ناشرين تقليديين وناشرين على الإنترنت وعلى الأقراص الحاسوبية، وموزعين للمنتجات، والمستخدمين لها من طلبة العلوم الصحية ومدريسيها، ومن يقوم بالتأليف في أحد مجالاتها، والمسؤولين عن التعليم بمراحله المختلفة ولا سيما التعليم العالي من عمداً للكليات ومديري الجامعات ووزراء التعليم والثقافة والتربية والصحة.

أما أهداف الشبكة فهي تعزيز التواصل بين المهتمين بترجمة العلوم الصحية والطبية والتعريف بأعمالهم وترويجها والاستفادة منها على أتم وجه، والتنسيق بين الأعمال والمراحل وتوافر المنتجات في الأسواق

وإتاحتها لمن يحتاج إليها بأفضل السبل والوسائل المتوفرة، وتجنب إضاعة الجهود والأموال في تكرار إنتاج بعض الأعمال وإهمال بعضها الآخر.

وقد أنشئت الشبكة على هامش الحلقة العملية الأولى لشبكة المترجمين الذين يساهمون في نقل العلوم الطبية والرسائل الصحية من اللغات الأجنبية إلى اللغة العربية، والتي عُقدت في المكتب الإقليمي لشرق المتوسط، في القاهرة، في آب/ أغسطس 2003، ويحرص القائمون على خدمتها في المكتب الإقليمي، ولاسيما الدكتور محمد هيثم الخياط، كبير مستشاري المدير الإقليمي ومدير البرنامج العربي للمنظمة، على إتاحة بيئة من الحوار والتنسيق بين الأطراف المشاركة في الشبكة، وتوصيل الرسائل والمبادرات التي يرسلها الأعضاء في الشبكة، إلى جانب عقد مؤتمر سنوي يستعرض فيه المشاركون الجهود التي بذلت في العام المنصرم، والنتائج التي أسفرت عنها تلك الجهود، ويتفقون على تنفيذ المزيد منها مما يلبي الاحتياجات الملحة.

وتستأثر المساجلات حول المصطلحات ومدى صحتها ومقبوليتها وشيوعها وما يستجد منها بقسط وافر من أعمال الشبكة، ولاسيما ما ينصبّ منها في تطوير وتحديث وتدقيق المعجم الطبي الموحد والمعجم المنشقة عنه. وثمة الكثير من الرسائل الإعلامية التي تعرض على المشاركين بالشبكة فرص العمل في المنظمات الدولية، والتدريب في المؤسسات المتخصصة، والمشاركة في المؤتمرات، والتعريف بالكتب التي تصدر هنا وهناك مما يهم أعضاء الشبكة. وقد استفاد من البيئة التعليمية التي تتيحها شبكة تعريب العلوم الصحية الكثير من الأعضاء في إعداد كتبهم ونشرها وتوزيعها والتعريف بها [38].

التعاون والتنسيق مع مجامع اللغة العربية

تأسس المجمع العلمي العربي بدمشق عام 1919، وبأادر أعضاؤه إلى إلقاء المحاضرات العلمية والأدبية وإصلاح اللغة السائدة آنذاك، وإصدار مجلة شهرية تحولت إلى الصدور كل ثلاثة أشهر، ودأب المجمع على نشر المصطلحات العلمية والتعريف بها دون أن يقرّها أو أن يحققها أعضاؤه، فقد كان المجمع يرى أن هذه الألفاظ، على وجاهة الكثير منها، لا تعبّر إلا عن رأي أصحابها، لأن المجمع لا يميز لنفسه إقرارها والتشبيث بها [39]. وقد تحوّل اسم المجمع بعد ذلك إلى مجمع اللغة العربية بعد استيثاق عرى الوحدة مع مصر، وكان جُلّ أعضاء المجمع من أساتذة الكليات العلمية من طب وصيدلة وهندسة وزراعة وجيولوجيا.

وقد طرأ تحول واضح في الوقت الحاضر للاهتمام بالمصطلحات العلمية وتنسيقها [40]، فتشكلت لجان متخصصة للعناية بها ومتابعتها، فتكوّن لدى المجمع رصيد ضخم من المصطلحات العلمية. وقد تعاون البرنامج العربي لمنظمة الصحة العالمية ووحدة المصطلحات في المكتب الإقليمي منذ عام 1998 مع مجمع اللغة العربية بدمشق في إضفاء السمت العصرية على العمل الإداري واللغوي في المجمع، بإدخال شبكة داخلية للتواصل بين الأعضاء والإداريين داخل المجمع، وتوصيل المجمع بالشبكة "الإنترنت"، واكتناز منتجات المجمع بشكل رقمي إلكتروني يتيح إيصال جميع ما صدر عنه من مطبوعات دورية ومخطوطات وكتب تراثية محققة لمن يبحث عنها بأيسر سبيل، ولا يزال [41].

أما مجمع اللغة العربية في القاهرة فقد أنشئ بمرسوم صدر عام 1932، ويعدّه الكثير من الباحثين المجمع العربي الوحيد الذي قصر عمله على اللغة ومصطلحاتها، وأسس لها لجاناً فرعية متخصصة

في الطب، والكيمياء والطبيعة، وعلوم الأحياء والزراعة، والعلوم الرياضية والهندسية، والاقتصاد والقانون، والعلوم الفلسفية والاجتماعية، والتاريخ والجغرافيا. وتستعين اللجان في تأدية أعمالها بخبراء، وتجتمع معهم كل أسبوع للنظر فيما يرد إليها أو ما يعرضه خبراءها عليها من مصطلحات، وهم يناقشون المصطلحات دون تعصب أو تطرف [42].

وقد كان للبرنامج العربي مع مجمع اللغة العربية في القاهرة تاريخ طويل من التعاون تبلور بإعداد برنامج حاسوبي يكتنز ذخيره اللغوية، والتي تتضمن جميع المصطلحات العلمي والفنية التي أصدرها مجمع اللغة العربية منذ بدئه العمل عام 1934 وحتى اليوم، إلى جانب القرارات والتوصيات التي اتخذها المجمع في لجانته ومؤتمراته، ومقررات اللجان حول الألفاظ والأساليب، وأصول اللغة، والمعجم المفهرس لألفاظ القرآن الكريم. ثم ساعد البرنامج العربي للمنظمة على إنشاء موقع للمجمع على الشبكة (الإنترنت)، وتكامل التعاون باختيار الدكتور محمد هيثم الحياط مدير البرنامج العربي للمنظمة عضواً في المجمع وبمساهمته الفعالة في لجنة الطب.

وقد تواصل التعاون بين مجمع اللغة العربية في عمان وبين البرنامج العربي للمنظمة، فقد كان الأستاذ الدكتور عبد الكريم خليفة رئيس المجمع على رأس المؤسسين لشبكة تعريب العلوم الصحية، وله مساهمات قيّمة في تعزيز مسيرتها. واستفاد البرنامج العربي للمنظمة أيضاً استفادة كبيرة من المصطلحات التي أعدها مجمع اللغة العربية في بغداد، وأدرج قسطاً منها في المعجم الطبي الموحد والمعجم التخصصية الفرعية المستفردة منه.

التعاون والتنسيق مع المؤسسات العربية المهتمة بالتعريب

كان للبرنامج العربي إسهام كبير في التعاون وبناء الشراكات مع المنظمات الدولية والإقليمية والمحلية لتعزيز حضور اللغة العربية وإغنائها في المحافل والمطبوعات وشبكة الإنترنت، ونخص بالذكر مجلس وزراء الصحة العرب الذي كان شريكاً فاعلاً في إعداد الطبعة الثالثة من المعجم الطبي الموحد، ومجلس وزراء التعليم العالي العرب الذي كان مسانداً حاضراً لما اتخذته المؤتمرات المتعاقبة حول التعريب، والمجلس العربي للاختصاصات الطبية الذي يصدر مجلته باللغات العربية والإنكليزية والفرنسية، ولعل ما فيها من خلاصات باللغة العربية هي أكثر ما تجذب الأطباء العرب، واتحاد الأطباء العرب الذي يجعل مناقشة أمر التعريب من الحصص الدائمة الحضور على جدول أعمال مؤتمره السنوي، وهو أيضاً مساهم فعال في المعجم الطبي الموحد، بل إن المعجم ثمرة مبادرة له، واتحاد الجامعات العربية الذي رعى موضوع التعريب في مؤتمراته المتعاقبة، ومركز تعريب العلوم الصحية بالكويت الذي كان ولا يزال شريكاً ورائداً في وضع خطط التعريب وتوفير مستلزماته من كتب دراسية ومصطلحات، والمركز العربي للتعريب والتأليف والترجمة والنشر بدمشق الذي جمعت بينه وبين البرنامج العربي للمنظمة شراكة قوية أثمرت عدداً من الكتب القيمة، ومكتب تنسيق التعريب بالرباط الذي كانت مصطلحاته معيناً ثراً نهل منه العاملون في وحدة المصطلحات وفي حقل الترجمة الطبية والصحية، والهيئة العليا للتعريب بالسودان التي عملت بالتعاون مع البرنامج العربي للمنظمة على إنشاء مطبعة محلية لطباعة الكتب والمنشورات التعليمية، والجمعية المصرية لتعريب العلوم في القاهرة، وكليات الطب والعلوم الصحية في الجامعات والمؤسسات التعليمية العربية، وقد ساهمت في إنجاح برنامج المنظمة لتبادل الزيارات بين أعضاء الهيئات التعليمية

العربية، والمنظمة الإسلامية للعلوم الطبية في الكويت والتي خصصت وقتاً وتمويلًا لبحث القضايا الصحية المستجدة بمشاركة من الباحثين الصحيين وعلماء الشريعة، والمنظمة الإسلامية للتربية والعلوم والثقافة التي رعت بعض المشروعات التعليمية والتثقيفية باللغة العربية في الإقليم، ومعهد المخطوطات العربية في القاهرة، والمجلس البريطاني من خلال فرعه في دمشق، سورية، والذي نفذ بالشراكة مع البرنامج العربي دراسة لتقييم وتحسين مهارات التواصل باللغة الإنكليزية بين طلبة ومدرسي كلية الطب في جامعة دمشق، ودور النشر الكبرى المهتمة بالتعريب مثل مكتبة لبنان-ناشرون ويعود لها الفضل في إنتاج وتوزيع الإخراجة الورقية من الطبعة الرابعة للمعجم الطبي الموحد الأم وطبعات المعاجم المستفردة منه في مواضيع فرعية ومتخصصة، مثل معجم التشريح الموحد ومعجم الصيدلة الموحد ومعجم طب الأسنان الموحد، ثم الإخراجة العربية للطبعة السابعة من كتاب البيولوجيا المنسوب لكامل وريس. ومكتبة أكاديميا إنترناشيونال في بيروت، وكان لها الفضل في إنتاج جُل الكتب في سلسلة الكتاب الطبي الجامعي. والمركز التقني المعاصر، وقد تعاون مع البرنامج العربي للمنظمة في إنتاج بعض العناوين الهامة، وأخص بالذكر منها مكافحة الأمراض السارية، والطبعة الثانية من كتاب الطرائق الأساسية للمختبرات الطبية، والإخراجة العربية لكتاب روبنز وقطران الموسوم بالأسس الباثولوجية للأمراض. ومجموعة خليفة للكمبيوتر في القاهرة، وشركة أتاسوفت في لندن. وجميع هذه المكتبات والمؤسسات قدمت للتعريب خدمات جلى وكان بعض ما أنتجته ثمرة تعاون وتشجيع من البرنامج العربي لمنظمة الصحة العالمية.

الخاتمة حول استشراف المستقبل

تمتلك اللغة العربية حيويتها الخاصة التي تحميها من التوقع والسقوط في الجمود والانغلاق، واستطاعت أن تواكب العصور التي مرت عليها، وأن تكون لغة كل عصر بكل معطياته، وهي قادرة على نقل كل ألوان الحداثة، وعلومها، وفلسفاتها، ومصطلحاتها المرتبطة بمفاهيمها. وقد أثمر العمل في البرنامج العربي للمنظمة نتائج طبية أسهمت في توحيد لغة التخاطب بين أرباب المهن الطبية عبر العمل الدؤوب في المعجم الطبي الموحد إضافة إلى تقديم صورة عن الوضع الصحي في العالم للقارئ العربي وإصدار الكتب والدلائل الإرشادية والتدريبية للعاملين الصحيين وطباعة وتوزيع الكتب الدراسية لطلبة الطب والعلوم الصحية العربية المترجمة أو المؤلفة بالعربية وإقامة الدورات التدريبية للمحاضرين والمترجمين والمصطلحيين. كما عملت شبكة تعريب العلوم الصحية التي أنشأها البرنامج العربي لمنظمة الصحة كمبر يتبادل من خلاله المهتمون بتدريس العلوم الصحية وجهات النظر ووضع المصطلحات بمجال الطب وسائر العلوم الصحية باللغة العربية، وأصبحت توفر لمجموع العاملين في الدول العربية وسيلة تواصل ومناقشة لكثير من المصطلحات وتعريفها، وهو ما ساعد على الانتهاء من إعداد الطبعة الرابعة للمعجم الطبي الموحد الذي بدأ العمل به سنة 1968 بقرار من اتحاد الأطباء العرب، حيث بلغ عدد مصطلحاته في هذه الطبعة 150 ألف مصطلح.

والتحدي المائل أمام البرنامج العربي اليوم هو المحافظة على قوة الدفع لمسيرته، بما يتطلبه ذلك من استمرارية للموارد البشرية والمالية، للنهوض بقضية التعريب وجعلها على رأس أولويات التعليم الجامعي.

المراجع

1. الأستاذ شحادة الخوري، التعريب، مجلة التعريب التي تصدر عن المركز العربي للتعريب والترجمة والتأليف والنشر المنبثق عن المنظمة العربية للتربية والثقافة والعلوم، ومكتبه في دمشق، في العدد الحادي والثلاثين من السنة السادسة عشرة، كانون الأول/ديسمبر 2006، الصفحة 11.
2. الدكتور صالح بلعيد، تعريب التعليم العالي أولوية الأولويات، وهي دراسة أعدت للندوة السادسة للمسؤولين عن تعريب التعليم العالي في الوطن العربي التي عقدت في عُمان عام 2006، ثم نشرت في مجلة التعريب التي تصدر عن المركز العربي للتعريب والترجمة والتأليف والنشر المنبثق عن المنظمة العربية للتربية والثقافة والعلوم، ومكتبه في دمشق، في العدد الثاني والثلاثين من السنة السابعة عشرة، حزيران/يونيو 2007، الصفحة 36.
3. الدكتور جابر عصفور، العربي ولغتها العربية، كتاب العربي 72 حول أزمة اللغة العربية، الصفحة 13.
4. الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي لمنظمة الصحة العالمية لإقليم شرق المتوسط، من كلمته في افتتاح المؤتمر السادس لشبكة تعريب العلوم الصحية التي عقدت تحت رعاية الكتورة نجاح العطار نائب رئيس الجمهورية العربية السورية في رحاب مجمع اللغة العربية بدمشق في المدة 8-10 حزيران/يونيو 2008.
5. الدكتور عبد الحسين طابا، المدير الإقليمي السابق لمنظمة الصحة العالمية لشرق المتوسط، عن تقديمه لكتاب الناس والصحة في الشرق الأوسط، تأليف يان سيمون، ترجمة الدكتور سعيد عبده، نشر المكتب الإقليمي لمنظمة
- الصحة العالمية في شرق البحر المتوسط، 1968، الصفحة 9.
6. حول المعلومات والاتجاهات الطبية والصحية، يمكن مراجعة التقارير السنوية الصادرة عن المكتب الإقليمي للمنظمة، مثل أعمال منظمة الصحة العالمية في إقليم شرق المتوسط، التقرير السنوي للمدير الإقليمي عن المدة من 1 كانون الأول/يناير إلى 31 كانون الثاني/ديسمبر 2005، الصفحات 35-41. وهي متاحة على موقع المكتب الإقليمي www.emro.who.int
7. الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي لمنظمة الصحة العالمية لإقليم شرق المتوسط، من مقدمة كتاب علم المصطلح لطلبة كليات الطب والعلوم الصحية، أعد بإشراف الدكتور محمد هيثم الخياط، وساهم فيه الدكتور الشاهد البوشيخي، والدكتور عز الدين البوشيخي، والدكتور مصطفى أوفوشي، والدكتور قاسم طه السارة وأعضاء شبكة تعريب العلوم الصحية "أحسن"، طباعة أكاديميا إنترناشيونال، بيروت، لبنان 2007.
8. للاطلاع على المزيد من المعلومات حول رسالة المنظمة والمهام المنوطة بها وبرامجها والبنية التنظيمية لها يمكن زيارة موقعها على الإنترنت، وهو موقع متعدد اللغات، أما مضمونه العربي فعنوانه: <http://www.who.int/about/ar>
9. الدكتور عبد المنعم محمد علي: مسيرة اللغة العربية في منظمة الصحة العالمية، المحاضرة الرئيسية في الاجتماع الأول لشبكة تعريب العلوم الصحية، المكتب الإقليمي لمنظمة الصحة العالمية في القاهرة، 2003، وهي

لبنان-ناشرون واتحاد مجامع اللغة العربية، دمشق، تشرين الأول/أكتوبر 1999.

14. الدكتور محمد علي الزركان، الدعوات المبكرة إلى توحيد المصطلح العلمي العربي من قبل الأفراد والجماعات، مجلة اللسان العربي المجلد 41، 1996 الصفحات 69-73.

15. الدكتور محمود فوزي المناوي، أزمة التعريب، مركز الأهرام للترجمة والنشر، القاهرة 2003، الصفحات 263-264.

16. الدكتور محمد هيثم الخياط، التعريب في سورية، وهي محاضرة أُلقيت في ندوة تعريب التعليم العالي والجامعي التي أقامها اتحاد مجامع اللغة العلمية العربية في الرباط (1985) ونشرت في الطبقات المتلاحقة لكتابه "في سبيل العربية".

17. الدكتور قاسم سارة، المعجم الطبي الموحد: تجربة رائدة في وضع المصطلح الطبي وتوجيهه ونشره، بحث أُلقي في المؤتمر الثالث لمجمع اللغة العربية بدمشق 10-12 تشرين الأول/أكتوبر 2004.

18. الدكتور عزة مصطفى، مقدمة الطبعة الثالثة للمعجم الطبي الموحد.

19. الدكتور محمد هيثم الخياط، مقدمة الطبعة الثالثة للمعجم الطبي الموحد.

20. الدكتور محمد هيثم الخياط، أربعون عاماً مع المصطلح، من البطاقات إلى الحوسبة، بحث قُدِّم إلى مؤتمر مجمع اللغة العربية في دورته الثالثة والستين، ونشر في الطبقات المتلاحقة لكتابه "في سبيل العربية".

21. الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي لمنظمة الصحة العالمية لإقليم شرق المتوسط من كلمته في المؤتمر السادس لشبكة تعريب العلوم الصحية التي عقدت تحت

متوافرة بنصها الكامل على موقع المكتب الإقليمي للمنظمة : www.emro.who.int

10. قرار جمعيه الصحة العالمية رقم ج ص ع 28-34 مايو/أيار 1975.

11. وفقاً للمرجع (٩) فقد أسندت رئاسة المجموعة إلى الأستاذ الدكتور مصطفى كامل ياسين (من العراق)، أستاذ القانون الدولي بجامعة جنيف، وكان أعضاء المجموعة الأستاذ عدنان يوسف (من العراق)، رئيس قسم الترجمة العربية بالأمم المتحدة، نيويورك، والأستاذ محمود مراد (من مصر)، أستاذ الترجمة العربية بكلية اللغات والترجمة بجامعة جنيف، والدكتور سيد أبو النجا (من مصر)، رئيس قسم الترجمة الفورية بمقر الأمم المتحدة بجنيف، والأستاذ رفعت لطفي (من مصر)، رئيس قسم الترجمة العربية بمقر الأمم المتحدة بجنيف، والأستاذ محمد يعقوب (من مصر)، رئيس قسم الترجمة بالمكتب الإقليمي لشرق المتوسط، والأستاذ سامي شوبر (من العراق)، المستشار القانوني برئاسة منظمة الصحة العالمية، جنيف، والأستاذ إبراهيم زريقات (من الأردن)، من وحدة اللغة العربية بالمقر الرئيسي للمنظمة، جنيف، والدكتور عبد المنعم محمد علي (من مصر)، رئيس وحدة اللغة العربية بالمقر الرئيسي للمنظمة، جنيف.

12. قطوف من الإنجازات اللغوية والأدبية للأطباء المجمعين (الدكتور علي توفيق شوشة 1891-1964)، الدكتور محمود فوزي المناوي، أزمة التعريب، مركز الأهرام للترجمة والنشر، القاهرة 2003، الصفحات 363-364.

13. الأستاذ أحمد شفيق الخطيب، منهجية وضع المصطلحات وتطبيقاتها، دائرة المعاجم، مكتبة

28. اللجنة الإقليمية لشرق المتوسط، الدورة السابعة والثلاثون، استعمال اللغات الوطنية في التعليم الطبي والصحي، القرار ش م/ل 37/ق-4، 10 تشرين الأول/أكتوبر 1990.
29. وقائع مؤتمر تعريب تعليم الطب والعلوم الطبية في الوطن العربي: خطوات تطبيقية، جمعية الأطباء البحرينية، المنامة، البحرين، 1618 شباط/فبراير 1993.
30. الدكتور قاسم سارة، التعريب جهود وآفاق، دار الهجرة بدمشق، 1989، الصفحات 99-145.
31. الدكتور أحمد ديب دشاش، من كلمته في الحصة المخصصة للتعريب في المؤتمر الثاني والأربعين لاتحاد الأطباء العرب، عمان 2008.
32. <http://www.emro.who.int/publications/emhj/1403/Index.htm>
33. الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي لمنظمة الصحة العالمية لإقليم شرق المتوسط من كلمته في المؤتمر السادس لشبكة تعريب العلوم الصحية التي عقدت تحت رعاية الدكتورة نجاح العطار نائب رئيس الجمهورية العربية السورية في رحاب مجمع اللغة العربية بدمشق في المدة 8-10 حزيران/يونيو 2008.
34. الأستاذ شحاذة الخوري، دور المراجع العلمية وأمهات الكتب في سيرورة المصطلحات العلمية وانتشارها، الدراسة التاسعة من الجزء الثالث من كتابه دراسات في الترجمة والمصطلح مالتعريب، دار الطليعة الجديدة، 2007، الصفحة 135.
- رعاية الكتورة نجاح العطار نائب رئيس الجمهورية العربية السورية في رحاب مجمع اللغة العربية بدمشق في المدة 8-10 حزيران/يونيو 2008.
22. الدكتور قاسم سارة، مقبولة الألفاظ المستحدثة، بحث ألقى في المؤتمر الرابع لمجمع اللغة العربية بدمشق 2005.
23. الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي لمنظمة الصحة العالمية، كلمته في افتتاح المؤتمر الإقليمي الخامس لتعليم العلوم الصحية باللغة العربية، الإسكندرية، مصر، 24-25 تشرين الثاني/نوفمبر 2007.
24. الدكتور خالد منيمنة، المؤتمرات القومية والوطنية التي عقدت حتى الآن حول تعريب التعليم الطبي وتوصياتها وقراراتها، بحث أعد للإلقاء في مؤتمر تعريب التعليم الطبي، دولة الكويت، 1996، موقع المركز العربي لتعريب العلوم الصحية "أكمل": <http://www.acmls.org>
25. الدكتور حسين عبد الرزاق الجزائري، المدير الإقليمي لمنظمة الصحة العالمية لإقليم شرق المتوسط من كلمته في مؤتمر تعريب تعليم الطب والعلوم الطبية في الوطن العربي، خطوات تطبيقية، جمعية الأطباء البحرينية، 1993، كتيب المؤتمر، الصفحات 17-23.
26. الدكتور عبد الرحمن العوضي، من كلمته في مؤتمر تعريب تعليم الطب والعلوم الطبية في الوطن العربي، خطوات تطبيقية، جمعية الأطباء البحرينية، 1993، كتيب المؤتمر، الصفحات 49-51.
27. الدكتور محمود حافظ، قضية التعريب في مصر، مجمع اللغة العربية في القاهرة، 1997 الصفحات 18-43.

الشهابي، الطبعة الثانية، 1965، مطبوعات
المجمع العلمي العربي بدمشق، الصفحات
63-61.

40. الدكتور محمود أحمد السيد، النهوض باللغة
العربية بين التوصيات والممارسات، قراءة
في توصيات مجمع اللغة العربي بدمشق،
مجلة التعريب التي تصدر عن المركز العربي
للتعريب والترجمة والتأليف والنشر المنبثق
عن المنظمة العربية للتربية والثقافة والعلوم،
ومكتبه في دمشق، في العدد الحادي والثلاثين
من السنة السادسة عشرة، كانون الأول/
ديسمبر 2006، الصفحة 79.

41. الدكتور مروان المحاسني، نائب رئيس
مجمع اللغة العربي بدمشق، من كلمته في
افتتاح المؤتمر السادس لشبكة تعريب العلوم
الصحية التي عقدت تحت رعاية الدكتور
نجاح العطار نائب رئيس الجمهورية العربية
السورية في رحاب مجمع اللغة العربية بدمشق
في المدة 8-10 حزيران/يونيو 2008.

42. عمل المجامع والجمعيات في وضع
المصطلحات، المصطلحات العلمية في اللغة
العربية في القديم والحديث، الأمير مصطفى
الشهابي، الطبعة الثانية، 1965، مطبوعات
المجمع العلمي العربي بدمشق، الصفحات
70-69.

35. الدكتور محمد توفيق الرخاوي، محاضراته
حول تعريب الطب في المؤتمر السادس لشبكة
تعريب العلوم الصحية التي عقدت تحت
رعاية الدكتورة نجاح العطار نائب رئيس
الجمهورية العربية السورية في رحاب مجمع
اللغة العربية بدمشق في المدة 8-10 حزيران/
يونيو 2008.

36. الدكتور دفع الله عبد الله الترابي، حصيلة
تعريب العلوم الصحية في الجامعات
السودانية، المؤتمر السادس لشبكة تعريب
العلوم الصحية التي عقدت تحت رعاية
الدكتورة نجاح العطار نائب رئيس الجمهورية
العربية السورية في رحاب مجمع اللغة العربية
بدمشق في المدة 8-10 حزيران/يونيو 2008.

37. الدكتور محمد هيثم الخياط، أهمية الترجمة في
نشر العلم ورفع مستوى التعليم، محاضرة
في أكاديمية المملكة المغربية، طنجة، 1995،
ونشرت في الطبعة المتلاحقة لكتابه "في
سبيل العربية".

38. الأستاذ ماهر محمدي ياسين وجمال فتح الله،
مقدمات كتاب تكنولوجيا التصوير الطبي
بالرنين المغناطيسي، مطابع الدار الهندسية،
القاهرة 2007.

39. عمل المجامع والجمعيات في وضع
المصطلحات، المصطلحات العلمية في اللغة
العربية في القديم والحديث، الأمير مصطفى

Pharmacoepidemiological study of self-medication in adults attending pharmacies in Alexandria, Egypt

S.A. Sallam,¹ N.M. Khallafallah,² N.K. Ibrahim¹ and A.O. Okasha¹

دراسة في الوبائيات الدوائية حول المداواة الذاتية بين البالغين الذين يرتادون الصيدليات في الإسكندرية - مصر
سنى عبده سلام، نوال محمد خلف الله، نهلة خميس إبراهيم، عائشة عمر عكاشة

الخلاصة: أجرى الباحثون دراسة مستعرضة للتعرف على مدى ونمط المداواة الذاتية بين البالغين وللتعرف على المعارف والممارسات التي تتعلق بالأدوية التي يشترونها، ولحساب المؤشرات الخاصة بوصف الأدوية وبالرعاية لمن يشتريها. وقد اتبع الباحثون الطريقة التي أعدتها منظمة الصحة العالمية، فاختاروا بطريقة عشوائية 35 صيدلية من مناطق مختلفة في مدينة الإسكندرية بمصر؛ وأجروا مقابلات مع 1294 مرتاداً لها، كان من بينهم 1050 (81.1%) ممن يشتري أدوية المداواة الذاتية، وكان أكثر الأسباب شيوعاً هو الاعتقاد بأن الحالة بسيطة، وكانت أكثر الأدوية المصروفة هي أدوية الجهاز التنفسي، وكان العدد الوسطي للأدوية لكل مرة يرتاد فيها المشتري الصيدلية 1.10، وكانت التكلفة الوسطية 7.29 جنيهها، وكان الزمن الوسطي لصرف الأدوية 2.53 دقيقة أما معارف وممارسات المرتادين للصيدليات لشراء الأدوية فقد كانت ضعيفة.

ABSTRACT A cross-sectional study was conducted to determine the extent and pattern of self-medication among adults, to identify their knowledge and practice concerning the purchased drugs and to calculate prescribing and purchaser care indicators. Following WHO methods, 35 pharmacies were randomly selected from districts in Alexandria city, Egypt. Of 1294 clients interviewed at these pharmacies, 1050 (81.1%) purchased self-medication; the commonest reason given was a belief that the condition was minor. The most frequently dispensed drugs were those for the respiratory system. The mean number of drugs per encounter was 1.10, mean cost LE 7.29 and mean dispensing time 2.53 minutes. Purchasers' knowledge and practice regarding the purchased drugs were poor.

Étude pharmacoépidémiologique de l'automédication chez les adultes s'approvisionnant dans des pharmacies d'Alexandrie (Égypte)

RÉSUMÉ Une étude transversale a été menée pour déterminer l'étendue et les caractéristiques de l'automédication chez les adultes, recenser les connaissances et les pratiques de ces personnes concernant les médicaments achetés, et calculer les indicateurs de prescription ainsi que les indicateurs de soins relatifs aux acheteurs. Conformément aux méthodes de l'OMS, 35 pharmacies ont été sélectionnées au hasard dans différents quartiers d'Alexandrie (Égypte). Sur 1 294 clients interrogés dans ces pharmacies, 1050 (81,1 %) achetaient des médicaments pour se soigner eux-mêmes ; parmi les raisons avancées, la principale était que d'après eux, ils ne souffraient pas d'une affection grave. Les médicaments les plus fréquemment délivrés étaient ceux destinés à l'appareil respiratoire. Le nombre moyen de médicaments par déplacement à la pharmacie était de 1,10 ; le coût moyen, de 7,29 livres égyptiennes ; et la durée moyenne de délivrance, de 2,53 minutes. Le niveau de connaissances et de pratiques des clients à propos des médicaments achetés était faible.

¹High Institute of Public Health; ²Faculty of Pharmacy, University of Alexandria, Alexandria, Egypt
(Correspondence to A.O. Okasha: aisha@doctor.com).

Received: 11/07/06; accepted: 18/10/06

Introduction

Pharmacoepidemiology is considered newly evolving science that studies the use and effects of drugs in large numbers of people [1]. Rational use of drugs has drawn public health attention globally with the aim of maintaining quality health care at lower cost [2]. As dispensing medication in an appropriate way is a cornerstone of rational drug use, the dispenser should be regularly updated with information, tools and skills [3].

Self-medication has been defined as self-administration of medication not prescribed by, or in a manner not directed by, a physician [4]. The public health importance of self-medication has increased since the late 1980s when more drugs were changed from prescription status to be sold over-the-counter (OTC) without a prescription. This is a worldwide trend. The increased possibilities of self-medication have implications for patients, pharmacists, and physicians [5]. It also allows pharmaceutical companies to expand their market [6].

Self-medication is common among individuals in many developing countries but not much is known about its determinants [7], and increasingly self-prescribed medications are obtained and consumed without the advice of the physician [8]. In Egypt in 1996 it was reported that some drugs that were unavailable in many developed countries because of the risks of adverse effects were still manufactured, marketed, prescribed by physicians, recommended by pharmacists and requested for purchase by clients [9]. It is customary in Egypt for drug products to be sold OTC without any prescription, except for a very limited number of drugs specified by the Ministry of Health and Population that require a special prescription for dispensing.

A limited number of drug utilization studies have been conducted in Egypt [10].

A pharmacoepidemiological study on drug utilization among children in Alexandria in 1995 reported that 21.1% of purchased medications were not prescribed [11]. Another study among university students showed that 66.1% took medicines without prescription [12]. The aim of this study was to determine the pattern of self-medication among adults attending pharmacies in Alexandria, to identify their knowledge and self-reported practices concerning the usage of the purchased drugs and to calculate the prescribing and purchaser care indicators for the encounters.

Methods

The study design and sample size followed World Health Organization (WHO) guidelines for investigation of therapeutic practice [13]. Accordingly, a sample of 35 pharmacies was selected randomly from all 7 districts of Alexandria, using the proportional allocation technique, where 30 encounters were included from each selected pharmacy. In order to reach the required sample size, all adults aged 20–64 years attending the selected pharmacies requesting drugs (with or without prescription) were selected. Among all adult clients requesting self-medication drugs (a product for self-use without a prescription indicated for the current complaint), a total sample of 1050 purchasers were interviewed.

Data collection was done through a questionnaire interview of purchasers and observation of the encounter. The interview questionnaire contained items about the purchaser: demographic characteristics (age, sex, education and occupation); complaint; duration of condition; source of advice and reason for self-medication; knowledge about the use of the purchased drug; and practices related to the product purchased. The observation sheet included items about

the dispensing procedure: history-taking; case referral; labelling of drugs; oral instructions about use; and whether the purchasers asked for any advice from the dispenser.

The dispensing time was recorded for each encounter. Data about the purchased drug was also recorded, such as trade name, generic name, dosage form and cost. Certain prescribing and purchaser care indicators were calculated according to WHO guidelines [13].

Analysis of data was conducted using SPSS, version 9.

Results

The sample of adults attending the pharmacies (with or without prescription) was 1294. A total of 1050 (81.1%) purchased products for self-medication and were included in the study.

The demographic characteristics of the purchasers of self-medication revealed a slight male predominance (56.5%); about two-thirds were married (61.7%). The mean age was 39.2 years; 27.9% were aged 20–29 years. Regarding educational level, 52.5% of purchasers were university graduates, while 16.6% and 19.8% respectively were illiterate or could just read and write. The most common occupation was housewife (23.0%), followed by clerical worker (16.2%).

The most frequent complaints expressed by purchasers of self-medication were common cold (9.2%), headache (7.4%), hypertension (5.6%), cough (5.0%) and dyspepsia (4.7%). Table 1 shows the complaints categorized by system; the most frequent were those of the respiratory system (21.0%), followed by the alimentary system (15.8%). Neurological and mental health problems represented 12.9%, followed by skin problems and cardiovascular problems, with 9.5% and 8.9% respectively.

