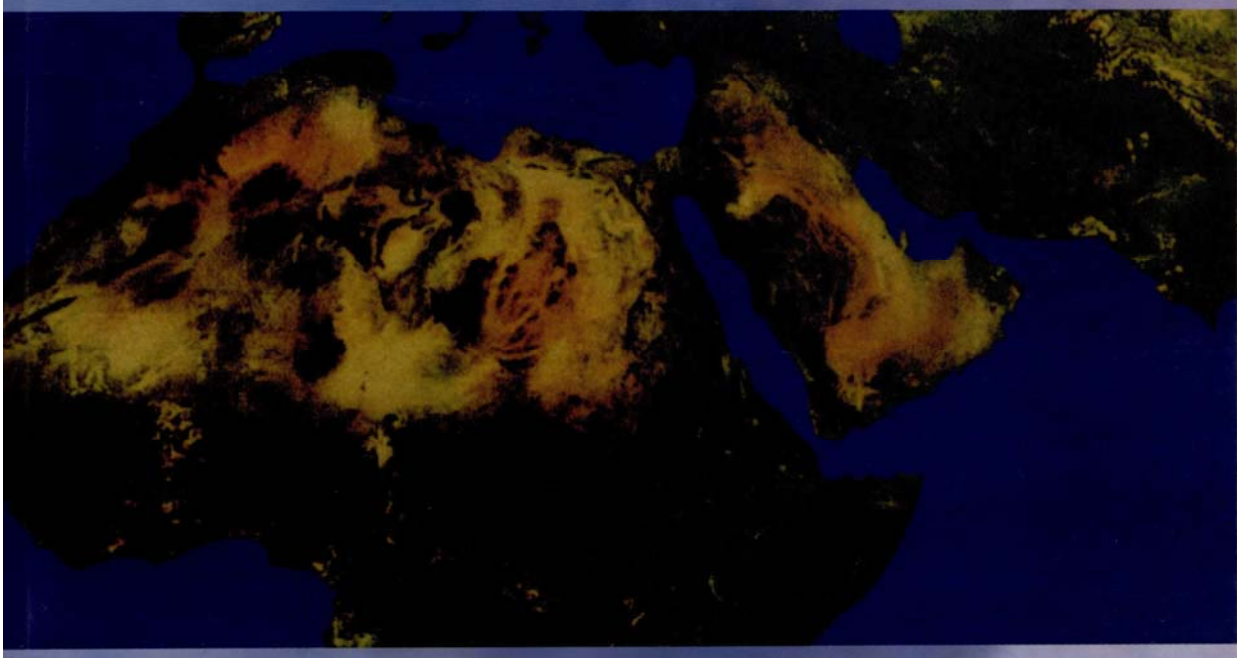
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المجلة الصحية لشرق المتوسط

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World Health Organization
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المكتب الإقليمي لشرق المتوسط
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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، وخاصةً ما يتعلق منها بإقليم شرق المتوسط. وهي موجَّهة 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.

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المجلة الصحية لشرق المتوسط

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Letter from the Editor

A growing number of World Health Organization (WHO) Member States and political and international health leaders recognize the urgent need to make a major, sustained commitment to strengthening health systems. Consultations over the past few years at global and regional levels have emphasized the importance of WHO's institutional role in this.

The Division of Health Systems and Services Development (DHS) in the WHO Regional Office for the Eastern Mediterranean is mandated to contribute to the improvement of key health outcomes through strengthening health systems performance. DHS focuses on enabling Member States of the Region to improve equity in health, access, coverage and quality of health services through policy dialogue informed by sound evidence.

Well-functioning health systems have certain characteristics in common. They have reliable procurement and distribution systems; they have an adequate workforce with appropriate skills and motivation; and they depend on sustainable, inclusive and fair financing systems. All these elements ensure that the costs of health care should not force impoverished households into further poverty. To meet the challenge of health systems development in the Region, DHS focuses on the issues of the systems that are not yet delivering adequate, equitable services to all, and strives to facilitate creating better functional links between programmes and stakeholders, thus ensuring capacity to address current issues and identify future challenges.

Access to safe and effective health technologies and medicines relies on policies for selection and management based on scientific evidence and best practice. DHS works with Member States in such activities as: developing and maintaining basic operational frameworks for safe and reliable health services and access to medicine; completing these frameworks through project proposals prepared by the Member States; and developing norms and standards, guidelines and training materials.

To respond to the current crisis in the health workforce in the Region, policies and actions are needed to address the dynamics of the labour market, the production and management of the workforce, and the distribution and performance of existing staff. DHS assists governments and health managers in developing and implementing strategies to achieve an effective and sustainable workforce.

رسالة من المحرر

يدرك عدد متزايد من الدول الأعضاء في منظمة الصحة العالمية، والقيادات السياسية والصحية الدولية الحاجة الماسة لإيجاد التزام قوي ومستمر بتقوية النُظم الصحية وتعزيزها. وقد أكّدت مشاورات عدّة، عقدت على مدى السنوات القليلة الماضية على المستوى العالمي والإقليمي، أهمية الدور المؤسسي لمنظمة الصحة العالمية في هذا المضمار.

وشعبة تطوير النُظم والخدمات الصحية بالمكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط مكلّفة بالإسهام في تحسين النتائج الصحية الأساسية، من خلال تقوية وتعزيز أداء النُظم الصحية. وتركز الشعبة على تمكين الدول الأعضاء في الإقليم من تحسين العدالة في الصحة، وإتاحة الخدمات ومد نطاق التغطية بها، وتحسين جودتها من خلال إقامة حوار بشأن السياسات يكون مرتكزاً على بيِّنات سليمة.

وللنُظم الصحية التي تعمل بكفاءة خصائص معينة تشترك فيها، مثل وجود أنظمة مشتريات وتوزيع موثوقة، وعدد كاف ومناسب من القوة العاملة التي تتمتع بمهارات جيدة ولديها دوافع عمل قوية، وتعتمد على نُظم مالية مضمونة الاستمرار وتتسم بالشمول والإنصاف. وفي توافر كل هذه العناصر ضمان بألا تدفع تكاليف الرعاية الصحية بالأسر الفقيرة نحو مزيد من الفقر. وبُغْيَة مواجهة التحدي المتمثّل في تطوير النظام الصحي في هذا الإقليم، تركز شعبة تطوير النُظم والخدمات الصحية على قضايا النُظم التي لم تستطع حتى الآن إيتاء خدمات كافية ومنصفة للجميع، وتجاهد من أجل تيسير إيجاد روابط عمل أفضل ما بين البرامج وأصحاب الشأن المعنيِّين، بما يحقق القدرة على معالجة القضايا الراهنة والتعرف على التحدّيات المستقبلية.

ويرتكز الحصول على تقنيات صحية وأدوية مأمونة وفعَّالة، على سياسات اختيار وتدبير تستند إلى بيِّنات علمية وعلى أفضل الممارسات. وتعمل شعبة تطوير النُظم والخدمات الصحية، مع الدول الأعضاء في الإقليم، على تنفيذ أنشطة مختلفة مثل إعداد أطر تنفيذية من أجل الحصول على خدمات صحية وأدوية مأمونة وموثوقة، واستكمال هذه الأطر من خلال مقترحات المشاريع التي أعدَّتها الدول الأعضاء، وإعداد قواعد ومعايير ودلائل إرشادية ومواد تدريبية في هذا الإطار.

ولكي يمكن التصدّي للأزمة الحالية الخاصة بالقوة العاملة الصحية في الإقليم، فإن هناك حاجة إلى وجود سياسات وإجراءات للتعامل مع ديناميات سوق العمل، وتخريج وتدبير القوى العاملة وتوزيعها، وتطوير أداء العاملين الصحيِّين الحاليِّين. وتساعد شعبة تطوير النُظم والخدمات الصحية الحكومات ومديري الصحة في إعداد وتنفيذ الاستراتيجيات التي يمكن من خلالها إيجاد قوى عاملة فعَّالة ومضمونة الاستمرار.

Hepatitis B and C viral infections in chronic liver disease: a population-based study in Qatar

A. Rikabi,[1] A. Bener,[2,4] A. Al-Marri[3] and S. Al-Thani[1]

العدوى بفيروسَيْ بي وسي لالتهاب الكبد في المرض الكبدي المزمن: دراسة سكانية المرتكز في قَطَر

عمار ركابي، عبد الباري بينر، عجايب المرى، شيخة آل ثاني

الخلاصة: درس الباحثون معدَّل انتشار العدوى بفيروسَيْ التهاب الكبد بي وسي بين مرضى الكبد في قَطَر في الفترة 2000 – 2005. وقد حصل الباحثون على درجات ومراحل حالات التهاب الكبد بي وسي من تقارير باثولوجية من المختبر المرجعي الرئيسي في قَطَر. ومن بين 915 مريضاً بالكبد خضعوا للدراسة، كان لدى 29.4٪ منهم التهاب الكبد سي ولدى 2.5٪ منهم التهاب الكبد بي. وقد كان معدَّل انتشار التهاب الكبد بي وسي أعلى بين غير القَطَريين منه لدى المواطنين القَطَريين، وهو أعلى لدى الذكور عنه في الإناث؛ ولاسيَّما التهاب الكبد سي. ولم تترافق معظم الحالات بمضاعفات (89٪) ولا بالتهاب (76.4٪)، وقد ازداد معدَّل انتشار التهاب الكبد سي بين مرضى الكبد خلال السنوات الأخيرة حتى وصل إلى 481 لكل ألف مريض بالكبد عام 2005.

ABSTRACT We investigated the incidence of hepatitis B (HBV) and C (HCV) virus infection among patients with liver disease in Qatar from 2000 to 2005. The grading and staging of HBV and HCV cases were obtained from pathology reports at the principal reference laboratory for Qatar. Of the 915 liver patients studied, 29.4% had HCV and 2.5% had HBV. The incidence of HBV and HCV infection was greater in non-Qataris than Qatari nationals and in males than females, especially for HCV. Most cases were uncomplicated (89.0%) and had no inflammation (76.4%). The incidence of HCV has been increasing in liver patients in recent years up to a rate of 481 per 1000 patients with liver disease in 2005.