Table 1 Distribution of adult purchasers of self-medication at Alexandria pharmacies by self-reported category of complaint

Category of complaint	No.	%
Respiratory problem	221	21.0
Alimentary problem	166	15.8
Neurological/mental health problem	135	12.9
Skin problem	100	9.5
Cardiovascular problem	93	8.9
Pain	82	7.8
Fatigue	47	4.5
Diabetes	37	3.5
Sensory organ problem	31	3.0
Gynaecological problem	29	2.8
Genitourinary problem	20	1.9
Dental problem	19	1.8
Other	70	6.7
Total	1050	100.0

Data concerning the present complaint revealed that about half of purchasers (48.5%) had had the complaint for less than 1 week; while one-third had had the condition for more than 6 months (32.8%) (Table 2). The majority (88.5%) had previously complained of the same condition. Previous use of the same product purchased was reported by 77.2%.

About half of the purchasers attributed the reason for self-medication to a perception of their problem as minor (44.5%), followed by 31.0% claiming to know the treatment from a previous prescription (Table 3).

Source of advice was mainly a prescription not issued for the current complaint (33.0%), the purchaser's own initiative (25.3%) and the pharmacist (22.0%) (Table 4).

Table 5 shows knowledge and self-reported practices of self-medication purchasers concerning the drug purchased. Drug-related knowledge among adults was poor: 88.3%, 92.9%, 95.7% and 95.4% of

Table 2 Distribution of self-medication purchasers (n = 1050) at Alexandria pharmacies by factors related to their complaint

Factor related to complaint	No.	%
< 1 week	509	48.5
1 to ≤ 4 weeks	116	11.0
1–6 months	81	7.7
> 6 months	344	32.8
<i>Previous complaint of same condition</i>		
Yes	929	88.5
No	121	11.5
<i>Previous use of same medication and completion of course</i>		
Used and completed course	594	56.6
Used but incomplete course	217	20.6
No previous use	239	22.8

purchasers did not know the drug dose, side-effects, precautions and contraindications of the purchased drugs respectively. Regarding self-reported practices, only 50.6% had read the patient information sheet, 62.2% had read the expiry date and 50.3% had followed the pharmacist's instructions on the label.

Statistically significant differences were found between the educational level of purchasers and behaviour concerning the purchased drugs (Table 6); purchasers with a higher level of education were more likely to read the patient information sheet, follow the pharmacist's label and read the expiry date of drug purchased; $P < 0.001$ for all behaviours.

Regarding the purchasers' practices when ill, 79.9% reported taking self-medication as their first action, 96.0% said that they turned to self-medication for perceived minor problems only and three-quarters perceived self-medication to be always effective in treating their condition. About

Table 3 Distribution of self-medication purchasers (n = 1050) at Alexandria pharmacies by reason for self-medication

Reason for self-medication	No.	%
Perceived problem as minor not requiring medical attention	467	44.5
Know the treatment from previous prescription	325	31.0
Confidence in the pharmacist	152	14.5
Cannot afford to see the doctor	52	4.9
No time to see the doctor	32	3.0
No confidence in the doctor	22	2.1

half of purchasers could not remember when they had last visited the doctor. Non-pharmacological home remedies were used by 61.3%.

Concerning the type of drug products regularly available at home, more than half of them were anti-inflammatory and analgesic drugs (58.5%), followed by cough (11.5%) and common cold (7.3%) remedies. The most frequent groups of drugs purchased were products for alimentary tract and metabolic disorders (30.4%), followed by those for respiratory system disorders (16.1%) (Table 7). The most frequent generic names requested were chlorpheniramine (7.7%), followed by diclofenac (4.5%). More than one-half of the drug products purchased (69.9%) were in oral solid dosage form (89.6% tablets and 10.4% capsules). Banned products such as dipyrrone were requested by the purchasers.

Observed dispensing procedure showed that 17.5% of purchasers had a case history taken and 6.2% were referred for medical care. The pharmacist was asked for advice by 29.6% of purchasers (Table 8).

Regarding the prescribing indicators, the mean number of drugs per encounter was 1.10, the mean drug cost per encounter was Egyptian pounds (LE) 7.29, and the percentage of encounters with 1 or more antibiotic dispensed was 6.8%.

Table 4 Distribution of adult purchasers (n = 1050) at Alexandria pharmacies by source of advice for self-medication

Source of advice for self-medication	No.	%
Purchaser's own initiative	266	25.3
Prescription not issued for the current complaint	346	33.0
Personal prescription	(325)	(30.9)
Prescription issued to others	(21)	(2.1)
Pharmacist	231	22.0
Pharmacist assistant	20	1.9
Lay people	187	17.8

As regards purchaser care indicators, the mean dispensing time was 2.53 minutes, the percentage of drugs adequately labelled was 17.4%, the percentage of drugs dispensed with oral instructions was 28.2% and the percentage of drugs actually dispensed was 100%.

Discussion

In the present study the rate of self-medication was high (81.1%), due partly to the lack of enforcement of the Egyptian law concerning drug products requiring a prescription to be sold OTC. Moreover, self-medication appears to be increasing compared to the pattern of drug supply from pharmacies in Alexandria in 1996 which showed that 72% of drugs in all therapeutic categories were dispensed without a prescription or advice from a pharmacist [9]. The findings of a study in south Brazil were consistent with the latter, where 76.1% of medicine users were self-medicated [14].

The educational level of the adult purchasers in the present study indicated that university graduates constituted 52.5%. Probably this educated group feels it has more ability to self-medicate. In India, Deshpande and Tiwari reported that

Table 5 Distribution of self-medication purchasers (n = 1050) at Alexandria pharmacies by knowledge and practice about the drug purchased

Knowledge/practice about drug purchased	No.	%
Knowledge of:		
<i>Dose</i>		
Yes	123	11.7
No	927	88.3
<i>Side-effects</i>		
Yes	15	1.4
No	975	92.9
Will read in information sheet	60	5.7
<i>Precautions</i>		
Yes	5	0.5
No	1005	95.7
Will read in information sheet	40	3.8
<i>Contraindications</i>		
Yes	8	0.8
No	1002	95.4
Will read in information sheet	40	3.8
Practice:		
<i>Expected duration of use</i>	40	3.8
Until complaint disappears	728	69.3
Until drug finishes	297	28.3
Adjusted by adviser	25	2.4
<i>Read patient information sheet</i>		
Yes	531	50.6
No	519	49.4
<i>Reasons for not reading information sheet</i>		
Difficult to read	177	34.0
Confidence in pharmacist	44	8.5
Difficult to understand	243	46.8
Written in English	18	3.5
No need to read it	37	7.2
<i>Followed pharmacist's label instructions</i>		
Yes	528	50.3
No	522	49.7
<i>Read expiry date</i>		
Yes	653	62.2
No	397	37.8

Table 6 Distribution of self-medication purchasers at Alexandria pharmacies by educational level and behaviour concerning purchased drugs

Purchasers' education level	Read patient information sheet		Followed pharmacist's label		Read drug expiry date	
	No.	%	No.	%	No.	%
Illiterate (<i>n</i> = 174)	11	6.3	23	13.2	33	19.0
Read and write/primary school (<i>n</i> = 212)	40	18.9	73	34.4	100	47.2
Preparatory/secondary school (<i>n</i> = 113)	42	37.2	45	39.8	70	61.9
University graduate (<i>n</i> = 551)	438	79.5	387	70.2	450	81.7
Total (<i>n</i> = 1050)	531	50.6	528	50.3	653	62.2
Significance	$\chi^2 = 414.0$; $P < 0.001$		$\chi^2 = 209.6$; $P < 0.001$		$\chi^2 = 247.5$; $P < 0.001$	

26% of graduates and 23.1% of illiterate people practised self-medication [15]. Another study in India in an urban slum community indicated that the practice of self-medication was more prevalent among literate people [16]. Among primary care patients in a clinic in Riyadh, literate patients also tended to self-medicate more than illiterate ones [17]. In Sri Lanka, it was suggested that literate people self-medicated far more than illiterate people [18]. In the present study 83.3% of self-prescribers were literate and 16.6% illiterate.

Pharmacists (22.0%) and to a less extent pharmacist assistants (1.9%) were a source of advice to purchasers in the present study. Pharmacists diagnosed certain conditions and prescribed a drug as a treatment. A quarter of the purchasers sought medication on their own initiative. A study on family use and understanding of modern medicine in 2 villages in rural Brazil indicated that the majority of medications were prescribed by pharmacist assistants or by the patients themselves [19]. Deshpande and Tiwari's study in India found that 30.8% purchased a particular medicine on advice from friends or neighbours [15].

The commonest reason given for self-medication was purchasers' belief that their

complaint was a minor problem, not requiring medical attention (44.5%). About one-third of the purchasers claimed that they knew the treatment from a previous prescription (31%), while 14.5% had confidence in the pharmacist. The study in Riyadh indicated that 58% of purchasers attempted self-medication due to the triviality of their symptoms or to save time and money [17]. In the slum community in India inability to pay for established medical facilities was the commonest motivation for self-medication (60.5%) [16].

Purchasers' knowledge relating to the purchased drug product was poor, although 77.2% had previously used the same product. A study in Alexandria investigating 4 different drug groups purchased without a prescription reported that 74% of the clients had used the product before [20]. The majority of the purchasers did not know the dose intended to be taken (88.3%), side-effects (92.9%), precautions (95.7%) and contraindications (95.4%). Other studies have identified clients' lack of information about drug products. Comparing the quality of service in pharmacies in Yugoslavia, patients' knowledge of the correct dosage ranged from 30% to 74% [21]. Research has demonstrated that individuals have

Table 7 Distribution of drugs purchased for self-medication at Alexandria pharmacies by drug group

Drug group	No.	%
Alimentary and metabolic system	351	30.4
Respiratory system	186	16.1
Musculoskeletal	127	11.0
Central nervous system	114	9.9
Cardiovascular system	113	9.8
Dermatological	73	6.3
Anti-infective, systemic	72	6.2
Genitourinary system	40	3.5
Sensory organ	34	2.9
Blood disorder	23	2.0
Antiparasitic	12	1.0
Systemic hormonal	7	0.6
Antineoplastic and immunological system	1	0.1
Total	1153	100.0

Table 8 Distribution of self-medication purchasers (n = 1050) at Alexandria pharmacies by dispensing procedure observed

Observed procedure	No.	%
<i>Patient asked advice</i>		
Yes	311	29.6
No	739	70.4
<i>Case history taken from patient</i>		
Yes	184	17.5
No	866	82.5
<i>Drug labelled</i>		
Yes	183	17.4
No	867	82.6
<i>Oral instructions given</i>		
Yes	296	28.2
No	754	71.8
<i>Medical referral made</i>		
Yes	65	6.2
No	985	93.8

their own ideas and beliefs about drug use, which are important determinants of their use [22–24].

Investigating self-medication and drug-taking behaviour revealed that most of the purchasers generally sought to self-medicate for minor problems (96%) while those who self-medicate for major problems were a minority (0.3%). A survey in Malaysia indicated a marked tendency among the general population to treat minor ailments by self-medication with OTC drugs [25].

Our findings about self-reported practices concerning purchased drugs suggest that purchasers make their own judgements and adjustments regarding adherence to medication regimens. Education appeared to be an important variable as the higher the purchasers' educational level, the more they complied with reading the patient information sheet, following the label instructions and reading the expiry date. In a community study in Spain, the instructions were read in only 48.6% of cases [26].

In the present study, the most frequent complaints were common cold (9.2%) and headache (7.4%). A survey of self-medication in eastern France stated that the 3 most frequent symptoms were headache (46.9%), nose, throat or respiratory tract diseases (22.1%) and abdominal pain (7.3%) [27]. Deshpande and Tiwari's study in India showed that cough (22.2%), fever (17.4%), boils (7.6%) and stomach acidity (6.8%) were the common complaints for self-prescription [16]. A telephone survey among 660 homes in Spain reported headache (42.8%), lumbago (41.7%) and colds (34.4%) as the most frequent symptoms. Self-medication, including physical and home remedies, was the most common response [28]. Products such as dipyrrone were requested by some purchasers. In many parts of the world dipyrrone is considered a dangerous drug and is no longer used, as fatalities were observed more than 60 years ago [29]. However, it continues to be marketed in some countries [30].

The mean number of drugs dispensed per encounter was 1.10 and the percentage of drugs actually dispensed was 100%. In the study in Yugoslavia the percentage of drugs actually dispensed was 29% to 63% [21]. A study on rational drug use in Ethiopia showed that most drugs in health centres (89%) and in health stations (71%) were actually dispensed, while the mean number of drugs per encounter was < 2.5 [31].

In the present study the mean cost of drugs per encounter was LE 7.29. A survey in 1995 in 3 outpatient facilities among 331 encounters in Ismailia governorate in Egypt reported that the mean drug cost was LE 8.40 and the percentage drugs actually dispensed was 54.0% [32].

In some drug utilization studies, such as this one, the parameters assessed were subjective, which is a limitation of such studies.

Conclusion

Several aspects of irrational drug use were found in this study, with a very high rate of self-medication and poor knowledge and practice concerning the purchased drugs. It is recommended that the dispensing procedure in Egypt needs improvement through educational, regulatory and managerial strategies.

References

1. Etminan M et al. Challenges and opportunities for pharmacoepidemiology in drug-therapy decision making. *Journal of clinical pharmacology*, 2006, 46(1):6–9.
2. Bazaldua O et al. Suggested guidelines for pharmacotherapy curricula in family medicine residency training: recommendations from the Society of Teachers of Family Medicine Group on Pharmacotherapy. *Family medicine*, 2005, 37(2):99–104.
3. Vacca C et al. Assessment of risks related to medicine dispensing by nonprofessionals in Colombia: clinical case simulations. *Annals of pharmacotherapy*, 2005, 39(3):527–32.
4. Guarlink DB, ed. *Webster's new world dictionary*. New Delhi, Bombay, Oxford, MBH Publishing Co, 1998.
5. Cranz H. Health economics and self medication. *Journal of social and administrative pharmacy*, 1990, 7:184–9.
6. Francis SA, Barnett N, Denham M. Switching of prescription drugs to over-the-counter status: is it a good thing for the elderly? *Drugs and aging*, 2005, 22(5):361–70.
7. Pagan JA et al. Self-medication and health insurance coverage in Mexico. *Health policy*, 2006, 75(2):170–7.
8. Chang FR, Trivedi PK. Economics of self-medication: theory and evidence. *Health economics*, 2003, 12(9):721–39.
9. Benjamin H, Smith F, Motawi A. Drugs dispensed with and without a prescription from community pharmacies in a conurbation in Egypt. *Eastern Mediterranean health journal*, 1996, 2:506–14.
10. *The world health report 1998. Life in the 21st century: vision for all*. Geneva, World Health Organization, 1998.
11. Ibrahim NK. *Drug utilization in respiratory and diarrheal diseases among children: an epidemiologic study* [MPH thesis]. Alexandria, High Institute for Public Health, University of Alexandria, 1995.
12. Fadel KA, Qayed MH. Self medication and care among university students, As-

- siut, Egypt 1996. *Bulletin of the High Institute of Public Health*, 1997, 27(1).
13. How to investigate drug use in health facilities. *Selected drug use indicators. Action program on essential drugs*. Geneva, World Health Organization, 1993 (WHO/DAP/93.1).
 14. Vilarino JF et al. Perfil da automedicação em municipio do Sul do Brasil [Self medication profile in a city of South Brazil]. *Revista de saúde pública*, 1998, 32(1):43–9.
 15. Deshpande SG, Tiwari R. Self medication: a growing concern. *Indian journal of medical science*, 1997, 51(3):93–6.
 16. Durgawale PM. Practice of self medication among slum-dwellers. *Indian journal of public health*, 1998, 42(2):53–5.
 17. Saeed AA. Self medication among primary care patients in Farazdak clinic in Riyadh. *Social science and medicine*, 1998, 27(3):287–9.
 18. Abosede OA. Self medication: an important aspect of primary health care. *Social science and medicine*, 1984, 19(7):699–703.
 19. Haak H. Pharmaceuticals in two Brazilian villages: lay practices and perception. *Social science and medicine*, 1988, 27(12):1415–27.
 20. Benjamin H, Smith F, Motawi A. Non-prescription products purchased from pharmacies in Alexandria. *Journal of social and administrative pharmacy*, 1998, 15(1):50–6.
 21. Janković SM et al. Service quality in public and private pharmacies in the city of Kragujevac, fr Yugoslavia. *Croatian medical journal*, 2001, 42(1):88–91.
 22. Michel JM. Why do people like medicines? A perspective from Africa. *Lancet*, 1985, 1(8422):210–11.
 23. Van der Geast S, Hardon A. Self medication in developing countries. *Journal of social administrative pharmacy*, 1990, 7(4):199–204.
 24. Davis P, ed. *For health or profit? Medicine, the pharmaceutical industry and the state in New Zealand*. Auckland, Oxford University Press, 1992.
 25. Ibrahim MI. Treating one's own ailments. *World health forum*, 1996, 17(4):409–10.
 26. Tejedor N et al. Trastornos comunes de salud: autocuidado y automedicación [Common health disorders: self-care and self-medication]. *Atencion primaria*, 1995, 16(1):13–8.
 27. Laure P. Enquête sur les usagers de l'automédication: de la maladie à la performance [Investigation on self medication: from disease to performance]. *Therapie*, 1998, 53(2):127–35.
 28. Nebot M, Llauger MA. Autocuidado de los trastornos comunes de salud: resultados de una encuesta telefónica en la población general [Self care of common health disorders: results of a telephone survey of the general population]. *Medicina clinica*, 1992, 99(11):420–4.
 29. Simpson RG. Aminopyrine and agranulocytosis. *British medical journal*, 1963, 1(5334):887.
 30. Hugueley CM. Agranulocytosis induced by dipyrone, a hazardous antipyretic and analgesic. *Journal of the American Medical Association*, 1964, 189(12):938–41.
 31. Desta Z et al. Assessment of rational drug use and prescribing in primary health care facilities in North West Ethiopia. *East African medical journal*, 1997, 74(12):758–63.
 32. Khedr MS. *Evaluation of rational drug prescribing in out patient facilities in Ismailia, Egypt*. Paper presented at the IEA Eastern Mediterranean Regional Meeting, Alexandria, Egypt, 1–4 September, 1995.

Skin manifestations of chronic hepatitis C virus infection in Cairo, Egypt

H.M.Z. Raslan,¹ W.M. Ezzat,¹ M.F. Abd El Hamid,² H. Emam² and K.S. Amre³

المظاهر الجلدية للعدوى بفيروس التهاب الكبد سي المزمن في القاهرة، مصر
هالة محمد رسلان، وفاء محمد عزت، محمود فوزي عبد الحميد، هناء محمد إمام، خالدة سيد عمرو

الخلاصة: قَيَّم الباحثون المظاهر الجلدية للعدوى بفيروس التهاب الكبد سي المزمن وارتباطها بحالة الكبد؛ ووجدوا لدى دراسة 155 مريضاً مصاباً بذلك في القاهرة، بمصر أن 71 مريضاً (45.8%) لديهم مظاهر جلدية، هي: الحكة دون أذيات جلدية واضحة 21.3%، اندفاعات فرغرية مصطبغة 5.2%، وقرحات قلاعية وحزاز مسطح 3.9%، والتهاب أوعية بتكسر الكريات البيض 2.6%، وصدفية 1.9%، وتينية مبرقشة 1.3%، وحالات أخرى 5.8%. فيما ترافق الكبد الضامر وضخامة الطحال والاستسقاء بشكل يُعتدَّ به إحصائياً مع وجود الأذيات الجلدية، فكان الاختطار النسبي لها في الكبد الضامر 8.0 وفي ضخامة الطحال 2.7 وفي الاستسقاء 1.8؛ كما ارتبط ضمور الكبد ارتباطاً يُعتدَّ به إحصائياً مع الحكة وكان الاختطار النسبي 2.1، ولم يكن هناك أي ارتباط للجنس مع أي من الأذيات الجلدية.

ABSTRACT We assessed the dermatological manifestations associated with chronic hepatitis C virus (HCV) infection and their association with liver status. Of 155 patients with chronic HCV infection in Cairo, Egypt, 71 (45.8%) had dermatological manifestations: pruritus without evident skin lesions (21.3%), pigmented purpuric eruption (5.2%), aphthous ulcer and lichen planus (3.9% each), leukocytoclastic vasculitis (2.6%), psoriasis (1.9%), tinea versicolor (1.3%) and other conditions (5.8%). Shrunken liver, splenomegaly and ascites were significantly associated with the presence of skin lesions (relative risk 8.0, 2.7 and 1.8 respectively), and shrunken liver was significantly associated with pruritus (relative risk 2.1). Sex was not associated with any of the skin lesions.

Manifestations cutanées de l'infection chronique par le virus de l'hépatite C au Caire (Égypte)

RÉSUMÉ Nous avons passé en revue les manifestations dermatologiques liées à l'infection chronique par le virus de l'hépatite C (VHC) et leur rapport avec l'état hépatique. Sur 155 patients atteints de cette infection au Caire (Égypte), 71 (45,8 %) présentaient des manifestations dermatologiques : prurit sans lésions cutanées évidentes (21,3 %), éruption purpurique pigmentée (5,2 %), ulcère aphteux et lichen plan (3,9 % chacun), vascularite leucocytoclasique (2,6 %), psoriasis (1,9 %), pityriasis versicolor (1,3 %) et autres affections (5,8 %). L'atrophie hépatique, la splénomégalie et l'ascite étaient significativement associées à la présence de lésions cutanées (risque relatif : respectivement 8,0, 2,7 et 1,8) et l'atrophie hépatique seule était significativement associée au prurit (risque relatif : 2,1). Le sexe n'était associé à aucune des lésions cutanées.

¹Department of Internal Medicine; ²Department of Dermatology and Venereology Research; ³Department of Medical Molecular Genetics, National Research Centre, Cairo, Egypt (Correspondence to W.M. Ezzat: wafaa_3t@yahoo.com).

Received: 14/08/06; accepted: 16/11/06

Introduction

Hepatitis C virus (HCV) infection is often asymptomatic, but numerous extrahepatic disorders, especially dermatological diseases, have been recognized in association with HCV infection [1–8]. Cutaneous lesions are a major presenting feature in some patients with HCV infection and can lead to the discovery of occult HCV infection [8]. The skin diseases frequently associated with HCV include cutaneous necrotizing vasculitis, mixed cryoglobulinaemia, porphyria cutanea tarda and lichen planus, but other skin disorders, such as pruritus, urticaria, erythema multiforme and nodosum, may also be linked to HCV [2]. The prevalence of skin manifestations varies from one geographic area to another, probably due to differences in viral, genetic or environmental factors [3].

In most cases, the pathogenesis of these disorders remains uncertain. Replication of the virus in lymphoid cells may cause extrahepatic manifestations. Another theory suggests that circulating immune complexes composed of HCV antigens and antibodies deposit in tissues and initiate an inflammatory cascade. Other possible mechanisms are local formation of immune complexes induced by viral antigens, or a local tissue inflammation induced by autoantibodies reacting with tissue antigens [4].

The aim of this study in Egypt was to detect the dermatological manifestations associated with chronic HCV infection and their association with liver status.

Methods

Sample

The study was conducted on all 155 patients with chronic HCV infection attending the Medical Services Unit of the National Research Centre, Cairo, Egypt from June 2005

to March 2006. Patients with coexisting liver disease (due to hepatitis B, autoimmune disease or alcohol abuse), diabetes mellitus, renal impairment or malignancy and those who were receiving treatment with antivirals and/or immunomodulatory agents were excluded from the study. Informed consent was obtained from every patient and the study was approved by the ethical committee of the National Research Centre.

HCV was diagnosed by: elevated alanine transaminase (ALT) level greater than twice the upper limit of normal for more than 6 months duration; and positive anti-HCV antibodies detected using IgG 3rd-generation commercial enzyme-linked immunosorbent assay (ELISA kit, Sorin Biomedical, Italy).

Data collection

All patients were examined clinically by a hepatologist, internist and dermatologist. The clinical examination included general examinations such as patient's mental state, build, pulse rate, respiratory rate, body temperature, blood pressure, and noting signs of liver cell failure such as pallor, jaundice, palmar erythema, fetor hepaticus and flapping tremor. Chest and heart examinations were done. Abdominal examination was done to detect cases of enlarged liver or spleen and presence of ascites as complications of liver cirrhosis. Abdominal ultrasound was available for only 84 patients as the other patients did not return for the appointment.

All patients had the following investigations (reference values): red blood cells (for males: $4.5\text{--}6.4 \times 10^3/\text{cm}^3$; for females: $3.8\text{--}5.6 \times 10^3/\text{cm}^3$); haemoglobin (males: 13–18 g/dL; females: 11.5–16.5 g/dL); total leukocyte count ($4\text{--}11 \times 10^3/\text{cm}^3$); platelets count ($150\text{--}400 \times 10^3/\text{cm}^3$), fasting blood sugar (70–115 mg/dL), ALT (0–35 IU/mL), aspartate aminotransferase (AST) (0–45 IU/mL), total serum bilirubin (0.2–1 mg/dL),

albumin (3.5–5.2 g/dL), prothrombin concentration (75%–100%) and schistosomal antibody. Previous *Schistosoma* infection was documented by history and schistosomal antibody in the serum $\geq 1/32$ U/L.

Due to cost constraints HCV-RNA by polymerase chain reaction (PCR) was done for only 115 patients and was positive for all of them. Peripheral blood cell isolation, RNA extraction and reverse-transcription nested PCR was carried out as described by El Awady et al. [5].

Statistical analysis

Data are presented as mean and standard deviation (SD) and percentage. The data were analysed by *Epi-Info*, version 6.2, and by *SPSS PC+*, version 7.5. The following tests of significance were used: analysis of variance (ANOVA) test between more than 2 means, *t*-test between means to analyse differences between means and *t*-test between percentages to analyse percentage difference. Relative risk (RR) and 95% confidence intervals (CI) were calculated to determine the risk and incidence of occurrence of the clinical and laboratory parameters. $P < 0.05$ was considered significant.

Results

The study sample comprised 155 patients; 104 men and 51 women, age range 27–75 years [mean 46.95 (SD 11.13) years].

Biochemical profile of patients with and without dermatological manifestations

Dermatological examination of all 155 patients with HCV revealed that 71 (45.8%) had dermatological manifestations. The most common was pruritus, with no evident skin lesions, in 33 patients (21.3% of the total; 46.5% of skin manifestations). Evident dermatological lesions were present in 38

patients (24.5% of the total; 53.5% of skin manifestations); these were in the form of pigmented purpuric eruption in 8 patients (5.2%); aphthous ulcer and lichen planus in 6 patients each (3.9%); leukocytoclastic vasculitis in 4 patients (2.6%); psoriasis in 3 patients (1.9%); tinea versicolor in 2 patients (1.3%); vasculitis, melasma, localized neurodermatitis, pseudofolliculitis, pityriasis rosea, chronic eczema, urticaria, scabies and stasis eczema were present in 1 patient each (0.6%). No patient had more than 1 lesion.

Table 1 shows the difference in biochemical tests and viral load between the patients with pruritus, patients with evident skin lesions other than pruritus and patients free of skin lesions. *Schistosoma* infection was detected in 45 patients. Although the mean values of serum bilirubin and AST were highest among HCV patients with evident skin manifestations other than pruritus, these differences were not significant. Mean values of serum albumin and prothrombin concentration were lowest among HCV patients with evident skin manifestations other than pruritus, but again this was not significant.

Association of clinical signs with dermatological manifestations

Abdominal ultrasound of 84 patients revealed that 11 patients had normal-sized "bright" liver, 47 had hepatomegaly and 26 had shrunken liver. There were 46 patients diagnosed with splenomegaly and 36 with normal size spleen (2 had had a splenectomy). Ascites was present in 11 patients and absent in 73.

Risk analysis among this subgroup of patients showed that among those free of dermatological manifestations, shrunken liver, splenomegaly and ascites were significantly associated with skin lesions (RR 8.0, 95% CI: 1.2–50.9; RR 2.7, 95% CI: 1.4–5.3;

Table 1 Biochemical tests and viral load in patients with chronic hepatitis C virus (HCV) infection with pruritus, evident skin manifestations other than pruritus and without skin manifestations

Test	HCV patients with pruritus (n = 33)	HCV patients with evident skin manifestations other than pruritus (n = 38)	HCV patients without skin manifestations (n = 84)	P-value
	Mean (SD)	Mean (SD)	Mean (SD)	
Serum bilirubin (mg/dL)	0.94 (0.44)	1.18 (0.73)	1.14 (0.66)	0.76
ALT (IU/L)	52.91 (45.64)	51.58 (26.05)	53.80 (38.51)	0.98
AST (IU/L)	64.64 (41.4)	74.54 (41.57)	59.32 (34.84)	0.45
Serum albumin (g/dL)	3.86 (0.62)	3.71 (0.65)	3.85 (0.66)	0.87
Prothrombin concentration ^a (%)	72.25 (16.56)	69.17 (25.70)	83.75 (14.12)	0.09
Viral load ^b (copies/mL)	217.5 (77.5)	368.6 (342.7)	295.9 (230.5)	0.46

^aAs a percentage of prothrombin time compared to pooled plasma from healthy controls.

^bViral load was only established for 115 patients.

SD = standard deviation; ALT = alanine transaminase; AST = aspartate aminotransferase.

and RR 1.8, 95% CI: 1.2–2.9 respectively) (Table 2). There was no sex predilection for the dermatological manifestations. There were no differences with regard to the risk of developing dermatological manifestations between patients with and without

schistosomiasis. There was no significant difference as regards liver biochemical tests or viral load between patients with and without dermatological manifestations

Patients with shrunken liver had significantly higher risk of pruritus than those with

Table 2 Association of liver abnormalities, spleen abnormalities and ascites with skin manifestations in patients with chronic hepatitis C virus (HCV) infection

Variable	HCV patients with skin manifestations (n = 37)		HCV patients without skin manifestations (n = 47) ^a		RR	95% CI	P-value
	No.	%	No.	%			
Liver							
Normal size	1	2.7	10	21.3			
Hepatomegaly	17	45.9	30	63.8	4.0	0.6–26.8	0.14
Shrunken	19	51.4	7	14.9	8.0	1.2–50.9	0.0004
Spleen							
Normal size	8	21.6	28	59.6			
Splenomegaly	28	75.7	18	38.3	2.7	1.4–5.3	0.0005
Ascites							
Absent	29	78.4	44	93.6			
Present	8	21.6	3	6.4	1.8	1.2–2.9	0.005

^a1 patient without skin manifestations had had a splenectomy.

RR = relative risk; CI = confidence interval.

hepatomegaly (RR 2.1, 95% CI: 1.2–3.9). Splenomegaly was significantly associated with pruritus (RR 3.3, 95% CI: 1.4–7.9), but the association of ascites with pruritus was not significant (RR 1.6, 95% CI: 0.7–3.9) (Table 3). Males had nearly 2 times greater risk of pruritus than females, but the association was not significant (RR 1.8, 95% CI: 0.8–4.1). There was no significant difference in the mean level of serum bilirubin between patients with pruritus [mean 0.94 (SD 0.44) mg/dL] and patients free from skin lesions [mean 1.14 (SD 0.66) mg/dL].

There was no significant association of hepatomegaly with evident dermatological lesions other than pruritus compared with patients without skin manifestations (RR 1.6, 95% CI: 0.2–12.1). However, shrunken liver was significantly associated with evident dermatological lesions other than pruritus (RR 5.9, 95% CI: 0.9–40.3). Splenomegaly and ascites had nearly 4 times the risk of skin manifestations (RR 3.7, 95% CI: 1.1–12.1 and RR 3.7, 95% CI: 1.7–8.2 respectively) (Table 4).

Discussion

Chronic HCV infection is associated with various dermatological manifestations [1,9]. Paoletti et al. reported a 12.5% prevalence of clinical dermatoses in HCV-infected patients [10]. We found skin manifestations in 45.8% of HCV-infected patients. The rates in our study are higher than in other studies, probably owing to the different HCV genotype in our population; distribution of HCV genotypes varies according to region [11].

Pruritus with no evident skin lesions was the most prevalent skin manifestation in our study, and there was a significant positive association of hepatomegaly, shrunken liver or splenomegaly with pruritus. The RR of pruritus was higher in patients with shrunken liver compared with patients with hepatomegaly, and in patients with splenomegaly compared with patients with normal size spleen. Our result agrees with Cacoub et al., who reported pruritus in 15% of cases of HCV and concluded that it is one of the most common extrahepatic manifes-

Table 3 Association of liver and spleen abnormalities and ascites with pruritus in patients with chronic hepatitis C virus (HCV) infection

Variable	HCV patients with pruritus (n = 23)		HCV patients without skin manifestations (n = 47) ^a		RR	95% CI	P-value
	No.	%	No.	%			
<i>Liver</i>							
Normal size	0	0.0	10	21.3			
Hepatomegaly	12	52.2	30	63.8			
Shrunken	11	47.8	7	14.9	2.1	1.2–3.9	0.001
<i>Spleen</i>							
Normal size	5	21.7	28	59.6			
Splenomegaly	18	78.3	18	38.3	3.3	1.4–7.9	0.002
<i>Ascites</i>							
Absent	20	87.0	44	93.6			
Present	3	13.0	3	6.4	1.6	0.7–3.9	0.38

^a1 patient without skin manifestations had had a splenectomy.

RR = relative risk; CI = confidence interval.

Table 4 Association of liver abnormalities, spleen abnormalities and ascites with evident skin manifestations in patients with chronic hepatitis C virus (HCV) infection

Variable	HCV patients with evident skin manifestations other than pruritus (n = 14)		HCV patients without skin manifestations (n = 47)*		RR	95% CI	P-value
	No.	%	No.	%			
<i>Liver</i>							
Normal size	1	7.1	10	21.3			
Hepatomegaly	5	35.7	30	63.8	1.6	0.2–12.1	0.99
Shrunken	8	57.1	7	14.9	5.9	0.9–40.3	0.03
<i>Spleen</i>							
Normal size	3	21.4	28	59.6			
Splenomegaly	10	71.4	18	38.3	3.7	1.1–12.1	0.01
<i>Ascites</i>							
Absent	9	64.3	44	93.6			
Present	5	35.7	3	6.4	3.7	1.7–8.2	0.01

*1 patient without skin manifestations had had a splenectomy.

RR = relative risk; CI = confidence interval.

tations of HCV infection [7]. In contrast, Paoletti et al. found pruritus in only about 1% of HCV-infected patients [10]. The precise mechanism of itch in liver diseases remains unclear, although the presence of bile salts in the skin, histamine and alternative liver metabolites have been proposed as explanations [12].

Pigmented purpura (Gougerot–Blum disease) in the form of lichenoid papules in association with brown pigmented lesions is a sign of capillaritis in HCV-infected patients [13]. We found pigmented purpuric eruption in 5.2% of our patients. The histopathology of this type of capillaritis reveals narrowing of the lumen with perivascular T-lymphocytic infiltrate, suggesting a cell-mediated immune reaction [14].