Infections par le virus de l'hépatite B et C dans la maladie hépatique chronique : étude en population au Qatar

RÉSUMÉ Nous avons étudié l'incidence de l'infection par le virus de l'hépatite B (VHB) et C (VHC) chez des sujets souffrant d'une maladie du foie au Qatar entre 2000 et 2005. Le grade et le stade des cas de VHB et de VHC ont été tirés des rapports de pathologie du principal laboratoire de référence du Qatar. Sur les 915 sujets hépatiques étudiés, 29,4 % étaient contaminés par le VHC et 2,5 % par le VHB. L'incidence de l'infection par le VHB et le VHC était plus élevée chez les non-Qataris que chez les Qataris et chez les hommes que chez les femmes, notamment en ce qui concerne le VHC. La plupart des patients ne présentaient pas de complications (89,0 %) ni d'inflammation (76,4 %). Ces dernières années, l'incidence du VHC a augmenté chez les patients hépatiques jusqu'à atteindre un taux de 481 pour 1 000 patients en 2005.

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Introduction

Hepatitis is an infection of the liver caused by several viruses, the most common of which are hepatitis A, B and C. Both hepatitis B virus (HBV) and C virus (HCV) are spread mainly through contaminated blood and blood products, sexual contact and contaminated needles. Although there has been a decrease in the incidence of viral hepatitis over the last decade, it is still the most common cause of chronic liver disease worldwide [*1–5*].

Globally, the number of individuals infected with HBV has been estimated to be 350 million, 40% of whom may progress to cirrhosis, liver failure and hepatocellular carcinoma [*3*]. Approximately 170 million people worldwide are affected with HCV. It is the most common chronic infection in the United States of America (USA) and is responsible for 40% of chronic liver disease [*4*]. HCV infections are the principal cause of chronic liver disease, cirrhosis, carcinoma and liver transplantation. Over 17 000 people with chronic liver disease were listed for liver transplantation in 2003, with > 10% expected to die before the operation [*6*].

Although viral hepatitis is a global health problem, there is a considerable variability in HBV and HCV rates between and within countries and between ethnic groups [*2*]. The aim of this study was to assess the incidence and impact of HBV and HCV infection in patients with liver disease in Qatar.

Methods

This was a cohort hospital-based study in Qatar during the period 2000–05.

Information was gathered from the hepatitis disease registry of the Department of Preventive Medicine in the National Health Authority. Details of any patient who visits a primary health centre or private clinic in Qatar with symptoms and signs of hepatitis are notified to the Communicable Diseases Control Section and a blood specimen is sent to the central laboratory of the Hamad Medical Corporation for diagnostic tests. All reports of positive cases from the laboratory are forwarded to the Communicable Diseases Control Section database, thus ensuring that any hepatitis patient in Qatar is accurately documented.

All infectious diseases reported to the Department of Preventive Medicine are coded according to the *International statistical classification of diseases and related health problems* (ICD-10). Viral hepatitis is classified into acute hepatitis A (B15), acute hepatitis B (B16), other acute viral hepatitis (B17), chronic viral hepatitis (B-18) and unspecified viral hepatitis (B-19) [*7*]. In the Qatar central laboratory, all cases of acute and chronic viral hepatitis B are classified under B-16 and acute and chronic viral hepatitis C are classified under B-18.

From a total of 915 patients in Qatar with hepatitis documented over the study period, we studied all patients with HBV and HCV infection. Liver biopsy of the studied patients helped to establish the correct diagnosis, assess the histological activity (grading) and assess structural changes, including fibrosis and cirrhosis (staging).

Histological study of liver biopsies was performed in the histopathology laboratory at Hamad General Hospital. Differentiation between chronic HBV and HCV infection was based on the presence of classical ground-glass hepatocytes and positive staining for hepatitis B surface antigen in cases of HBV infection. Cases of chronic hepatitis C showed some or all of the histological features usually present in this infection, including lymphoid follicles in portal tracts, damaged interlobular bile ducts, steatosis and granulomas.

The histological changes of chronic hepatitis were classified according to the method of Scheuer [*8*]. The grading score (0–4) represents necroinflammatory activity, from absent or minimal (0) to severe and widespread interface hepatitis (4). The staging score (0–4) is based on the degree and extent of fibrosis, from no fibrosis (0) to probable or definite cirrhosis (4).

The chi-squared test for trend was used to compare the trend statistical significance differences between years. $P < 0.05$ was taken as the cut-off value for significance.

Results

Of the 915 patients with liver disease who were screened during the period 2000–05, 269 (29.4%) had HCV and 23 (2.5%) had HBV infection.

Figure 1 shows the incidence of HBV and HCV infection per 1000 population with liver disease over each year of the study. In every year, HCV was more common than HBV. However, there was a notable increase in the incidence of HCV in patients with liver disease during recent years, reaching 481 per 1000 patients in 2005. Incidence of HBV it was 28 per 1000 in the same year.

The rate of HCV was higher in those of non-Qatari nationality than in Qatari nationals (82.9% for all the years combined versus 17.1%) (Table 1). There was a sharp increase in the number of cases of HCV in liver patients in 2005 compared with 2000

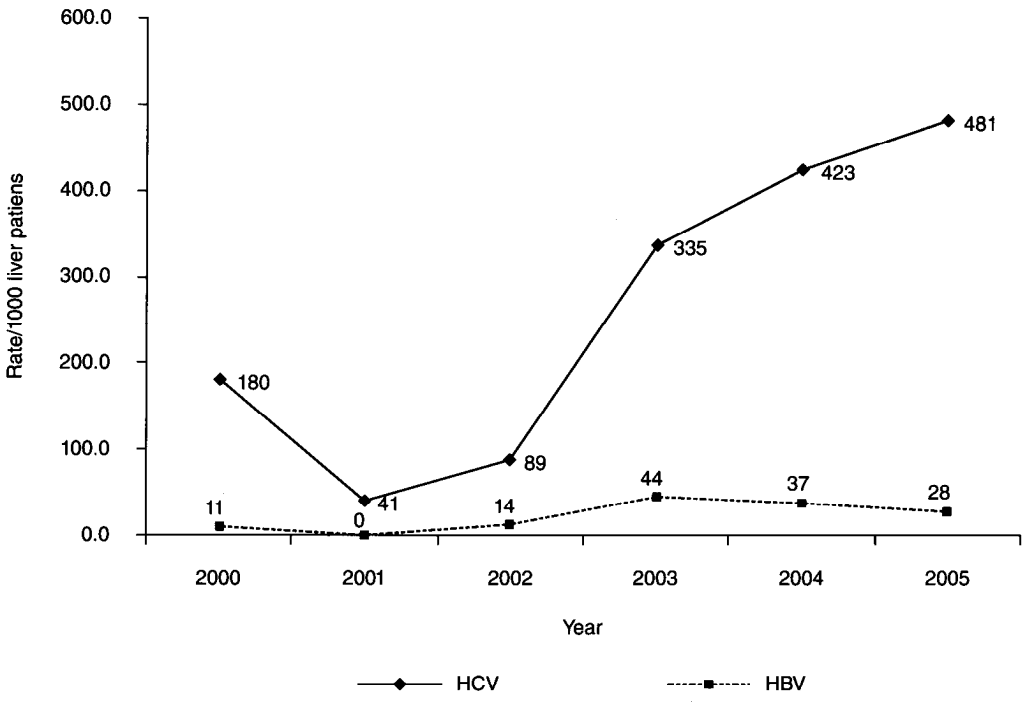


Figure 1 **Incidence of hepatitis B virus (HBV) and C virus (HCV) infection per 1000 patients with liver disease**

Table 1 **Number of cases of hepatitis B and C virus infection reported in patients with liver disease by nationality during the period 2000–05**

Variable	Qatari		Non-Qatari		Total
	No.	%	No.	%	No.
Hepatitis B					
2000	1	100.0	0	0.0	1
2001	0	0.0	0	0.0	0
2002	0	0.0	2	100.0	2
2003	5	71.4	2	28.6	7
2004	3	42.9	4	57.1	7
2005	1	16.7	5	83.3	6
Total	10	43.5	13	56.5	23
Hepatitis C					
2000	2	12.5	14	87.5	16
2001	1	20.0	4	80.0	5
2002	1	7.7	12	92.3	13
2003	13	24.5	40	75.5	53
2004	11	13.8	69	86.3	80
2005	18	17.6	84	82.4	102
Total	46	17.1	223	82.9	269
Total	56	19.1	236	80.8	292

(9-fold higher in Qataris and 6-fold higher in non-Qataris).

Over the years, the rate of HBV and HCV infection was higher in male than female patients (73.9% versus 26.1% for HBV and 80.7% versus 19.3% for HCV) (Table 2).

Table 3 shows the stage and grade of HBV and HCV in the patients by nationality. Most of the cases were uncomplicated (260, 89.0%) and had no inflammation (233, 76.4%). Of the complicated cases (32 patients), stage 2 was frequent (10 cases), especially in those of non-Qatari nationality (7 patients). Also, among patients with inflammation, grade 2 was the most frequent (38 cases), of whom 32 were non-Qataris.

Comparing the proportion of HBV and HCV among patients with liver disease in studies from different countries (Table 4), the proportion of HCV in Qatar (29.4%) and Pakistan (29.0%) were similar and very close to the proportion of India (31.5%). HBV, on the other hand, is relatively rare in Qatar (2.5%) and incidence was relatively lower than in the USA and the Far East.

Discussion

Viral hepatitis is the most common cause of chronic liver disease throughout the world [*9,10*]. Chronic HBV accounts for 5%–10% of cases of chronic liver disease and cirrhosis in the USA [*9*]. In our study, 31.9% of patients with liver disease had HCV or HBV. A study in Singapore showed that chronic HCV- and HBV-related liver disease constituted 57% of all indications for adult liver transplants [*11*]. A study in Romania on chronic HCV and HBV infections showed that an association with chronic liver disease was seen in half the patients [*12*].