Our data revealed lichen planus in 3.9% of HCV-infected patients. The prevalence of HCV infection in patients with lichen planus shows wide variation from 3.8% in France [15] to 62% in Japan [16]. This variation is probably due to genetic dif-

ferences in different geographic regions. Although the etiology of HCV-induced lichen planus is unknown, it is probably related to viral replication in lymphocytes [1]. The coexistence of the 2 conditions is more than coincidental, and it is appropriate to screen all patients with lichen planus for HCV infection [17].

Leukocytoclastic vasculitis was found in 2.6% of our patients, which is consistent with the finding of Hartmann et al. who reported leukocytoclastic vasculitis of the skin in 2% of HCV-infected patients [18]. They suggested that immune stimulation of T-cell clones in HCV infection produces monoclonal macroglobulins with coaffinity to a constituent of HCV and IgG. Potential antigens of relevance include bacteria, viruses, drugs and other chemicals. Immune complexes have a role in HBV- and HCV-induced vasculitis and in cryoglobulinaemic vasculitis [19].

Psoriasis affected 1.9% of our patients. Taglione et al. described HCV-infected

patients with psoriasis [20]. Both genetic and environmental influences have a critical role in psoriasis. The environmental risk factors include trauma, infection, medicines and immunological factors. There is considerable evidence that T-lymphocytes have an important role in the development of psoriasis [21].

Our data showed urticaria among 0.6% of patients with HCV infection. The prevalence of chronic urticaria varies from 1% to 5% in the general population [22]. Doutre et al. described acute and chronic urticaria in various skin diseases with HCV infection [23]. However Cribier et al. showed that, at least in Europe, HCV rates in cases of chronic urticaria are similar to those of the general population [24]. In patients with HCV, urticaria tends to last longer than the typical few hours, is associated with worse liver status and leaves a brown stain [25].

Several studies reported an association between HCV and porphyria cutanea tarda. In a systematic review, the mean prevalence of HCV infection calculated from 2167 patients from 50 studies was 47% [26]. However, we did not observe any case of porphyria cutanea tarda in our HCV patients. Porphyria cutanea tarda is the most common form of porphyria and is caused by reduced activity of uroporphyrinogen decarboxylase. The enzymatic defect is essential but not sufficient for the clinical manifestations [27]. Recently, mutations in the gene associated with hereditary haemo-

chromatosis have been associated with sporadic and familial porphyria cutanea tarda, suggesting that inheritance of haemochromatosis alleles may be a susceptible factor for the development of the disease [28]. This may explain the absence of porphyria cutanea tarda in our patients.

Other dermatologic lesions—aphthous ulcer, tinea versicolor, scabies, melasma, localized neurodermatitis, pseudofolliculitis, pityriasis rosea, eczema and stasis eczema—were each present in 1 patient in our study. We did not find any correlation between these lesions and chronic HCV in other studies, so we do not know if this is a chance association or if HCV may predispose to these lesions. Further studies with a larger number of HCV patients are recommended to evaluate the relationship.

Conclusion

HCV is associated with various dermatological disorders and patients with liver cirrhosis are at higher risk of developing lesions. In those with pruritus, HCV infection should be sought routinely as it is the most common dermatological manifestation in infected patients and the risk of development occurs early in the course of the disease. Epidemiological studies are essential to determine the real prevalence of other dermatoses in the course of HCV infection.

References

1. Jackson JM. Hepatitis C and the skin. *Dermatologic clinics*, 2002, 20:449–58.
2. Hadziyannis SJ. Skin diseases associated with hepatitis C virus infection. *Journal of the European Academy of Dermatology and Venereology*, 1998, 10(1):12–21.
3. Bonkovsky H, Mehta S. Hepatitis C: a review and update. *Journal of the American Academy of Dermatology*, 2001;44:159–79.
4. Maticic M. Hepatitis C virus infection: the dermatological perspective. *Acta der-*

- matovenerologica Alpina, Panonica, et Adriatica*, 2003, 12:19–27.
5. El Awady MK et al. Assay of viral replication in peripheral blood mononuclear cells enhances sensitivity of diagnosis and monitoring of HCV associated hepatitis. *Clinica chimica acta*, 1999, 283:1–14.
 6. Sene D, Limal L, Cacoub P. Hepatitis C virus associated extrahepatic manifestations: a review. *Metabolic brain disease*, 2004, 19(34):357–81.
 7. Cacoub P et al. Extrahepatic manifestations of chronic hepatitis C. *Arthritis and rheumatism*, 1999, 42 (10):2204–12.
 8. Dupin N et al. Essential mixed cryoglobulinemia: a comparative study of dermatologic manifestations in patients infected or noninfected with hepatitis C virus. *Archives of dermatology*, 1995, 131:1124–7.
 9. Kurokawa MH et al. Analysis of hepatitis C virus (HCV) RNA in the lesions of lichen planus in patients with chronic hepatitis C: detection of anti-genomic as well as genomic-strand HCV RNAs in lichen planus lesions. *Journal of dermatological science*, 2003, 32:65–70.
 10. Paoletti V et al. Prevalence and clinical features of skin diseases in chronic HCV infection. A prospective study in 96 patients. *Panminerva medica*, 2002, 44:349–52.
 11. Pawlotsky JM et al. Extrahepatic immunologic manifestations in chronic hepatitis C and hepatitis C virus serotypes. *Annals of internal medicine*, 1995, 122:169–73.
 12. Ghent CN. Cholestatic pruritus. In: Bernhard JD, ed. *Itch: mechanisms and management of pruritus*. New York, McGraw-Hill, 1994:229–42.
 13. Chima N et al. Gougerot-Blum disease as a manifestation of hepatitis C infection. *Journal of cutaneous pathology*, 2000, 27:569.
 14. Ghersetich I et al. Cell infiltrate in progressive pigmented purpura (Schamberg's disease): immunophenotype, adhesion receptors, and intercellular relationships. *International journal of dermatology*, 1995, 34:846–50.
 15. Cribier B et al. Lichen planus and hepatitis C virus infection. An epidemiologic study. *Journal of the American Academy of Dermatology*, 1994, 31:1070–2.
 16. Nagao Y et al. Lichen planus and hepatitis C virus in the northern Kyushu region of Japan. *European journal of clinical investigation*, 1995, 25:910–4.
 17. Harman M et al. Lichen planus and hepatitis C virus infection: an epidemiologic study. *International journal of clinical practice*, 2004, 58:1118–9.
 18. Hartmann H et al. Cryoglobulinemia in chronic hepatitis C virus infection: prevalence clinical response to interferon treatment and analysis of cryoprecipitates. *Zeitschrift für Gastroenterologie*, 1995, 33(11):643–50.
 19. Barham KL et al. Vasculitis and neutrophilic vascular reactions. In: Burns T et al., eds. *Rook's textbook of dermatology*, 7th ed. Massachusetts, Blackwell Science, 2004:49–51.
 20. Taglione E et al. Hepatitis C virus infection. Prevalence in psoriasis and psoriatic arthritis. *Journal of rheumatology*, 1999, 26:370–2.
 21. Griffiths CE, Camp RD, Barker JN. Psoriasis. In: Burns T et al., eds. *Rook's textbook of dermatology*, 7th ed. Massachusetts, Blackwell Science, 2004:35.
 22. Schafer T, Ring J. Epidemiology of urticaria. *Monographs in allergy*, 1993, 31:49–60.
 23. Doutre MS, Beylot-Marry M, Beylot C. Urticaria and hepatitis C infection. *British journal of dermatology*, 1998, 138: 194–5.

24. Cribier BJ et al. Chronic urticaria is not significantly associated with hepatitis C or hepatitis G infection: a case-control study. *Archives of dermatology*, 1999, 135:1335-9.
25. Hamid S, Cruz P, Lee W. Urticarial vasculitis caused by hepatitis C virus infection: response to interferon alfa therapy. *Journal of the American Academy of Dermatology*, 1998, 39(2 Pt 1):278-80.
26. Gisbert JP et al. Prevalence of hepatitis C virus infection in porphyria cutanea tarda: systematic review and meta-analysis. *Journal of hepatology*, 2003, 39:620-7.
27. Bulaj Z et al. Hemochromatosis genes and other factors contributing to the pathogenesis of porphyria cutanea tarda. *Blood*, 2000, 95(5):1565-71.
28. Roberts AG, Wathely SD, Morgan RR. Increased frequency of the haemochromatosis Cys 282 tyr mutation in sporadic porphyria cutanea tarda. *Lancet*, 1997, 349:321-3.

Hepatitis C

Hepatitis C virus (HCV) is a major cause of acute hepatitis and chronic liver disease, including cirrhosis and liver cancer. Globally, an estimated 170 million persons are chronically infected with HCV and 3 to 4 million persons are newly infected each year. HCV is spread primarily by direct contact with human blood. The major causes of HCV infection worldwide are use of unscreened blood transfusions, and re-use of needles and syringes that have not been adequately sterilized.

No vaccine is currently available to prevent hepatitis C and treatment for chronic hepatitis C is too costly for most persons in developing countries to afford. Thus, from a global perspective, the greatest impact on hepatitis C disease burden will likely be achieved by focusing efforts on reducing the risk of HCV transmission from nosocomial exposures (e.g. blood transfusions, unsafe injection practices) and high-risk behaviours (e.g. injection drug use).

Source: WHO Fact sheet No. 164

Lupus et virus d'Epstein-Barr

I. Tazi,¹ S. Fehri,¹ K. Elghrari,² T. Ouazzani² et N. Benchemsi¹

الذئبة الحمامية الجهازية وفيروس ابشتين بار
إلياس التازي، سهام فهري، كوثر الغراري، طام وزاني، نفيسة بنشمسي

الخلاصة: قام الباحثون بالتعرف على معدل انتشار أضداد فيروس ابشتين - بار لدى 44 مريضاً بالذئبة الحمامية الجهازية ولدى 44 من المتبرعين بالدم الأصحاء الذين يضاؤون المرضى من حيث العمر والجنس، كشواهد منهم 39 امرأة، وكان العمر الوسطي 33 سنة، وكانت 4 حالات (9%) و5 شواهد (11%) إيجابية للأضداد من الأيغ م (الغلوبيولين المناعي M) المضادة للمستضد بقبضه الفيروس (قوة الاحتمال: 0.9). وكانت جميع الحالات إيجابية للأضداد المضادة إيج جي (الغلولين المناعي G) بالمقارنة مع 91% لدى الشواهد (قوة الاحتمال 0.12). وكانت النسبة الوسطية للمناعة لهذه الأضداد 2.341 في الحالات و1.873 في الشواهد (قوة الاحتمال 0.068). وكانت حالة إيجابية (91%) للإيغ جي. للمستضدات النووية EB مقارنة بـ 42 من الشواهد (95%) (قوة الاحتمال = 0.6).

RÉSUMÉ Nous avons déterminé la prévalence des anticorps anti-virus Epstein-Barr (EBV) chez 44 patients atteints de lupus érythémateux disséminé et 44 sujets témoins choisis parmi des donneurs de sang sains du même sexe et du même âge. Sur les 44 patients étudiés, 39 étaient de sexe féminin. La moyenne d'âge était de 33 ans. Quatre patients lupiques (9 %) contre 5 sujets sains (11 %) étaient positifs pour l'IgM anti-VCA (antigène de capsid du virus) ($p = 0,9$). Tous les lupiques ont positivé l'IgG anti-VCA contre 91 % des sujets témoins ($p = 0,12$). La moyenne de l'ISR pour cet anticorps était de 2,341 chez les lupiques et de 1,873 chez les témoins ($p = 0,068$). Les anticorps IgG dirigés contre l'antigène nucléaire-1 (EBNA-1) de l'EBV étaient positifs chez 40 patients lupiques (91 %) contre 42 (95 %) patients sains ($p = 0,6$).

Systemic lupus erythematosus and Epstein-Barr virus

ABSTRACT We determined the prevalence of antibodies to Epstein-Barr virus (EBV) in 44 patients with systemic lupus erythematosus (SLE) and 44 healthy blood donors matched for sex and age as controls. Of the cases, 39 were women; mean age was 33 years. Four cases (9%) and 5 controls (11%) were positive for IgM anti-viral capsid antigen (VCA) ($P = 0.9$). All the cases were positive for IgG anti-VCA compared with 91% of the controls ($P = 0.12$). The mean immunity ratio for this antibody was 2.341 in cases and 1.873 in controls ($P = 0.068$). Forty (91%) cases were positive for IgG anti-EBNA1 (EB nuclear antigen1) compared with 42 (95%) controls ($P = 0.6$).

¹Laboratoire d'Hématologie, CHU Ibn Rochd, Casablanca (Maroc) (Correspondance à adresser à I. Tazi : Tazi_illias@hotmail.com).

²Service de Dermatologie, CHU Ibn Rochd, Casablanca (Maroc).

Reçu : 01/09/07 ; accepté : 31/12/07

Introduction

Le lupus érythémateux disséminé (LED) est une maladie auto-immune non spécifique d'organe, d'étiologie inconnue, qui touche essentiellement la femme jeune [1].

Son déterminisme fait intervenir des facteurs endocriniens, environnementaux et génétiques dont l'importance relative reste à déterminer. La conjonction de ces facteurs aboutit, par l'intermédiaire de mécanismes non encore élucidés, à la perte de tolérance au soi qui se traduit par une hyperactivation polyclonale B et la production de nombreux auto-anticorps, dont certains ont un rôle pathogène direct [2,3].

La maladie lupique est certainement multifactorielle ; parmi les facteurs environnementaux, les virus semblent jouer un rôle [4].

Diverses études ont soutenu l'hypothèse que l'infection par le virus d'Epstein-Barr (EBV) pouvait déclencher un LED, si le patient est génétiquement susceptible (on considère que plus de 100 gènes pourraient être incriminés dans le déterminisme génétique du lupus) [5]. La probabilité de l'implication de ce virus dans la pathogénie du LED a été renforcée par l'observation d'un titre élevé d'anticorps anti-EBV chez les patients atteints de LED.

Aucune étude jusqu'à présent n'a démontré clairement la relation entre ces deux situations pathologiques. Bien que celle-ci ait été démontrée par quelques auteurs, elle a été critiquée par d'autres [6].

Il nous a donc paru intéressant de mener une étude dans ce sens dont le but est de déterminer la prévalence des anticorps anti-EBV chez les malades atteints de lupus.

Méthodes

Patients

Quarante-quatre (44) patients atteints de LED suivis dans le service de dermatologie

du CHU Ibn Rochd de Casablanca ont été choisis de façon arbitraire, indépendamment de l'âge, du sexe, du type de lupus ou de la durée d'évolution.

Tous les patients ont au minimum quatre critères de l'Association des Rhumatologues américains (*American College of Rheumatology* - ACR) affirmant le diagnostic de LED [7].

Une fiche de renseignements cliniques, biologiques, thérapeutiques et évolutifs a été établie pour chaque patient.

Trente-neuf (39) malades sont de sexe féminin et 5 de sexe masculin, soit un sex-ratio femme/homme de 7,8/1. L'âge moyen de ces patients est de 33 ans avec des extrêmes de 19 ans et 55 ans. Trente-cinq (35 patients (79 %) sont d'origine rurale, 9 patients (21 %) d'origine urbaine. Deux patients (4 %) avaient un parent de premier degré porteur d'un lupus.

Vingt-quatre (24) malades (soit 54 %) ont un lupus érythémateux aigu disséminé, 19 (44 %) un lupus chronique et 1 un lupus subaigu.

Un facteur déclenchant est noté dans 15 cas (exposition solaire : 7 ; infection virale : 6 ; infection bactérienne : 2) ; aucun cas de lupus induit n'a été colligé.

Le rash malaire et les arthralgies sont les manifestations cliniques les plus fréquentes, notées dans 68 % des cas. Une glomérulonéphrite lupique a été notée chez 30 % des malades. Les complications hématologiques sont fréquentes : 29 patients (67 %) ont développé une anémie, 18 (42 %) ont une leucopénie. Trois patients (7 %) ont eu des manifestations cliniques du syndrome des anticorps antiphospholipides (SAPL).

Par ailleurs, 95 % des patients ont des anticorps antinucléaires. Les anticorps anti-ADN natif sont présents chez 58 % des malades, les anticorps anti-Sm (antigène Smith) chez 13 %. Les aCL (anticorps anticardioplipines) sont notés chez un patient

parmi les trois malades qui ont fait des manifestations thrombotiques. La recherche de cellules LE (*Lupus erythematosus*) a été positive seulement dans 1 cas.

Le traitement a comporté de la chloroquine dans 27 cas (62 %), des corticoïdes pour 37 malades (85 %) à raison de 1mg/kg/j durant 25 mois en moyenne avec un recours aux bolus (1g/j x 3 j) dans 8 cas (18 %). Les corticoïdes ont été associés au cyclophosphamide (700 mg/mois en IV) dans 3 cas (7 %). La thalidomide a été prescrite dans 3 cas (7 %).

L'évolution sous traitement a été jugée bonne dans 35 % des cas ; 65 % des patients ont présenté une complication.

L'étude de la prévalence des anticorps anti-EBV est faite chez 44 donneurs de sang en bonne santé – 39 femmes et 5 hommes âgés de 19 à 55 ans qui constituent le groupe témoin (le groupe des malades et le groupe des témoins ont été choisis similaires en ce qui concerne l'âge, le sexe et l'origine urbaine ou rurale).

Méthodes

Principe de dépistage des anticorps anti-EBV

Le principe de la trousse ELISA Microplaques repose sur la capacité des substances biologiques, en l'occurrence des antigènes, à s'adsorber sur les surfaces en plastique telles que le polystyrène (phase solide). Les coffrets utilisés dans cette étude se basent sur la technique ELISA et utilisent des antigènes EBV-VCA purifiés fixés sur la phase solide.

Lors de la 1^{re} étape de la réaction, ces antigènes, fixés au fond des puits de la microplaque, sont mis au contact avec le sérum du patient. Les anticorps spécifiques de ces antigènes, s'ils sont présents, se lient pour former des complexes antigène-anticorps. À la fin de l'incubation, l'excès d'anticorps et les protéines du sérum sont

éliminés par lavage. Lors de la 2^e étape de la réaction, le conjugué est ajouté et se lie spécifiquement aux complexes anticorps-antigènes présents. À la fin de l'incubation, le conjugué est éliminé par lavage. Après addition de substrat tétraméthylbenzidine, la réaction est arrêtée par une solution d'acide (H_2SO_4 1N). L'intensité de la couleur obtenue, proportionnelle à la concentration d'anticorps dans le sérum, peut être lue sur un spectrophotomètre.

Technique

Les 88 échantillons sériques provenant des deux groupes – 44 patients atteints de LED et 44 donneurs de sang – ont été testés avec les réactifs Platelia® EBV-VCA-IgM, Platelia®EBV-VCA-IgG et Platelia®EBV-VCA-EB-NA-1 (Laboratoires Biorad) destinés à la recherche quantitative des anticorps vis-à-vis de l'antigène de capsid du virus d'Epstein-Barr (EBV-VCA) selon la méthode ELISA [8].

Interprétation des résultats

Pour chaque prélèvement, le ratio d'immunité (ISR - *international standardized ratio*), calculé en divisant la densité optique de l'échantillon par la valeur seuil du réactif calibrateur est interprété comme indiqué au tableau 1.

La présence d'anticorps anti-EBV est indispensable pour attribuer au virus la responsabilité d'un syndrome infectieux aigu. La possibilité de titrer, dans un même sérum, les anticorps contre plusieurs antigènes EBV conduit à établir pour chaque individu un profil sérologique. Selon la présence ou l'absence de ces différents anticorps et selon la valeur des titres en cas de positivité, l'interprétation est différente. C'est la seule sérologie virale qui, aujourd'hui, sur un seul sérum précoce, permet d'affirmer une infection actuelle ou de l'infirmier catégoriquement, de constater

Tableau 1 Interprétation ISR

Prélèvement ISR	Résultats	Interprétation
≤ 0,90	Négatif	Ac anti-EBV-VCA non détectable
0,91 - 1,09	Douteux	À tester à nouveau
≥ 1,10	Positif	Présence Ac anti- EBV-VCA

Le test de χ^2 a été utilisé pour la comparaison des effectifs.

La significativité est retenue pour des valeurs de p inférieures à 0,05.

ISR = international standardized ratio ; Ac = anticorps ; EBV = virus d'Epstein-Barr ; VCA = antigène de capside du virus.

qu'un sujet n'a jamais rencontré le virus, ou au contraire qu'il est immunisé et ne fera donc pas une nouvelle infection à EBV, tout cela grâce à la combinaison des différents marqueurs.

Pendant la phase aiguë, les anticorps IgG et IgM anti-VCA sont présents dès le début des signes cliniques (il est rare que l'on mette en évidence une séroconversion), alors que les IgG anti-EBNA-1 ne sont en général détectables qu'à la convalescence. Les anticorps IgG dirigés contre l'antigène précoce (Diffus) [anti-EA(D)] apparaissent également dès le début de la maladie, mais de façon inconstante et ne sont donc pas

un marqueur fiable de la primo-infection. Les IgM anti-VCA et les IgG anti-EA disparaissent à la guérison, au bout de 3 à 4 semaines ; les IgG anti-VCA et les IgG anti-EBNA-1 au contraire persistent toute la vie. Les anticorps anti-EBNA-2 ne sont pas toujours détectables.

La présence d'anticorps IgM dirigés contre les antigènes viraux du cycle lytique signe en général la primo-infection à EBV. Mais comme ces IgM réapparaissent parfois lors des réactivations, il est utile de rechercher les anticorps IgG de type EBNA-1 qui doivent être absents au cours de la primo-infection aiguë.

La primo-infection à EBV est prouvée par le profil sérologique EBV : anticorps IgG et IgM anti-VCA positifs et IgG anti-EBNA négatifs.

Résultats

Quatre patients atteints de LED (9 %) et 5 sujets témoins (11 %) sont positifs pour l'IgM anti-VCA. La corrélation entre les deux groupes est non significative ($p = 0,9$) (Tableau 2).

La réactivité de l'anticorps IgM anti-VCA est faible pour tous les prélèvements, avec une moyenne de l'ISR de 0,689 pour

Tableau 2 Résultats des sérologies EBV

Sérologie	Patients lupiques Nombre de patients positifs/Nombre total testé (%)	Population témoin Nombre de témoins positifs/Nombre total testé (%)	p
IgM anti-VCA	4 /44 (9 %) (IC 95 % : 0,0059 - 0,175)	5/44 (11 %) (IC 95 % : 0,0198 - 0,207)	0,9
IgG anti-VCA	44/44 (100 %) (IC 95 % : (1 - 1)	40/44 (91 %) (IC 95 % : 0,824 - 0,994)	0,12
IgG anti-EBNA-1	40/44 (91 %) (IC 95 % : 0,824 - 0,994)	42/44 (95 %) (IC 95 % : 0,892 - 1,016)	0,6

EBV = Virus d'Epstein-Barr ; VCA = antigène de capside du virus ; EBNA = antigène nucléaire du virus d'Epstein-Barr ; IC = intervalle de confiance.

Tableau 3 ISR des malades et des témoins

Anticorps	Malades			Témoins			p
	ISR min.	ISR max.	ISR moy.	ISR min.	ISR max.	ISR moy.	
VCA-IgM	0,294	1,445	0,689	0,377	1,241	0,543	0,06
VCA-IgG	1,890	3,027	2,341	0,907	2,085	1,873	0,068
VCA-EBNA-1	1,262	3,347	2,149	1,142	3,141	2,045	0,074

ISR : international standardized ratio ; VCA = antigène de capside du virus ; EBNA = antigène nucléaire du virus d'Epstein-Barr.

les sujets atteints de lupus (extrêmes : 0,294 - 1,445) et de 0,543 pour les sujets témoins (extrêmes 0,377 - 1,241) (Tableau 3).

Les anticorps de type IgG anti-VCA sont positifs chez 100 % des malades et 91 % des témoins. La différence est non significative ($p = 0,12$) (Tableau 2).

La moyenne des ISR pour l'anticorps de type IgG anti-VCA est de 2,341 chez les malades (extrêmes : 1,890 - 3,027) et de 1,873 pour la population témoin (extrêmes : 0,907 - 2,085). La différence est non significative ($p = 0,068$) (Tableau 3).

Quarante (40) malades (91 %) ont des anticorps IgG anti-EBNA-1 positifs contre 42 (95 %) témoins. La différence est non significative ($p = 0,6$) (Tableau 2).

La réactivité de l'anticorps IgG anti-EBNA-1 est augmentée chez les malades (ISR moyen de 2,149 [extrêmes : 1,262 - 3,347]) et les témoins (ISR moyen de 2,045 [extrêmes : 1,142 - 3,141]) ($p = 0,074$) (Tableau 3).

La différence entre les ISR moyens des malades et des témoins pour les anticorps IgM anti-VCA, IgG anti-VCA et IgG anti-EBNA-1 est non significative (Tableau 3).

Quatre malades (9 %) présentent une infection à EBV récente : IgM anti-VCA positifs, IgG anti-VCA positifs et IgG anti-EBNA-1 négatifs. Quarante (40) malades (91 %) avaient un contact antérieur avec le virus : IgG anti-VCA positifs, IgG anti-EBNA-1 positifs et IgM anti-VCA négatifs. Deux témoins (4,5 %) n'ont aucun contact

avec le virus : toute sérologie négative. Cinq témoins (11 %) ont une réactivation de l'infection à EBV : IgM anti-VCA positifs, IgG anti-VCA positifs et IgG anti-EBNA-1 positifs. Trente-cinq (35) témoins (79,5 %) avaient un contact antérieur avec le virus : IgM anti-VCA négatifs, IgG anti-VCA positifs et IgG anti-EBNA-1 positifs. Deux témoins (4,5 %) ont une sérologie IgG anti-EBNA-1 positive isolée qui n'a pas de signification vis-à-vis du virus EBV.

Discussion

Découvert en 1964 dans la tumeur de Burkitt, le virus d'Epstein-Barr (EBV), comme tous les herpès virus, est susceptible de provoquer des infections aiguës mais aussi des infections latentes ou persistantes dans lesquelles l'expression du génome viral est très restreinte ; le maintien de cet état de latence dépend du système immunitaire de l'hôte [9].

Même s'il existe des arguments épidémiologiques contradictoires, certains arguments physiopathologiques sont en faveur d'un rôle possible de l'EBV dans la genèse du LED puisqu'il est en étroite relation avec les cellules responsables de la réponse immunitaire et les anomalies lymphocytaires B [4].

La parenté antigénique très proche et le haut degré d'homologie entre les peptides viraux et les peptides nucléaires ont sug-

géré, dans une population prédisposée, la possibilité d'une auto-immunité anti-spliceosome par mimétisme nucléaire [10,11].

Ce virus pourrait jouer un rôle dans la genèse du lupus érythémateux disséminé (LED) en raison de l'hyperstimulation immunologique qu'il peut induire et de la parenté structurale entre certains antigènes du spliceosome retrouvés dans le LED et certains antigènes précoces de l'infection à EBV [10,12].

L'EBV présente un tropisme cellulaire pour les lymphocytes B. Son génome comprend une séquence codant pour une interleukine 10 (IL-10) pouvant inhiber l'apoptose, provoquant ainsi une prolifération polyclonale B [13].

Dans le lupus, il existe aussi de nombreuses anomalies lymphocytaires B. L'IL-10 est sans doute la cytokine dont la contribution au lupus a été la mieux démontrée en allant jusqu'à la modulation thérapeutique. Les taux circulants d'IL-10 au cours du lupus sont plus élevés que normalement et sont corrélés à différents indices cliniques et biologiques d'activité. En effet, l'IL-10 est un facteur de différenciation des lymphocytes B en plasmocytes avec une orientation vers la production d'IgG [14].

Dans la littérature, les travaux qui se sont intéressés à évaluer l'implication de l'EBV dans la pathogénie du lupus sont nombreux mais contradictoires. Cela peut être dû en partie à l'hétérogénéité des techniques utilisées et des cas étudiés. Globalement, deux groupes d'études peuvent être distingués.

Le premier groupe correspond aux études qui ont trouvé une forte prévalence de l'EBV dans le lupus, suggérant que l'EBV pourrait être impliqué dans la pathogénie du lupus. Les premiers travaux scientifiques publiés il y a un quart de siècle ont démontré que le titre des anticorps anti-EBV est plus élevé chez les malades lupiques que chez

les sujets témoins [15,16]. Yokochi et al, dans une étude menée en 1989, ont détecté chez les malades lupiques un titre élevé d'anticorps anti-EBV comparativement aux individus témoins [17]. Des publications récentes rapportent que certains individus ont développé immédiatement un lupus après une mononucléose induite par l'EBV, soutenant l'hypothèse que l'infection à EBV peut déclencher au moins quelques cas de LED [6,18]. D'autres études menées chez des enfants et des adolescents ont trouvé des résultats comparables et supposent que l'infection par le virus EBV représente un facteur de risque environnemental pouvant déclencher le LED [12,19]. En effet, James et al. ont montré que les enfants et adolescents atteints de LED ont une séroconversion significativement plus fréquente pour l'EBV que la population saine (99 % vs 70 %) et qu'ils sont souvent porteurs de l'ADN viral dans leurs lymphocytes circulants [12]. Mais d'après Evans, 95 % des sujets adultes sont présumés être porteurs du virus EBV ; cette forte prévalence fait penser qu'il existe d'autres facteurs aussi importants que l'EBV capables d'intervenir dans la pathogénie du LED [20].

Ainsi, il est difficile de prouver qu'il y a une association entre EBV et LED en comparant les taux de séroconversion entre malades et sujets témoins, puisque la majorité des adultes est séropositive pour l'EBV [21]. En effet, May et al. pensent que, malgré le lien probable entre ces deux situations pathologiques, il est difficile de le confirmer avec certitude puisque 80 à 90 % des sujets adultes dans le monde sont séropositifs pour l'EBV [22].

Le second groupe d'études qui a cherché à évaluer l'implication de l'EBV dans le lupus conteste la participation de l'EBV dans la pathogénie du lupus. En effet, Tsai et al. n'ont pas trouvé chez les patients lupiques une augmentation de la séroconversion pour

l'EBV [21]. Dans une étude réalisée en Corée, Moon et al, en comparant la charge virale par PCR semi-quantitative, n'ont pas trouvé de significativité entre les malades lupiques et les sujets témoins (98,5 % vs 94 %) [23]. De même, cette étude ne trouve pas de lien entre ces deux situations pathologiques, surtout que le titre des anticorps anti-EBV n'est pas un indicateur fiable du statut de l'EBV dans le corps puisque la réponse sérologique peut être modifiée non seulement par la nature de l'antigène mais aussi par une dysrégulation induite par la maladie ou par le traitement administré. Les résultats de cette série sont en accord avec les résultats du second groupe d'études. Il n'y a pas de différence significative entre les patients lupiques et les témoins vis-à-vis de la positivité des anticorps de l'EBV : IgM et IgG anti-VCA et IgG anti-EBNA-1; même la différence entre les ISR moyens des malades et des témoins pour ces anticorps est non significative. Il est difficile alors de

confirmer avec certitude l'implication de l'EBV dans le déclenchement de la maladie lupique, d'autant plus que la prévalence de l'EBV est très élevée dans notre contexte.

La faible taille de l'échantillon étudié rend le lien de causalité EBV et lupus difficile à établir ou à éliminer avec précision, d'où l'intérêt d'une étude plus étendue notamment de cohorte prospective chez des patients EBV-positifs, en surveillant l'apparition d'un lupus chez eux.

Conclusion

Ainsi la maladie lupique est probablement multifactorielle ; les facteurs environnementaux, en particulier viraux, pourraient intervenir dans sa genèse, mais il semble illusoire de retenir un seul agent viral puisque la diversité génétique permet d'expliquer que différents virus puissent être impliqués selon le répertoire génétique du patient.

Références

1. Subra JF, Druet P, Fournier GJ. Physiopathologie des maladies lupiques. *Médecine thérapeutique*, 2000, 6:529–36.
2. Kotzin BL. Systemic lupus erythematosis. *Cell*, 1996, 85:303–6.
3. Drake CG, Kotzin BL. Genetic and immunological mechanisms in the pathogenesis of systemic lupus erythematosis. *Current opinion in immunology*, 1992, 4:733–40.
4. Bezanahary H et al. Lupus érythémateux disséminé et *herpes viridae* : à propos de trois observations. *La Revue de Médecine Interne*, 2002, 23:1018–21.
5. Propriété du laboratoire d'immunologie CHRU (Centre Hospitalier Régional Universitaire) de Lille – thèse Sophie Canonne 15/6/2001 (www3.univ-lille2.fr/immunologie/these/m&m%20.pdf, consulté le 4 mai 2008).
6. Verdolini R et al. Systemic lupus erythematosis induced by Epstein–Barr virus infection. *British journal of dermatology*, 2002, 146:877–81.
7. Hochbreg MC. Updating the American College of Rheumatology revised criteria for the classification of systemic lupus erythematosis. *Arthritis and rheumatism*, 1997, 40:1725.
8. Hess RD. Routine Epstein–Barr virus diagnostic from the laboratory perspective: still challenging after 35 years. *Journal of clinical microbiology*, 2004, 42(8):3381–7.
9. Crawford D. Epstein–Barr virus. In: Zuckerman A, Banatvata J, Patisson J, eds.