Table 2 **Number of cases of hepatitis B and C virus infection reported patients with liver disease by sex during the period 2000–05**

Variable	Male		Female		Total
	No	%	No.	%	No.
Hepatitis B					
2000	1	100.0	0	0.0	1
2001	0	0.0	0	0.0	0
2002	2	100.0	0	0.0	2
2003	4	57.1	3	42.9	7
2004	4	57.1	3	42.9	7
2005	6	100.0	0	0.0	6
Total	17	73.9	6	26.1	23
Hepatitis C					
2000	15	93.8	1	6.3	16
2001	4	80.0	1	20.0	5
2002	10	76.9	3	23.1	13
2003	44	83.0	9	17.0	53
2004	62	77.5	18	22.5	80
2005	82	80.4	20	19.6	102
Total	217	80.7	52	19.3	269
Total	234	80.1	58	19.9	292

Table 3 **Stage and grade of cases of hepatitis B and C virus infection in patients with liver disease by nationality during the period 2000–05 (Scheuer's classification [8])**

Variable		Qatari		Non-Qatari		Total
		No.	%	No.	%	No.
Stage (extent of fibrosis)						
0	No fibrosis	49	18.8	211	81.2	260
1	Fibrosis confined to portal tracts	1	12.5	7	87.5	8
2	Periportal or portal–portal septa, intact vascular relationship	3	30.0	7	70.0	10
3	Fibrosis with distorted structure but no obvious cirrhosis	3	50.0	3	50.0	6
4	Probable or definite cirrhosis	0	0.0	8	100.0	8
Grade (necroinflammatory activity)						
0	Absent or minimal	46	20.6	177	79.4	223
1	Portal inflammation only	3	21.4	11	78.6	14
2	Mild or localized interface hepatitis	6	15.8	32	84.2	38
3	Moderate or more extensive interface hepatitis	1	6.7	14	93.3	15
4	Severe and widespread interface hepatitis	0	0.0	2	100.0	2

In Singapore the prevalence of HBV-related liver diseases was high (Table 4), which was not surprising as HBV is endemic with a 4.1% carrier rate and complication developing in 10%–40% of patients with chronic HBV [*11*]. In Qatar, HBV was relatively rare, 2.5%, HCV was more common in patients with liver disease (29.4%) and the incidence increased throughout the study period. In contrast, HCV is relatively rare in Singapore and in parts of Asia [*13*]. In addition, studies from India have shown a prevalence of HCV of 3%–31.5% in patients with cirrhosis and chronic liver disease (Table 4) [*14*]. However, clinical studies from southern Europe and the USA have shown a high percentage of HCV infection in patients with cirrhosis [*15*], which is consistent with our findings.

Table 4 **Comparison of rates of hepatitis B virus (HBV) and C virus (HCV) infection among patients with liver disease in different countries**

Country	HBV %	HCV %	Source
Qatar	2.5	29.4	This study
USA	5–10	–	[9]
Singapore	10–40	–	[11]
Philippines	8.8–12	–	[20]
Italy	–	62–74	[16]
India	–	3.0–31.5	[14]
Pakistan	–	29	[18]
Egypt	–	74	[17]

USA = United States of America

There is considerable variability in the prevalence of HBV and HCV between different countries and ethnic groups. For instance, the prevalence of HCV in people with chronic liver disease has been estimated at 62%–74% in Italy [*16*], 74% in Egypt [*17*] and only 29% in Pakistan [*18*]. This is similar to our finding that non-Qatari liver patients had a higher rate of HBV and HCV infection than Qatari liver patients. People of non-Qatari nationality in Qatar come mostly from hepatitis-endemic areas, which explains the higher incidence among them.

It is evident from the study findings that HCV is a major cause of chronic liver disease in Qatar. Poynard, Bedossa and Opolon reported that approximately 300 million people infected worldwide with HCV will progress to cirrhosis or liver failure, and would need a transplant in the future [*19*].

Conclusion

The present study findings revealed that over 30% of patients in Qatar with liver disease had viral HBV or HCV, with HCV playing the greater role,. HBV and HCV infection are both preventable. In order to limit the spread of hepatitis, efforts must be directed at minimizing exposure to sources of infection. Further studies are necessary to evaluate the sociodemographic and other associated risk factors involved with HBV and HCV infection in patients with liver disease.

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Combination therapy with interferon and ribavirin for chronic hepatitis C infection in beta-thalassaemia major

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المعالجة المشتركة لالتهاب الكبد المزمن سي لدى المصابين بالتلاسيميا بيتا الكبرى بالإنترفيرون والريبافيرين

محمد جعفر صفار، هيوا صفار، علي رضا خليليان، فرشاد نقشوار

الخلاصة: تتعقّد معالجة العدوى بالتهاب الكبد المزمن سي لدى المصابين بالتلاسيميا بيتا الكبرى المعتمدين على نقل الدم بتراكم الحديد في الكبد وبالخوف من انحلال الدم المرافق للمعالجة بالريبافيرين. وقد قيّم الباحثون كفاءة المعالجة المشتركة بالانترفيون ألفا والريبافيرين لدى مرض التلاسيميا المصابين بعدوى الفيروس سي لالتهاب الكبد وما يرافق تلك المعالجة من تأثيرات جانبية. وقد شملت الدراسة 17 مريضاً (كان 10 منهم من غير المستجيبين للمعالجة بالإنترفيرون لوحده، و7 منهم يعالجون لأول مرة، وكان وسطي العمر لديهم 23.1 عاماً). وقد تلقوا جميعهم المعالجة المشتركة لمدة 12 شهراً، فبلغ معدّل الاستجابة الفيرلوجية المستقرّة بعد 6 شهور من المعالجة 58.8٪. وقد ازدادت متطلبات نقل الدم المؤقتة أثناء المعالجة بمقدار 36.6٪. وقد تحمل مرضى التلاسيميا الكبرى المصابين بعدوى فيروس التهاب الكبد سي المعالجة المشتركة تحملاً جيداً، وقد تكون مفيدة لهم.

ABSTRACT Treatment of chronic hepatitis C virus (HCV) infection in transfusion-dependent beta-thalassaemia major patients is complicated by existing hepatic siderosis and the fear of ribavirin-associated haemolysis. We evaluated the efficacy and side-effects of combination interferon-α (INF) and ribavirin therapy for HCV-infected thalassaemia patients. A total of 17 patients were enrolled (10 nonresponders to INF monotherapy, 7 naive to treatment, mean age 23.1 years) and they received 12 months of combination therapy. The sustained virological response rate 6 months after treatment was 58.8%. Blood transfusion requirements during treatment temporarily increased by 36.6%. Combination therapy was tolerated by, and may be useful for, HCV-infected thalassaemia major patients.

Thérapie combinée par interféron et ribavirine pour soigner l'infection chronique par le virus de l'hépatite C dans les cas de bêta-thalassémie majeure

RÉSUMÉ Le traitement de l'infection chronique par le virus de l'hépatite C (VHC) chez les patients atteints de bêta-thalassémie majeure et dépendants des transfusions est compliqué par l'existence d'une sidérose hépatique et par la crainte de l'hémolyse associée à la ribavirine. Nous avons évalué l'efficacité et les effets secondaires de la thérapie combinée par interféron α et ribavirine chez des thalassémiques infectés par le VHC. Au total, 17 patients ont été recrutés pour l'étude (10 ne répondaient pas à la monothérapie par interféron, 7 n'avaient pas encore reçu de traitement, moyenne d'âge 23,1 ans) et ont reçu la thérapie combinée pendant 12 mois. Le taux de réponse virologique prolongé six mois après le traitement était de 58,8 %. La nécessité de transfusions sanguines pendant le traitement a provisoirement augmenté de 36,6 %. La thérapie combinée était tolérée par les malades atteints de thalassémie majeure infectés par le VHC et peut leur être bénéfique.

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Introduction

Hepatitis C virus (HCV) infection is common in patients receiving long-term blood transfusion therapy [*1–5*]. In the case of patients with beta-thalassaemia major (TM), hepatic damage due to HCV infection is exacerbated by iron overload due to transfusion, and liver disease is a recognized cause of mortality [*6*]. The therapeutic aim in HCV infection, especially in TM patients, is the early eradication of the virus in order to avoid long-term clinical complications [*7*]. Current evidence indicates that combination therapy with interferon [interferon-2α (INF) or pegylated interferon-α] and ribavirin (Rib) for HCV infection is associated with higher rates of sustained virological, biochemical and histological responses compared with INF alone [*8–10*]. However, reversible haemolytic anaemia, the major toxicity associated with Rib therapy, is a limiting factor for the use of Rib in patients with underlying haemolytic anaemia, and can cause further problems with anaemia because these patients are prone to constant haemolysis [*11–14*].

This report reviews the response to INF and Rib combination therapy in chronic HCV-infected TM patients who did not respond or relapsed to INF monotherapy and/or were naive to HCV treatment in Sari, Islamic Republic of Iran.

Methods

Patients

Between April 2000 and April 2005, 17 transfusion-dependent TM patients were consecutively enrolled into a noncontrolled, descriptive study of 12 months of INF and Rib combination therapy at the thalassaemia hepatitis centre at Boali-Sina hospital, Sari, Islamic Republic of Iran. These HCV-infected TM patients were selected from a previous study [*15*]. In that study 77 (15%) patients were found to have seroprotective titres in an HCV-infection screening of 500 TM patients at Sari thalassaemia centre. After approval of the ethics committee and with informed written consent from patients and parents, liver biopsy was performed on 42 patients; 33 were treated with INF for 9–12 months. Virological response occurred in 60% of treated patients. Untreated patients, i.e. those who were unresponsive to INF therapy or relapsed, were included in the study reported here.

The inclusion criteria were: chronic HCV-infected TM patients who failed to respond or relapsed to INF monotherapy or were naive to treatment, and seropositivity for anti-HCV antibodies. HCV status was determined using 3rd generation enzyme-linked immunosorbent assay (ETI-AB-HCV K-3, DiaSorin, Vercelli, Italy) and reconfirmed by HCV-RNA, using a qualitative polymerase chain reaction (PCR) assay (genotyping was not possible), the presence of abnormal serum alanine aminotransferase (ALT) levels (≥ 1.5-fold normal values) for 6 months and a diagnosis of chronic hepatitis determined from liver biopsy performed within the preceding 6–12 months.

The exclusion criteria included: decompensated liver disease; symptomatic cardiac or renal impairment; psychiatric or autoimmune diseases; leukopenia ($< 2 \times 10^9$ cells/L) or thrombocytopenia ($< 100 \times 10^9$ cells/L); and serological evidence of hepatitis B virus and or human immunodeficiency virus infection. All patients and their parents were informed about the purpose of the study and the known side-effects with both drugs, and were asked to sign a consent form.