- Principles and practice of clinical virology*. Hoboken, John Wiley & Sons Inc., 1995:109–34.
10. James JA et al. Immunoglobulin epitope spreading and autoimmune disease after peptide immunization: Sm B/B'-derived PPPGMRPP and PPPGIRGP induce spliceosome autoimmunity. *Journal of experimental medicine*, 1995, 181(2):453–61.
 11. Vaughan JH. The Epstein–Barr virus and systemic lupus erythematosus. *Journal of clinical investigation*, 1997, 100:2939–40.
 12. James JA et al. An increased prevalence of Epstein–Barr virus infection in young patients suggests a possible etiology for systemic lupus erythematosus. *Journal of clinical investigation*, 1997, 100:3019–26.
 13. Burdin N, Rousset F, Banchereau J. B cell derived IL-10: production and function. *Methods*, 1997, 11(1):98–111.
 14. Emilie D et al. Interleukine 10 : une cytokine clé du lupus érythémateux disséminé. *Pathologie Biologie*, 1998, 46:583–5.
 15. Evans AS, Rothfield NF, Niederman JC. Raised antibody titres to EB virus in systemic lupus erythematosus. *Lancet*, 1971, 1(7691):167–8.
 16. Stancek D, Rovensky J. Enhancement of Epstein–Barr virus antibody production in systemic lupus erythematosus patients. *Acta virologica*, 1979, 23(2):168–9.
 17. Yokochi T et al. High titer of antibody to the Epstein–Barr virus membrane antigen in sera from patients with rheumatoid arthritis and systemic lupus erythematosus. *Journal of rheumatology*, 1989, 16(8):1029–32.
 18. Dror Y et al. Systemic lupus erythematosus associated with acute Epstein–Barr virus infection. *American journal of kidney disease*, 1998, 32(5):825–8.
 19. Harley J, James J. Epstein–Barr virus infection may be an environmental risk factor for systemic lupus erythematosus in children and teenagers [Letter]. *Arthritis and rheumatism*, 1999, 42(8):1782–3.
 20. Evans AS, Niederman JC. Epstein–Barr virus. In: Evans AS, ed. *Viral infections of humans. Epidemiology and control*. New York, Plenum Publishing Corporation, 1989:265–92.
 21. Tsai YT et al. Detection of Epstein–Barr virus and cytomegalovirus genome in white blood cells from patients with juvenile rheumatoid arthritis and childhood systemic lupus erythematosus. *International archives of allergy and immunology*, 1995, 106(3):235–40.
 22. Huggins ML, Todd I, Powell RJ. Reactivation of Epstein–Barr virus in patients with systemic lupus erythematosus. *Rheumatology international*, 2005, 25(3):183–7.
 23. Moon UY et al. Patients with systemic lupus erythematosus have abnormally elevated. Epstein–Barr virus load in blood. *Arthritis research & therapy*, 2004, 6(4):R295–302.

Microbiological quality and sample collection policy for dairy products in Ramallah and Al-Bireh district, Palestine

I.A. Al-Khatib¹ and S.M. Al-Mitwalli¹

الجودة الميكروبيولوجية وسياسة جمع العينات لمنتجات الألبان في منطقتي رام الله والبيرة، بفلسطين
عصام أحمد الخطيب، سوزان محمد المتولي

الخلاصة: هدف الباحثون إلى التعرف على التلوث بالجراثيم أو بالعوامل الممرضة في عينات من منتجات الألبان جمعها المفتشون المسؤولون عن صحة البيئة في وزارة الصحة الفلسطينية في الفترة من 2001 إلى 2004. وقد جمعت 722 عينة من منتجات الألبان بشكل عشوائي من مصادر مختلفة في رام الله والبيرة؛ وكانت النسبة المئوية للنماذج غير المقبولة في السنوات جميعها: 23٪ بسبب عدد الجراثيم الهوائية، و21٪ بسبب عدد القولونيات، و15.2٪ بسبب عدد القولونيات البرازية، و1٪ بسبب عدد العنقوديات الذهبية، و10.3٪ بسبب الفطور، و2.3٪ بسبب الخمائر، و14.3٪ بسبب الإشريكية القولونية. وكانت العينات المفحوصة سلبية لأنواع السلمونيلا، كما ارتفع عدد الجراثيم الهوائية بشكل مستمر بين عامي 2001 و2004.

ABSTRACT We aimed to identify bacterial pathogens/contaminants in dairy product samples collected by environmental health inspectors of the Palestinian Ministry of Health from 2001–04. A total of 722 samples of dairy products were randomly collected from different sources in Ramallah and Al-Bireh district. The percentages of unacceptable samples for the combined years were: 23.0% for total aerobic count, 21.0% for total coliforms, 15.2% for faecal coliforms, 1.0% for *Staphylococcus aureus*, 10.3% for moulds, 2.3% for yeasts and 14.3% for *Escherichia coli*. All the examined samples tested negative for *Salmonella* spp. Total aerobic counts rose continuously between 2001 and 2004.

Qualité microbiologique des échantillons de produits laitiers et politique en matière de prélèvement dans le district de Ramallah et Al-Bireh (Palestine)

RÉSUMÉ Notre objectif était d'identifier les agents pathogènes bactériens/contaminants dans les échantillons de produits laitiers prélevés par les inspecteurs des services d'hygiène de l'environnement du ministère de la Santé palestinien entre 2001 et 2004. Au total, 722 échantillons de produits laitiers ont été prélevés de façon aléatoire auprès de différentes sources dans le district de Ramallah et Al-Bireh. Les pourcentages d'échantillons inacceptables pour le total de la période étaient les suivants : 23,0 % pour le dénombrement de bactéries aérobies totales, 21,0 % pour les coliformes totaux, 15,2 % pour les coliformes fécaux, 1,0 % pour *Staphylococcus aureus*, 10,3 % pour les moisissures, 2,3 % pour les levures et 14,3 % pour *Escherichia coli*. Tous les échantillons examinés étaient négatifs pour *Salmonella* spp. Les concentrations de bactéries aérobies totales n'ont pas cessé d'augmenter entre 2001 et 2004.

¹Environmental Health Unit, Institute of Community and Public Health, Birzeit University, West Bank, Palestine (Correspondence to I.A. Al-Khatib: ikhatib@birzeit.edu).

Received: 27/09/06; accepted: 03/12/06

Introduction

Milk is a highly nutritious food that, unfortunately, is ideally suited to the growth of pathogenic organisms. Consumption of raw milk remains a well-identified risk factor for foodborne disease but pasteurization has been highly effective in ensuring the safety of dairy products [1,2]. In some countries, especially those with a warm climate, raw milk and products such as cheese continue to be responsible for many outbreaks of gastroenteritis [3]. Several outbreaks of typhoid fever in industrialized countries have been ascribed to consumption of unripened hard cheese made from raw milk handled by chronic carriers [4,5]. Some of the bacteria can cause severe illness with long-term consequences and death [6–9]. Enteric bacilli multiply in milk at ordinary atmospheric temperatures, so that even a trivial contamination may cause an explosive outbreak. Sporadic infections may, however, result if the product is contaminated during the distribution process [4]. Industrial cattle breeding and food production facilitate the spread of non-typhoidal *Salmonella* spp., *Campylobacter* spp. and possibly *Yersinia enterocolitica* [2,10,11].

The aim of this report was to explore the microbiological quality of dairy products from different sources from Ramallah and Al-Bireh district and to assess the quality of the health inspection procedures based on the number of samples collected.

Methods

Data on the microbiological quality of dairy samples was obtained from the records of the Central Public Health Laboratory of the Palestinian Ministry of Health (MoH) for the Ramallah and Al-Bireh district. The collected data were for the years of 2001–04.

A total of 722 dairy product samples were collected randomly from different sources by environmental health inspectors of the Palestinian MoH in routine inspections over the study period. Samples were taken from raw milk, yogurt, pasteurized milk, *labneh* (concentrated yoghurt), salt cheese and cooked cheese. The samples were collected from different sources such as dairy factories, sweet shops, grocery shops, restaurants and vendors of various sectors encompassing the whole of Ramallah and Al-Bireh district. The samples were collected in pre-sterilized containers and transported in ice-buckets to the Palestinian Central Public Health Laboratory in Ramallah city on the day of collection.

The analyses covered total aerobic count (TAC), and the presence of total coliforms, faecal coliforms, *Staphylococcus aureus*, moulds, yeasts and *Salmonella* spp. The criteria (cut-off levels) for unacceptable contamination for each measure are shown in Table 1. Decisions regarding whether food samples were considered acceptable for human consumption were based on the microbiological guidelines for food samples of the MoH [12] that mainly depend on the Palestinian Standards Institution. The bacteriological analytical manual online, published by the United States Department of Health and Human Services [13], was used as a reference for sample testing.

The data were reviewed, cleaned and revised with the help of the Environmental Health Department personnel of the MoH as well as Central Public Health Laboratory technicians. The data were coded and analysed using SPSS, version 12.0.

Results

The total number of tested dairy samples from different sources in Ramallah and Al-Bireh district increased slightly from 2001

Table 1 Palestinian standard limits (cut-offs levels) for unacceptable contamination for the different microbiological measures

Dairy product	Total aerobic count (CFU/g)	Total coliforms (CFU/g)	Faecal coliforms (CFU/g)	<i>Staph. aureus</i> (CFU/g)	<i>Salmonella</i> spp. (No./25g)	Yeasts (CFU/g)	Moulds (CFU/g)	Yeast and moulds (CFU/g)	<i>E. coli</i>
Raw milk	1st class = 5×10^5 2nd class = 3×10^6 3rd class = 4×10^6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Yogurt	n/a	50 in factories, 100 in markets	n/a	n/a	n/a	n/a	n/a	50 in factories, 500 in markets	n/a
Pasteurized milk	5×10^4 in factories, 10×10^4 in markets	10 in factories, 50 in markets	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Labneh	n/a	10	n/a	100	n/a	n/a	10	n/a	n/a
Salt cheese	n/a	1000 in factories, 2000 in markets	n/a	n/a	n/a	n/a	100 in factories, 200 in markets	n/a	n/a
Cooked cheese	5×10^4 in markets	Nil	n/a	n/a	n/a	n/a	Nil	n/a	n/a

CFU = colony-forming units; n/a = not applicable.

($n = 203$) to 2002 ($n = 236$) but decreased to 2004 ($n = 109$).

Table 2 shows the annual frequency and percentage of levels of contamination in dairy product samples for the different tests conducted. From 2001 to 2004, the number of samples graded as unacceptable increased for TAC and faecal coliforms. There was no overall trend of increasing or decreasing numbers of unacceptable samples for the indicators examined. The proportion of samples with unacceptable levels of TAC increased from 2001 to 2004, while for other indicators acceptability increased or decreased over time.

A significant statistical relationship was seen between the sampling year and the number of unacceptable dairy samples, with a rising trend of unacceptable levels over time for TAC ($\chi^2 = 52.626$; $P < 0.001$), total coliforms ($\chi^2 = 9.382$; $P = 0.025$), faecal coliforms ($\chi^2 = 18.938$; $P < 0.001$), moulds ($\chi^2 = 11.956$; $P = 0.008$) and *Staph. aureus* ($\chi^2 = 13.703$; $P = 0.003$) (Table 2).

Figure 1 shows the average overall percentage of acceptable samples during 2001–04. All of the samples examined tested negative for *Salmonella* spp.

Discussion

Dairy products prepared under unhygienic conditions pose a great threat to the health of consumers in Palestine, who consume them in large amounts. This study in Ramallah and Al-Bireh district showed relatively high rates of dairy samples that did not meet Palestinian standards for acceptable levels of contamination.

TAC is a quality control test that is a basic measure of the bacteria in dairy products. It reveals general sanitation and herd health conditions. So the high proportion of samples with unacceptable TAC in this study (23.0%) may be a result

of poor sanitation and bad herd health conditions in Ramallah and Al-Bireh district.

Coliform testing is a more specific bacteriological test for the quality of dairy products. While the presence of coliform bacteria does not necessarily signify that pathogens are present or that the produce has come in contact with faeces, high counts are an indicator of poor herd hygiene, improperly washed and maintained equipment or a contaminated water supply [14]. The existence of samples with unacceptable levels of total coliforms in this

study (21.0%) was likely due to unsanitary conditions or practices during production, processing or storage of the dairy products. More concerning is the high proportion of samples with unacceptable levels of faecal coliforms (15.2%). These include *E. coli* O157:H7, *Salmonella* and *Shigella* [15] and are considered to be directly associated with faecal contamination from warm-blooded vertebrates [16].

Enterotoxins produced by *Staph. aureus* can cause food poisoning: a large-scale mass outbreak in Japan was caused by skim-milk

Table 2 Annual frequency of acceptable and unacceptable levels of contamination of dairy products in routine inspections in Ramallah and Al-Bireh district, Palestine

Organism	2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%
<i>Total aerobic count</i>								
Acceptable	137	91.3	112	82.4	56	60.2	29	52.7
Unacceptable	13	8.7	24	17.6	37	39.8	26	47.3
<i>Total coliforms</i>								
Acceptable	76	73.1	200	84.7	126	74.1	87	79.8
Unacceptable	28	26.9	36	15.3	44	25.9	22	20.2
<i>Faecal coliforms</i>								
Acceptable	110	81.5	219	92.8	134	78.8	88	80.7
Unacceptable	25	18.5	17	7.2	36	21.2	21	19.3
<i>Staphylococcus aureus</i>								
Acceptable	157	100.0	235	99.6	166	96.5	109	100.0
Unacceptable	—	—	1	0.4	6	3.5	—	—
<i>Salmonella</i> spp.								
Positive	0	0.0	0	0.0	0	0.0	0	0.0
Negative	155	100.0	235	100.0	170	100.0	109	100.0
<i>Yeasts</i>								
Acceptable	89	84.8	215	93.5	151	88.8	96	88.1
Unacceptable	16	15.2	15	6.5	19	11.2	13	11.9
<i>Moulds</i>								
Acceptable	97	93.3	222	99.1	166	97.6	108	99.1
Unacceptable	7	6.7	2	0.9	4	2.4	1	0.9
<i>Escherichia coli</i>								
Acceptable	84	85.7	—	—	—	—	—	—
Unacceptable	14	14.3	—	—	—	—	—	—

— = no samples were tested.

powder contaminated with *Staph. aureus* enterotoxin A [17]. In our study unacceptable levels of *Staph. aureus* were found on average in 1.0% of samples during 2001–04 and may be attributed to the practice of preparing large batches too far in advance and holding them for long periods at room temperature. It also indicates poor hygiene conditions and faults in manufacturing/handling during cheese production.

The most common sources of food poisoning from *Salmonella* spp. are beef, poultry and eggs, but improperly prepared fruits, vegetables, dairy products and shellfish have also been implicated [18]. All the examined samples tested negative for *Salmonella* spp. in all years of the study.

While yeasts are needed to ferment and ripen many cheese varieties and make a positive contribution to the development of taste and aroma [19–23], they may also act as spoilage organisms causing yeasty off-flavour, loss of texture, excessive gas

formation and increased acidity [24,25]. The average rate of samples with unacceptable levels of yeasts in this study was 2.3%.

There are several factors which may explain the high levels of dairy food contamination in Palestine: inadequate levels of health inspection, economic and transport difficulties and poor knowledge and practices among farmers.

We noted a rising trend of unacceptable TAC over the period of the study, from 8.7% in 2001 to 47.3% in 2004. Accompanying this was a fall in the total number of dairy samples tested, from 203 in 2001 to 109 in 2004. This may be a reflection of the unstable political situation in Palestine, which has led to lower standards of health inspection and difficulties in timely and hygienic transport of dairy products. Dairy farmers are rarely visited by the Ministry of Health inspectors or veterinary health inspectors of the Ministry of Agriculture.

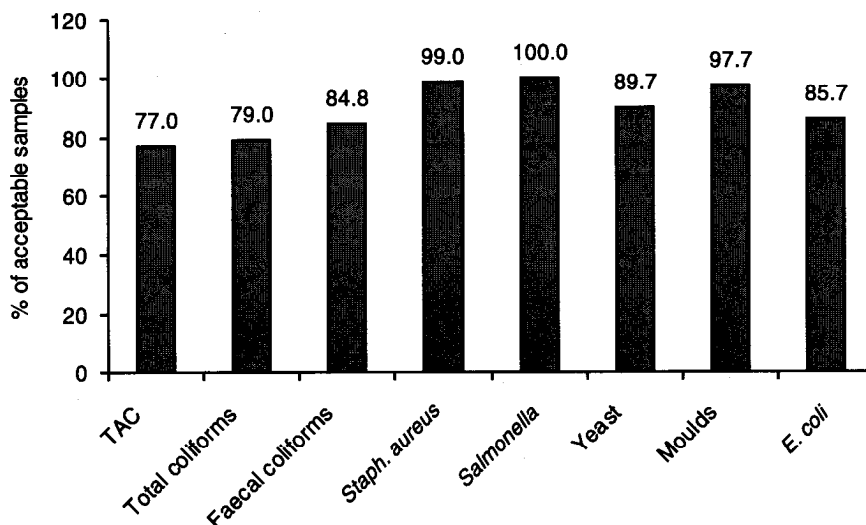


Figure 1 Average annual acceptable levels of contamination of dairy products in routine inspections in Ramallah and Al-Bireh district, Palestine, 2001–04 (TAC = total aerobic count)

Experience suggests that such visits make farmers feel responsible for the safety of milk that originates from their farms, and this will result in the reduction of the sources of microbial contamination. Most of the milk in Ramallah and Al-Bireh district is produced in the villages by farmers with small landholdings. Although an increasing proportion of the milk produced is collected by cooperatives and other organized dairies, much of the milk is still processed in traditional ways, with inadequate refrigeration and transportation facilities, especially during sieges, invasions and curfews imposed by the Israeli military forces on Palestine.

Data limitations include unsystematic testing, as not all the samples were uniformly tested for the different indicators

From field observations in our study, some of the staff handled dairy products with open sores without wearing a waterproof protection. There are also no strict regulations for the dairy plant process to be followed by the workers in this district. For example, many of them did not regularly wear work clothes that show dirt easily. In addition, many workers in places where dairy products are served, such as restaurants and school cafeterias, did not wear a head or beard cover while serving food.

The conditions under which milk is produced in the villages are also far from satisfactory, mainly because of the poor economic situation and lack of practical knowledge of proper milk hygiene measures on the part of the producers. The milk animals are housed in small closed or open yards adjacent to the family house. Flooring is usually of plaster or mud. The cows are rarely washed before milking. Milking is done by hand. Because of the distances between the production and consumption points, milk is unavoidably kept at ambient temperatures and this supports rapid micro-

bial growth, especially during the summer. This situation is similar to that in Turkey, where most milk and dairy products are not prepared under hygienic conditions [26,27]. Our results also agree with research conducted in Karak, Jordan, where samples of unpasteurized milk, yoghurt, *labnah* and white soft cheese produced by farmers by traditional methods showed a high viable coliforms count (indicative of unsanitary conditions), yeasts, moulds and *Staph. aureus*, which indicates serious faults in production hygiene, unsatisfactory sanitation and unsuitable storage temperature [28].

There are some steps that can be taken to improve the situation. One is the development of rational schedules for microbiological testing of dairy samples to include all months of the year, especially the summer ones. Also, the development of proper sanitation and herd health conditions will help reduce the levels of contamination. Dairy farmers need to be encouraged to feel responsible for the safety of milk that originates from their farms.

Additional efforts should be made by the veterinary health services provided by the Ministry of Agriculture to ensure that dairy herds are free of any infectious diseases which could be transmitted to humans through milk or its products. Suspect animals should be isolated for treatment and their milk destroyed. Public awareness targeting dairy factories and households that produce dairy products should encourage and help them to follow strict and detailed technical and hygiene procedures in order to maintain good quality produce.

Acknowledgement

The authors are grateful to the Swiss Agency for Development and Cooperation for funding this research.

References

1. Headrick ML et al. The epidemiology of raw milk-associated foodborne disease outbreaks reported in the United States, 1973 through 1992. *American journal of public health*, 1998, 88:1219–21.
2. Ruegg PL. Practical food safety interventions for dairy production. *Journal of dairy science*, 2003, 86:E1–9.
3. Altekruse S et al. Foodborne bacterial infections in individuals with the human immunodeficiency virus. *South medical journal*, 1994, 87:69–73.
4. Vaishnavi C et al. Bacteriological study of Indian cheese (*paneer*) sold in Chandigar. *Indian journal of medical microbiology*, 2001, 19(4):224–6.
5. Khan SA et al. Characterization of erythromycin-resistant methylase genes from multiple antibiotic resistant *Staphylococcus* spp. isolated from milk samples of lactating cows. *American journal of veterinary research*, 2000, 61:1128–32.
6. D'Aoust JY. Salmonella and international trade. *International journal of food microbiology*, 1994, 24:1–31.
7. Desenclos JC et al. Large outbreak of *Salmonella enterica* serotype paratyphi B infection caused by goats' milk cheese, France: a case finding and epidemiological study. *British medical journal*, 1996, 312:91–4.
8. O'Donnell ET. The incidence of *Salmonella* and *Listeria* in raw milk from farm bulk milk tanks in England and Wales. *Journal of the Society of Dairy Technology*, 1995, 48:25–9.
9. Rampling A. Raw milk cheeses and salmonella. *British medical journal*, 1996, 312:67–8.
10. Grundmann H. [Differential therapy of infectious diarrhea] Differentialtherapie von infektiösen Durchfallerkrankungen. *Praxis (Bern 1994)*, 1994, 83:1176–8.
11. White DG et al. The isolation of antibiotic-resistant salmonella from retail ground meats. *New England journal of medicine*, 2001, 345:1147–54.
12. *Microbiological guidelines for food*. Ramallah, Palestine, Department of Environmental Health, Ministry of Health, 2000.
13. *Bacteriological analytical manual online*. Center for Food Safety and Applied Nutrition, United States Food and Drug Administration, 2001 [website] (<http://vm.cfsan.fda.gov/~ebam/bam-toc.html>, accessed 22 January 2009).
14. *Coliforms*. International Specialty Supply [website] (<http://www.sproutnet.com/Reports/coliforms.htm>, accessed 22 January 2009).
15. *Eliminate fecal coliforms*. University of California Division of Agriculture and Natural Resources [website] (http://groups.ucanr.org/UC_GAPs/Eliminate_Fecal_Coliforms/, accessed 22 January 2009).
16. Paille D et al. Seasonal variation in the fecal coliform population of Louisiana oysters and its relationship to microbiological quality. *Journal of food protection*, 1987, 50(7):545–9.
17. Soejima T et al. Comparison between ultrafiltration and trichloroacetic acid precipitation method for concentration of *Staphylococcus aureus* enterotoxin in dairy samples. *International journal of food microbiology*, 2004, 93:185–94.
18. *Excerpt from salmonellosis*. eMedicine [online article] (<http://www.emedicine.com/med/byname/salmonellosis.htm>, accessed 22 January 2009).
19. Jakobsen M, Narvhus J. Yeasts and their possible beneficial and negative effects

- on the quality of dairy products. *International dairy journal*, 1996, 6:755–68.
20. Viljoen BC, Greyling T. Yeasts associated with Cheddar and Gouda making. *International journal of food microbiology*, 1995, 28:79–88.
 21. Dea'k T et al. Molecular characterization of *Yarrowia lypolytica* and *Candida zeylanoides* isolated from poultry. *Applied and environmental microbiology*, 2000, 66:4340–4.
 22. Rossi J et al. Yeasts in dairy. *Annali di microbiologia ed enzimologia*, 1997, 47:169–83.
 23. Cosentino S et al. Yeasts associated with Sardinian ewe's dairy products. *International journal of food microbiology*, 2001, 69:53–8.
 24. Walker SJ. Major spoilage microorganisms in milk and dairy products. *International journal of dairy technology*, 1988, 41:91–2.
 25. Fleet GH. Spoilage yeasts. *Critical reviews in biotechnology*, 1992, 12:1–44.
 26. Arslan A et al. The presence of *Listeria*, *Salmonella*, *E. coli* type 1 and *Klebsiella pneumoniae* on the ice creams sold in Elaz. *Turkish journal of veterinary and animal science*, 1996, 20:109–12.
 27. Akman D. Prevalence of *Listeria* species in ice creams sold in the cities of Kahramanmaraş and Adana. *Turkish journal of medical sciences*, 2004, 34:257–62.
 28. Al-Tahiri R. A comparison on microbial conditions between traditional dairy products sold in Karak and same products produced by modern dairies. *Pakistan journal of nutrition*, 2005, 4(5):345–8.

Foodborne disease outbreaks. Guidelines for investigation and control

These guidelines have been written for public health practitioners, food and health inspectors, district and national medical officers, laboratory personnel and others who may undertake or participate in the investigation and control of foodborne disease outbreaks.

While the book focuses on practical aspects of outbreak investigation and control, it also provides generic guidance that can be adapted to individual countries and local requirements. At the field level it will be valuable in initial epidemiological, environmental and laboratory investigations, in implementation of appropriate control measures, and in alerting investigators to the need to seek assistance for more complex situations. At national and regional levels, the guidelines will assist decision-makers in identifying and coordinating resources and in creating an environment appropriate for the successful management of foodborne disease outbreaks.

Further information about this and other WHO publications can be found at: <http://apps.who.int/bookorders/anglais/home1.jsp?session=1>

Distribution of ABO and Rh D blood groups in the population of Poonch district, Azad Jammu and Kashmir

M.N. Khan,¹ I. Khaliq,² A. Bakhsh,² M.S. Akhtar³ and M. Amin-ud-Din²

توزيع الزمر الدموية ABO و RHD بين سكان مقاطعة بونش وأزاد جامو وكشمير
محمد نسيم خان، عمران خالق، الله بخش، محمد شاهين أختر، محمد أمين الدين

الخلاصة: أجرى الباحثون تقيماً لتوزيع الزمر الدموية ABO والزمرة D (Rh) بين سكان مقاطعة بونش في آزاد جامو وكشمير. وقد تم كشف الأنماط الظاهرية للزمر الدموية بالطريقة الكلاسيكية التي تعتمد على الشرائح. وقد أظهر نظام الزمر الدموية ABO في مجمل العينة الاتجاه ذاته المنتشر بين سكان شبه القارة الهندية بشكل عام (فالزمرة B هي الأكثر انتشاراً، يليها الزمرة O ثم الزمرة A ثم الزمرة AB). كما لوحظ الاتجاه المماثل لدى الذكور، ولكن الاتجاه لدى الإناث كان مختلفاً، إذ كانت (الزمرة O هي الأكثر انتشاراً يليها الزمرة B ثم A ثم الزمرة AB)، إلا أن تكرار الألائل لدى الجنسين كان وفق الترتيب التالي: الزمرة O هي الأكثر انتشاراً تتلوها الزمرة B ثم الزمرة A. كما كان توزيع اتجاه سلبية وإيجابية الزمرة Rh لدى الجنسين مشابهاً لما سبق.

ABSTRACT We evaluated the distribution of ABO and Rhesus (Rh) D blood groups in the population of Poonch district in Azad Jammu and Kashmir. The blood group phenotypes were detected by the classic slide method. The ABO blood group system in the total sample showed the same trend of prevalence as for the general Indian subcontinent ($B \geq O > A > AB$). The same trend was found among males, but among females the order of prevalence was different ($O > B > A > AB$). However, the allelic frequencies in both sexes were in the order of $O > B > A$. The Rh positive and negative distribution trend in both sexes was also similar.

Répartition des groupes sanguins ABO et Rh D dans la population du district de Poonch (Azad Jammu-et-Cachemire)

RÉSUMÉ Nous avons évalué la répartition des groupes sanguins ABO et Rhésus (Rh) D dans la population du district de Poonch (Azad Jammu-et-Cachemire). Les phénotypes de ces groupes ont été détectés par la méthode classique des frotis sur lame. Le système de groupe sanguin ABO dans l'échantillon total présentait la même tendance de prévalence que celui du sous-continent indien en général ($B \geq O > A > AB$). La même tendance était observée chez les hommes, alors que chez les femmes, l'ordre de prévalence était différent ($O \geq B > A > AB$). Toutefois, les fréquences alléliques chez les deux sexes suivaient l'ordre $O > B > A$. La tendance de répartition des Rh positif et négatif chez les deux sexes était également similaire.

¹Department of Zoology, University of Azad Jammu and Kashmir, Muzaffarabad, Azad Jammu and Kashmir.

²Department of Biology, Government College, Dera Ghazi Khan, Pakistan (Correspondence to M. Amin-ud-Din: amin1158@hotmail.com).

³Department of Biology, Federal Government Degree College, Islamabad, Pakistan.

Received: 17/09/06; accepted: 03/12/06

Introduction

Since 1901, more than 20 distinct blood group systems have been characterized but the ABO and Rhesus (Rh) blood groups remain the most clinically important. Both these systems are useful in blood transfusion and organ transplantation. They are also well-defined genetic markers employed in population genetic and anthropological studies [1,2]. The distribution of these 2 blood groups has been repeatedly investigated in various populations all over the world during the last half-century. The frequencies exhibit considerable variation in different geographic locations, reflecting the underlying genetic and ethnic diversity of human populations [3].

In Azad Jammu and Kashmir, situated in the north-east corner of the Eastern Mediterranean Region, only 1 study on Rh blood groupings is available, an unpublished thesis [4]. To fill this gap in information, the present study was carried out to record the frequency of ABO and Rh blood groups in the population of Poonch district, Azad Jammu and Kashmir, with a view to generate data for health planners to utilize in future clinical, epidemiological and anthropological studies

Methods

Poonch district was divided into 2 parts during the Indo-Pakistan war of 1947–48; one remained with India and one became a part of Azad Jammu and Kashmir (a self-governing state under the auspices of Pakistan). Rawalakot is the headquarters of Poonch district in Azad Jammu and Kashmir. It has an area of 855 km² and shares borders with Indian-controlled Kashmir in the east and Pakistan in the west. The population has remained intact and isolated because of the mountainous nature of the area. The total

population of the district according to the 1998 census is 412 000, 80% from the Sudhan tribe, while the rest are mainly from the Pathan, Raja and Gujar tribes.

A sample of 3328 unrelated subjects (2920 males and 408 females) from different families and from different areas gave informed consent to participate in the study. The blood samples from the males were collected at various sites including the Combined Military Hospital in Rawalakot, United Hospital Rawalakot, the Boys High School and Degree College Rawalakot over a period of 3 years from June 2003 to June 2006. The blood samples from the females were collected from women attending Dr Amna Maternity Centre, Rawalakot. Local religious and cultural factors prevented sampling of women in this study.

Serological phenotyping was performed mainly by the procedure of forward typing in which a sample of blood was mixed with anti-A, anti-B and anti-D antisera (Plasmatec, Kent, United Kingdom). However, for unclear results (158 cases) reverse typing (crossmatching) was performed for blood group confirmation. In this procedure, the person's serum was mixed with blood cells of a donor of known blood group to watch for agglutination. No attempt was made to further analyse subgroups.

The allelic frequencies and standard errors (SE) were calculated as per Hedrick's method [5]. The deviations between the distribution of observed and expected values in the Hardy-Weinberg equilibrium were also tested at the 5% significance level.

Results

Overall, blood group B was the most prevalent (36.6%), followed by groups O, A and AB. A similar trend was found among males but in females, blood group O (32.6%) was

Table 1 Distribution of phenotypic and allelic frequencies of ABO blood groups in the population of Poonch district, Azad Jammu and Kashmir

Sex	Phenotype						χ^2_3	Allelic frequency (SE)					
	A		B		O			AB	Total	p	q	r	
	No.	%	No.	%	No.	%							No.
Male	599	20.5	1091	37.4	1030	35.3	200	6.9	2920	18.129; $P < 0.001$	0.148 (0.012)	0.253 (0.006)	0.594 (0.009)
Female	114	27.9	128	31.4	133	32.6	33	8.1	408		0.200 (0.015)	0.222 (0.016)	0.571 (0.020)
Total	713	21.4	1219	36.6	1163	35.0	233	7.0	3328		0.154 (0.005)	0.249 (0.006)	0.591 (0.007)

SE = standard error.

SE = standard error.

the most prevalent, followed by B, A and AB (Table 1). The difference in A, B, O and AB blood group prevalence between males and females was statistically significant ($\chi^2_3 = 18.129$; $P < 0.001$).

In addition, in the total sample, the frequencies of A, B and O alleles were calculated as 0.154 (SE 0.005), 0.249 (SE 0.006) and 0.591 (SE 0.007) respectively (Table 1). On comparison, the deviations between the distribution of observed data on ABO groups from expected values were not significant in the male sample ($\chi^2_1 = 3.062$; $P > 0.05$) but were significant in the female sample ($\chi^2_1 = 6.017$; $P < 0.025$) and in the total sample ($\chi^2_1 = 4.033$; $P \leq 0.05$).

The distribution of Rh blood groups in males and females is shown in Table 2. At the Rh locus, 89.5% of the sample were Rh positive (Rh+). In addition, the frequency of Rh+ among male and female participants was 89.8% and 87.8% respectively. The frequency of the d allele was calculated to be 0.350 (SE 0.023) in the male and female samples respectively (Table 2). -The difference between male and female samples at this locus was not statistically significant ($\chi^2_1 = 1.548$; $P > 0.05$).

On reverse typing of 158 subjects before blood transfusion, no incompatibility case was observed that confirmed the result of forward typing.

Discussion

In the present study, the ABO blood group typing in the total sample showed the same trend of prevalence as in the general Indian subcontinent ($B \geq O > A > AB$). The same trend was found among males but the order was different among females ($O \geq B > A > AB$). However, the allelic frequencies were in the order of $O > B > A$.

Statistically significant differences in the A, B, O and AB blood group prevalence between males and females, along with the significant

Table 2 Distribution of phenotypic and allelic frequencies of Rhesus (Rh) blood group in the population of Poonch district, Azad Jammu and Kashmir

Sex	Rh+		Phenotype Rh-		Total No.	χ^2_1	Allelic frequency (SE)	
	No.	%	No.	%			D	d
Male	2621	89.8	299	10.2	2920	1.548; $P > 0.05$	0.680 (0.008)	0.320 (0.008)
Female	358	87.8	50	12.3	408		0.650 (0.023)	0.350 (0.023)
Total	2979	89.5	349	10.5	3328		0.676 (0.008)	0.324 (0.008)

SE = standard error.

deviations between observed and expected values in females and the total sample, showed that the sample collected from the male population might be considered representative of the district population. The ABO blood group data collected from female visitors and patients at gynaecology wards or maternity centres might be non-representative because the sample may be skewed towards better educated and wealthier women who make routine visits to maternity centres during pregnancy, whereas women of the general population only use these facilities when facing gynaecological complications. Compared with the general population there was a 7.4% higher prevalence of blood group A among females recruited at maternity centres, which may indicate that females of blood group A are more susceptible to gynaecological problems.

The phenotypic and allelic frequencies of both ABO and Rh blood groups in the study area were not completely consistent with neighbouring populations. For instance, blood group A was the most frequent in the northern neighbour populations of Nepal [6], Russian Federation [7] and Chitral [8]. The allelic frequencies for A, B and O in our study (0.154, 0.249 and 0.591 respectively) were, however, closer to those of the Tibetan population (0.1295, 0.2544

and 0.6152) but the allelic frequency of the d allele (0.324) differed from the Tibetan population (0.0572) [9]. Our findings also differed from those of a recent study in Arunachal Pradesh, India [10].

In the southern neighbour Pakistan, racial variation is found between provinces. The overall trend of ABO frequencies in our study was, however, very similar to the $B > O > A > AB$ trend found in Punjab [11], but differed from trends in other provinces, such as $B > A > O > AB$ in Bannu, North-West Frontier Province [12], and $O > B > A > AB$ in Sindh [13, 14]. The allelic frequencies for A, B and O alleles in Sindh [13] and in Multan [15] also differed from our findings. But the trend of allelic frequencies $O > B > A$ was similar in these studies.

In our population, the allelic frequency of Rh- (10.5%) agreed with other studies carried out in Bannu (10.8%) [12] and Rawalpindi/Islamabad (8.7%) [16], but differed from Punjab (2.8%) [11] and even the Azad, Jammu and Kashmir population as whole (2.3%) [4].

Our data shows that these allelic frequencies are unique and are not in total agreement with the previous studies. However, the allelic frequencies of ABO and Rh d are close to the population inhabiting the northern region of Pakistan, a finding that needs to be studied in more detail.

References

1. Amin-ud-Din M et al. Serological study among the municipal employees of Tehran, Iran. Distribution of ABO and Rh blood groups. *Haematology*, 2004, 7(4):502-4.
2. Sigmon JM. Basic principles of the ABO and Rh blood group systems for hemapheresis practitioners. *Journal of clinical apheresis*, 1992, 7(3):158-62.
3. Cavalli-Sforza LL, Menozzi P, Piazza A. *The history and geography of human genes*. Princeton, New Jersey, Princeton University Press, 1994.
4. Rashid M. *Gene frequency of ABO, blood groups in Azad Kashmir* [MSc thesis]. Peshawar, Pakistan, Department of Botany, University of Peshawar, 1983.
5. Hedrick PW. *Genetics of populations*, 2nd ed. London, Jones and Bartlett, 2000.
6. Pramanik T, Pramanik S. Distribution of ABO and Rh blood groups in Nepalese medical students: a report. *Eastern Mediterranean health journal*, 2000, 6(1):156-8.
7. Tomilin VV, Gurtovaia SV. Chastota vstrechaemosti antigenov sistemy ABO u nasekenniia Rossiiskoi Federatsii [The incidence of finding ABO system antigens in the population of the Russian Federation]. *Sudebno-meditsinskaya ekspertiza*, 1999, 42:16-8.
8. Bernhard W. Die Verteilung der ABO-Blutgruppen und Haufigkeit des Rh-Faktors (D) bei verschiedenen ethnischen Gruppen im Hindukush (Kafiren, Kalash, Chitrali) [Distribution of ABO blood groups and incidence of Rh factor (D) in various ethnic groups in the Hindu Kush region (Kafirs, Kalash Chitrali)]. *Anthropologischer Anzeiger*, 1980, 37:251-4.
9. Tripathy V. ABO and Rh D polymorphism among Tibetans in India. *Human biology*, 2006, 78(2):229-33.
10. Krithika S, Maji S, Vasulu TS. Genetic heterogeneity among three Adi tribes of Arunachal Pradesh, India. *Human biology*, 2006, 78(2):221-7.
11. Afzal M et al. A survey of blood groups. *Journal of the Pakistan Medical Association*, 1977, 27(11):426-8.
12. Khan MS et al. Prevalence of blood groups and Rh factor in Bannu region NWFP (Pakistan). *Pakistan journal of medical research*, 2004, 43(1):8-10.
13. Bhatti R, Shiekh DM. Variations of ABO blood groups. Gene frequencies in the population of Sindh (Pakistan). *Annals of King Edward Medical College*, 1999, 5(3/4):328-31.
14. Hussain A et al. Frequency of ABO and Rh blood groups in the population of Baluchistan (Pakistan). *Pakistan Armed Forces medical journal*, 2001, 51(1):22-6.
15. Mian A, Farooq A. Distribution of ABO and RH blood group alleles in different populations of southern Punjab, Pakistan. *Anthropologischer Anzeiger*, 1999, 57(1):33-9.
16. Bhatti FA, Amin M. Spectrum of ABO and D blood groups of donors at Rawalpindi/Islamabad. *Pakistan journal of pathology*, 1996, 7(2):26-8.

Healthy lifestyle habits among Greek university students: differences by sex and faculty of study

I. Tirodimos,¹ I. Georgiouvia,¹ T-N. Savvala,¹ E. Karanika¹ and D. Noukari¹

عادات أنماط الحياة الصحية بين طلبة الجامعة اليونانية: الاختلافات مصنفة بحسب نوع الجنس وكليات الدراسة
إلياس تيروذيموس، يوانا يورغوفيا، ثيودورا نيكيتاريا سافالا، إيليني كارانيكا، ديسبينا نوکاری

الخلاصة: تهدف هذه الدراسة إلى تقييم عادات الأكل والسلوكيات والمعتقدات الأخرى المتعلقة بالصحة بين طلبة جامعة أرسطو في ذي سالونيك، باليونان. وقد حلل الباحثون المعطيات المستمدة من 300 استبياناً خالياً من ذكر الأسماء، استكملة الطلبة مع التأكيد على الفروق بحسب نوع الجنس وبحسب كليات الدراسة. واتضح أنه رغم ممارسة الطالبات للرياضة بشكل أقل من الطلاب، إلا أنهم أحرزوا درجات أعلى في ما يتعلق بالطعام الصحي، وكان معدل زيادة الوزن والبدانة وتعاطي المسكرات أقل لديهم، فيما كان عدد طلاب الطب الذين يتعاطون المسكرات ويدخنون أقل من غيرهم، دون أن يكون لديهم اختلافات في عادات الأكل.

ABSTRACT The objective of this survey was to assess the eating habits and some health-related behaviours and beliefs of students at Aristotle University of Thessaloniki, Greece. Data from a self-completed anonymous questionnaire to 300 students were analysed with emphasis on differences by sex and faculty of study. Female students, although they exercised less than men, had higher scores for healthy eating, had a lower rate of overweight/obesity and a lower rate of alcohol consumption. Fewer medical students reported drinking alcohol and smoking than other students, but there was no difference concerning their eating habits.

Modes de vie sains chez les étudiants grecs : différences selon le sexe et la faculté fréquentée

RÉSUMÉ L'objectif de cette étude était de faire le point sur les habitudes alimentaires et sur certains comportements et croyances en matière de santé des étudiants de l'université Aristote de Thessalonique (Grèce). Les données provenant d'un auto-questionnaire anonyme distribué à 300 étudiants ont été analysées, l'accent étant mis sur les différences selon le sexe et la faculté fréquentée. Les étudiantes faisaient moins d'exercice que les étudiants, mais elles obtenaient de meilleurs scores en ce qui concerne l'alimentation saine et des taux inférieurs de surpoids/obésité et de consommation d'alcool. D'après leurs réponses, les étudiants en médecine buvaient moins d'alcool et fumaient moins que les autres étudiants, mais leurs habitudes alimentaires n'étaient pas différentes.

¹Laboratory of Hygiene and Epidemiology, Medical School, Aristotle University, Thessaloniki, Greece
(Correspondence to I. Tirodimos: iltirodimos@yahoo.gr).

Received: 17/10/06; accepted: 03/12/06

Introduction

A significant amount of the mortality and morbidity experienced worldwide today is preventable [1]. The major determinants of health are socioeconomic factors, lifestyle factors and the physical environment [2]. Lifestyle-related risk factors that were acknowledged in *The European health report* of the World Health Organization (WHO) included unhealthy nutrition, physical inactivity, tobacco use and the use of alcohol and illicit drugs [2].

Health-related behaviour in early life influences later risks for lifestyle-related disorders. It is therefore important to investigate health behaviours among young people. University students represent a major segment of the young adult population. It makes sense to focus on them, for example in studies of the association between beliefs and practices for a healthy lifestyle, in order to design effective health promotion activities targeting this group [3].

Regarding healthy nutrition, the traditional Greek diet, a variant of the Mediterranean diet, has attracted the interest of scientists for many years as a health-promoting nutritional model [4]. It is rich in legumes, fish, vegetables, fruits, cereals and olive oil, whereas meat is eaten rarely. However, in recent years in Greece the traditional Greek diet is mainly followed by the elderly population [5]. The younger population, on the other hand, has been adopting a more "westernized" diet combined with a less physically active way of life.

Although universities and colleges are potentially important targets for the promotion of healthy lifestyles of the adult population, only a few studies have been conducted in Greece examining the dietary and health habits of university students, mainly at the University of Crete in south-

ern Greece [6–8]. These studies revealed not only that university students' regular diet contained excessive quantities of saturated fat, cholesterol and sodium, but also that the prevalence of smoking among students was one of the highest reported in the literature.

Our study focused on the nutritional and health habits of university students in Thessaloniki, the second largest city in Greece. Aristotle University of Thessaloniki is one of the largest universities in the Balkan peninsula in terms of student population. To our knowledge, this is the first study in this large university in northern Greece that aimed to measure students' knowledge of nutrition as well as their food and health habits. A particular emphasis was placed on studying differences by sex and faculty of study.

Methods

The survey was conducted between September 2004 and March 2005. It was carried out within the training framework of the hygiene class, which is presented in the 3rd year of the medical course in Aristotle University Medical School. A sample of all medical students registered in the 3rd year of their studies was asked to complete a self-administered questionnaire. The study also included a sample of 3rd-year students from the faculties of physical sciences, engineering, law and languages which adequately represents the range of subjects studied at the university. Both samples represented adequately the total population of students in the academic year. A total of 345 questionnaires were distributed and 300 were returned completed (response rate 87%). The mean age was 21.5 years for both sexes.

Questionnaires were administered to students during class time over 2 semesters.

We assured students that their participation was voluntary and asked them to submit their responses anonymously. The questionnaire was designed by the authors to cover areas that are important for studying health and health habits. The validity of the questionnaire was established by basing it on literature reviews of issues related to healthy diet, health habits and motivation for a healthy lifestyle. For example, the 1-week food frequency questionnaire that was used was based on that reported by Stefanik and Trulson, adapted to the Greek diet [9].

The questionnaire was tested in a pilot study on 30 medical students. It covered the following areas:

- Sociodemographic variables. These included: sex, age, height, weight, father overweight/obese, mother overweight/obese, student residence (living alone or with parents), faculty attending (8 questions). Data on weight and height were used to calculate body mass index (BMI) (kg/m^2) and to classify students into overweight/obese or normal weight categories [10].
- Students' awareness and knowledge of nutrition. This was measured by separate questions concerning: the energy content of foods (fats, sugars, proteins); the role of fats; the sources of vitamins and minerals; the components of the Mediterranean diet; the proper percentage content of fats/sugars/proteins in the daily nutrition (5 questions). A percentage score of 0–100 was constructed by summing the number of correct answers. "Medium" knowledge was classified as score 45–60, "good" knowledge was score >60–> 75.
- Students' nutritional habits. Students completed a 3-day diet diary in which they described and wrote down all items

of food and drink consumed for 3 consecutive days including 1 weekend day. In addition, a 1-week food frequency questionnaire was completed by each student. The questionnaire covered the previous week and included 40 foods that are the most common in the Greek diet. A score from 0 to 100 was constructed. Eating habits that were judged to be "correct" in terms of healthy nutritional behaviours were: avoiding fat and cholesterol-rich foods, and an effort to eat fruit and fibres.

- Questions related to health habits (physical activity, cigarette smoking and alcohol use). The measure of physical activity was the self-reported number of hours of exercise per week. Regular exercise was defined as exercising > 2 hours/week. Respondents were asked about the frequency of their weekly consumption of alcoholic beverages during the previous 3 months (units/week). Smokers were classified as those who reported smoking more than 1 cigarette per day for at least 3 consecutive months.

The statistical software package *SPSS*, version 12.0, was used for the analysis of data. Parametric variables were analysed using the Student *t*-test. The chi-squared test was used for non-parametric variables. *P*-value < 0.05 was considered statistically significant.

Table 1 Number of students participating in the survey by sex and faculty of study

Sex	No. of students		
	Medical faculty	Other faculties	Total
Male	62	79	141
Female	74	85	159
Total	136	164	300

Results

Table 1 shows the number of students participating in the survey according to sex and faculty of study.

The first hypothesis predicted that women would be characterized by better knowledge and making a greater conscious effort to achieve healthy nutrition, a higher intake of a low-fat diet and a lower frequency of alcohol consumption and smoking. Table 2 shows the students' nutritional and health habits according to sex. The overall mean score for knowledge of healthy foods was judged as medium (56.8% for men and 57.9% for women) and so was the mean score for nutritional habits (61.8% for men and 66.7% for women). Although the female students had significantly higher scores on healthy nutritional habits than the male students ($P < 0.003$) there was no statistically significant association between students' sex and their knowledge about healthy food ($P = 0.627$).

A total of 17.1% of the students were overweight or obese ($BMI > 25 \text{ kg/m}^2$), of whom 58.8% were male and 41.2% female. Men used alcohol more than women; the overall mean alcohol intake was 4.01 units/week for the male students and 2.46 units/week for the female students ($P <$

0.002). Only a few individuals reported consuming excessive amounts of alcohol on a weekly basis ($> 100 \text{ g}$ for men and $> 60 \text{ g}$ for women.). More of the male students exercised regularly ($> 2 \text{ h/week}$) than did females ($P < 0.0001$), but there was no significant difference in smoking habits among the female and male students ($P < 0.615$).

The second hypothesis predicted that medical students would report better knowledge and have better health behaviours than students from other disciplines and faculties. Table 3 shows the relationship between students' faculty of study and nutritional and health habits. The medical school students had significantly better knowledge of healthy food than the other, non-medical students (mean score 63.1% versus 52.6%; $P < 0.0001$), but there was no association between nutritional habits and faculty of study. However, significantly fewer of the medical students smoked than the other students; 35.2% of those smoking were medical students whereas 64.8% were students of other faculties ($P = 0.02$). The mean amount of alcohol consumed was 2.22 units/week for medical students and 3.98 units/week for other, non-medical students ($P < 0.0001$).

Table 2 Students' nutritional and health habits by sex

Variable	Men (<i>n</i> = 141)	Women (<i>n</i> = 159)	<i>P</i> -value
Mean score on nutritional habits ^a	61.8	66.7	0.003
Mean score on knowledge of healthy food ^a	56.8	57.9	0.627
Mean no. of alcohol units consumed/week	4.01	2.46	0.002
Of students exercising regularly ($> 2 \text{ h/week}$) (%)	58.1	41.9	< 0.0001
Of overweight/obese students (%)	58.8	41.2	0.066
Of students smoking cigarettes (%)	49.5	50.5	0.615
Of students drinking alcohol (%)	50.0	50.0	0.094

^aMaximum score 100.

Table 3 Students' nutritional and health habits by faculty of study

Variable	Medical faculty (n = 136)	Other faculties (n = 164)	P-value
Mean score on knowledge of healthy food ^a	63.1	52.6	< 0.0001
Mean no. of alcohol units consumed/week	2.22	3.98	< 0.0001
Of students smoking cigarettes (%)	35.2	64.8	0.020
Of students drinking alcohol (%)	42.2	57.8	0.091

^aMaximum score 100.

Discussion

Before considering the implications of our findings, several limitations in the data must be acknowledged. This sample of university students is not representative of the whole population and therefore caution in generalization of the results is necessary. University students are younger and better educated than the whole population, and lifestyle behaviours in terms of smoking, drinking alcohol, eating poorly and being physically inactive do not show an effect on health in a short time perspective. Another limitation of the present study could be that health was measured only by self-reporting. It may be that participants did not report accurately or that a particular group of participants experienced more pressure to answer questions in a socially desirable manner. However, there are studies that show quite high correlations between reported and measured health variables, such as weight [11]. Despite these limitations, this study provides an extension of previous research on university students' health in Greece.

The overall mean score for both nutrition knowledge and healthy diet was medium. "Healthy" behaviours, such as avoiding fatty and high cholesterol foods and efforts to eat more fruits and fibre were often reported by the students. However, the prevalence of smoking (49.5% for men and 50.5% for women) is one of the high-

est reported in the literature for students. Similar studies worldwide have reported a prevalence of smoking among university students ranging from 23.4% to 44.0% for males and from 19.0% to 46.0% for females [3]. On the other hand, the percentage of students in our sample not consuming alcohol on a regular basis (50.0%) is one of the highest reported in Europe [12]. Only a few individuals in our sample reported consuming excessive amounts on a weekly basis (> 100 g for men and > 60 g for women.). This is consistent with the observation that the incidence of alcoholism in Greece, like other Mediterranean countries, is relatively low [13,14].

Women students, although they exercised less regularly than men, were characterized by a greater effort to achieve healthy nutrition, a higher engagement in low-fat diet and a lower frequency of alcohol consumption. In addition, women had a lower rate of overweight/obesity which is likely to be related to more healthy nutrition. These gender differences have been reported by others as well [15,16]. It appears that either men are less susceptible to societal pressure to be thin or that there exists a reporting bias in which men are less likely to admit vulnerability to such pressures.

Although medical students had better knowledge about healthy food than others, there was no difference concerning their

eating habits. On the other hand, some health hazards were also identified as less specific for medical students. A lower percentage of medical students reported smoking cigarettes and drinking alcohol than other students, probably because of their better knowledge of preventive behaviour and better health practices. We believe that physicians and medical students should not only have better knowledge and awareness of nutrition recommendations and practice guidelines relating to cardiovascular and other chronic disease risk reduction, but also set an example for their patients. Yet several studies have reported high tobacco and alcohol consumption among medical students [17,18]. Compared with these studies, the prevalence of smoking among

Greek medical students in Aristotle University (35.2%) is among the highest in the world reported in the literature for medical students, even higher than that reported by Mammas et al. [6].

From the health educator's perspective, universities and colleges represent the final opportunity for the health and nutritional education of a large number of students. Our study adds information on students' lifestyle in Greece in comparison with other countries. Following WHO proposals for a European network of health-promoting universities [19], a detailed knowledge of lifestyles and health needs in students is essential and may help to plan more effective interventions in this setting.

References

1. Eyre H, Kahn R, Robertson RM. Preventing cancer, cardiovascular disease, and diabetes: a common agenda for the American Cancer Society, the American Diabetes Association, and the American Heart Association. *Circulation*, 2004, 109:3244–55.
2. *The European health report 2002*. Copenhagen, World Health Organization Regional Office for Europe, 2005 (European Series, No. 97).
3. Steptoe A et al. Trends in smoking, diet, physical exercise, and attitudes toward health in European university students from 13 countries, 1990–2000. *Preventive medicine*, 2002, 35:97–104.
4. Willet WC. Diet and health: what should we eat? *Science*, 1994, 264:532–7.
5. Trichopoulou A et al. Diet and overall survival in elderly people. *British Medical journal*, 1995, 311:1457–60.
6. Mammas I et al. Cigarette smoking, alcohol consumption, and serum lipid profile among medical students in Greece. *European journal of public health*, 2003, 13:278–82.
7. Mammas I et al. Nutrient intake and food consumption among medical students in Greece assessed during a Clinical Nutrition course. *International journal of food sciences and nutrition*, 2004, 55(1):17–26.
8. Bertsias G et al. Fruit and vegetables consumption in relation to health and diet of medical students in Crete, Greece. *International journal for vitamin and nutrition research*, 2005, 75(2):107–17.
9. Stefanik PA, Trulson MF. Determining the frequency intakes of foods in large group studies. *American journal of clinical nutrition*, 1962, 11:335–43.
10. *Obesity: preventing and managing the global epidemic. Report of a WHO consultation*. Geneva, World Health Organization, 2000 (WHO Technical Report Series, No. 894).

11. Stunkard AJ, Albaum JM. The accuracy of self-reported weights. *American journal of clinical nutrition*, 1981, 34:1593–9.
12. Smart RG, Ogborne A. Drinking and heavy drinking by students in 18 countries. *Drug and alcohol dependence*, 2000, 60(3):315–8.
13. Liakos A, Madianos M, Stefanis C. Alcohol consumption and rates of alcoholism in Greece. *Drug and alcohol dependence*, 1980, 6:425–30.
14. Bloomfield K et al. International comparisons of alcohol consumption. *Alcohol research and health*, 2003, 27(1):95–109.
15. Stock C, Wille L, Kramer A. Gender-specific health behaviors of German university students predict the interest in campus health promotion. *Health promotion international*, 2001, 16(2):145–54.
16. Monneuse MO, Bellisle F, Koppert G. Eating habits, food and health related attitudes and beliefs reported by French students. *European journal of clinical nutrition*, 1997, 51(1):46–53.
17. Richmond R. Teaching medical students about tobacco. *Thorax*, 1999, 54:70–80.
18. Dekker HM et al. Prevalence of smoking in physicians and medical students, and the generation effect in the Netherlands. *Social science and medicine*, 1993, 36(6):817–22.
19. Tsouros A et al., eds. *Health promoting universities: concept, experience and framework for action*. Copenhagen, World Health Organization Regional Office for Europe, 1998.

Preventing leading causes of premature death, disease and disability

Many of today's and tomorrow's leading causes of death, disease and disability (cardiovascular disease, cancer, chronic lung diseases, depression, violence, substance abuse, injuries, nutritional deficiencies, HIV/AIDS/STI and helminth infections) can be significantly reduced by preventing 6 interrelated categories of behaviour, that are initiated during youth and fostered by social and political policies and conditions. These are: tobacco use; behaviour that results in injury and violence; alcohol and substance use; dietary and hygienic practices that cause disease; sedentary lifestyle; and sexual behaviour that causes unintended pregnancy and disease.

Source: WHO School and youth health website
(http://www.who.int/school_youth_health/en/)

Review

Immune thrombocytopenia in children with reference to low-income countries

A. Rehman¹

نقص الصفيحات المناعي لدى الأطفال في البلدان المنخفضة الدخل
عبد الرحمن

الخلاصة: نقص الصفيحات المناعي هو اضطراب حميد يزول تلقائياً. والمعطيات شحيحة حول حالة هذا الاضطراب ومعدل انتشاره في البلدان المنخفضة الدخل. وتستعرض هذه الورقة البحوث حول نقص الصفيحات المناعي مع المقارنة بين البلدان المنخفضة الدخل والمرتفعة الدخل. ويرتكز التشخيص عادة على تعداد كامل عناصر الدم ودراسة لطاخة من الدم المحيطي، وفي حالات منتقاة دراسة رشفة نقي العظم. ومعدل هدأة المرض عالية في كل من البلدان المنخفضة الدخل والمرتفعة الدخل، وتندر الإصابة بالنزف داخل القحف. وتتمثل المعالجة الموصى بها ببساطة بمراقبة الحالات ولاسيما عندما يكون تعداد الصفيحات أكثر من عشرة آلاف صفيحة في كل ملي متر مكعب. وإذا كان هنالك من حاجة للمعالجة فإن الستيروائيدات القموية هي الخيار الأكثر ملاءمة اقتصادياً.

ABSTRACT Immune thrombocytopenia is a benign and self-limiting disorder. Data about the condition and its incidence from low-income countries is limited. This paper reviews the research about immune thrombocytopenia, comparing low- and high-income countries. Diagnosis is usually based on complete blood count and peripheral smear and, in selected cases, bone marrow aspiration. The disease has a high remission rate both in high- and low-income countries and intracranial haemorrhage is rare. The recommended treatment is simply observation of cases, especially when the platelet count is $> 10\,000/\text{mm}^3$. If drug therapy is required, oral steroids are the most economical choice.

Thrombopénie immunologique chez les enfants : le cas des pays à faible revenu

RÉSUMÉ La thrombopénie immunologique est un trouble bénin et spontanément résolutif. Les données sur cette maladie et sur son incidence dans les pays à faible revenu sont limitées. Le présent article fait le point sur la recherche dans ce domaine, en comparant les pays à revenu faible et élevé. Le diagnostic repose généralement sur la numération sanguine complète et le frottis sanguin périphérique et, dans certains cas, sur la ponction médullaire. Le taux de rémission de la maladie est important dans les pays à revenu élevé et à faible revenu, et les hémorragies intracrâniennes sont rares. Le traitement recommandé est la simple observation des cas, notamment lorsque le nombre de plaquettes est supérieur à $10\,000/\text{mm}^3$. Si un traitement est nécessaire, les stéroïdes par voie orale constituent la solution la plus économique.

¹Paediatric Unit-II, Bahawal Victoria Hospital, Bahawalpur, Pakistan (Correspondence to A. Rehman: drarehman100@yahoo.com).

Received: 15/07/06; accepted: 18/12/06

Introduction

According to 2005 World Bank data there are 54 low-income countries in the world (i.e. gross national income US\$ 875 or less per capita) [1]. Providing equitable and cost-effective evidence-based management of noncommunicable diseases is a major challenge in such low-resource settings [1,2]. One such disease in children is immune thrombocytopenia (also called immune thrombocytopenic purpura or ITP), which is the most common acquired bleeding illness in children [3]. There is substantial discrepancy in the treatment of ITP among clinicians, even among high-income countries, who are likely to over-treat [4,5]. The treatment costs can be as high as US\$ 4700 per patient in high-income countries in spite of the benign nature of ITP [6].

The purpose of this paper is to review the research about ITP with a focus on low-income countries and comparison of the data from high-income countries, to help in designing cost-effective ways to manage the disease in low-income settings.

Definition and pathogenesis

ITP in children is usually a benign and self-limiting disorder. The American Society of Hematology defines it as an isolated thrombocytopenia with clinically no apparent associated conditions or no other cause of thrombocytopenia, such as HIV infection, systemic lupus erythematosus, lymphoproliferative disorders, myelodysplasia, agammaglobulinaemia or hypogammaglobulinaemia, drug-induced thrombocytopenia, alloimmune thrombocytopenia or congenital/hereditary non-immune thrombocytopenia [7]. Chronic ITP is the term used if the disease persists for over 6 months [8].

It is caused by an inappropriate response of the immune system usually following a

viral infection or immunization. In ITP the autoantibodies are directed against the individual's own platelets, resulting in increased Fc-mediated platelet destruction by macrophages in the reticuloendothelial system [3].

Incidence and epidemiology

The incidence of the disease in high-income countries is about 3–10 per 100 000 children per year below 16 years of age [8,9]. The exact incidence of the disease in low-income countries is unknown. A study in Nigeria showed that the overall prevalence was 0.005% of total hospital cases [10]. The percentage of children admitted due to ITP during the years 2003 and 2004 to the Department of Haematology/Oncology at the Children's Hospital in Lahore, Pakistan was 4.8%, out of which 69% cases were acute ITP [11]. The disease has rarely been described in Africa, which may be due to genetic or environmental factors, or it may simply be that physicians overlook this disease when making a diagnosis [12,13].

Kühne et al., from a high-income country, reported a history of infection preceding the disease in 60.2% of cases [14]. In high-income countries it may also follow a childhood vaccination [15]. Kühne et al., comparing Vietnamese with German and Swiss children found significant differences in history of infection preceding the onset of ITP between the Asian and European cohorts [16]. ITP seems to be characterized by a seasonal occurrence usually after acute viral infections [11,17,18].

Clinical features

The usual age range for presentation of ITP reported from Switzerland was 1–10 years [14]. Studies from low-income countries show an age range of 1.2–14 years

[11,19,20]. Kühne et al. did not find any difference in age or sex of presentation between the Asian and European cohorts [16]. In high-income countries both sexes are equally affected, whereas in the limited studies reported in low-income countries the female:male ratio varies from 2:3 to 1.9:1 [11,18–21].

The classical features in children from high-income countries include a sudden onset of excessive bruising, petechiae and or mucous membrane bleeding 1–4 weeks following a viral infection [3]. Fever, lethargy, weight loss, bone pains, joint pains, pallor, lymphadenopathy and hepatosplenomegaly are characteristically absent. Minimal splenomegaly occurs in about 5%–12% of symptomatic children [22,23] but marked splenomegaly is typically absent. The presentation from low-income countries is very similar [11,18–20]. Anaemia [24], splenomegaly and lymphadenopathy may be more common in low-income countries due to the high prevalence of nutritional deficiencies and infections, but no studies are available to confirm this.

Diagnosis

It is recommended by the American Society of Hematology that in a typical case only complete blood count (CBC) and examination of the peripheral blood smear are essential for the diagnosis [7]. The CBC demonstrates isolated and often profound thrombocytopenia. Platelets are normal or large but not giant in size with normal red blood cell morphology and normal white blood cell count and morphology. A study in Nigeria showed that 72% of ITP cases were severely anaemic requiring blood transfusion [10], which might be due to the high prevalence of iron deficiency in low-income countries [25] and associated blood loss from the disease process.

It has been established from studies in high-income countries that bone-marrow aspiration is only indicated if there is any doubt about the diagnosis [26,27], if steroids are to be given [4,5] or in infants with Down syndrome in whom thrombocytopenia may signal the development of megakaryoblastic leukaemia [28]. Other studies in high-income countries have shown that bone-marrow aspiration is not necessary in typical cases even if steroids are to be used [29–31].

Hassan et al. from Pakistan studied bone-marrow aspiration in children with ITP and found that, in addition to typical changes in megakaryocytic series in the bone marrow, a concomitant iron deficiency as well as mild to moderate megaloblastic changes were seen [21]. Kalim et al. from Pakistan concluded that it was necessary to do bone-marrow aspiration in every child with a typical presentation of ITP [19].

The American Society of Hematology does not recommend investigations such as antinuclear antibody, direct antiglobin antibody, HIV, mean platelet volume or reticulocyte counts for the routine work-up of acute ITP as these are not cost-effective and do not improve the diagnosis [7].

Differential diagnosis

There is long list of causes of thrombocytopenia in children both in high and low-income countries, such as congenital thrombocytopenias, acute leukaemia, aplastic anaemia and myelodysplastic syndromes, haemolytic-uraemic syndrome, and drugs such as quinine, cephalosporins and rifampicin. Infections that are endemic in certain areas of low-income countries, such as dengue fever [32], brucellosis [33], leishmaniasis [34], malaria, HIV [35] and viral hepatitis [36], can cause thrombocytopenia.

All the above-mentioned conditions have other characteristic clinical features in addition to thrombocytopenia. Jan studied the etiology of thrombocytopenia in children aged under 12 years at Peshawar, Pakistan, and found acute ITP was responsible for 32% of cases, aplastic anaemia for 24%, acute lymphoblastic leukaemia for 22%, lymphoma for 4%, haemolytic-uraemic syndrome for 4%, megakaryocytic hypoplasia for 3%, drug-induced thrombocytopenia for 3%, hypersplenism for 3%, neonatal thrombocytopenia for 2%, *Plasmodium falciparum* malaria for 2% and leishmaniasis for 1% cases of thrombocytopenia [37]. Ali et al. found that malaria was responsible for 27.0%, megaloblastic anaemia for 23.0%, bacterial infections for 13.5%, leukaemia for 13.5%, neonatal thrombocytopenia for 9.5%, ITP for 2.7%, disseminated intravascular coagulation for 1.4%, aplastic anaemia for 1.4% and upper respiratory viral infections for 8% of cases [38].

Outcome

In high-income countries 75%–90% of cases go into complete remission irrespective of the treatment given [39–41] and the reported mortality in ITP is 0.1%–0.5% [23,42]. In low-income countries the remission rate within 6 months is about 44%–100%, irrespective of treatment [11,19–21,43]. Female sex, insidious onset of the disease and preceding history of viral infection were features related to an increased chance of development of chronic ITP [18]. It is not generally life-threatening.

Intracranial haemorrhage & ITP

Intracranial haemorrhage is extremely rare in ITP. The majority of intracranial haemorrhage events in high-income countries

do not occur during the first few days after diagnosis. Intracranial haemorrhage has occurred in children even on treatment [44] and has no correlation with either the severity of bleeding symptoms or the platelet count [45].

Arya et al. from India reported intracranial haemorrhage in 8 cases (3.3%); 6 of these children had chronic ITP at the time of presentation with intracranial haemorrhage [46]. Only 2 children presented within 3 months of diagnosis of ITP. The mean interval from the onset of ITP to the development of intracranial haemorrhage was 1.9 months in these 2 cases with high mortality, despite the use of immunoglobulin therapy or high-dose corticosteroids in these patients. Other studies from low-income countries have not reported any cases of intracranial haemorrhage [11,37,43].

Management

There is a need to explain the clinical course of ITP to the parents of the affected child. It is important to restrict motor activities temporarily, to avoid contact sports, to avoid some procedures (e.g. dental extractions) and not to use certain drugs such as aspirin and ibuprofen which may worsen bleeding symptoms. It is advisable to attend the hospital in the case of an accident.

There is substantial discrepancy in the management of ITP among published guidelines from high-income countries [7,47]. According to the American Society of Hematology the best treatment is observation, except when the platelet count is $< 20\,000/\text{mm}^3$ with significant mucous membrane bleeding or $< 10\,000/\text{mm}^3$ with minor purpura [7]. Treatments used for acute ITP include intravenous immunoglobulin (IV Ig), steroids and anti-D immunoglobulin (anti-D Ig). The role of drugs is controver-

sial. These drugs only increase the platelet count but do not alter the clinical course of the disease [7].

The exact mechanism of action of IV Ig is unknown. IV Ig may be involved in occupying the Fc-receptors on reticulo-endothelial cells, resulting in survival of the opsonized platelets [23]. Another mechanism of action may be the presence of anti-idiotypic antibodies in the pooled IV Ig preparations which bind to circulating autoantibodies, rendering them ineffective for platelet opsonins, and may also suppress the B-cells that produce the offending autoantibodies [23].

The mechanism of action of glucocorticosteroids is thought to be multifactorial. They can increase vascular stability and increase platelet survival; an effect attributed to both decreased production of anti-platelet antibodies and decreased clearance of opsonized platelets [48].

The mechanism of action of anti-D Ig is said to be that anti-red blood cell antibody complexes bind to macrophage Fc-receptors and interfere with platelet destruction.

The limited number of studies done in low-income countries have shown that children with severe thrombocytopenia, particularly when the platelet count is between 10 000 and 20 000/mm³ [19,49], can safely be managed with "watchful waiting" without any specific therapeutic intervention. Chandra et al. from India compared the bleeding manifestations when the platelet count was < 10 000/mm³ and those between 10 000–20 000/mm³ and showed that in 76.6% of episodes with counts > 10 000/mm³ there was no or only cutaneous bleeding compared to 59.5% episodes of bleeding when the platelet count was < 10 000/mm³ ($P < 0.05$) [49]. Kalim et al. from Pakistan also advised a wait-and-see policy [19].

IV Ig is considered as the drug of choice according to the American Society of He-

matology, if needed [7]. A meta-analysis of corticosteroids versus IV Ig for the treatment of acute ITP showed that children treated with corticosteroids were 26% less likely to have a platelet count > 20 000/mm³ after 48 hours of therapy when compared with children treated with IV Ig [50]. Adverse effects of IV Ig are common (in 15% to 75% of cases) but generally mild. However, IV Ig is costly and may not be easily available even in high-income countries [51,52], as a result of growing indications for its use [53]. Hord and Grossman found that the cost of hospitalization was 3.5 times greater for patients on IV Ig as compared to steroids [54]. The current quoted cost in Australia of imported IV Ig is AUD 100 per gram [53]. The situation in low-income countries is worse; e.g. in India the price of IV Ig is US\$ 48–58 per gram, meaning that the cost of treating a child weighing 30 kg is about US\$ 2880–3480 [55]. Another treatment is anti-D Ig which is generally not as long-lived as IV Ig and cannot be used in Rh-D negative people. Furthermore, it aggravates anaemia, is also expensive and is not easily available in low-income countries.