Treatment regimen and monitoring

Recombinant INF (pegferon-B3 MioIU, Pooyesh-Darou, Tehran, Islamic Republic

of Iran), 3 MU 3 times weekly subcutaneously, was administered together with Rib (Ribacip-200, Cipla, Mumbai, India), 800 mg daily orally in 2 divided doses, up to 4 months after virological response or a maximum of 9 months if there was no response. The treatment duration was 12 months, during which the pretransfusion haemoglobin level was maintained at 9–11 g/dL with more frequent transfusion if required, and iron chelation therapy with desferrioxamine was increased with increased blood consumption.

Baseline assessment was the number of units of red blood cells transfused during the 12 months prior to therapy. Patients were seen at weeks 1, 2, 4 and 6 and every 3–4 weeks thereafter for assessment of compliance, adverse effects, blood transfusion requirements and full blood count. Dosage adjustment was allowed for INF if the patients developed leukopenia (< 2000 cells/mL) or thrombocytopenia (< 100 000 cells/mL). The dosage of Rib was not adjusted as these patients were all transfusion-dependent.

Biochemical monitoring included ALT testing on alternate months and serum ferritin testing at 3-month intervals. The virological response was assessed by serum HCV-RNA detection at months 4, 8 and 12 during treatment and for at least 6 months after completion of treatment. Sustained virological and biochemical responses were defined as disappearance of HCV-RNA and normalization of ALT for 6 months after completion of treatment.

Analysis

Paired *t*-tests were used to compare ALT levels, serum ferritin concentration and mean blood consumption before and after treatment. $P < 0.05$ was considered significant.

Results

A total of 17 HCV-infected TM patients (11 males) consented to treatment; 7 patients were naive to treatment and 10 had been treated before (5 non-responders, 5 relapsers). The mean age of patients was 23.1 (range 17–34) years, and the mean duration of blood transfusion was 19.9 (range 13.5–29) years. The mean serum ferritin and ALT levels before treatment were 1782 µg/L [standard deviation (SD) 659], and 125 IU/L (SD 51) respectively. Three (3) patients required transient reduction of INF dose for 2 weeks because of mild leukopenia. All patients completed the 9–12 months treatment.

Serum HCV-RNA became undetectable in 8 patients after 4 months and in a further 4 patients by 12 months. However, 2 initial responders showed reappearance of HCV-RNA 6 months after treatment. The sustained virological response rate was 10/17 patients (58.8%). Comparing serum HCV-RNA clearing rates according to the pretreatment status of the patients indicated that 5/10 (50.0%) previously treated, and 5/7 (71.4%) naive patients showed sustained virological clearance. Biochemical response occurred earlier than virological response, and was achieved in 13 (76.5%) cases. Serum ferritin levels remained stable during treatment in both responders and nonresponders respectively [1435 (SD 1241) µg/L versus 1946 (SD 1073) µg/L)] ($t = 0.75$, $P = 0.45$).

Side-effects of fever, chill, malaise and headache were common but transient. There was no weight reduction. The most significant complication was Rib-associated haemolysis. The patients required more frequent transfusion to maintain a pretransfusion haemoglobin level of about 9–11 g/dL compared with the transfusion require-

ments during the 12-month period prior to treatment [mean 4353 mL/year/patient pretreatment (SD 1241) versus 5947 (SD 1278) mL/year/patient during the treatment period]. During treatment the mean blood consumption per patient rose from 4353 to 5947 mL/year, a 36.6% increase (range 3.0% to 112%). After treatment, blood consumption reduced to pretreatment levels.

All the results are shown in Table 1.

Discussion

The results of this study showed that with INF and Rib combination therapy, sustained clearance of serum HCV-RNA can be obtained in more than half of TM patients with chronic HCV infection who have failed INF monotherapy or were naive to HCV treatment. The major side-effect was a significant increase in the need for transfusion during the treatment.

A combination of INF (or pegylated interferon-α) and Rib therapy has been shown to be superior to INF monotherapy as treatment of choice in non-TM patients [*8–10*]. The benefits of this form of therapy may significantly outweigh the risks associated with the increased haemolysis even in TM patients. However, data on combination therapy in TM patients are limited and most reports are based on INF monotherapy [*16,17*].

Limited case series have shown that the addition of Rib to INF improves the virological response rate to 45%–72%, albeit at the cost of a 30%–50% increase in blood transfusion requirements during the treatment period [*18,19*]. In a study by Telfer et al., INF in combination with Rib produced sustained virological response rates of 45% in 11 HCV-infected transfusion-dependent TM patients in whom INF monotherapy failed [*18*]. The use of combination therapy in 18 previously untreated HCV-infected TM patients by Li et al. revealed that 72.2% of treated patients showed sustained virological clearance [*19*]. Another study on the efficacy and tolerability of pegylated interferon-α with or without Rib in chronic HCV-infected TM patients showed that 62.5%and 30.0% of patients got a sustained virological response to combination and monotherapy respectively [*20*].

The overall serum HCV-RNA viral clearance rate achieved in our study was 58.8%, more than the 45% rate achieved by Telfer et al. [*18*], but lower than the 72.2% obtained by Li et al. [*19*]. Although the number of patients in our study was too small to be divided into 2 subgroups, when the comparison of serum HCV-RNA clearing rates were made according to the pretreatment status of the patients, the results indicated that 5 out of 10 (50.0%) of previously treated, and 5 out of 7 (71.4%) of naive patients showed sustained virological clearance. These values are in accordance with results of the above-mentioned studies [*18–20*].

The most important side-effect associated with combination therapy is a significant increase in haemolysis [*11–14*], leading to a greater need for transfusion. This may put these patients at risk of a further increase in iron overload during combination therapy. Therefore, patients should be instructed to intensify desferrioxamine chelation during treatment [*21*]. Our study demonstrated an average 36.6% increase in blood consumption during therapy, which is consistent with the studies of Telfer et al. [*17*], Li et al. [*18*] and Inati et al. [*19*] where the levels of blood consumption were increased by 41%, 30% and 34% respectively.

Serum ferritin levels remained static during the treatment period. However, in

Table 1 **Baseline characteristics of beta thalassaemia major patients and their response to ribavirin/interferon combination therapy**

Case[a]	Age (years)	Transfusion duration (years)	Chelation	Ferritin level (µg/L)		ALT level (IU/L)		HCV-RNA response[b]			Blood consumption (mL/year)	
				Pre Rx	Post Rx	Pre Rx	Post Rx	During Rx		Post Rx	Pre Rx	During Rx
								4 m	12 m	6 m		
1	25	21.0	DFO	1029	939	175	38	+	+	+	2850	4300
2	24	77.0	DFO	1871	976	75	68	+	–	+	2800	5200
3	18	13.0	DFO	2802	2300	140	34	+	–	–	3800	5600
4	25	21.0	DFO	1590	1210	61	26	–	–	+	4200	6100
5	23	21.5	DFO+L1	2380	1989	135	22	+	+	+	4500	6350
6	19	18.5	DFO	2522	2114	219	186	+	+	+	3500	5350
7	23	22.0	DFO	2242	960	213	23	+	–	–	3000	3100
8	34	29.0	DFO	1496	601	189	36	–	–	–	4200	8900
9	23	17.5	DFO	1028	1000	128	20	–	–	–	3100	5700
10	25	22.0	DFO	1753	1338	124	22	+	–	–	6500	7200
11	22	19.0	DFO	1149	1268	135	112	+	+	+	7000	7600
12	25	21.0	DFO+L1	3100	2580	84	32	–	–	–	3100	6100
13	23	19.0	DFO	2186	1496	60	84	+	+	+	4700	6200
14	23	21.0	DFO+L1	1038	2200	124	22	–	–	–	5050	5300
15	17	15.5	DFO	1690	801	68	21	–	–	–	5650	6600
16	23	19.5	DFO	1330	1300	112	32	–	–	–	5650	5900
17	21	19.5	DFO	1110	980	86	28	–	–	–	4400	5600

[a]Patient 1–10 were hepatitis C virus-infected beta thalassaemia major cases without response to interferon-2α monotherapy (1–5 nonresponders, 6–10 relapsers) and patients no. 11–17 were naive to treatment.

[b]At 4 months during treatment, at 12 months during treatment and 6 months after treatment.

Rx = treatment; DFO = desferrioxamine; L1 = deferiprone; ALT = alanine aminotransferase; HCV-RNA = hepatitis C virus ribonucleic acid test result.

responders there was not statistically significant ($P = 0.45$) decline in serum ferritin levels which might just reflect a decrease in hepatitis activity.

The main limitation of our study was the small number of patients enrolled, primarily as a result of the declining number of patients with TM and HCV; this fact is evident in the literature, where the largest cohort of patients receiving combination therapy consisted of 18 patients.

Conclusion

In conclusion, considering that the risks associated with increased transfusion requirements for a few months are outweighed by the benefits, this small study confirms that the combination of INF and Rib is effective, probably safe, and should be considered as the first-line therapy in cases of HCV-infected transfusion-dependent TM patients, who fail to respond to INF monotherapy.

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International consultative workshop on preventive measures against infectious disease for Hajj and Umra concluded in Saudi Arabia

The Government of Saudi Arabia held a 4-day international consultative workshop on infectious disease control and prevention for Hajj and Umra on 27–30 June, where concerns about the ongoing influenza A(H1N1) pandemic and the potential for transmission in crowded settings were discussed.

The panel for the consultation included local and regional experts and international experts from WHO, the Centers for Disease Control and Prevention (CDC), the European Centre for Disease Prevention and Control (ECDC) and other institutions in Europe, Australia and China. Based on consideration of the existing scientific evidence regarding mass gathering and the special settings of Hajj and Umra in particular, and the implications for local and global health, recommendations were made to the Government of Saudi Arabia.

Futher information can be found in the WHO EMRO Press release, 1 July, 2009 (http://www.emro.who.int/pressreleases/2009/no15.htm).

Does sputum culture affect the management and/or outcome of community-acquired pneumonia?