O'Brien et al. from the United States of America analysed the costs and found that steroids are the drug of choice in low-income countries, if any drug is to be used, due to the high cost and problems in availability of IV Ig and anti-D Ig [56]. Uncontrolled studies done in low-income countries show that steroids are effective [10,13,19,20]. Although short courses of steroids in childhood ITP are not commonly associated with the side-effects of weight gain, sleep disturbance, hypertension and hyperglycaemia, careful monitoring is still needed. One very important issue is reactivation of tuberculosis (TB) while on steroids, as TB is endemic in many low-income countries. It is important to observe patients with evidence of previous infection with TB or who

live in areas where TB is endemic, for signs of reactivation of disease [57]. A recent meta-analysis of 6602 patients concluded that although TB occurred more frequently in patients receiving steroids than in the placebo group, the difference was not statistically significant [58]. It is better to rule out TB prior to starting steroids, if possible. Another drawback is that steroids may hide leukaemia, but it is very rare for a child to present with isolated thrombocytopenia in leukaemia.

The dose regimens include oral prednisolone 2 mg/kg/day or 60 mg/m²/day for 14 days, followed by a tapering dose and discontinuation on day 21 [59] or 4 mg/kg/day in 3 divided doses for 7 days, followed

by a 50% reduction in the dose in the second week, and then by a tapering dose and discontinuation on day 21 [60].

Conclusion

The data about ITP from poor countries, although very limited, resemble that from high-income countries. The best treatment is observation, except in cases with platelet count < 10 000/mm³, where steroids may be tried without any definite benefit. There is an urgent need to develop an ITP registry system to study the disease and to develop uniform cost-effective management protocols for the disease.

References

1. The World Bank [website] (<http://www.worldbank.org/>, accessed 20 January 2009).
2. Townsend Centre for International Poverty Research [website] (<http://www.bris.ac.uk/poverty/child%20poverty.html#abpov>, accessed 20 January 2009).
3. Rehman A. Acute immune thrombocytopenic purpura in children. *Turkish journal of hematology*, 2007, 28:41–8.
4. Bolton-Maggs PH, Moon I. Assessment of UK practice for management of acute childhood idiopathic thrombocytopenic purpura against published guidelines. *Lancet*, 1997, 350:620–3.
5. Vesely S et al. Self reported diagnostic and management strategies in childhood idiopathic thrombocytopenic purpura: results of a survey of practicing pediatric hematology–oncology specialists. *Journal of pediatric hematology/oncology*, 2000, 22:55–61.
6. Kumar M et al. Treatment, outcome, and cost of care in children with idiopathic thrombocytopenic purpura. *American journal of hematology*, 2005, 78:181–7.
7. George JN et al. Idiopathic thrombocytopenic purpura: a practice guideline developed by explicit methods for the American Society of Hematology. *Blood*, 1996, 88:3–40.
8. Mattia DD et al. Acute childhood idiopathic thrombocytopenic purpura: AIEOP consensus guidelines for diagnosis and treatment. *Haematologica*, 2000, 85:420–4.
9. Lilleyman JS. Management of childhood idiopathic thrombocytopenic purpura. *British journal of haematology*, 1999, 105:871–5.
10. Salawu L, Durosinmi MA. Immune thrombocytopenic purpura: 11-year experience in Ile-Ife, Nigeria. *African journal of medicine and medical sciences*, 2001, 30:99–103.
11. Ali AS et al. Idiopathic thrombocytopenic purpura—initial illness and subsequent behaviour. *Pakistan pediatric journal*, 2005, 29(2):93–9.

12. Gbadoe AD et al. Le purpura thrombopenique idiopathique de l'enfant en Afrique noire: a propos d'un cas au Togo [Idiopathic thrombopenic purpura in a child in black Africa: a case report in Togo]. *Santé*, 1998, 8:337-41.
13. Rasamoelisoa JM et al. Etude du purpura thrombopenique idiopathique dans deux services pediatriques de la ville d'Antananarivo [Study of idiopathic thrombopenic purpura in two paediatric services of Antananarivo city]. *Archives de l'Institut Pasteur de Madagascar*, 1999, 65:110-2.
14. Kühne T et al. A prospective comparative study of 2540 infants and children with newly diagnosed idiopathic thrombocytopenic purpura (ITP) from the intercontinental childhood ITP study group. *Journal of pediatrics*, 2003, 143:605-8.
15. Sanford R, Kimmel MD. Vaccine adverse events: separating myth from reality. *American family physician*, 2002, 66:2113-20.
16. Kühne T et al. Ethnicity and environment may affect the phenotype of immune thrombocytopenic purpura in children. *Pediatric research*, 2000, 48:374-9.
17. Gebauer E, Vijatov G. Idiopatska trombocitopenijska purpura u dece [Idiopathic thrombocytopenic purpura in children]. *Medicinski pregled*, 1998, 51:127-34.
18. Khan HA, Iftikhar S. Idiopathic thrombocytopenic purpura: experience at Department of Pediatrics, Mayo Hospital, Lahore, 1998-2001. *Pakistan journal of pathology*, 2002, 13:7-13.
19. Kalim M, Ali L, Khattak AA. Childhood idiopathic thrombocytopenia: clinical profile and management. *Journal of Postgraduate Medical Institute*, 2005, 19:101-5.
20. Bedri A, Abebe E. Idiopathic thrombocytopenic purpura (ITP) in Ethiopian children: clinical findings and response to therapy. *Ethiopian medical journal*, 1995, 33(2):75-81.
21. Hassan K et al. A comparison of clinico-haematological features in children and adults suffering from idiopathic thrombocytopenic purpura. *Journal of Pakistan Institute of Medical Sciences*, 1993, 4:214-7.
22. Souid A, Sadowitz PD. Acute childhood immune thrombocytopenic purpura. Diagnosis and treatment. *Clinical pediatrics*, 1995, 34:487-94.
23. Crow AR et al. Mechanisms of action of intravenous immunoglobulin in the treatment of immune thrombocytopenia. *Pediatric blood and cancer*, 2006, 47(5 Suppl.):710-3.
24. Yip R. The challenge of improving iron nutrition: limitations and potentials of major intervention approaches. *European journal of clinical nutrition*, 1997, 51:516-24.
25. Paracha P et al. Prevalence of anaemia in semi-urban areas of Peshawar, Pakistan: a challenge for health professionals and policy makers. *Journal of the Pakistan Medical Association*, 1997, 47(2):49-53.
26. Halperin DS, Doyle JJ. Is bone marrow examination justified in idiopathic thrombocytopenic purpura? *American journal of diseases of children*, 1988, 142:508-11.
27. Calpin C et al. Is bone marrow aspiration needed in acute childhood idiopathic thrombocytopenic purpura to rule out leukemia? *Archives of pediatrics & adolescent medicine*, 1998, 152:345-7.
28. Zipursky A, Poon A, Doyle J. Leukemia in Down syndrome: a review. *Pediatric hematology and oncology*, 1992, 9:139-49.
29. Dubansky AS, Boyett JM, Fallette J. Isolated thrombocytopenia in children with acute lymphoblastic leukemia: a rare event in a pediatric oncology group study. *Pediatrics*, 1989, 84:1068-71.
30. Jubelirer SJ, Harpold R. The role of the bone marrow examination in the diagnosis of immune thrombocytopenic purpura: case series and literature review. *Clini-*

- cal and applied thrombosis/hemostasis*, 2002, 8:73–6.
31. Klaassen RJ et al. Initial bone marrow aspiration in childhood idiopathic thrombocytopenia: decision analysis. *Journal of pediatric hematology/oncology*, 2001, 23:511–8.
 32. Karande S et al. Concurrent outbreak of leptospirosis and dengue in Mumbai, India, 2002. *Journal of tropical pediatrics*, 2005, 51:174–81.
 33. Al-Shamahy HA, Wright SG. A study of 235 cases of human brucellosis in Sana'a, Republic of Yemen. *Eastern Mediterranean health journal*, 2001, 7:238–46.
 34. Kafetzis DA. An overview of paediatric leishmaniasis. *Journal of postgraduate medicine*, 2003, 49:31–8.
 35. Scaradavou A. HIV-related thrombocytopenia. *Blood reviews*, 2002, 16:73–6.
 36. Shenoy R, Nair S, Kamath N. Thrombocytopenia in hepatitis A—an atypical presentation. *Journal of tropical pediatrics*, 2004, 50:241–4.
 37. Jan MA. Thrombocytopenia in children. *Journal of Postgraduate Medical Institute*, 2004, 18:353–8.
 38. Ali N et al. Thrombocytopenia: analysis of 415 patients. *Pakistan journal of pathology*, 2004, 15:143–6.
 39. Dickerhoff R, von Ruecker A. The clinical course of immune thrombocytopenic purpura in children who did not receive intravenous immunoglobulins or sustained prednisone treatment. *Journal of pediatrics*, 2000, 137:629–32.
 40. Gadner H. Management of immune thrombocytopenic purpura in children. *Reviews in clinical and experimental haematology*, 2001, 5:201–21, discussion 311–2.
 41. Ahmed S et al. Prognostic variables in newly diagnosed childhood immune thrombocytopenia. *American journal of hematology*, 2004, 77:358–62.
 42. Moser AM, Shalev H, Kapelushnik J. Anti-D exerts a very early response in childhood acute idiopathic thrombocytopenic purpura. *Pediatric hematology and oncology*, 2002, 19:407–11.
 43. Tancabelic J, Stout LA, Wetering J. Acute immune thrombocytopenic purpura in children and adolescents in South Dakota 1998–2004. *South Dakota journal of medicine*, 2005, 58:465–8.
 44. Butros LJ, Bussel JB. Intracranial hemorrhage in immune thrombocytopenic purpura: a retrospective analysis. *Journal of pediatric hematology/oncology*, 2003, 25:660–4.
 45. Iyori H et al. Intracranial haemorrhage in children with immune thrombocytopenic purpura. *Annals of haematology*, 2000, 79:691–5.
 46. Arya LS et al. Spontaneous intracranial hemorrhage in children with immune thrombocytopenic purpura. *Indian pediatrics*, 2002, 39:468–72.
 47. Sutor AH et al. Hämostasiologie: Akute postinfektiöse Immunthrombozytopenie im Kindesalter [Haemostasis: acute postinfection immune thrombocytopenia in infancy. In: Reinhard D et al., eds. *Leitlinien Kinderheilkunde und Jugendmedizin [Guidelines for paediatric and adolescent medicine]*. Munich, Urban and Fischer, 1999:23–7.
 48. Schultz Beardsley D, Nathan DG. Platelet abnormalities in infancy and childhood. In: Nathan DG, Orkin SH, eds. *Nathan and Oski's hematology of infancy and childhood*. Philadelphia, Saunders, 1998:1585–630.
 49. Chandra J et al. Bleeding manifestations in severely thrombocytopenic children with immune thrombocytopenic purpura. *Hematology*, 2006, 11:131–3.
 50. Beck CE et al. Corticosteroids versus intravenous immune globulin for the treat-

- ment of acute immune thrombocytopenic purpura in children: a systematic review and meta-analysis of randomized controlled trials. *Journal of pediatrics*, 2005, 147:521–7.
51. *Biological product shortages*. US Food and Drug Administration [website] (<http://www.fda.gov/cber/shortage/shortage.htm#cur>, accessed 20 January 2009)
 52. Boulis A, Goold S, Ubel PA. Responding to the immunoglobulin shortage: a case study. *Journal of health politics, policy and law*, 2002, 27:977–1000.
 53. *Review of the use and supply of intravenous immunoglobulins in Australia: a report by the Blood and Blood Products Committee, Australian Health Ministers' Advisory Council*. Adelaide, Australian Health Ministry, 2000.
 54. Hord JD, Grossman NJ. Intravenous corticosteroids versus intravenous gamma-globulin in the treatment of acute immune thrombocytopenic purpura. *Pediatric hematology and oncology*, 1993, 10:323–7.
 55. *What is IVIG or intra venous immunoglobulin?* CIDPUSA Foundation [website] (<http://www.cidpusa.org/ivig.html>, accessed 20 January 2009).
 56. O'Brien SH, Ritchey AK, Smith KJ. A cost–utility analysis of treatment for acute childhood idiopathic thrombocytopenic purpura (ITP). *Pediatric blood and cancer*, 2006, 48(2):173–80.
 57. Chrousos GP. Glucocorticoid therapy and Cushing syndrome. In: *emedicine*, updated on 6 December 2002 (<http://www.emedicine.com/>, accessed 20 January 2009).
 58. Conn HO, Poynard T. Corticosteroids and peptic ulcer: meta-analysis of adverse events during steroid therapy. *Journal of internal medicine*, 1994, 236:6–9.
 59. Buchanan G, Holtkamp C. Prednisone therapy for children with newly diagnosed idiopathic thrombocytopenic purpura. A randomized clinical trial. *American journal of pediatric hematology/oncology*, 1984, 6:355–61.
 60. Blanchette V et al. Randomised trial of intravenous immunoglobulin G, intravenous anti-D and oral prednisone in childhood acute immune thrombocytopenic purpura. *Lancet*, 1994, 344:703–7.

Report

Design and implementation of a hospital information system for the Palestine Red Crescent Society in Lebanon

L. Rossi,¹ E. Matera,¹ A. Hourani,² H. Yousef,³ V. Racalbutto,⁴ C. Venier⁴ and M. Osman²

تصميم وتشغيل نظام معلومات لمستشفيات جمعية الهلال الأحمر الفلسطيني في لبنان

لورنزا روسي، إنريكو ماتيريا، أشرف حوراني، حسن يوسف، فنشزو راكلوتو، شيارا فينير، محمد عثمان

الخلاصة: لقد تم تصميم نظام معلومات للمستشفيات التي تستقبل مزيحاً من الحالات مع تشغيله في مستشفيات جمعية الهلال الأحمر الفلسطيني بهدف دعم شبكة المستشفيات الفلسطينية في لبنان وتحسين صحة اللاجئين فيه. ويرتكز النظام على الجمع الروتيني للمعطيات الإدارية والسريية حول كل حالة إدخال، وباستخدام رموز تشخيصية مقبولة دولياً. وهو نظام مُحَوَّسَب سهل الاستخدام وبعد خطوة تمهيدية لتحسين إدارة المستشفى وسوف يسهم في تقييم جودة الرعاية. وهو نموذج مفيد لتطوير نظم المعلومات للمستشفيات في لبنان وفي بلدان الشرق الأدنى.

ABSTRACT A case-mix hospital information system was designed and implemented in Palestine Red Crescent Society hospitals in order to support the network of Palestinian hospitals in Lebanon and to improve the health of refugees in the country. The system is based on routine collection of essential administrative and clinical data for each episode of hospitalization, relying on internationally accepted diagnostic codes. It is a computerized, user-friendly information system that is a stepping-stone towards better hospital management and evaluation of quality of care. It is also a useful model for the development of hospital information systems in Lebanon and in the Near East.

Conception et mise en œuvre d'un système d'information hospitalier destiné au Croissant-Rouge palestinien au Liban

RÉSUMÉ Un système d'information hospitalier de type « case-mix » a été conçu et mis en place dans les hôpitaux du Croissant-Rouge palestinien afin d'aider le réseau des hôpitaux palestiniens au Liban et d'améliorer la santé des réfugiés dans ce pays. Ce système repose sur la collecte systématique de données administratives et cliniques essentielles correspondant à chaque épisode d'hospitalisation, en fonction de codes de diagnostic reconnus à l'échelle internationale. Il s'agit d'un système informatisé convivial qui va permettre d'améliorer sensiblement la gestion des hôpitaux et l'évaluation de la qualité des soins. Ce système constitue également un modèle utile pour la mise au point de systèmes d'information hospitaliers au Liban et au Proche-Orient.

¹Agency for Public Health, Lazio Region, Rome, Italy (Correspondence to L. Rossi: rossiquick@gmail.com; lrossi@unicef.org).

²Palestine Red Crescent Society, Lebanon Branch, Beirut, Lebanon.

³Independent Consultant, Lebanon.

⁴General Directorate for Cooperation for Development, Ministry of Foreign Affairs, Rome, Italy.

Received: 15/06/06; accepted: 27/11/06

Introduction

Approximately 400 000 Palestinian refugees currently live in Lebanon [1], displaced since the diasporas that followed the 1947 Arab-Israeli war, and the 1967 6-day war. Around 53% of registered Palestinian refugees still reside in 12 refugee camps scattered throughout the country, suffering critical problems with housing, water supply and sanitation [1]. A high rate of unemployment [2] binds their survival to a subsistence economy, dependant mainly on foreign remittances and international assistance.

Despite these difficulties, regional development and international aid have helped the refugee population in Lebanon reach a stage in the demographic and epidemiological transition similar to that of the host country [1,3]. Much of the support for the registered Palestinian population in Lebanon has been secured by the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA). Assistance to the refugee population is also provided by the Palestine Red Crescent Society (PRCS), whose Lebanon branch operates 6 hospitals in the country, as well as other health and social services.

In 1998, the working group on Palestinian refugees within the multilateral peace negotiations in the Middle East assessed the hospital care needs of Palestinian refugees, and advised that the existing gaps in care were a key humanitarian issue deserving urgent attention. As a result, UNRWA contracted renovated hospitals from PRCS, shifting bed-days from Lebanese private hospitals to a friendlier environment for refugees, and donors pledged to improve PRCS hospital performance. One issue raised by the international community was the need for health data to monitor the health status of Palestinian refugees and the health service activities provided.

Around much of the world, health information systems have been set up to provide routine data in support of a wide range of functions to improve quality of care. Service delivery, disease control, financial control, human and material resource management and the best allocation of limited resources, policy formulation, epidemiological analysis and performance profiling, all need the timely use of good quality data for effective planning and operation. More countries are now introducing standard nomenclature and classification systems, and organizing workshops on health statistics, data analysis and information use for programme managers and health planners. In the Near East as well, several national initiatives aimed at strengthening hospital information systems are in progress, such as those in Jordan [4,5], Syrian Arab Republic and Lebanon itself [6 and Najjar F, unpublished document].

In this paper we report on the process and achievements of a project designed to develop a case-mix hospital information system in PRCS hospitals, as a tool to improve the health care offered to the Palestinian community living in Lebanon.

Aim of the project

The objective of the project, which was funded by the Italian Cooperation (Ministry of Foreign Affairs), was to endow the PRCS hospital network with a computerized case-mix hospital information system and develop the necessary skills for using it, in order to make data available to PRCS and UNRWA alike. The ground was prepared so that data could be used for: describing hospital activity and the health needs of Palestinian refugees; improving hospital management and evaluating health care costs; and assessing and improving the quality of care.

- to review the existing means of recording hospital data, identifying gaps and needs at different levels of the hospital network;
- to define the most appropriate reporting tools;
- to decide about the coding system for different types of information to be collected;
- to define methods for data collection and processing, and acquire the requisite materials; and
- to organize educational programmes for data managers and users.

Preparatory phase

After investigating the existing resources and reaching a consensus on the features and requirements of the new system, a discharge summary was identified as an adequate tool for registering information on each hospital episode. This was a paper form containing a minimum essential data set regarding the

- to involve stakeholders in hospital information system programming;

Date of discharge تاريخ الخروج		Date of discharge تاريخ الخروج	
Name of doctor اسم الطبيب		Name of doctor اسم الطبيب	
Principal diagnosis التشخيص الأساسي			
Secondary diagnosis 1 التشخيص الثاني			
Secondary diagnosis 2 التشخيص الثاني			
Principal procedure التدخل الأساسي			
Date of principal procedure تاريخ التدخل الأساسي			
Other procedure (surgical or diagnostic): 1 تدخل آخر			
Other procedure (surgical or diagnostic): 2 تدخل آخر			
Attending physician's name and signature اسم الطبيب و التوقيع			
Name of center اسم المركز			

Figure 1 New discharge summary sheet used as frontispiece of the clinical file

hospitalization episode [7] (Figure 1). The discharge summary is divided into 3 sections related to hospital administrative data, patient sociodemographic characteristics and clinical information.

All information is written in full and coded. Diagnoses are coded using the International Classification of Diseases and related health problems, 10th revision (ICD-10), and surgical and major medical procedures through the Current Procedural Terminology Codes (CPT4) issued by the American Medical Association. These coding systems have been adopted to align PRCS with the current Lebanese Ministry of Health Information System.

A Franco-Lebanese software engineering company was contracted to design the software database, to install it in all hospitals and to train PRCS personnel in using it. The software is a Microsoft *Access* database, simple to manage, user-friendly and compatible with most statistical analysis software or databases.

The training of PRCS staff at local universities was pivotal to implementing the information system. Administrative staff in charge of data entry were trained in computer and database use, selected medical staff received a 6-month training on coding clinical information and managing the information system and the PRCS project coordinators attended postgraduate training in data management and analysis for epidemiological and evaluative research.

All hospitals were equipped with a computer, printer, new clinical files and ICD-10 manuals.

The personnel in charge, identified among staff already employed by PRCS, carried out the new duties during working hours without any additional compensation, in order to streamline the project into ordinary tasks, and to set up the conditions

for its sustainability at the end of the Italian support. The only incentive provided was in the form of training courses and educational materials.

Utilization phase

The second phase concentrated on:

- testing and using the system;
- developing data dissemination and feedback mechanisms; and
- summarizing the results and discussing them with the relevant stakeholders.

On 1 July 2003, all hospitals started filling in the discharge summary for every episode of discharge, and entering the information in the database. At admission of the patient, the staff member compiles the administrative and demographic sections of the discharge summary. At patient discharge, the trained medical staff member reports and codifies the diagnoses and procedures. Thereafter, the clinical files are returned to the administration office, where data are entered in the database at one time, within a few days after patient discharge.

Weekly visits by the IT supervisor aimed to ensure that all paper files were computerized in a timely manner and that errors and inconsistencies were corrected before the data were transferred electronically to the central computer at PRCS headquarters.

During the first 6 months of the new information system, the database was updated and modified numerous times to respond to unplanned requirements that arose from its utilization.

Data were analysed locally to produce reports for the medical directors, and transmitted monthly to PRCS headquarters in Beirut. The IT director, under the supervision of the medical coordinator, performed additional quality control at headquarters.

In June 2004, the system was running in all the PRCS hospitals and was able to

produce, as planned, routine information on PRCS hospitalization.

Outcome of the project

All project activities were completed in 2 years, relying on a local budget of about US\$ 100 000. The budget paid for training courses, local personnel and equipment, such as computers and software and educational materials (42%, 26% and 32% respectively). Despite the limited resources available, the project succeeded in developing and completing a simple yet functional system, and hopefully in fostering PRCS self-trust, taking into consideration that most government-operated hospitals in Lebanon still do not have a computerized information system.

In October 2004, a 1-year PRCS hospital activity report was produced with the data collected, and presented at a seminar held at UNRWA headquarters in Beirut; the report is currently available online [8].

PRCS and UNRWA have also initiated talks to evaluate the possibility of basing reimbursement on the periodical release of data. This would make referral and reimbursement procedures more transparent, a goal repeatedly expressed in the proceedings of the conference on humanitarian needs of Palestine refugees held in Geneva in June 2004 [9] and in the UNRWA medium-term plan 2005–09 [10] “to ensure that rational referral practices are adequately followed and implemented and that statistics on service utilization—actual durations of stay or types of procedures actually performed—are not inflated or under-reported”. It would also make available to UNRWA information useful for epidemiological research: “improving UNRWA hospital management information systems and strengthening linkages with contracted hospitals in order to improve information exchange and feed-

back on refugee patients treated in these hospitals”.

In this light, holding the seminar at UNRWA headquarters in Beirut represented a positive step toward improving the synergy between the 2 organizations.

Description of hospital activity and the health needs of Palestinian refugees

The system routinely generates individual data on all patients discharged from PRCS hospitals since July 2003. The analysis published in the above-mentioned report [8], although not the direct aim of this paper, shows the potential of the information system in describing the health services provided by the PRCS hospital network, both to external partners and to PRCS managers. More detailed analyses may address specific areas of care, in response to different information needs.

Improving hospital management and evaluation of health care costs

Individual hospital directors have started producing reports and bringing them to the attention of the PRCS Scientific Committee regular meetings, to substantiate the requests related to resource and budget allocation. A good collaboration has emerged in some hospitals between clerks who manage the data and produce the reports and hospital directors who ask for specific information.

Moreover, following the implementation of the system, a project was financed by the Humanitarian Office of the European Commission and carried out by the Dutch Red Cross, with the aim of improving the financial sustainability of the PRCS hospital network through strengthening its hospital management. Three information systems have been created to audit the costs of hospital and ambulatory care, as well as the drug procurement cycle, and these have been based on the individual hospitaliza-

tion records (except the one on ambulatory care). The project has been refinanced and is still running.

Assessing and improving quality of care

The process of evaluating quality of care and developing good practice guidelines adapted to the local context, as already started in PRCS hospitals, has continued on request of PRCS with the methodological support of an Italian nongovernmental organization. The data collected by the hospital information system serve as baseline information for the selection of areas of care that need to be evaluated.

Discussion

We can consider the health context of Palestinian refugees in Lebanon as a microsystem where PRCS is one health care provider and UNRWA is the health agency or the commissioner; in such a scenario, the need for financial and performance accountability to ensure appropriate allocation of funds and quality of care becomes a priority [11]. Therefore, endowing the organization with such a tool enables it to describe and report the hospital services delivered, to evaluate the quantity and quality of care and to plan interventions to correct inefficiencies and minimize adverse outcomes.

Epidemiological profiling and comparability

The information collected by the system is easy to retrieve, ready to analyse and, thanks to the use of internationally accepted diagnostic codes, offers the chance to compare PRCS hospital data with those collected elsewhere.

Such data allow analysis of the supply side, i.e. the "offer" of secondary care. If additional data on Palestinian hospitalizations reimbursed by UNRWA and

treated by different providers in Lebanon are pooled with PRCS data, they can be used to estimate hospitalization rates and to describe the demand for secondary care among Palestinian refugees.

For those conditions for which hospitalization is a good proxy of disease-specific morbidity (e.g. hip fracture) they also allow epidemiological profiling of the hospitalized refugee population, and comparability among hospitals and geographic areas of residence.

Fostering hospital management

A basic hospital information system registering individual discharges represents a stepping-stone for the development of linked information systems, which together build up a management information system. Such a system allows cost analyses, quality standards protocols, patient referral systems, rationalization of expenses for drugs and acquisition of new technologies, and inventories of vehicles and equipment. Worldwide, information systems are thus becoming a core focus of hospital administration in district and regional health authorities.

In this framework, PRCS doctors and managers should continue to update and strengthen their capacity in terms of statistical analysis and epidemiology and health services research in order to exploit the full potential of the new system. PRCS staff participation in postgraduate and training courses together with their counterparts at Lebanese Ministry of Health level gave them a chance to feel part of the system, addressing their sense of exclusion and hopefully boosting their morale and self-trust.

Promote performance and financial accountability, and improve quality of care

Health systems around the world face increasing pressures to provide health services effectively, efficiently and equitably.

Promoting performance accountability is often considered one way to improve quality of care, and reliable information systems are needed to measure service output and to design performance indicators and benchmarking comparisons among wards and hospitals [12].

Moreover, as hospital care is becoming a major budgetary item of total health expenditures in many countries, financial accountability acquires more relevance, particularly in the context of limited resources. Hospital information systems can also allow the shift to payment systems that maximize efficiency, quality of care, equity and consumer satisfaction [13], rather than per-day or fee-for-service payments, and eventually to remunerate hospitals according to case-mix.

The fact that PRCS is contracted by UNRWA is particularly relevant; their latest report in 2004 stressed that "morbidity statistics were collected for the first time in 2003 and their validity might be questioned because the hospital discharge notes are in many instances inadequate, which makes it difficult to classify morbidity conditions in the categories to which they belong" and concluded, among others, that "improving UNRWA hospital management information systems and strengthening linkages with contracted hospitals in order to improve information exchange and feedback on refugee patients treated in these hospitals" is the future direction to follow [14].

The new information system is running in all PRCS hospitals and generates case-mix information; having being operational only for a short time, it needs attentive maintenance and consolidation to continue to be reliable and fully exploited.

The new system represents a smart model of a fully computerized case-mix information system for the Lebanon health care sector. In the context of a refugee popu-

lation living in disadvantaged conditions, such a system may foster PRCS self-trust and contribute to sustaining the social capital of the organization as well as supporting capacity building, and it represents a potential milestone for hospital management development [15].

However, in this phase the system is not yet fully integrated within the hospital management nor is it fully exploited by PRCS directors, and does not substitute for all registration forms.

Lessons learned

We believe that the effort in training health managers and medical directors to make use of the data should go in parallel with the implementation of the information system. The main risk is to keep in place an under-used system which constitutes a burden for data-entry staff and managers, with no benefits for the organization and that produces poor quality data.

The mutual and self-reinforcing relationship between quality of data and its utilization is well acknowledged. It is mandatory that data be used at all levels, from hospital wards and departments to medical directors at headquarters, to satisfy information needs and to promote clinical governance. It is also strategic for supporting capacity-building that information is shared among all stakeholders, and that indicators of activity are fed back to data managers, if the value and potential of these are to be fully appreciated and exploited.

Moreover, once the system is routinely used, updates will be required by hospital managers, as happened during its development; therefore the system needs continuous maintenance and attention.

Finally, we believe that the flexibility and essential features of the system allowed it to be adapted to the new information need when the Dutch Red Cross programme was

initiated, in addition to guaranteeing its sustainability.

Future directions

Other aid projects have been recently be funded to support PRCS to focus on the implementation of different information systems (centred on the individual patient file) to document specific aspects of PRCS hospital activity; others are concentrating on improving areas of hospital care identified through the analysis of data generated by the system. This may suggest that the intrinsic value of the new system has been recognized and is making a positive impact.

Though the achievements of the project over 2 years are encouraging, the analysis and use of the data collected is not yet routine. External partners or *ad hoc* experts must continue their technical support to PRCS to ensure a continuous strengthening of the system and its streamlining into current activities, until a culture of information is created at the managerial level.

Acknowledgements

We would like to thank Elham Yaacoub and Dr Salah Al Ahmad at PRCS for their continuous support and collaboration in all project activities in Lebanon.

References

1. *Report of the Commissioner-General of the United Nations Relief and Works Agency for Palestine Refugees in the Near East. General Assembly official records, sixtieth session, Suppl. No. 13.* New York, United Nations, 2005 (A/60/13).
2. Madi HH. Infant and child mortality rates among Palestinian refugee populations. *Lancet*, 2000, 356:312.
3. *Lebanon: economic and social rights of Palestinian refugees: submission to the Committee on the Elimination of Racial Discrimination.* Lebanon, Amnesty International, 2003 (MDE 18/017/2003).
4. Abubaker W, Abdulrahman M. Quality assurance guides health reform in Jordan. *Q.A. brief*, 1996, 5:19–21.
5. Rawabdeh AA. Health care cost containment strategies: the Jordanian experience. *International journal of health planning and management*, 2005, 20:53–66.
6. Van Lerberghe W et al. Reform follows failure: I. Unregulated private care in Lebanon. *Health policy and planning*, 1997, 12:296–311.
7. *Developing health management information systems. A practical guide for developing countries.* Manila, World Health Organization Regional Office for the Western Pacific, 2004.
8. Othman M et al. *The new PRCS hospital information system in Lebanon. Report of one-year hospital activity.* Beirut, Italian Cooperation, 2004 (http://www.asplazio.it/asp_online/att_ospedaliera/files/files_valutazione_esterna/san_internaz/rapporto_libano.pdf, accessed 17 November 2008)).
9. Conference on humanitarian needs of Palestine refugees convenes at Geneva. In: Committee on the Exercise of the Inalienable Rights of the Palestinian People (CEIRPP). *Bulletin on action by the United Nations system and intergovernmental organizations relevant to the question of Palestine.* May–October 2004, Volume XXVII, Bulletin No. 2 (<http://domino.un.org/unispal.nsf/bb6fe1e72803131885256c380071d04c/02855ed4ed05a4dc85256fe30056930b!OpenDocument>, accessed 16 January 2009).

10. UNRWA: *medium term plan (MTP) 2005–2009. A better future for Palestinian refugees*. Gaza, United Nations Relief and Work Agency for Palestine Refugees in the Near East, 2005 (<http://www.un.org/unrwa/news/mtp.pdf>, accessed 16 January 2009).
11. Abramson WB. Monitoring and evaluation of contracts for health service delivery in Costa Rica. *Health policy and planning*, 2001, 16:404–11.
12. Brinkerhoff DW. Accountability and health systems: toward conceptual clarity and policy relevance. *Health policy and planning*, 2004, 19:371–9.
13. Roger France FH et al. *Case mix: global views, local actions. Evolution in twenty countries*. Amsterdam, IOS Press, 2001 (Studies in Health Technology and Informatics, Vol. 86).
14. *Review of hospital services (policies, utilization trends and cost-analysis)*. Gaza, Health Department, United Nations Relief and Work Agency for Palestine Refugees in the Near East, 2004.
15. Shaw C. *How can hospital performance be measured and monitored?* Copenhagen, WHO Regional Office for Europe, 2003 (Health Evidence Network report) (<http://www.euro.who.int/document/e82975.pdf>, accessed 6 August 2008).

Management Effectiveness Programme

The Management Effectiveness Programme (MEP) is an evolving system of management practices, tools, roles and training methods adapted from various fields for creating quality health systems to improve the health of the population. The MEP is intended to be an integral part of the national health systems development and improvement efforts of the country. It focuses on the development of selected sites, which could be a health district, hospital, laboratory, health departments at national or peripheral levels, etc.

The MEP supports site health leaders and their teams in identifying weaknesses in their system and developing their capacity to improve their management processes and practices. The MEP is designed to integrate the fundamental principles of quality management into the management practices and processes of the national health system.

The main strategy for implementing the MEP combines a learning technology in the form of core modules with a systems and roles development approach for each site. Further information on MEP is available at: <http://www.emro.who.int/mei/mep/>

Report

Developing a holistic accreditation system for medical universities of the Islamic Republic of Iran

A. Yousefy,¹ T. Changiz,¹ N. Yamani,¹ R.H. Zahrai² and S. Ehsanpour²

إنشاء نظام اعتماد شمولي للجامعات الطبية في جمهورية إيران الإسلامية
علي رضا يوسفی، طاهره جنکیز، نیکو یامانی، روشنک حسن زهراي، سهیلا احسانپور

الخلاصة: تصف هذه الورقة خطوات إنشاء نظام اعتماد للجامعات الطبية في الجمهورية الإسلامية الإيرانية. وقد عمل البرنامج الوطني للاعتماد في الفترة 2001-2005 بدعم من الحكومة، وتم تنفيذه في ثلاث مراحل رئيسية، تتضمن كل مرحلة منها عدداً من المهام. وبعد مراجعة النشريات العالمية حول الاعتماد، وبعد الحصول على إجماع وطني، أعدت معايير وطنية مؤسسية للاعتماد، تتضمن 95 معياراً و 504 مؤشرات تتوزع على عشرة مجالات؛ فإذا حققت الجامعات الطبية الإيرانية هذه المعايير الوطنية المقبولة، فإنها ستؤدي دوراً هاماً في تعزيز أداء النظام الصحي.