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هل يؤثر زرع البلغم على تدبير و/ أو نتيجة الالتهاب الرئوي المكتسَب من المجتمع؟

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الخلاصة: أجرى الباحثان هذه الدراسة الاستباقية في 6 مشافي في ادمنتون، بكندا، للتعرُّف على العوامل التي ترافق الحصول على البلغم لزرعه، وتأثير زرع البلغم على تدبير المرضى المصابين بالالتهاب الرئوي المكتسب من المجتمع. وقد بلغ عدد المشاركين في هذه الدراسة 1362 شخصاً بالغاً أدخلوا المستشفيات لإصابتهم بالتهاب رئوي مكتسب من المجتمع. وحصل الباحثان على بلغم من 539 مريضاً (39.6٪)، وكانت الكمية جيدة ومقبولة للزرع لدى 507 منهم (94.1٪)، ومن بين هؤلاء كان زرع البلغم إيجابياً لدى 171 (33.7٪). وكانت أكثر المضادات الحيوية التي توصف لمجموعات المرضى ذوي الزرع الإيجابي للبلغم، ولمن لم يتم أخذ البلغم منهم. هي ليفوفلوكساسين وسيفوروكسيم وأزيثروميسين. وقد كان زرع البلغم إيجابياً لدى نسبة صغيرة من مرضى الالتهاب الرئوي المكتسب من المجتمع، وهو ليس له تأثير على المعالجة بالمضادات الحيوية ولا على معدَّل الوفيات

ABSTRACT This prospective study was conducted in 6 hospitals in Edmonton, Canada to determine the factors associated with obtaining sputum for culture and the effect of sputum culture on the management of patients with community-acquired pneumonia (CAP). Participants were 1362 adults who were hospitalized with CAP. Sputum was obtained from 539 (39.6%) patients, of which 507 (94.1%) were good quality, acceptable for culture; 171 (33.7%) of these had a positive sputum culture. Levofloxacin, cefuroxime and azithromycin were the most common antibiotics prescribed for the groups with positive sputum culture and no sputum collection. Positive sputum culture was demonstrated in only a small number of patients with CAP; this did not affect antimicrobial therapy or mortality.

La culture des expectorations a-t-elle une incidence sur la prise en charge et/ou l'issue de la pneumonie communautaire ?

RÉSUMÉ Cette étude prospective a été menée dans six hôpitaux d'Edmonton (Canada) afin de déterminer les facteurs associés à l'obtention d'expectorations à des fins de mise en culture et les effets de celle-ci sur la prise en charge des patients atteints de pneumonie communautaire (PC). 1 362 adultes hospitalisés avec une PC ont participé à cette étude. Des expectorations ont été obtenues chez 539 patients (39,6 %), et 507 (94,1 %) d'entre elles étaient d'une qualité satisfaisante et acceptable pour la culture ; pour 171 (33,7 %), cette culture était positive. La lévofloxacine, la céfuroxime et l'azithromycine étaient les antibiotiques les plus prescrits pour les groupes qui avaient une culture positive ou dont les expectorations n'avaient pas été recueillies. La culture des expectorations ne s'est révélée positive que chez un petit nombre de personnes atteintes de PC ; cela n'a pas eu d'incidence sur la thérapie antimicrobienne ou sur la mortalité.

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Introduction

The value of sputum culture in the diagnosis, management, and outcome of community-acquired pneumonia (CAP) remains a matter of controversy. The Infectious Diseases Society of America pneumonia guidelines recommend Gram staining and culture of expectorated sputum for inpatients with CAP [*1*]. The reasons for this recommendation are to permit optimal antibiotic selection directed to the causative agent; to limit injudicious antibiotic use in terms of cost; to limit inducible resistance and adverse drug reactions; to support a rational basis for change from parenteral to oral therapy and any change in therapy necessitated by an adverse drug reaction; to identify drug resistant pathogens and monitor trends such as penicillin-resistant *Streptococcus pneumoniae*, β-lactamase-producing *Haemophilus influenzae*, or methicillin-resistant *Staphylococcus aureus*; and to prompt contact tracing of organisms like *H. influenzae* type b and *Neisseria meningitidis* [*1*]. On the other hand, the American Thoracic Society pneumonia guidelines recommend sputum culture only if a drug-resistant pathogen or an organism not covered by usual empiric therapy is suspected [*2*].

In a recent evaluation of the usefulness of sputum culture for diagnosis of CAP, only 15.8% of the study population of 1669 patients had a microbiological diagnosis [*3*]. However, more than 40% of the patients did not have a sputum specimen collected, and 46% of the collected specimens were of poor quality and were not cultured [*3*]. In contrast to this Musher, Montoya and Wanahita argue persuasively for performing sputum culture and indicate that it has a sensitivity of 79% when bacteraemic pneumococcal pneumonia is used as the gold standard [*4*]. However, in 47 of the 105 patients in their study, sputum was not submitted or was inadequate for culture.

We conducted this study to evaluate the factors associated with obtaining sputum for culture and to determine the effects of sputum culture on the management and outcome of patients with CAP.

Methods

The study was carried out from 15 November 2000 to 14 November 2002. It was approved by the research ethics board of the University of Alberta. The study was part of the evaluation of a comprehensive pathway for the treatment of CAP. Participants were adults aged 17 years and older who were hospitalized at any of the 6 hospitals in Capital Health Region, Edmonton, Alberta, Canada with a diagnosis of CAP. Pregnant women, nursing mothers, immunosuppressed patients (patients receiving ≥ 10 mg prednisone per day for more than 2 weeks, or other immunosuppressive drugs), and those who had been hospitalized within 30 days prior to the current hospitalization were excluded from the study. Those with HIV infection were excluded if the T-helper lymphocytes CD4 positive count was < 250/mm^3. We also excluded patients who were managed as outpatients or needed to be admitted to the intensive care unit, as well as those from acute and sub-acute and continuous care facilities. For patients with multiple admissions, only the first admission was included.

CAP was defined as ≥ 2 of the following symptoms or signs: fever (temperature > 38 °C), cough, sputum production, shortness of breath, pleuritic chest pain, crackles, or consolidation on examination of the chest, together with an acute pulmonary infiltrate evident on the chest radiographs compatible with pneumonia.

"In-patients" are those patients who were hospitalized on the ward and did not need admission to the intensive care unit.

After explaining the procedure to them, all patients were asked, if at all possible, to provide a sputum sample in a sterile sputum specimen container under the supervision of a nurse. Sputum specimens were collected before administering antibiotics in the emergency departments.

Only sputum specimens with > 25 polymorphonuclear cells and < 10 epithelial cells per low-power field were considered of good quality and were processed [5]. Sputum specimens were cultured onto sheep blood agar plates incubated in 5% CO_2 for 24 hours. If no growth was evident at 24 hours, plates were further incubated for a total of 48 hours. In addition, the sputum specimen was also cultured onto a chocolate agar plate and a MacConkey agar plate for 24 hours (all media Dylan Inc., Edmonton, Alberta). Microorganisms were identified according to standard methods.

Data collected at the time of enrolment included demographic information, previous history of admission to hospital, drug history, antibiotic therapy before admission, symptoms, laboratory findings and cultures. Severity of illness at the time of admission was evaluated according to the Pneumonia Patient Outcome Research Team (PORT) score [6]. Length of hospital stay was calculated from time of presentation to the emergency department until discharge from hospital.

Statistical analysis

For analysis of data, *SPSS*, version 12.0 was used. The significance of proportional differences between nominal variables was determined using the chi-squared test or Fisher exact test, and differences between continuous variables were determined using the Student *t*-test. A 2-tailed $P < 0.05$ was used to define statistical significance. Logistic regression was performed using those variables found significant in univariate analysis.

Results

The study population of 1362 consecutive patients with bacterial CAP comprised 722 men (53%) and 640 women (47%), ranging in age from 18.0 years to 104.8 years, mean 69.0 [standard deviation (SD) 18.4] years. Sputum was collected from 539 (39.6%) patients; 507 (94.1%) samples were acceptable for processing for culture. We recovered ≥ 1 microorganism from 171 (33.7%) specimens (representing 12.6% of the initial 1362 patients).

Isolated microorganisms from sputum included *Strep. pneumoniae* ($n = 59$), *H. influenzae* ($n = 40$), *Staph. aureus* ($n = 23$), *Moraxella catarrhalis* ($n = 15$), *Pseudomonas aeruginosa* ($n = 14$), *Strep.* spp. ($n = 12$), *Klebsiella pneumoniae* ($n = 5$), *H. parainfluenzae* ($n = 4$), *Stenotrophomonas (Xanthomonas) maltophilia* ($n = 3$), *Escherichia coli* ($n = 3$), *Serratia marcescens* ($n = 2$), *Acinetobacter calcoaeticus* ($n = 2$), *Pseudomonas fluorescens* ($n = 2$), *Alcaligenes xylosoxidans* ($n = 1$), *Proteus mirabilis* ($n = 1$), *Enterobacter cloacae* ($n = 1$) and *Klebsiella ozaenae* ($n = 1$). There were no isolates of methicillin-resistant *Staph. aureus*.

Female sex, heart disease, dementia, altered mental status, risk classes IV–V [6] and death as an outcome during hospitalization were all associated with not having sputum collected for culture. Logistic regression analysis of variables significant in the univariate analysis (Table 1) showed sputum collection was dependent on site of hospitalization—site D versus site C ($P < 0.001$), and site C versus sites E ($P = 0.045$) and F ($P = 0.001$); also male versus female ($P = 0.023$); smokers versus non-smokers ($P = 0.017$); in those with cough versus no cough ($P < 0.001$); and no altered mental state versus altered mental state ($P = 0.001$).

Table 1 **Comparison of characteristics of patients with community-acquired pneumonia who had a positive sputum culture with those patients who had no sputum collection**

Characteristic	Patients with positive sputum culture (n = 171)		Patients with no sputum collection (n = 823)		*P-value*
	No.	%	No.	%	
Sex					
Male	97	56.7	412	50.1	0.113
Female	74	43.3	411	49.9	
Smoking status					
Smoker	46	26.9	179	21.7	0.002
Ex-smoker	69	40.4	254	30.9	
Non-smoker	36	21.1	278	33.8	
Not documented	20	11.7	112	13.6	
Symptom					
Fever	87	50.9	345	41.9	0.032
Shaking chills	51	29.8	165	20.0	0.005
Shortness of breath	121	70.8	509	61.8	0.028
Cough	150	87.7	512	62.2	< 0.001
Altered mental state	13	7.6	146	17.7	0.001
Site, hospital					
A	45	26.3	113	13.7	< 0.001
B	38	22.2	238	28.9	
C	34	19.9	132	16.0	
D	33	19.3	130	15.8	
E	13	7.6	133	16.2	
F	8	4.7	77	9.4	
Risk class[a]					
I	2	1.2	11	1.3	0.178
II	43	25.1	140	17.0	
III	28	16.4	147	17.9	
IV	61	35.7	320	38.9	
V	37	21.6	205	24.9	
Mortality					
Died	9	5.3	114	13.9	0.002
Alive	162	94.7	709	86.1	

[a]*Source: reference [6].*

There were no significant differences between patients with positive sputum culture and those with no sputum collection regarding sex, risk class and co-morbidity (including asthma, chronic obstructive pulmonary disease, diabetes mellitus, heart disease and cancer). However the mean age of the sputum positive group, 65.8 (SD 19.1) years, was lower than mean age of those who did not have a sputum culture done, 70.9 (SD 18.1) years (P = 0.001). Patients with positive sputum culture were more

likely to have fever, shaking chills, shortness of breath and cough, and less likely to have altered mental state than patients with no sputum collection (Table 1).

Table 2 shows sputum collection, quality and culture results according to the PORT score in 1362 patients with CAP. The percentage of patients with sputum collected decreased with increasing risk class, and since age is the major driver of risk class, this is likely to be a reflection of increasing age.

Levofloxacin (n = 137, 80.1%) cefuroxime (n = 37, 21.6%) and azithromycin (n = 32, 18.7%) were the most common antibiotics prescribed for those with positive sputum culture; in the group from whom no sputum was collected, corresponding values were: levofloxacin 677 (82.3%), cefuroxime 172 (20.9%) and azithromycin 130 (15.8%). Patients with a positive sputum culture were more likely to receive ciprofloxacin and ceftazidime as part of their antibiotic regimen. Of the 46 patients who gave no sputum sample and who received ciprofloxacin or ceftazidime, 9 died compared to 3 of the 27 with a positive sputum culture who received these 2 drugs (P = 0.51). Ninety-three (54.4%) patients with positive sputum culture and 473 (57.5%) of those from whom no sputum was collected received monotherapy (P = 0.497).

The mean length of stay was statistically significantly lower in the positive sputum culture group, 8.8 (SD 8.0) days than in the group from whom no sputum was collected, 10.8 (SD 13.9) days (P = 0.012). Patients with positive sputum culture had lower death rate (9/171, 5.3%) both in comparison with patients from whom no sputum was collected (114/823, 13.9%) (P = 0.002) and patients with "negative or poor or no sputum collection" (136/1191, 11.4%) (P = 0.015). However on logistic regression analysis these differences disappeared.

Table 3 shows the results of sputum culture done on those who had no prior antibiotic treatment versus those who had received antibiotics prior to hospitalization. The number of specimens with *Staph. aureus*, aerobic Gram-negative rods and fungi was higher in latter group

Discussion

For decades, sputum culture as a tool for the management of CAP has been a matter of controversy [*5,7*]. Although sputum culture is considered the basis for the bacteriological diagnosis of pneumonia, its reliability has been challenged because of low sensitivity and specificity [*8*]. Most of the time sputum specimens submitted for culture were not collected correctly and contained oropharyngeal or upper respiratory secretions [*8*]. However in a prospective study of the diagnostic value of sputum culture in acute pneumonia in 16 patients, culture of transtracheal aspirate and/or bronchial aspi-

Table 2 **Sputum collection, quality and culture results according to the Pneumonia Patient Outcome Research Team class in 1362 patients with community-acquired pneumonia**

Characteristic	Risk class I, II		Risk class III		Risk class IV, V		Total		*P*-value
	n/N	%	n/N	%	n/N	%	n/N	%	
Sputum collection done	131/282	46.5	102/249	41.0	306/831	36.8	539/1362	39.6	0.015
Good quality sputum	122/131	87.1	93/102	91.2	292/306	98.3	507/539	94.1	< 0.001
Organism isolated from sputum culture	45/122	36.9	28/93	30.1	98/292	33.6	171/507	33.7	0.579

Table 3 **Results of sputum culture done prior to or after antibiotic therapy in 171 patients with community-acquired pneumonia (excluding fungal isolates)**

Organism recovered	No prior antibiotic treatment (n = 81)		Prior antibiotic treatment (n = 90)	
	No.	%	No.	%
Streptococcus pneumoniae	35	43.2	24	26.7
Haemophilus influenzae	25	30.9	15	16.7
Moraxella catarrhalis	9	11.1	6	6.7
Pseudomonas aeruginosa	8	9.9	6	6.7
Staphylococcus aureus	7	8.6	16	17.8
Haemophilus parainfluenzae	1	1.2	3	3.3
Pseudomonas fluorescens	1	1.2	1	1.1
Klebsiella pneumoniae	1	1.2	4	4.4
Serratia marcescens	1	1.2	1	1.1
Streptococcus pyogenes	1	1.2	7	7.8
Streptococcus agalactiae	0	–	3	3.3
Stenotrophomonas maltophilia	0	–	3	3.3
Escherichia coli	0	–	3	3.3
Acinetobacter calcoaceticus	0	–	2	2.2
Streptococcus anginosus	0	–	1	1.1
Klebsiella ozaenae	0	–	1	1.1
Alcaligenes xylosoxidans	0	–	1	1.1
Enterobacter cloacae	0	–	1	1.1
Proteus mirabilis	0	–	1	1.1
Fungal isolate	4	4.9	25	27.7
Total (excluding fungal isolates)[a]	89	–	99	–

[a] *In some samples more than one organism was isolated.*

rate from patients with acute pneumonia did not provide a diagnosis any more frequently than from sputum culture alone [*5*]. In our study, sputum was collected from only 40% of cases, however, 94% of the collected sputum samples were of good quality.

Although one-third of the good quality sputum specimens yielded a causative organism, we actually isolated microorganisms from only 12.6% of the patients with CAP. This compares with a prospective study in 2005 of 262 patients hospitalized with CAP, of 157 patients who had sputum collected, only 44 (28.0%) were adequate for culture; 36 of these gave a positive result, which meant that 13.7% of all patients in the study had a positive culture [*9*].

In a cohort study of 1669 patients for assessment of the usefulness of sputum culture for diagnosis of CAP, only 532 (54%) of the 983 patients with sputum production gave a good quality sample, and overall 264 (15.8%) patients had positive sputum culture [*3*]. There were no significant differences in rates for sputum sample obtained, good quality sample and positive sputum culture according to severity of pneumonia using the PORT severity of illness scoring system. However, in our study we noted a higher rate of sputum collection for low risk classes I–II compared to high risk classes IV–V; but there were more good quality sputum samples in classes IV–V than in classes I–II and III.

In a study of sputum examination in the management of patients with CAP in a primary care hospital, 36.4% of 116 patients were capable of producing a sputum sample, of which 54.7% gave samples valid for culture [*10*]. There was a delay of more than 24 hours in 31% of the patients for collection of sputum and in 52% for processing. Delay in processing was associated with an increase in the isolation of *Candida* spp. In a number of studies [*10–13*], including ours, microorganism recovery was very low in sputum cultures owing to factors such as processing of sputum collection and prior antibiotic therapy, which can decrease diagnostic yield. The value of sputum culture is decreased by the administration of antibiotics before hospitalization, however in a substantial number of samples, *Strep. pneumoniae* and *H. influenzae* were isolated in our patients even though they had taken antibiotics before admission. In a previous study, it was noted that increasing prevalence of Gram-negative bacilli among oropharyngeal bacterial flora in patients with illnesses of varying severity was not correlated with antibiotic administration or inhalation therapy; in our study, however, we found an increased number of Gram-negative rods in patients who had received antibiotics before admission [*14*].

Patients with a positive sputum culture for aerobic Gram-negative bacteria were more likely to receive ciprofloxacin and ceftazidime as part of their antibiotic regimen. However, use of these antibiotics did not explain the trend towards reduced mortality.

The major limitation of the present study is that we did not have sputum specimens from all the patients.

To sum up, sputum culture was performed infrequently and a positive sputum culture did not influence mortality rate or length of stay.

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Pattern of varicella and associated complications in children in United Arab Emirates: 5-year descriptive study

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أنماط الحُماق والمضاعفات التي تصاحبه أطفال الإمارات العربية المتحدة: دراسة وصفية استغرقت 5 سنوات

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الخلاصة: كان الغرض من هذه الدراسة توصيف السمات الوبائية للحماق وللمضاعفات التي تصاحبه في إمارة العين في الإمارات العربية المتحدة خلال الفترة 2000 – 2004. وتراوح عدد الحالات المبلغ عنها بين 373 و790 حالة لكل مئة ألف من السكان وكان معظم الحالات (89٪) من الأطفال دون سن 15 عاماً، ومن بين 187 طفلاً احتاجوا للإدخال إلى المستشفيات كان لدى 50.3٪ منهم مرض حموّي ناجم عن عدوى جرثومية ثانوية، ولدى 17.6 منهم مضاعفات عصبية. وقد بلغ معدّل الوفيات الإجمالي بين الأطفال الذين أدخلوا المستشفيات 1.1٪، ونجمت الوفاة لديهم جميعاً عن المجموعة A من العقديات الغزوية. لقد أصبح الحماق والمضاعفات المصاحبة له لدى أطفال كانوا أصحاء قبل الإصابة به من المشكلات الهامة في الصحة العمومية وفي السريريات في الإمارات العربية المتحدة.

ABSTRACT The objective of this study was to characterize the epidemiology of varicella and varicella-associated complications in Al-Ain, United Arab Emirates (UAE) during 2000–04. The annual number of reported cases varied from 373 to 790 per 100 000 population. Most (89%) occurred in children < 15 years old. Of 187 children requiring hospital admission, 50.3% had febrile illness due to secondary bacterial infection and 17.6% had neurological complications. The overall mortality rate among hospitalized children was 1.1%, all due to invasive group A *Streptococcus*. Varicella and associated complications in previously healthy children is becoming an important clinical and public health problem in the UAE.