ABSTRACT This report describes the steps in the development of an accreditation system for medical universities in the Islamic Republic of Iran. The national accreditation project, supported by the government, was performed from 2001 to 2005. The project was carried out in 3 main phases, each phase including a number of tasks. After a review of the international literature on accreditation and through national consensus, a set of national institutional accreditation standards was developed, including 95 standards and 504 indicators in 10 areas. By complying with accepted national standards, Iranian medical universities will play an important role in promoting health system performance.

Élaboration d'un système d'accréditation global des facultés de médecine de la République islamique d'Iran

RÉSUMÉ Ce rapport décrit le processus l'élaboration d'un système d'accréditation des facultés de médecine en République islamique d'Iran. Le projet national d'accréditation a été réalisé de 2001 à 2005 avec l'aide du gouvernement. Il s'est déroulé en trois phases principales, chacune impliquant un certain nombre d'opérations. Après examen de la littérature internationale sur l'accréditation et grâce à un consensus national, un ensemble de normes nationales d'accréditation institutionnelle comprenant 95 normes et 504 indicateurs dans 10 domaines a été mis au point. En respectant les normes reconnues au niveau national, les facultés de médecine iraniennes joueront un rôle important dans le bon fonctionnement du système de santé.

¹Medical Education Research Centre; ²Nursing and Midwifery School, Isfahan University of Medical Sciences, Isfahan, Islamic Republic of Iran (Correspondence to N. Yamani: yamani@edc.mui.ac.ir).

Received: 29/07/06; accepted: 20/12/06

Introduction

In recent years there has been a rapid growth in the number of higher education institutions worldwide and in the variety of disciplines. Meanwhile, quality assurance and improvement, and maintaining this quality across different dimensions, have been a growing concern for both educators and governments. Moreover, shifts in attitudes and expectations in society have forced higher education to move toward establishing evaluation systems that are able to report the quality of the infrastructure, processes and outcomes.

The most critical issue for these systems is to identify the characteristics and indicators of quality in higher education. Quality in higher education was traditionally determined more by implicit perceptions of institutional reputation and characteristics than by explicit evidence of outcome and achievements [1]. Nowadays quality is defined in many ways, such as "fitness for purpose", "meeting the expectations of the consumer" or "satisfaction of clients" [2]. Quality should be measured across all parts of the institution or educational programme: input, process and output.

Accountability is another issue which requires that universities are responsible for their action and products (outcome), and hence, they have to accept external evaluation. There has been some resistance toward external evaluation of universities, who wish to protect their academic freedom and institutional autonomy. But the public's expectation of guarantees about the quality of the graduates on the one hand and the needs of universities for financial support on the other hand, compels universities to explore practical and effective ways to assure the community of their quality.

Measuring the quality of an educational institution is a difficult task, in terms of

determining both what to measure and how best to measure it. Different evaluation models have been considered. Accreditation as a means for quality assurance has been highly approved and used by many educational institutions in different countries. In medical education, it is used as an evaluation model which provides support for continuous quality improvement in medical education and safeguards the medical profession [2]. Also, accreditation preserves long-held educational values of quality improvement and self-regulation while simultaneously addressing society's needs for accountability and quality assurance [3]. Accreditation is defined as "a process of external quality review used by higher education to scrutinize colleges, universities and educational programmes for quality assurance and quality improvement" [1].

Accreditation may be applied to institutions or programmes. Programme accreditation focuses on the individual programme's requirements to ensure the quality of inputs, process and output of the programme (for example, an internal medicine residency programme). In contrast, institutional accreditation considers the whole institution as an integral system and deals with the standards of system integrity and quality [4,5].

The task of specifying standards or guidelines is central to the accreditation process. Standards constitute a new framework against which universities can measure themselves, and the accreditation of the educational institution can be initiated [6]. The accreditation framework and process must be in accordance with the political and operational structure of the government, in order to make it practicable. One of the most important elements of the reform process is adoption of national standards, which is a stage towards establishing a national accreditation system.

Medical schools in the Islamic Republic of Iran

Although there are several well-established accreditation systems for individual programmes (mainly postgraduate residency programmes) in the Islamic Republic of Iran, the unique characteristics of medical schools in our country forced policy-makers to seek national standards for institutional accreditation of the schools. These characteristics include:

- A rapid increase in the number of medical schools. In recent decades these rose from 13 in 1979 to 48 in 2006 [7,8].
- The dominance of the public sector in the medical education system. There are 38 medical schools affiliated to government-controlled universities, while the others are private.
- A centralized educational curriculum. All medical schools follow a curriculum developed by the Iranian Ministry of Health and Medical Education (MOHME) [8].
- Unique responsibilities for community health. Since 1985 the Iranian universities of medical sciences were merged with MOHME. This integration made the universities of medical sciences responsible for all educational, research and health service activities in each province of the Islamic Republic of Iran [9].

Due to these factors, as well as the rapid growth in the number of medical universities and educational programmes in recent decades, establishing an accreditation system was an essential but challenging task. Quality assurance of higher education institutions in the Islamic Republic of Iran could no longer rely on governmental supervision and control. Hence, the undersecretary for education at MOHME called for an institutional

accreditation project to design an accreditation system in accordance with the local situation of the Islamic Republic of Iran.

Phases of the project

The accreditation project in the Islamic Republic of Iran was a national project, supported by the undersecretary for education of MOHME and performed from 2001 to 2005. A national taskforce established at the Educational Development Centre of Isfahan University of Medical Sciences initiated the project, and took charge of performing the project's tasks and leading the main activities.

The project design was based on 5 main guidelines for the development of an accreditation system: setting the standards; establishing the accreditation body; setting a plan of action; starting self-assessment accreditation; and implementing and maintaining accreditation [10].

We outline here the 3 main phases of the project, each phase performed through a number of tasks.

Phase 1: principles of standard setting

Phase 1 was performed through 3 main tasks: developing an operational definition of institutional accreditation; establishing guiding principles for standard setting; and defining and determining the areas to be included in the accreditation.

In order to perform the first task, several study groups participated in reviewing the history of accreditation, accreditation procedures and accreditation standards in different countries [10–17]. Then, after differentiating between the domains of programme accreditation and institutional accreditation, the project focused on institutional accreditation. Finally, using these

sources and an extensive literature review and also through consultation with international experts in accreditation, the following subjects were chosen to be considered in developing institutional accreditation: medical universities' performance in accordance with their mission and goals; inputs of medical universities; the process of medical universities; the potentials of medical universities; national and scientific values; the efficiency of medical universities; and the integration of activities in medical universities.

In performing the second task, the researchers developed the principles of standard setting. The goal of this task was to consider national requirements and social values in this process.

The third task was defining the different areas of accreditation. During focus group discussions and consultation with experts, it was decided to nominate 10 accreditation areas similar to the ones in other countries and accreditation organizations: (1) Mission and goals; (2) Management; (3) Resources and facilities; (4) Staff education; (5) Continuing education of graduates; (6) Faculty members; (7) Students' services; (8) Research; (9) Student education; (10) Clinical education. Each area of accreditation included a number of standards and, to make the standards understandable, applicable and measurable, a number of indicators were presented under each standard. The suggested standards and indicators were designed to ensure that the accredited university has appropriate purposes; has the resources necessary to accomplish its purposes; and will continue to accomplish them. Each standard requires that the institution assess its degree of effectiveness in each area covered by the standard and use the result of that assessment to improve and enhance the institution's ability to meet its mission [5].

Phase 2: setting the standards

Phase 2 included 2 main tasks: setting the standards and indicators; and defining assessment methods for the standards.

For the first task, the standards, and the indicators within each standard, were compiled using the viewpoint of experts, educators and stakeholders in each area. This was facilitated by researching standards compiled by institutional accreditation bodies in other countries [10–17], and international standards, such as those of the World Federation for Medical Education [6,18]. In the end, 95 standards and 504 indicators in the 10 areas (defined above) were compiled.

The second task was defining the assessment method for each indicator. The aim was to provide the universities with clear tasks for self-assessment and documentation, and to prepare a specific and objective tool for external evaluators.

No field testing has been done so far to explore the relevance and applicability of the proposed standards and indicators but the national consensus process (outlined next) helped to make the standards and indicators clear and applicable.

Phase 3: national consensus

Phase 3 of the project was to build a national consensus. The standards and related indicators were sent to 1171 experts in 40 medical universities throughout the country; experts in each area of accreditation commented on the standards and indicators in that area. The educational development centre in each university was responsible for distributing and collecting the questionnaires in that university. In total, 445 people returned the completed questionnaires. Based on the results of the consultation, some standards and indicators were revised, some were deleted and some were reclassified: the

indicators which received more than 75% agreement on being a "must" standard were put under this category and the rest under the "should" category. The use of the word "must" indicates that the compliance with the standard is absolutely necessary to achieve the accreditation status. The word "should" indicates that meeting the standard is expected unless there are circumstances that obstruct full compliance.

Some of the indicators that were deleted after the national consensus were:

- "The amount of technical and scientific services by faculty members is determined." (This indicator was under the area: Faculty members).
- "The student representatives take part in planning for examinations." (Student education).
- "The role of advisors, faculty educational councils and the university educational council in educational decision-making is clear." (Student education).

Some of the standards that were added after the national consensus were:

- "There is easy access to teaching media and equipment in classrooms." (Resources and facilities).
- "Students are properly informed of by-laws regarding student violations." (Student services).
- "Ethical rules are considered in performing autopsies." (Clinical education).

The product of this final revision was 505 indicators under 95 standards in 10 areas of accreditation (some indicators were deleted and some were added so that the number of indicators and standards did not change during this process). A sample of the standards and indicators is shown in Table 1.

Two factors were important for obtaining institutional support for the initiative from the different faculties, who are the real stakeholders in the project. One of these was

national consensus-building which acted by informing faculties of the accreditation philosophy and process as well as obtaining their support and cooperation. Also, the focus of some national meetings, such as medical education congresses, was on accreditation, which reinforced the initiative. The other factor is that the educational system in the Islamic Republic of Iran is mostly centralized, and all medical universities, despite having some autonomy, are obligated to follow MOHME regulations. As the accreditation questionnaires were distributed by MOHME, the universities felt obligated to comply. So, both obligation and encouragement were applied for obtaining support.

National Commission for Accreditation

After approving the accreditation standards, the Higher Council for Medical Sciences Planning, which acts under MOHME, developed the necessary by-laws for establishing a National Commission for Accreditation, and defining its position, membership and responsibilities.

The secretariat for the Commission was agreed to be within MOHME, and the members were assigned as follows: 10 members from under-secretaries and managers of MOHME as well as the secretaries of specialty and basic sciences councils; 3 members from university chancellors; and 5 university faculty members who are expert in the field of accreditation. The under-secretary for education heads the Commission. The faculty members and university chancellors are selected for a period of 2 years.

Some of the important responsibilities of the Commission are: developing new accreditation standards; continuous review-

Table 1 Sample indicators for each area of accreditation in the Iranian national accreditation system for medical universities (illustrating 1 sample standard for each area and 1 sample indicator under each standard, with their relevant codes)

Area		Standard (sample)		Indicator (sample)	
A2	Mission and goals	S1A1	The mission and goals of the university and its units are clear and announced.	I1S1A1	There are written long-term and short-term objectives for the university and its units.
	Management	S6A2	There is a proper system for performance evaluation of staff.	I1S6A2	The evaluation forms are in accordance with staff job descriptions.
	Resources and facilities	S6A3	There is proper physical space in the schools of the university.	I1S6A3	The number of classes is sufficient for the number of students and course units presented.
A4	Staff education	S3A4	There is a proper programme for staff education.	I1S3A4	Educational programmes are designed according to the needs assessment of the staff (based on personal and institutional priorities).
A5	Continuing education of graduates	S3A5	There are suitable continuing education programmes for the medical community.	I4S3A5	There is a continuous evaluation system for continuing education programmes and its results are applied for improving the programmes.
A6	Faculty members	S3A6	There is an appropriate system for evaluating and promoting faculty members.	I1S3A6	The annual evaluation of faculty members is performed by students and administrators based on specific criteria and through specified procedures.
A7	Student services	S1A7	The necessary services are provided for students.	I7S1A7	Appropriate sociopsychological counselling is provided for students.
A8	Research	S1A8	The research activities are properly planned, managed and monitored.	I3S1A8	There are long-term and short-term programmes in the institution for promoting the quality of research.
A9	Student education	S2A9	Appropriate and active teaching methods are supported.	I1S2A9	Teaching methods workshops are run regularly in the institution.
A10	Clinical education	S5A10	The hospital clinics are appropriate for education.	I1S5A10	Outpatient files are accessible for education and research.

ing of accreditation standards and making necessary revisions; developing necessary by-laws for institutional accreditation; selecting competent faculty members for visiting teams; providing necessary education for the visiting teams; and helping medical universities in performing self-assessment.

The Commission will undertake its tasks by forming affiliated committees and also by delegating some tasks to the major universities. The main responsibilities of the Commission will be supervising the committees and approving by-laws and necessary rules. The decisions of the Commission will be communicated as for other decisions made at the ministry level.

The implementation process has already been started by establishing the Commission. The mode of implementation depends on the decisions of the Commission, but it has already planned educational workshops about the accreditation process for reviewers and professionals at the institutional level, which in turn can lead towards the institutionalization of accreditation in higher education.

Discussion

By developing national accreditation standards and indicators, this project aimed to propose a sound system for institutional accreditation designed to strengthen and sustain the quality and integrity of Iranian higher education institutions while making them worthy of public confidence.

The extent to which each educational institution accepts and fulfils the responsibilities inherent in the process of accreditation is a measure of its concern for quality in higher education and its commitment to achieving excellence in its endeavours [14]. Investigating the established accreditation process in other higher education institutions shows that the accreditation commission in those institutions has defined

accreditation standards to assist both the institution and accreditation organization in defining institutional quality and educational effectiveness and in promoting the development and sharing of practices leading to the improvement of quality [5, 12].

Moreover, studying the areas and criteria of accreditation set by other institutions shows that most of them use similar areas approved by this project. For example, the Australian Medical Council proposed 10 main standards for accrediting basic medical education, 6 of which are the same as the accreditation areas in the present project and 4 of which are mainly concerned with programme accreditation [15]. The Southern Association of Colleges and Schools in the United States of America (USA) has considered accreditation standards in 8 main areas including: Mission; Governance and administration; Institutional effectiveness; Educational programmes; Faculty; Learning resources; Student affairs and services; and Resources [11]. These areas are almost the same as in the present project.

Another aspect of this project was developing indicators under each standard and specifying the method for measuring or determining the degree of fulfilment of each indicator, which can be used by the institution itself or the accreditation body. Some other accreditation organizations, such as the Western Association of Schools and Colleges in the USA, have identified guidelines for accreditation criteria that identify expected forms or methods of demonstrating performance [12]. However, many accreditation organizations have no specific indicators for demonstrating each standard or any guidelines to explain the method of assessing each criterion or standard. So, a unique feature of the standards developed by this project was identifying the indicators under each standard in each area and specifying the method of assessing

each indicator. By doing this, the institutions under review will not need to apply for interpretation of each standard. They will be able to go through a self-assessment review on their own and with minimal assistance from the accrediting body.

Another feature of the standards in this project was that they were designed to be relevant to the context of the Islamic Republic of Iran, such as the standards meeting the regulations made by MOHME concerning continuing education of graduates and its management, educational facilities (especially appropriate and adequate physical space), and specific policies in the management area.

Any accreditation system has to be adjusted to the economic and political structures of the society in which it will be used as well as the universities' management policies. Hence it should be noted that there were some limitations on the researchers' proposals for the National Commission for Accreditation. First, as the educational system in the Islamic Republic of Iran is centralized and all universities are either government-run or act under its regulations, specific members had to be considered for this Commission such as the minister, the under-secretary for education and so on. Secondly, as nongovernmental organizations in the Islamic Republic of Iran are not empowered to take part in these activities and programmes, representation on the Commission from students and the general public has not yet been considered. Of course, the composition of the Commission as well as the accreditation standards can be changed over time and based on new policies and decisions.

Overall institutional improvement is stimulated by the requirement that the accredited institution conducts periodic self-evaluation to identify what it does well, determine the areas in which improvement

is needed, and develop plans to address needed improvements. While accreditation indicates an acceptable level of overall quality, any institution, however excellent, is capable of improvement, which must come from its understanding of its own strengths and weaknesses. Institutional improvement is also encouraged through the advice and counsel provided by the visiting team, which comprises experienced educators drawn primarily from accredited institutions, and by the publications of the accrediting body [5]. The purpose of considering "should" indicators in the present accreditation model was to encourage universities to make efforts toward improving their quality.

During the national consensus for approving the standards and indicators, the viewpoints of university administrators and experts were sought. The aim was to take advantage of their knowledge and experience to ensure that every area was well covered and every standard and indicator made good sense in the real situation of every institution by separating "must" and "should" standards.

On the other hand, the medical universities in the Islamic Republic of Iran vary in their size, facilities, number of students, resources, number of faculty members and so on. So evaluating them all by the same standards would be unfair. Providing the option of "must" and "should" standards was an attempt to overcome this problem. The university administrators know their own situation and can select each indicator as a "must" or "should" standard. Therefore, it is up to the universities to achieve "should" standards or move toward achieving them.

By performing self-assessment and accreditation periodically, each institution will try to fulfil the required standards and even move beyond the "must" standards.

Therefore, the accreditation standards will need periodic refinement in response to changes following each accreditation as well as other changes that can happen in any institution over time. Other accreditation organizations either develop standards in a way to include a wide range of collegiate institutions, as evidenced by their differences in purpose, size, organization, scope, support and control [5], or assign a specific committee to periodically revise standards [16]. So, one of the next steps in establishing the accreditation system should be assigning a standard committee of experts to periodically revise the old standards and add new ones if needed. This has been considered in the approved by-laws concerning establishing the accreditation system for Iranian medical universities.

Conclusion

This project has taken an important step towards establishing an accreditation system for medical universities in the Islamic Republic of Iran. This will lead to improvement and quality assurance of higher education institutions. By complying with accepted national standards, the medical universities will play an important role in promoting health system performance.

Considering the international focus on the quality of higher education, and the World Health Organization's regional initiative to reform the education of health professional through accreditation [2], establishing a national accreditation system based on the results of this project could increase the international and regional credibility of Iranian medical universities.

References

1. *The fundamentals of accreditation: what do you need to know?* Washington DC, Council for Higher Education Accreditation, 2002.
2. *Technical discussions, accreditation of hospitals and medical education institutions—challenges and future directions.* Cairo, World Health Organization Regional Office for the Eastern Mediterranean, 2003.
3. Baker RL. Evaluating quality and effectiveness: regional accreditation principles and practices. *Journal of academic librarianship*, 2002, 28(1):3–7.
4. *Accreditation in the United States* (<http://www.ed.gov/admins/finaid/accred/accreditation.html>, accessed 18 January 2009).
5. *Evaluation manual.* Bedford, Massachusetts, Association of Schools and Colleges, 1996.
6. International standards in medical education: assessment and accreditation of medical schools' educational programmes. A WFME position paper. The Executive Council, the World Federation for Medical Education. *Medical education*, 1998, 32:549–58.
7. Mohammadi A, Mojtahedzadeh R, Motarjemi R. [*Iranian medical schools: database and ranking*]. Tehran, Ministry of Health and Medical Education, 2003 [in Farsi].
8. Tavakol M, Murphy R, Torabi S. Medical education in Iran: an exploration of some curriculum issues. *Medical education online*, 2006, 11(5):1–8.
9. [*Evaluation of the integration of medical education and health care system in the Islamic Republic of Iran*]. Tehran, Deputy for Education, Ministry of Health and Medical Education, 2003 [in Farsi].
10. *Accreditation handbook.* Oregon, Northwest Association of Schools and Colleges, 1999.

11. *Criteria for accreditation*. Decatur, Georgia, Southern Association of Colleges and Schools, United States, 2004.
12. *Handbook of accreditation*. Burlingame, California, Western Association of Schools and Colleges, 2001.
13. *Accreditation of higher education institutions: an overview*. Tempe, Arizona, Arizona North Central Association of Colleges and Schools, United States, 2001.
14. *Characteristics of excellence in higher education*. Philadelphia, Pennsylvania, Middle State Commission on Higher Education, 2002.
15. *Assessment and accreditation of medical schools: standards and procedures*. Kingston, New South Wales, Australian Medical Council, 2002.
16. *Functions and structure of a medical school: standards for accreditation of medical education programs leading to the MD degree*. Washington DC, Liaison Committee on Medical Education, 2002.
17. *Accreditation criteria*. Taipei, Taiwan Medical Accreditation Council (http://www.nhri.org.tw/nhri_org/mc/main4.html, accessed 18 January 2009).
18. *Basic medical education. WFME global standards for quality improvement*. Copenhagen, World Federation for Medical Education, 2003.

Management effectiveness initiatives

The management of health care is a pivotal factor in the delivery of effective health service with growing recognition of the key role that non-clinical activities play in the way that health care is delivered. Management effectiveness is crucial in all health care settings: hospitals, primary health care clinics, mobile units, laboratories and pharmacies. The WHO Regional Office for the Eastern Mediterranean (EMRO) works in partnership with ministries of health of the Region to strengthen the way in which health care facilities and professionals are managed. The ultimate aim is to improve their functioning by working towards greater effectiveness, efficiency, quality and coverage of services which lead to better health outcomes.

EMRO offers technical assistance in developing key health management tools and approaches such as hospital accreditation, licensing of health professionals and facilities, patient safety, quality assurance, the introduction of family practice, evidence-based medicine, decentralization, hospital autonomy, community health management and the district health system approach.

Further information on hospital accreditation in the Region and EMRO's work in this area can be found at: <http://www.emro.who.int/mei/HA.htm>.

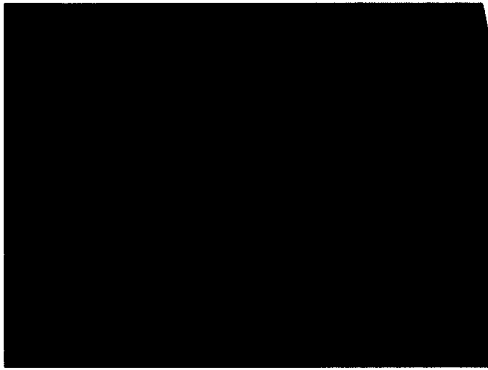


Figure 2 Postinflammatory hyperpigmentation following the insect injury



Figure 3 Specimen of the insect, identified as the cuckoo wasp

the wasp is active and most of the soldiers are moving around. When the wasp comes into contact with skin it secretes a white, acidic vesicant substance that initiates an acute contact irritant dermatitis similar to that caused by the secretions of insects of the genus *Paederus* [3]. The extent of the skin reaction seems to depend on the time and duration of exposure, which accounts for the variation in the clinical severity of the lesions from one patient to another. The acidic pH of the insect secretion is likely to be the trigger for the irritant reaction [4].

The insect responsible for the lesions was believed to be the cuckoo wasp. A previous study in the same area by Al-Basheer, Hijazi and Dama recorded a similar outbreak of skin reactions [5], but this was thought to be caused by beetles and not wasps.

Despite initial concerns about the lesions, they were found to be easily treated

if noticed early. Complications were rare, except for 1 case of residual postinflammatory hyperpigmentation, which is common after acute skin reactions [6], and 1 case of secondary bacterial infection. Fast healing of the lesions was greatly dependent on primary action being taken immediately after contact (washing with water).

It is important to be aware of unusual environmental hazards in areas where soldiers will serve in order to educate them about the potential hazards specific to the area.

Acknowledgement

We would like to thank Dr Ahmad Katebeh, Associate Professor, Entomology Department, Agriculture College, Jordan University, for his help in identification of the insect.

References

1. Lyon WF. *Nuisance parasitic wasps*. Ohio State University extension fact sheet. HYG-2113-95 [online fact sheet] (<http://ohioline.osu.edu/hyg-fact/2000/2113.html>, accessed 18 January 2009).
2. *Insects and their allies. Hymenoptera: ants, bees and wasps*. Victoria, Australia, Commonwealth Scientific and Industrial Research Organization [online fact sheet] (<http://www.ento.csiro.au/education/in->

- sects/hymenoptera.html, accessed 18 January 2009).
3. Sendur N, Savk E, Karaman G. Paederus dermatitis: a report of 46 cases in Aydin, Turkey. *Dermatology*, 1999, 199(4):353–5.
 4. Arthropod bites and stings. In: Fitzpatrick TB et al., eds. *Dermatology in general medicine*, 4th ed. New York, McGraw–Hill, 1993:2823–5.
 5. Al-Basheer M, Hijazi M, Dama T. Blister beetles dermatosis: a report of 43 cases in a military unit in Eritrea. *Journal of the Royal Medical Services*, 2002, 9(2):40–3.
 6. Irritant contact dermatitis. In: Burton JL, Burns DA, Breathnach SM, eds. *Rook textbook of dermatology*, 6th ed. Volume 1. Oxford, Blackwell Science, 1998:730–1.

International Travel and Health 2009

More than 900 million international journeys were undertaken in 2008. This amount of global travel exposes many people to changes in altitude, humidity, disease agents and temperature – all of which can lead to ill-health. Many health risks can be minimized by precautions taken before, during and after travel. *International Travel and Health 2009* explains how travellers can stay healthy, and provides WHO guidance on vaccinations, malaria chemoprophylaxis and treatment, protection against insects and other disease vectors, and safety in different environmental settings.

This book covers all the main health risks to travellers, both during their journey and at the destinations. It describes the relevant infectious diseases, including causative agents, modes of transmission, clinical features, geographical distribution and prophylactic and preventive measures.

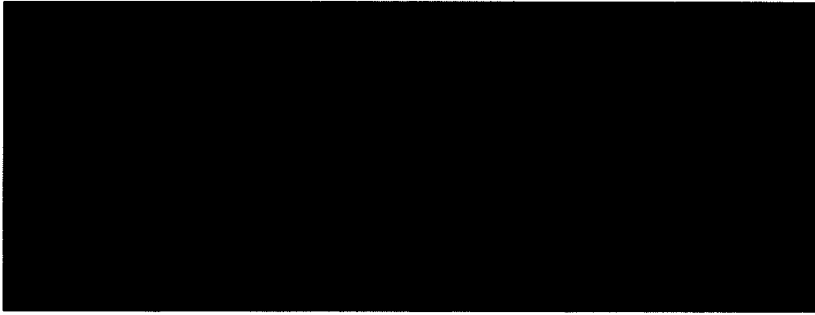


Figure 1 Spirochete; acanthocytosis; and poikilocytosis of erythrocytes in a thin smear of peripheral blood with Giemsa stain

[10]. Both reported cases had the signs and symptoms of fulminant sepsis and neonatal jaundice, similar to our case, although hepatosplenomegaly, which was present in both cases, was absent in our case. Haemorrhage was reported in one of the newborns, and severe acidosis in the other, and both died 16 and 24 hours after admission respectively [10].

In another report from an endemic region for tick-borne TBRF in Tanzania, East Africa, 5 cases of neonatal borreliosis were reported. It was mentioned that previously only 20 newborns with TBRF had been diagnosed in that endemic area. Among those cases, 4 had neonatal jaundice, 2 showed signs of septicaemia and 3 of them eventually died. According to that report, in 2 newborns with severe spirochetaemia, the one treated with low-dose penicillin died and the other treated with erythromycin survived [10]. Our experience with eryth-

romycin treatment is similar to theirs, and this antibiotic seems to be an effective drug in treatment in newborns with borreliosis, even in severely ill cases.

As mentioned above, poikilocytosis and acanthocytosis were the main feature of the peripheral blood smear, rather than spirochetaemia. We cannot know if there was any link between the infection and these observations, and as there are no similar reports, we recommend further study on this issue.

We conclude that in endemic regions for TBRF, neonatal borreliosis should be considered for every newborn admitted with the impression of neonatal sepsis, and a history of febrile disease in the mother during her pregnancy, especially in the last days of pregnancy, should be taken. Obtaining peripheral blood smears at least 3 times from the baby is necessary to diagnose the main disease.

References

1. Azimi P. Relapsing fever (*Borrelia*). In: Behrman RE, Kliegman RM, Jenson HB, eds. *Nelson textbook of pediatrics*, 17th ed. Philadelphia, WB Saunders, 2004:985.
2. Christenson SC. Relapsing fever. In: Jenson HB, Baltimore RB, eds. *Pediatric infectious diseases*, 2nd ed. Philadelphia, WB Saunders, 2002:387–8.

3. Rebaudet S, Barola S. Epidemiology of relapsing fever borreliosis in Europe. *FEMS immunology and medical microbiology*, 2006, 48:11–5.
4. Barbour AG, Hayes S. Biology of *Borrelia* species. *Microbiological reviews*, 1986, 50(4):381–400.
5. Ghavami MB, Asmar M, Piazak N. [Epidemiology of tick borne relapsing fever in Zanjan city]. *Journal of the Zanjan University of Medical Sciences*, 2002, 9(37):22–7 [in Farsi].
6. Arshi S et al. Relapsing fever in Ardabil, a north-western province of Iran. *Archives of Iranian medicine*, 2002, 5(3):141–5.
7. Janbakhsh B, Ardalan A. The nature of sporadic cases of relapsing fever in Kazeroon area, southern Iran. *Bulletin de la Société de pathologie exotique et de ses filiales*, 1977, 70:587–9
8. Brasseur D. Tick-borne relapsing fever in a premature infant. *Annals of tropical paediatrics*, 1985, 5:161–2.
9. Yagupsky P, Moses S. Neonatal *Borrelia* species infection (relapsing fever). *American journal of diseases of children*, 1985, 139(1):74–6.
10. Melkert PW, Stel HV. Neonatal *Borrelia* infection (relapsing fever): reports of 5 cases and review of the literature. *East African medical journal*, 1991, 68(12):999–1005.

Vector biology and control

The Vector Biology and Control unit in WHO/EMRO aims to support Member States in reducing the burden of the major vector-borne diseases through the promotion and strengthening of cost-effective and sustainable vector control interventions in the context of integrated vector management in line with the recommendations contained in Resolution EM/RC.52/R.6. The programme also maintains a special focus on promoting multisectoral cooperation for implementation and resource mobilization, and advocacy and strengthening of national capacity in entomology and vector control.

Further information about the work of WHO/EMRO in vector control can be found at: <http://www.emro.who.int/vbc/>

Case report

Congenital tick-borne relapsing fever: report of a case with transplacental transmission in the Islamic Republic of Iran

M. Mahram¹ and M.B. Ghavami²

Introduction

Tick-borne relapsing fever (TBRF) is an arthropod-borne infection found in the Middle East, Africa, Europe and North America. The disease is caused by several species of *Borrelia* and transmitted by various species of soft ticks [1,2]. Specific relationships usually exist between *Borrelia* species, the vector ticks and the distribution area [3]. *Ornithodoros tholozani* is distributed in the Middle East and is known as the main vector and sole reservoir for *B. persica*, which is often responsible for old-world TBRF. Ticks of this species live in close proximity with humans host and feed for short periods, through a painless bite, often at night [4].

TBRF is endemic in the north-west of the Islamic Republic of Iran where clinical and epidemiological studies have been conducted [5,6]. It is more prevalent in children under 5 years and pregnant women. In infected pregnant women, transplacental transfer of the microorganism is possible, which leads to neonatal infection. Although the mothers may have nonspecific febrile illnesses, the infected infants may present with severe disease. Most of the previ-

ous studies concern children and adults, whereas no studies have been published on neonatal borreliosis in the Islamic Republic of Iran [6,7]. In this study, we report the clinical and laboratory results of a neonate infected with *B. persica*.

Case report

A full-term male 7-day-old neonate was admitted with malaise, weakness of neonatal reflexes and jaundice. At the time of admission there were no positive signs or symptoms, such as fever, hepatosplenomegaly or respiratory distress. The parents did not report any history of previous diseases in the mother during pregnancy or before. Based on the primary clinical findings, empirical antibiotic therapy with ampicillin and gentamicin was administered. Chest X-ray and urinalysis were normal and blood and urine cultures were negative. Complete blood count was normal except for reduced platelet count of 46 000/mm³ (repeat test in another sample was 34 000/mm³). Total bilirubin level was elevated at 19 mg/dL, with direct bilirubin of 0.3 mg/dL (Table 1).

¹Department of Paediatrics, Vali-e-Asr Hospital, Zanjan University of Medical Sciences, Zanjan, Islamic Republic of Iran (Correspondence to M. Mahram: drmahram@yahoo.com).

²Department of Parasitology, Faculty of Medicine, Zanjan University of Medical Sciences, Zanjan, Islamic Republic of Iran.

Received: 14/10/06; accepted: 16/11/06

Table 1 Laboratory results of a 7-day-old newborn infected with *Borrelia persica* in Zanjan, north-west Islamic Republic of Iran

Variable	Value
<i>Complete blood count and differentiation</i>	
White blood cell count (/mm ³)	15 800
Polymorpholeukocytes (%)	55
Lymphocytes (%)	40
Monocytes (%)	4
Eosinophils (%)	1
Haemoglobin level (g/dL)	17.2
Haematocrit	53
Platelet count (/mm ³) (repeat test)	46 000 (34 000)
<i>Other tests</i>	
Reticulocyte count (%)	0.6
Erythrocyte sedimentation rate (mm/h)	6
C-reactive protein level (mg/L)	15
Total bilirubin level (mg/dL)	19
Direct bilirubin level (mg/dL)	0.3
Blood sugar level (mg/dL)	267
Blood urea nitrogen level (mg/100 mL)	20.6
Creatinine level (mg/dL)	0.3
Total calcium (mEq/L)	9.3
Sodium (mEq/L)	134
Direct Coombs test	Negative
Glucose-6-phosphate dehydrogenase level	Normal
Urine analysis	Normal
Urine culture	Negative
Blood culture	Negative

During the first 2 days of admission, while the patient was receiving the antibiotics, his general condition deteriorated and we feared that a severe neonatal sepsis was starting. Despite the earlier history-taking, we discovered that the mother had had a febrile disease during the last days of her pregnancy and that a physician had administered doxycycline, which she had not taken.

In view of the regional epidemiology, and the antibiotics administered to the mother, we guessed that the mother's febrile disease could have been borreliosis. We therefore prepared a peripheral blood smear from the baby and found a large number of *Borrelia* isolates on the smear. Poikilocytosis, especially acanthocytosis in red blood cells, was observed, rather than borreliae (Figure 1).

After establishing the diagnosis of borreliosis in the patient, intravenous erythromycin was added to the previous treatment (40 mg/kg/24 hour, every 6 hours). Following 24 hours of treatment with erythromycin, the general condition of the baby improved rapidly. Treatment was continued for 10 days, and finally the patient was discharged in a very good clinical condition, without jaundice and with a platelet count of 462 000/mm³.

Discussion

In view of the age of the newborn at the time of admission and the presence of febrile disease in the mother during the last days of pregnancy, we conclude that borreliosis was transmitted through the transplacental route. However, some articles have reported vertically transmission as a possible route of acquiring the infection in newborns [8,9].

Although several reports of TBRF have been published, relatively few reports of neonatal TBRF could be found, due either to underdiagnosis or to its actually being a rare disease. In a report from Ardabil province in north-west of Islamic Republic of Iran, none of 391 known cases of TBRF were in the neonatal period [6]. In another study in 11 western states of the United States of America and in British Colombia, of 450 known cases of TBRF, including 6 pregnant women, 2 patients were newborns

Case report

Contact irritant dermatitis from insect secretions: report of 74 cases in a military unit in Eritrea

R.M. Smadi,¹ B.Y. Smadi² and A. Ka'abneh³

Introduction

Eritrea is situated on the east coast of Africa, bordering Sudan, Djibouti and Ethiopia. It is hot and dry in the desert strip along the Red Sea coast, cooler and wetter in the central highlands, and semi-arid in the western hills and lowlands, with the heaviest rainfall during June to September, except in the coastal desert.

Since settlement of the conflict between Eritrea and Ethiopia in 2000, a United Nations peacekeeping mission has been present in the area and the troops have faced a number of medical problems specific to the area.

We present an outbreak of 74 cases of an acute blistering skin reaction in a military unit serving in Eritrea. This reaction followed exposure to the secretions of a flying insect that is prevalent in hot tropical areas.

Case series

During the period July 2002 to January 2003, 74 patients visited military clinics in 3 different locations in the western sector of Eritrea (Barintu, OmHajar and Shambiko) with acute blistering skin lesions. All the patients were otherwise healthy, male soldiers (age range 23–48 years) with no significant

past medical history. All were seen in the first 72 hours after the injury and followed up for 2–4 weeks until complete healing of the lesions. A detailed clinical history was obtained, which included the time of injury, the onset of symptoms, the characteristics of the lesion (site, size, number, associated symptoms, natural history) and the primary actions taken by the patient.

Most of the patients had 1 or 2 lesions and more than three-quarters of these were in exposed parts of the body (neck, upper limb and upper chest) (Table 1). The clinical severity of the lesions varied from patient to patient (Figures 1 and 2). In most cases the reaction started as redness with acute vesiculation that proceeded to bullae formation in the following hours, with a burning sensation and sometimes pain. Most lesions (85%) had completely healed within 1 week. One patient had residual postinflammatory hyperpigmentation (Figure 2), and another had secondary bacterial infection, which was successfully treated by topical and systemic oral antibiotics.

Patients observed that the reaction followed contact with an unidentified flying insect although there was no sensation of a sting at the time of injury. The most effective treatment was to wash the site of contact with tap water if the patient noticed the

¹Department of Dermatology; ²Department of Internal Medicine; ³Department of Surgery, King Hussein Medical Centre, Amman, Jordan (Correspondence to B. Smadi: BilalSmadi2002@yahoo.com).

Received: 03/07/03; accepted: 05/10/04

Table 1 Profile of the skin lesions

Variable	No. of patients (n = 74)	%
<i>No. of lesions</i>		
1	31	42
2	29	39
3	9	12
4	5	7
<i>Site of lesions</i>		
Neck area	29	39
Upper limbs	24	32
Lower extremities	12	16
Anterior chest	4	5
Back	3	4
Abdomen	2	3
<i>Symptoms</i>		
Burning sensation	68	92
Erythema	63	85
Vesiculation & bullae	59	80
Pain	17	23
<i>Time to complete healing (weeks)</i>		
1	63	85
2	9	12
3	2	3

insect on the skin; this resulted in only mild or no erythema. Other treatments included cold wet compresses, drying soothing agents (calamine lotion), steroid creams, antibiotics (topical and systemic), antihistamines, emollients and barrier creams.

Insect description

The insect was described as fluorescent green metallic in colour, about 10 mm in length and 3 mm wide (Figure 3). Its main time of activity was observed to be the daytime, mainly between 10:00 and 18:00 hours. It was noticed that the insect curls around itself when attempts are made to kill it. Observations suggested that it did not sting or bite but secreted a white material from its rear, which caused irritation and blistering within hours of exposure. The

pH of the secreted material, measured by Combur-Test urine test strips (Roche), was around 5, which corresponds with the popular name of this insect among the soldiers: acidic fly.

The insect was identified as most probably the cuckoo wasp (Hymenoptera. Suborder: Apocryta. Superfamily: Chrysidoidea. Family: Chrysididae). It lives mainly in the area bordering Ethiopia and Sudan and is not found in Asmara due to its inability to live in high altitude areas. Most of our cases occurred between July and October, which is the active season of the wasp. When these wasps are disturbed, they curl their body into a ball with the wings protruding from the sides, which may be a way of feigning death as a protection mechanism [1]. The adult wasps do not sting [2], which corresponds with our patients' symptoms of burning and erythema, and rarely cause actual pain.

Discussion

All our patients were soldiers, and most cases occurred during the day time when



Figure 1 Acute vesiculation and bullae following contact with the insect

Letter to the Editor

Avian influenza – bi-communal waterbird counts in Cyprus

Sir

The first island-wide waterbird monitoring programme in Cyprus started in June 2007. The Unit of Environmental Studies of the Research Center at the University of Nicosia is carrying out this project together with Turkish Cypriot scientists, the Turkish-Cypriot Biologists Association, the Cyprus Game Fund and the Cyprus Veterinarian Association, with support from the United Nations Development Programme's Action for Cooperation and Trust in Cyprus (UNDP-ACT) and the United States Embassy. The project is carried out under the auspices of the Emergency Disease Forum (EDF) which is an informal bi-communal platform created by UNDP-ACT to ensure an efficient channel for immediate communication and cooperation between veterinary and health experts in the event of a disease outbreak on the island.

So far, Greek and Turkish Cypriot conservationists have carried out nearly 2 years of joint counts of waterbirds at 27 wetland areas throughout all districts in Cyprus. When considering that some of the wetland areas are broken down into distinct count

sectors, reaching a total of 50 sectors, this is an impressive amount of data that has been collected for the first time ever in Cyprus. The waterbird counts take place every month, and are carried out by 7 dedicated teams of birdwatchers and ornithologists from both communities.

The aim of the project is to establish an island-wide waterbird surveillance programme to improve the capacity to detect a potential avian influenza outbreak and possible routes of transmission of the virus, and generally to better understand the movement patterns of waterbirds throughout Cyprus. Regular surveillance of waterbirds has been carried out by the Research Unit of the Cyprus Game Fund in the southern part of Cyprus since 1993, while a similar surveillance system did not exist until now in the northern part of this island.

A joint database containing information from all Cyprus has been created and a book presenting data from the first year of the study has been published and disseminated to relevant stakeholders. In the meantime, 2 documentaries about the project have been prepared by a local television channel, and the project has been presented at local and international conferences.

I. Charalambidou
Unit of Environmental Studies, Research
Center, University of Nicosia, Nicosia, Cyprus
(iris.chara@cytanet.com.cy)

S. Gucel
Environmental Sciences Institute, Nicosia, Cyprus
(sgucel@hotmail.com)

Guidelines for authors

1. Papers submitted for publication must not have been published or accepted for publication elsewhere. The Eastern Mediterranean Regional Office reserves all rights of reproduction and republication of material that appears in the *Eastern Mediterranean health journal* (EMHJ).
2. Original papers written in Arabic, English or French may be sent for consideration to the Editor-in-chief, *Eastern Mediterranean health journal*, WHO Regional Office for the Eastern Mediterranean, PO Box 7608, Nasr City (11371), Cairo, Egypt. Papers can also be submitted by email to EMHJ@emro.who.int. Papers will be abstracted in all three languages.
3. The subject of the paper should pertain to public health or some other related technical and scientific subject within the field of interest of the World Health Organization, with special reference to the Eastern Mediterranean Region.
4. Three copies of each manuscript should be provided. The text, together with the accompanying tables and figures, should not exceed 15 double-spaced typewritten or printed A4 pages (4500 words) and should be printed on one side only. When the manuscript is accepted or conditionally accepted, the author will be requested to submit a 3.5 inch computer diskette containing the text, tables, graphs and illustrations. For English and French papers, please provide the text, upon the editor's request, in both wordprocessed format (we prefer Microsoft Word for the PC but can translate most other formats) and also saved as a text/ASCII file. Papers submitted in Arabic should follow the same guidelines as papers written in English or French. If the paper is a translation of all or part of another unpublished work, a copy in the original language should be submitted too. Where possible, graphs should be provided in Harvard Graphics under Windows or Excel, and the illustrations and photographs should be provided in EPS or TIFF format. However, it is necessary to provide three sets of original photographs and figures with the background data. If there is any text or lettering on the photographs, an additional clean set should be provided without the text/lettering.
5. All papers received will be peer reviewed, and on the basis of the reviewer's comments, the Editorial Board reserves the right to accept or reject any paper. Papers are accepted on the understanding that they are subject to statistical and editorial revision as deemed necessary, including abridgement of the text and omission of tabular or graphic material.
6. The title of the paper should be as concise as possible, preferably around 10 words, and should be placed on a separate sheet, together with the full name(s) of the author(s), institutional affiliations(s) and highest scientific degrees obtained. The mailing address, as well as any other contact information (email address, fax, telephone) of the corresponding author should be provided. The number of authors should not exceed five. All authors should have made material contribution to either the design, analysis or writing of the study and have approved the final version submitted. Authors may be asked to verify their contribution. Other names may be included in the acknowledgements.
7. To facilitate the translation of abstracts and authors' names, authors whose mother tongue is written in Arabic characters and writing in English or French should supply their full names in Arabic script and provide transliterations.

8. Papers reporting original research findings should follow the IMRAD format: Introduction; Materials (subjects) and methods; Results; Analysis; and Discussion. An abstract of no more than 100 words should be supplied, clearly and briefly stating the objectives, context, results and conclusions.

9. Authors should verify where appropriate that all persons on whom research has been carried out have given their informed consent, and where participants (living or dead) were unable to give such consent, that surrogate consent was obtained.

10. Review articles should contain sections dealing with objectives, sources, methods of selection, compilation and interpretation of data and conclusions.

11. In-text citations of published works should be limited to essential up-to-date references. Apart from review articles, a maximum of 25 references is advisable. They should be numbered separately as they occur in the text with sequential Arabic numerals in parentheses [square brackets]. These references should appear in a numbered list on a separate page at the end of the paper. They should contain the following elements of information as appropriate: name(s) and initial(s) of author(s); title of paper or book in its original language plus translation; complete name of journal plus volume number and page range; name of publisher (commercial or institutional) and place of publication (city and country); and date of publication. Papers with inadequate references or references not arranged according to these principles will be returned to the author for correction. The following are examples of the Journal's preferred style:

Book: Al Hamza B, Smith A. *The fifth sign of identity*. Cairo, American University Press, 1990.

Journal article: Jones A et al. One day in Tibet. *Journal of tautology*, 1993, 13(5):23-7.

Document: Al-Itneen M, ed. *The principles of uncertainty*. Geneva, World Health Organization, 1985 (document WHO/DOC/537).

12. Figures and tables with appropriate captions should each be on a separate sheet, numbered sequentially with arabic numerals and attached to the end of the paper. Each figure and table should be referred to in the text and its placement in the text should be clearly indicated where appropriate. Where appropriate, sources should be given for each figure or table. If any figures, tables or other materials have been copied from other sources, authors have the sole responsibility for securing the necessary permission. In order to avoid layout problems in final production tables and figures should be limited as far as possible. Not more than one table or figure per 1000 words is preferable. Figures derived from data must be accompanied by those data to enable redrawing if necessary.

13. Original papers and diskettes will not be returned except upon request by the principal author.

14. On publication the authors will receive one copy each of the issue in which the article appears and the principal author will receive 50 reprints. Requests for further reprints and pricing information may be obtained from the Editor-in-chief.

المجلة الصحية لشرق المتوسط دلائل إرشادية للمؤلفين

١. ينبغي أن لا تكون الورقات المقدمة للنشر، قد نشرت أو قبلت للنشر في أي مكان آخر. ويحتفظ المكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط بجميع حقوق استنساخ أو إعادة نشر المواد التي تنشر في المجلة الصحية لشرق المتوسط.
٢. يمكن أن ترسل الورقات الأصلية، المكتوبة بالعربية، أو الإنكليزية، أو الفرنسية، للنظر فيها من قبل رئيس تحرير المجلة الصحية لشرق المتوسط، بالمكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط، ص. ب. (٧٦٠٨)، بمدينة نصر (١١٣٧١)، بالقاهرة، في مصر. كما يمكن تسليم الورقات بالبريد الإلكتروني على العنوان EMHJ@emro.who.int. ويتم تقديم خلاصات للورقات، باللغات الثلاث.
٣. ينبغي أن يكون موضوع الورقات متتمياً لمجال الصحة العمومية، أو أي ميدان تقني وعلمي آخر، له صلة بالمجالات ذات الأهمية لمنظمة الصحة العالمية، مع الإشارة بشكل خاص إلى إقليم شرق المتوسط.
٤. ينبغي تقديم ثلاث نسخ من كل مخطوطة أو مطبوعة. كما ينبغي أن لا يتعدى النص، مع الجداول، والرسومات المرافقة، ١٥ صفحة مطبوعة على الآلة الكاتبة مع ترك فاصلين بين كل سطر، من القطع A4 (٤٥٠٠ كلمة)، وأن تكون الطباعة على وجه واحد فقط من الصفحة. وعندما يتم إعلان المؤلف بأن المطبوعة التي قدمها قد تم قبولها من دون شرط، أو قبولها بشروط، ينبغي أن يقدم قرص حاسوبي (٣, ٥ بوصة)، يتضمن النص، والجداول، والرسوم البيانية والتوضيحية. وبالنسبة للورقات المقدمة باللغتين الإنكليزية والفرنسية، يرجى، بناءً على طلب رئيس التحرير، أن يتم تقديم النص، في كل من، صيغة معالجة الكلمات (وحبذا لو أمكن استخدام برنامج الكلمات اللينة الدقيقة Microsoft Word، بالنسبة للحاسوب الشخصي، غير أننا يمكن أن نترجم غالبية الصيغ الأخرى)، وفي شكل محفوظ كنص/ ملف الكود الأمريكي القياسي لتبادل المعلومات ASCII (أسكي). وينبغي اتباع نفس الإرشادات في ما يتعلق بالورقات المقدمة باللغة العربية. وإذا كانت الورقة المقدمة، هي ترجمة كلية أو جزئية لعمل آخر لم ينشر، فينبغي تقديم نسخة من هذا العمل، في لغته الأصلية. وحيثما أمكن، يفضل أن تكون الرسوم البيانية في شكل رسوم هارفارد البيانية، مع استخدام برنامج النوافذ Windows أو إكسل Excel، وتقديم الرسوم التوضيحية والصور الفوتوغرافية في صيغة EPS أو TIFF. كما أنه من الضروري تقديم ثلاث مجموعات من الصور الفوتوغرافية والرسومات الأصلية، مع المعطيات الأساسية. وفي حالة وجود أي نص أو حروف مكتوبة على الصور، فينبغي تقديم نسخة إضافية خالية من أي نص مطبوع أو أي حروف مكتوبة.
٥. يتم مراجعة جميع الورقات المقدمة مراجعة دقيقة من قبل الزملاء، وفي ضوء هذه المراجعة، تحتفظ هيئة التحرير بحق قبول أو رفض أي ورقة. ومن المتفق عليه أن جميع الورقات التي يتم قبولها، تخضع للمراجعة الإحصائية والتحريرية، بحسب ما يلزم، بما في ذلك اختصار النص، أو حذف بعض الجداول أو الرسوم البيانية.
٦. ينبغي أن يكون عنوان الورقة مختصراً على قدر المستطاع، وحبذا لو كان حوالي ١٠ كلمات، وأن يكتب على ورقة منفصلة، مع تحديد اسم المؤلف (أو أسماء المؤلفين)، وعضويتهم في المؤسسات المختلفة، وأعلى الدرجات العلمية التي حصلوا عليها. كذلك، ينبغي ذكر العنوان البريدي، والمعلومات الأخرى اللازمة للاتصال بالمؤلف (بريد إلكتروني، فاكس، هاتف). ويجب أن لا يزيد عدد المؤلفين على خمسة. ولا بد أن يكونوا قد ساهموا جميعاً في تصميم البحث أو تحليل نتائجه أو كتابته، وأن يكونوا قد وافقوا، جميعاً على النسخة النهائية المقدمة. وقد يطلب من المؤلفين إثبات الإسهام الذي قدموه. ويمكن إدراج أسماء أخرى إلى عبارات الشكر التي تكون في مقدمة الورقة.
٧. ومن أجل تسير ترجمة الخلاصات وأسماء المؤلفين، على المؤلفين الذين تكون لغتهم الأم تكتب بحروف عربية، ويكتبون مؤلفاتهم بالإنكليزية أو الفرنسية، أن يزدودوا رئيسي التحرير بأسمائهم كاملة، مكتوبة بالحروف العربية، ثم بالحروف اللاتينية.

٨. الورقات التي تمثل تقارير حول نتائج البحوث الجديدة، ينبغي أن تكتب بالترتيب التالي: المقدمة؛ المواد (المواضيع) والطرق؛ النتائج؛ التحليل؛ والمناقشة. وينبغي أن تشفع هذه الورقات بخلاصة لكل منها، لا تزيد على ١٠٠ كلمة، تبين بوضوح، وبإيجاز، الأهداف، والسياق، والنتائج، والاستنتاجات.

٩. ينبغي أن يثبت المؤلفون، بحسب ما يلزم، أن جميع الأشخاص الذين أجري عليهم البحث، قد وافقوا موافقة واعية على ذلك، وفي حالة تعذر الحصول على موافقة المشاركين (أحياء أو أموات)، ينبغي أن يثبت المؤلفون أنه قد تم الحصول على موافقة وكلائهم أو ورثتهم.

١٠. ينبغي أن تتناول مقالات الاستعراض والمراجعة الماضية، النقاط التالية: الأهداف، المصادر، طرق الانتقاء، تجميع المعطيات وتفسيرها والاستنتاجات.

١١. ينبغي أن يقتصر الاستشهاد من أي أعمال منشورة، في النص، على المراجع الحديثة الأساسية. ولا ينصح بزيادة المراجع على ٢٥ مرجعاً على الأكثر، باستثناء المقالات النقدية. ويلزم ترقيم المراجع، كلما ظهرت في النص، وأن يليها أعداد عربية بين أقواس [أقواس مربعة]. كما ينبغي تدوين هذه المراجع في قائمة مرقمة، في صفحة منفصلة، في نهاية الورقة، وأن تتضمن المعلومات التالية، إن أمكن: اسم المؤلف أو أسماء المؤلفين، والحروف الأولى من أسماؤهم، وعنوان الورقة أو الكتاب في اللغة الأصلية، إضافة إلى ترجمته؛ واسم المجلة بالكامل، مع رقم المجلد، وعدد الصفحات؛ واسم الناشر (التجاري أو المؤسسي)؛ ومكان النشر (المدينة والبلد)؛ وتاريخ النشر. وسوف يتم إعادة الورقات التي تكون فيها المراجع غير كاملة، أو غير مرتبة بحسب هذه المبادئ، إلى المؤلف، لتصحيحها. وفي ما يلي أمثلة للأسلوب الذي تفضل المجلة الصحية لشرق المتوسط أن يتبع:

كتاب:

Al Hamza B, Smith A. *The fifth sign of identity*. Cairo, American University Press, 1990.

مقالة في مجلة:

Jones A et al. One day in Tibet. *Journal of tautology*, 1993, 13(5):23-7.

وثيقة:

Al-Itneen M, ed. *The principles of uncertainty*. Geneva, World Health Organization, 1985 (document WHO/DOC/537).

١٢. وفي ما يتعلق بالرسومات والجداول، المشفوعة بالشروح الملائمة، فإنه ينبغي أن ترد كل منها في صفحة منفصلة، ومرفقة على التوالي بالأعداد العربية، وملحقة في نهاية الورقة. كما ينبغي الإشارة إلى كل رسم وكل جدول يشار إليه في النص، وتحديد مكانه بوضوح، بحسب ما يلزم، وحجداً لو أمكن تحديد مصدر كل رسم وكل جدول. وفي حالة نقل أي رسومات أو جداول من مواد أخرى، فإنه تقع على عاتق المؤلف، أو المؤلفين، المسؤولية الكاملة عن الحصول على الأذن اللازمة. وتُغَيَّر تحجب أي مشكلات في طريقة تنسيق المنتج النهائي، فإنه ينبغي الاقتصار على قدر الإمكان في إدراج الجداول والرسومات. وحجداً لو أمكن الاقتصار على جدول واحد أو رسم واحد لكل ١٠٠٠ كلمة. علماً بأن الرسومات المتعلقة ببعض المعطيات، ينبغي أن تصاحب هذه المعطيات، وأن يتسنى إعادة رسمها، إذا تطلّب الأمر.

١٣. لا ترد الورقات والقريصات الأصلية، إلا بناءً على طلب من المؤلف الرئيسي.

١٤. بعد النشر، يحصل المؤلفون على نسخة من العدد الذي ترد فيه المقالة، بينما يحصل المؤلف الرئيسي على ٥٠ نسخة من البحث المنشور. وتقدم الطلبات للحصول على المزيد من النسخ، أو على معلومات حول الأسعار، إلى رئيس التحرير.

Directives à l'intention des auteurs

1. Les articles soumis pour publication ne doivent pas avoir été publiés ou acceptés pour publication dans d'autres revues. Le Bureau régional de la Méditerranée orientale se réserve tous les droits de reproduction ou de republication des matériels qui paraissent dans *La Revue de Santé de la Méditerranée orientale*.
2. Les articles originaux en anglais, arabe ou en français peuvent être soumis pour considération au Rédacteur en chef de *La Revue de Santé de la Méditerranée orientale*, Bureau régional de l'OMS pour la Méditerranée orientale, BP 7608, Cité Nasr (11371), Le Caire (Égypte). Les articles peuvent également être envoyés par courriel à l'adresse suivante : EMHJ@emro.who.int. Ils seront résumés dans les trois langues.
3. Le sujet de l'article doit concerner la santé publique ou d'autres domaines techniques et scientifiques connexes dans le champ d'intérêt de l'Organisation mondiale de la Santé, se rapportant plus particulièrement à la Région de la Méditerranée orientale.
4. Chaque manuscrit doit être fourni en trois exemplaires. Le texte, avec les tableaux et les figures qui l'accompagnent, ne devrait pas dépasser 15 pages, format A4, dactylographiées ou imprimées en double interligne (4500 mots) et devrait être imprimé sur le recto seulement. Lorsque le manuscrit est accepté, avec ou sans conditions, l'auteur doit soumettre une disquette informatique de 3,5 pouces, contenant le texte, les tableaux, les graphiques et les illustrations. Pour les articles en anglais et en français, à la demande de l'éditeur, le texte devra être fourni en format traitement de texte (de préférence Microsoft Word pour PC, mais la plupart des autres formats peuvent être convertis) et sauvegardé également dans un fichier texte ASCII. Les articles soumis en arabe devraient suivre les mêmes directives que les articles rédigés en anglais ou en français. Si l'article est une traduction, dans son intégralité ou en partie, d'un autre document non publié, une copie de ce document dans la langue d'origine devrait également être soumise. Si possible, les graphiques devraient être fournis en format Harvard Graphics pour Windows ou Excel, et les illustrations et photographies devraient être en format EPS ou TIFF. Toutefois, il est nécessaire de fournir trois jeux des photographies et figures d'origine avec les données de base. Si les photographies comportent un texte ou lettrage, un jeu supplémentaire doit être fourni sans ce texte/lettrage.
5. Tous les articles seront revus par des pairs, et sur la base des commentaires du réviseur, le Comité de rédaction se réserve le droit d'accepter ou de rejeter tout article. Les articles sont acceptés sous réserve de la révision dont ils feront l'objet au plan statistique et rédactionnel, comme jugé nécessaire, ce qui peut amener à abréger le texte et supprimer certaines données présentées sous forme de tableaux ou de graphiques.
6. Le titre de l'article devrait être aussi concis que possible, de préférence 10 mots environ, et devrait être mis sur une page séparée, avec le nom complet de l'auteur (ou des auteurs), l'organisme (ou les organismes) d'appartenance et le diplôme scientifique le plus élevé obtenu. L'adresse pour la cor-répondance, ainsi que toute autre information nécessaire (adresse courriel, télécopie, téléphone) pour contacter l'auteur correspondant devraient être fournies. Le nombre des auteurs ne devrait pas dépasser cinq. Tous les auteurs devraient avoir apporté une contribution matérielle à la conception, à l'analyse ou à la rédaction de l'étude et avoir approuvé la version finale soumise. Une vérification de cette contribution peut être demandée aux auteurs. Les noms d'autres personnes peuvent être inclus dans les remerciements.

7. Afin de faciliter la traduction des résumés et du nom des auteurs, les auteurs dont la langue maternelle s'écrit en caractères arabes et qui rédigent en anglais ou en français doivent fournir leur nom complet en écriture arabe ainsi qu'une transcription.
8. Les articles présentant des résultats de recherche originale devront suivre le format IMRAD : introduction, matériel (sujets) et méthodes ; résultats ; analyse ; et discussion. Un résumé de 100 mots maximum sera fourni, mentionnant clairement les objectifs, le contexte, les résultats et les conclusions.
9. Les auteurs devront vérifier, le cas échéant, que toutes les personnes sur lesquelles la recherche porte ont donné leur consentement éclairé, et lorsque des participants (vivants ou décédés) n'ont pas pu donner ce consentement, qu'un consentement de substitution a été obtenu.
10. Les articles d'analyse devront comporter des sections portant sur les objectifs, les sources, les méthodes de sélection, la compilation et l'interprétation des données et des conclusions.
11. Les citations dans le texte de travaux publiés devraient être limitées aux références essentielles récentes. Hormis les articles d'analyse, il est conseillé de ne pas dépasser 25 références. Elles devraient être numérotées en chiffres arabes placés entre parenthèses [crochets] selon l'ordre dans lequel elles apparaissent dans le texte. Ces références devraient figurer sous forme de liste numérotée sur une page séparée à la fin de l'article. Elles devraient contenir les éléments d'information suivants, selon le cas : nom(s) et initiale(s) de l'auteur/des auteurs ; titre de l'article ou de l'ouvrage dans sa langue originale ainsi que la traduction ; nom complet de la revue ainsi que le numéro du volume et les pages concernées ; nom de la maison d'édition (commerciale ou institutionnelle) et lieu de publication (ville et pays) ; et date de la publication. Les articles comportant des références inadéquates ou dont les références ne sont pas organisées conformément à ces principes seront renvoyés aux auteurs pour correction. Exemples du style préféré de *La Revue* :
Livre : Al Hamza B, Smith A. *The fifth sign of identity*. Cairo, American University Press, 1990.
Article de Revue : Jones A et al. One day in Tibet. *Journal of tautology*, 1993, 13(5):23-7.
Document : Al-Itneen M, ed. *The principles of uncertainty*. Geneva, World Health Organization, 1985 (document WHO/DOC/537).
12. Les figures et les tableaux avec les légendes appropriées devraient être placés chacun(e) sur une feuille séparée, numérotés en chiffres arabes selon l'ordre et joints à la fin du document. Chaque figure et chaque tableau devraient avoir une référence dans le texte et son emplacement dans le texte devrait être indiqué clairement le cas échéant. Au besoin, les sources devraient être mentionnées pour chaque figure ou tableau. Si des figures, tableaux ou d'autres matériels ont été copiés d'autres sources, les auteurs portent l'entière responsabilité d'obtenir l'autorisation nécessaire. Afin d'éviter les problèmes de mise en page lors de la production finale, le nombre de tableaux et figures devrait être limité autant que possible. Il est préférable de ne pas avoir plus d'un tableau ou d'une figure pour 1000 mots. Les figures établies à partir de données doivent être accompagnées de ces données pour permettre une recomposition, le cas échéant.
13. Les articles originaux et les disquettes ne seront pas renvoyés sauf si l'auteur principal en fait la demande.
14. Lors de la publication, les auteurs recevront chacun un exemplaire du numéro dans lequel l'article paraît et l'auteur principal recevra 50 tirés à part. Les demandes de tirés à part supplémentaires et les informations sur le prix peuvent être obtenues auprès du Rédacteur en chef.

WHO sales and discount policy

Objective

Within the financial obligations of the publishing and distribution process, prices of WHO publications are kept as low as possible in order to maximize their dissemination and reach readers for whom they are intended.

The price and discount policies for WHO/EMRO and WHO/HQ publications are as follows:

Price and discount policy for WHO/EMRO publications

- EMRO publications are priced in US dollars.
- Sales agents receive a 40% discount and 30 days credit. Credit limit is US\$ 500.00.
- Bulk orders of individual books, i.e. 1000 copies per title, qualify the agent for a 50% discount instead of a 40% discount; however, payment of total value must be made before dispatch of publications is effected.
- Dispatch charges are calculated at 25% of cover prices.
- Present delivery time average is two weeks from date of receipt of firm order.

Price and discount policy for WHO/HQ publications

- WHO/HQ publications and subscriptions are priced in Swiss francs. Clients in developing countries are eligible for a special tariff which in all cases is 30% less than the Swiss francs regular prices.
- Sales agents receive a 40% discount for book orders and 20% for subscription orders. Credit limit is Swiss francs 1000.00.
- Bulk orders qualify the agents for a special higher discount, provided the dispatch of the whole order is done to the same consignee. In this case, a proforma invoice will be issued by WHO/HQ, and the order will be dispatched only upon receipt of payment. No return of books or periodicals will be accepted.
- Payment of invoices may be made in US dollars at the official rate of exchange at the date of payment.
- Present delivery time average is four weeks from date of receipt of orders.

A WHO/EMRO Publications Price List is available on request.

البلدان أعضاء اللجنة الإقليمية لشرق المتوسط في منظمة الصحة العالمية
الأردن أفغانستان الإمارات العربية المتحدة باكستان البحرين تونس
الجمهورية العربية الليبية جمهورية إيران الإسلامية الجمهورية العربية السورية
الجمهورية اليمنية جيبوتي السودان الصومال العراق عمان فلسطين قطر
الكويت لبنان مصر المغرب المملكة العربية السعودية

**Member States of the World Health Organization
Eastern Mediterranean Regional Committee**

Afghanistan Bahrain Djibouti Egypt Islamic Republic of Iran
Iraq Jordan Kuwait Lebanon Libyan Arab Jamahiriya Morocco
Oman Pakistan Palestine Qatar Saudi Arabia Somalia Sudan
Syrian Arab Republic Tunisia United Arab Emirates Republic of Yemen

**États Membres du Comité régional de la Méditerranée orientale
de l'Organisation mondiale de la Santé**

Afghanistan Arabie saoudite Bahreïn Djibouti Égypte
Émirats arabes unis République islamique d'Iran Iraq
Jamahiriya arabe libyenne Jordanie Koweït Liban Maroc
Oman Pakistan Palestine Qatar République arabe syrienne Somalie
Soudan Tunisie République du Yémen

Correspondence

Editor-in-chief
WHO Eastern Mediterranean Regional Office

P.O. Box 7608
Nasr City, Cairo 11371
Arab Republic of Egypt

Tel: (202) 2670 2535
email: khayat@emro.who.int
emhj@emro.who.int

Fax: (202) 2670 2492
(202) 2670 2494

Subscription details

Individual copies: US\$ 15.00

Annual subscription: US\$ 60.00

There is a 50% discount for orders from developing countries

Prices include cost of dispatch

Subscription orders should be sent to the Editor-in-chief

Letter from the Editor	492
TB contact investigations: 12 years of experience in the National TB Programme, Morocco 1993–2004	494
Results of the feasibility test of the Practical Approach to Lung Health in the Syrian Arab Republic	504
Immune response to measles vaccine after mass vaccination in Urmia, Islamic Republic of Iran	516
Rubella seroprevalence among women aged 15–39 years in Morocco	526
Surveillance of childhood vaccine-preventable diseases at health facilities in Jeddah, Saudi Arabia	532
Prevalence of oropharyngeal colonization by <i>Haemophilus influenzae</i> type b in Iranian children	544
Stunting is a major risk factor for overweight: results from national surveys in 5 Arab countries	549
The use of body mass index for measurement of fat mass in children is highly dependant on abdominal fat	563
CD95 expression in white blood cells of malnourished infants during hospitalization and catch-up growth	574
Persistence of goitre in children post-salt iodization in Islamic Republic of Iran: autoimmune status	584
Prevalence of type 2 diabetes in the Islamic Republic of Iran: systematic review and meta-analysis	591
Incidence of cancer in Gulf Cooperation Council countries, 1998–2001	600
Association of reproductive factors with the incidence of breast cancer in Gulf Cooperation Council countries	612
Woman abuse and pregnancy outcome among women in Khoram Abad, Islamic Republic of Iran	622

Contents

Providing emotional stability through relaxation training	629
Effect of music on anxiety, stress, and depression levels in patients undergoing coronary angiography	639
Publications indexed in Medline and Embase originating from the Syrian Arab Republic: a survey	648
تدريس اللغة الإنكليزية بكلية الطب، جامعة دمشق	653
دور منظمة الصحة العالمية وبرنامجها العربي في النهوض باللغة العربية	665
Pharmacoepidemiological study of self-medication in adults attending pharmacies in Alexandria, Egypt	683
Skin manifestations of chronic hepatitis C virus infection in Cairo, Egypt	692
Lupus et virus d'Epstein-Barr	701
Microbiological quality and sample collection policy for dairy products in Ramallah and Al-Bireh district, Palestine	709
Distribution of ABO and Rh D blood groups in the population of Poonch district, Azad Jammu and Kashmir	717
Healthy lifestyle habits among Greek university students: differences by sex and faculty of study	722
Immune thrombocytopenia in children with reference to low-income countries	729
Design and implementation of a hospital information system for the Palestine Red Crescent Society in Lebanon	738
Developing a holistic accreditation system for medical universities of the Islamic Republic of Iran	747
Contact irritant dermatitis from insect secretions: report of 74 cases in a military unit in Eritrea	757
Congenital tick-borne relapsing fever: report of a case with transplacental transmission in the Islamic Republic of Iran	761
Letter to the Editor	765
Guidelines for authors	766
WHO sales and discount policy	772