Évolution de la varicelle et des complications associées chez l'enfant aux Émirats arabes unis : étude descriptive sur 5 ans

RÉSUMÉ L'objectif de cette étude était de caractériser l'épidémiologie de la varicelle et des complications associées à cette maladie à Al-Ain, aux Émirats arabes unis (ÉAU), entre 2000 et 2004. Le nombre annuel de cas déclarés variait de 373 à 790 pour 100 000 habitants. La plupart des cas (89 %) se comptaient parmi les enfants âgés de moins de 15 ans. Sur 187 enfants nécessitant une hospitalisation, 50,3 % présentaient un syndrome fébrile dû à des infections bactériennes secondaires et 17,6 %, souffraient de complications neurologiques. Le taux de mortalité global chez les enfants hospitalisés était de 1,1 %, dans tous les cas à cause d'infections invasives à streptocoque du groupe A. La varicelle et les complications associées chez des enfants jusque-là en bonne santé sont en passe de devenir un problème clinique et de santé publique important aux ÉAU.

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Introduction

Varicella (chickenpox) is now a vaccine-preventable disease and has been included in the infant immunization schedule in many parts of the world [*1,2*]. Globally, this has led to an increased awareness of the importance of varicella and its epidemiology, immunology and clinical impact on the community [*3–5*]. To our knowledge the health impact of childhood varicella in the population of the United Arab Emirates (UAE) has not been quantified and the reported data on varicella-associated morbidity and mortality are limited [*5–7*]. Varicella is a reportable disease in the UAE and generally viewed as a self-limiting illness in healthy children. This study was carried out before the availability of varicella vaccine for UAE children. It aimed to map the background epidemiology of varicella over 5 years and record the clinical data of hospitalized children.

Al-Ain city is a traditional oasis, inland desert region with an estimated population of 475 000 [*8*]. The climate ranges between a relatively cool, dry winter and a hot, dry summer with minimal yearly rainfall. Al-Ain and Tawam hospitals are tertiary care centres providing health care services both for UAE citizens and for the multinational expatriate population residing in the region.

Methods

The varicella seasonality, disease incidences and age specificity were estimated from the varicella notifications compiled by the Department of Preventive Medicine at Al-Ain General Authority for Health Services [*9*]. All the notified cases were clinically diagnosed and reported by primary care clinic physicians.

Varicella-associated complications were derived from an established hospital-based surveillance system and from the medical records of patients admitted to the general paediatric wards in Al-Ain and Tawam hospitals, teaching hospitals affiliated to the United Arab Emirates University. Data gathered from medical records included information about age, sex, nationality, reason for admission, type of complication, duration of hospitalization and disease outcome. A complication associated with varicella illness was defined as a condition or event occurring within 3 weeks of onset of skin rash.

Statistical analysis was carried out using Student *t*-test for comparison of continuous variables, confirmed by nonparametric Mann–Whitney *U*-test. Chi-squared analysis was performed to test for differences in proportions of categorical variables between ≥ 2 groups. In 2×2 tables, the Fisher exact test (2-tailed) was used when sample size was small. Chi-squared goodness-of-fit test was used for trend. $P < 0.05$ was considered as the cut-off value for significance.

Results

Incidence of varicella

The number of cases of varicella reported over the 5 consecutive years ranged from 1754 to 3712 cases each year, giving an annual incidence of 373–790 per 100 000 population. The monthly distribution and the seasonal wave of varicella cases are shown in Figure 1. There was a statistically significant difference ($P < 0.0001$) in the monthly rate of cases reported during the 5-year study period (with a strong peak during March–May). A higher proportion of the reported varicella cases were in males than females (58% versus 42%) and 80% were among UAE nationals.

A majority of cases (89%) occurred in children aged < 15 years. Age-specific

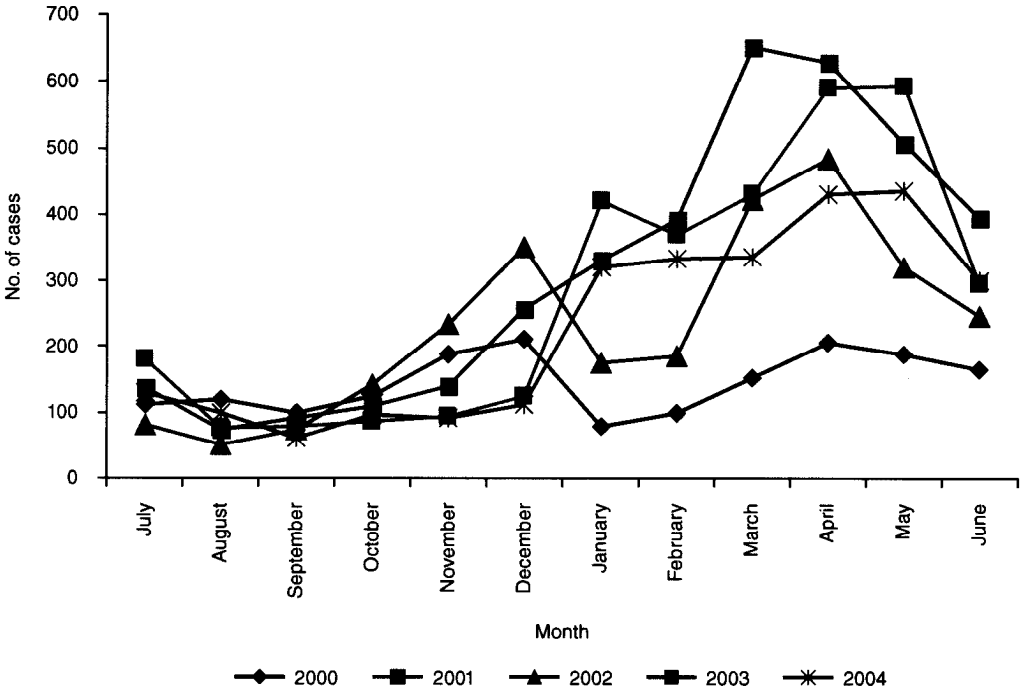


Figure 1 **Monthly distribution of reported varicella cases in the United Arab Emirates, 2000–04**

incidence was derived from population estimates of the Emirates Ministry of Health [*8*]. Over the 5 years, 2% of cases were in infants < 1 year old, 37% of cases occurred in preschool children aged 1–5 years (estimated annual incidence 129 per 1000 children) and 50% occurred in school-age children aged 6–15 years (89 per 1000 children). A history of recent household contact with siblings attending school was recorded in > 40% of varicella-infected children < 5 years of age.

Varicella-associated complications

Of the 187 children admitted to hospital 136 (72.7%) were < 5 years of age, including 10 neonates (22.5% aged 0–1 year and 50.3% aged 1–5 years), 25.0% were 6–10 years and 2.7% were 11–15 years. Mean age was 5.9 years. Length of hospital stay averaged 7.5 days. The number of admissions increased during the peak seasons of the year.

Table 1 records varicella-related illness among the hospitalized children, all of whom were reported to be healthy before contracting varicella. Bacterial infection was the reason in 94 cases (50.3%): secondary bacterial infection of the skin or soft tissue (47 cases, 25.1%) and respiratory tract infection, including clinical pneumonia, (45 cases, 24.1%) were the most common complications. Children with soft-tissue infections were younger than children with other complications. Group A *Streptococcus* and *Staphylococcus aureus* were the most common organisms identified. Two children died of group A *Streptococcus* septicaemia associated with soft tissue in-

Table 1 **Varicella-associated illness among 187 hospitalized children in the United Arab Emirates, 2000–04**

Associated illnesses	No. of cases	%	Remarks
Fever			
Prolonged primary fever	19	10.2	Bacterial cultures negative
Secondary fever associated with:			
Respiratory tract infection	38	20.3	Included otitis media & lower respiratory tract infection without radiological evidence of pneumonia
Superficial skin infection	36	19.3	Group A *Streptococcus* cultured in 8 cases & *Staphylococcus* spp. in 12 cases
Dehydration	29	15.5	
Pneumonia	7	3.7	X-ray evidence: segmental, lobular
Cellulitis of neck & groin	7	3.7	*Staphylococcus aureus* cultured in 5 cases
Invasive group A *Streptococcus* septicaemia	4	2.1	
Pyogenic arthritis	2	1.1	
Neurological complications			
Cerebellar ataxia	23	12.3	
Brief seizures	5	2.7	
Aseptic meningitis	3	1.6	
Encephalitis	1	0.5	
Acute transverse myelitis	1	0.5	
Other			
Hepatitis	7	3.7	
Thrombocytopenia	3	1.6	
Acute glomerulonephritis	2	1.1	
Total	187	100.0	

fection, representing an overall case fatality rate among hospitalized children of 1.1%.

There were 33 (17.6%) children admitted to hospital with neurological signs and symptoms (Table 1); 23 (mean age 6.2 years) presented with acute cerebellar ataxia 6–17 days (mean 8 days) after the onset of rash. Five febrile children (median age 1.9 years) presented with single brief seizures with no other associated neurological manifestations.

Discussion

Varicella is generally thought to be a benign disease and the systemic symptoms are usually mild in previously healthy children. In contrast, in adults varicella is frequently associated with complications and death, and the infection is known to be severe, progressive and often fatal among immunocompromised individuals, including neonates and children [*10,11*].

The UAE is a newly developed country with a divergent, multinational, working adult population in a desert climate. The epidemiology of varicella followed the pattern typical in temperate climates with infection acquired at an earlier age. It supports our own earlier study in the region that children of school-age lacked immunity against varicella [*5*]. The age susceptibility

to varicella zoster virus has regional and geographical variations [*12,13*].

There are no other varicella incidence figures or hospitalization data from the UAE for comparison. Infectious complications occurred mostly in children aged < 5 years, in agreement with earlier studies from the United States of America (USA) Canada and many European countries [*12–14*]. Over 60% of cases in the USA occur in children age 5–9 years, with 80% under 10 years of age [*15,16*]. In a recent study from Canada, the age groups 1–4 years and 5–9 years represented close to 80% of the annual cases of varicella, as in our study where 70% of cases were 1–10 years old [*11*].

There have been many reports in recent decades of varicella causing severe illness and occasionally fatalities in healthy children [*17–19*]. In industrialized countries, varicella caused more deaths and hospitalizations in previously healthy persons without underlying immunocompromising conditions [*20,21*]. We identified 187 children requiring hospitalization for varicella-associated complications during the 5-year observation period. Of these, 72.7% were aged < 5 years, including 10 neonates. Perinatally-acquired varicella infections were mild because of the passive immunoprophylaxis therapy administered after the mother's exposure to Varicella virus. Neonatal varicella can be serious, and without these drugs mortality rates may be as high as 31% [*10,22*].

Bacterial skin superinfections were the largest cause of complications in our hospitalized children, a finding that is consistent with previous epidemiological studies [*18,19,21*]. Recent reports warn of an increase in hospitalization for secondary bacterial infection, notably those caused by invasive group A *Streptococcus*. We cultured group A *Streptococcus* associated with soft tissue infection in 4 children, 2 of whom died. Suspicion of secondary bacterial infection should prompt early recognition when fever returns after initial defervescence. Considering the virulent nature of superinfection, especially with *Staphylococcus* and group A *Streptococcus* in varicella-infected children, it is prudent to institute empirical antimicrobial therapy in selected cases until the cultures become available.

CNS involvement was the second commonest complication, seen in 17.6% of hospitalized children, but no mortality was recorded. This rate of CNS complications was significantly higher than the 6% reported in Canada, but much lower than the 61% reported in previously healthy children in Germany [*17,19*]. Symptoms of postinfectious cerebellar ataxia appeared late in the course of varicella infection, as described in other reported studies. All the children recovered spontaneously and residual cerebellar syndrome persisted for 4 and 7 months in 2 cases. Five other children presented with brief febrile convulsions without other neurological abnormalities at the onset of varicella rash, presumably precipitated by the onset of fever. Long-term neurological outcomes and disability associate with varicella are often not reported, which hampers comparison.

To our knowledge this is the first reliable data published from the UAE on varicella. The study provides an insight into varicella-related clinical issues among previously healthy children in the region. While mortality from varicella is relatively rare for healthy children, the exact economic burden pertinent to childhood varicella morbidity is unknown in our health care context. Nationwide surveillance is needed to estimate the health and financial impact of varicella in our population while considering the introduction of varicella vaccine into the Expanded Programme on Immunization

in the UAE. Until then, varicella-related complications, hospitalization and death attributable to chickenpox will continue to occur among our children and nonimmune adult populations.

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National Health facility survey on the quality of outpatient primary child health care services: IMCI health facility survey Morocco October–December 2007

Integrated management of childhood illness (IMCI) was introduced in Morocco in 1997 as an integrated strategy to address the most important causes of mortality and morbidity in line with the primary health care approach.

This evaluation was conducted after 7 years of IMCI expanded implementation to collect information to assess the quality of outpatient health care services provided to sick children under 5 years old at health centres with IMCI- trained staff.

The full document can be downloaded at:
http://www.emro.who.int/publications/Book_Details.asp?ID=973

T-cell cytokine production and endothelial dysfunction in type 2 diabetic patients with nephropathy

L. Kamel,[1] A. Morsy[1] and A. El Shamaa[2]

إنتاج سيتوكين الخلايا التائية وخلل وظيفة البطانة لدى السكريين من النمط 2 المصابين باعتلال الكلية

ليلى كامل، عبد الله مرسي، عزة الشماع

الخلاصة: قيّم الباحثون في هذه الدراسة التغيرات في مستويات السيتوكينات للأنترفيرون γ والانترلوكين - 10 (وهي واسمات بيولوجية للتغير الالتهابي) مع الواسمات البيولوجية الذوّابة sICAM-1 وسيليكتن sE (وهي واسمات بيولوجية لخلل وظيفة البطانة) لدى السكريين سواء مصابين أو غير مصابين باعتلال الكلية. ولاحظ الباحثون ازدياداً ملحوظاً في كل من الانترفيرون γ والانترولوكين - 10 لدى السكريين المصابين باعتلال الكلية وأولئك الذين لديهم مرضاً كلوياً في مرحلته النهائية، وذلك بالمقارنة مع الشواهد ومع المرضى غير المصابين باعتلال الكلية. وقد حصل ازدياد يُعْتَدُّ به في كل من الانترفيرون γ والانترلوكين - 10 بعد الديال الدموي. أما sICAM-1 وسيليكتن sE فقد كانت أعلى بمقدار يُعْتَدُّ به لدى السكريين ومجموعات المصابين باعتلال الكلية السكري والمرض الكلوي في مرحلته النهائية بالمقارنة مع الشواهد، وكان sICAM-1 أعلى بعد الديال الدموي ولم يكن سيليكتن sE أعلى بعد الديال الدموي.

ABSTRACT This study assessed changes in serum levels of cytokines IFNγ and IL-10 (biomarkers of inflammatory changes) and soluble biomarkers sICAM-1 and sE-selectin (biomarkers of endothelial dysfunction) in diabetic patients with and without nephropathy. IFNγ and IL-10 were significantly elevated in patients with diabetic nephropathy (DN) and end-stage renal disease (ESRD) compared with controls and diabetic patients without DN. IFNγ and IL-10 levels were significantly increased after haemodialysis. sICAM-1 and sE-selectin were significantly higher in diabetic, DN and ESRD groups compared with controls, and sICAM-1 but not sE-selectin was increased after haemodialysis.

La production de cytokines par les cellules T et du dysfonctionnement endothélial chez les sujets diabétiques de type 2 atteints de néphropathie

RÉSUMÉ Cette étude a permis d'évaluer les modifications des taux sériques de cytokines IFNγ et IL-10 (biomarqueurs de modifications de l'état inflammatoire) et de biomarqueurs solubles sICAM-1 et sE-sélectine (biomarqueurs du dysfonctionnement endothélial) chez des patients diabétiques atteints et non atteints de néphropathie. Les IFNγ et les IL-10 étaient significativement élevés chez ceux qui présentaient une néphropathie diabétique (ND) et une maladie rénale en phase terminale (MRPT) par rapport aux témoins et aux patients diabétiques sans ND. Les niveaux d'IFNγ et d'IL-10 avaient augmenté de façon significative après l'hémodialyse. Le taux de sICAM-1 et de sE-sélectine étaient significativement plus élevés dans les groupes atteints de diabète, de ND et de MRPT par rapport aux témoins, et ceux de sICAM-1 mais pas de sE-sélectine avaient augmenté après l'hémodialyse.

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Introduction

Diabetic nephropathy (DN) is a leading cause of chronic renal failure and is a growing concern given the increasing incidence of type 2 diabetes. For diabetic patients on haemodialysis (HD), dysfunction of the host defences against infection has major clinical and sociocconomic implications.

The autoimmune nature of diabetes and the major contribution of lymphocyte T-cells are well established. However, the mechanism of this immune dysregulation is still unclear. T-cells have 2 subsets of helper cells: T-helper type 1 (Th1) and type 2 (Th2). Th1 cells are effectors of cell-mediated immunity, secreting the cytokine interferon-gamma (IFNγ) that inhibits Th2 cell differentiation. Th2 cells produce cytokine interleukins IL-4 and IL-10, which inhibit IFNγ secretion and cell immunity [*1*]. An altered balance of Th1/Th2 may be associated with the pathogenesis of end-stage renal disease (ESRD) [*2*] and with impaired immunity in HD patients [*3*]. Both IFNγ and IL-10 play major roles in the regulation of immune and inflammatory responses; in a model of chronic renal disease IL-10 blocked inflammation and improved renal function [*4*].

Vascular damage is frequently observed in patients with chronic renal failure and under HD, and disturbances in endothelial function may play a role in vascular complications such as stroke or ischaemic heart disease. Malyszko et al. found evidence of endothelial cell injury in renal failure patients, particularly those on continuous ambulatory peritoneal dialysis, and a high degree of hypercoagulation relative to healthy subjects [*5*]. This may lead to fibrin deposition in the vascular wall, thrombus formation, and the development and progression of atherosclerosis with its complications. Several markers of endothelial cell activation—including soluble intercellular adhesion molecule (sICAM-1), von Willebrand factor, soluble E-selectin (sE-selectin), and soluble thrombomodulin—are providing further evidence of the relationship between endothelial cell activation and damage to the vasculature in diabetes [*6*].

The purpose of the present study was to assess the changes in serum levels of the pro-inflammatory cytokine IFNγ and anti-inflammatory cytokine IL-10 (as markers of inflammatory changes) and the soluble biomarkers sICAM-1 and sE-selectin (as markers of endothelial dysfunction) in diabetic patients with and without nephropathy. We also evaluated the effect of renal dialysis on these mediators. Such information is crucial to determine the optimal approach to improve the immune response of DN patients which might reduce the morbidity and mortality due to infection.

Methods

Patients

The study was carried out on 73 subjects selected from the Nephrology Department and Dialysis Unit of Theodor Bilharz Research Institute, Cairo. Subjects were categorized into groups as follows:

- Diabetic group (n = 17): patients with type 2 diabetes without renal involvement (normoalbuminuria). The diagnosis of type 2 diabetes was established before they were screened for the study and they did not require insulin therapy for glucose control. Diabetes was defined according to the recommendations of the American Diabetes Association Expert Committee on the Classification and Diagnosis of Diabetes [*7*].
- Diabetic nephropathy (DN) group (n = 22): patients with type 2 diabetes with renal involvement. The inclusion criteria were: lower limb oedema, proteinuria,

impaired renal function and normal-sized kidney with increased echogenicity on abdominal ultrasound.

- ESRD group (n = 19): patients with type 2 diabetes with ESRD before the start of dialysis sessions. Data for these patients were collected before and after 10 sessions of HD. Dialysis (4 hours duration) was done 3 times/week with haemophan membranes using acetate solution.
- Control group (n = 15): volunteers recruited from those attending outpatient clinics for check-ups and who had no medical disorders in a health examination.

Data collection

All subjects underwent the following: full history-taking, thorough clinical examination, abdominal ultrasonography, fundus examination and electrocardiography. Venous blood samples were withdrawn from the anticubital vein from all subjects in the morning after 12 hours overnight fasting. Routine tests were performed immediately and aliquots were stored at –60 °C for further estimation of serum levels of IFNγ, IL-10, sICAM-1 and sE-selectin.

The routine laboratory investigations performed by conventional methods included:

- Complete blood count, fasting and postprandial blood glucose and routine urine analysis for all groups and microalbumin for those with negative protein in the urine. Normoalbuminuria was defined as spot urine albumin/creatinine ratio < 30 μg/mg, whereas macroalbuminuria was defined as spot urine albumin/creatinine ratio > 300 μg/mg. This ratio is regarded as one of the best indicators of urinary albumin excretion and is recommended by the American Diabetes Association [7].
- Liver function tests: serum aminotransferase, alkaline phosphatase, albumin, bilirubin and prothrombin concentration.
- Kidney function tests: serum creatinine, urea, sodium, potassium, calcium and phosphorus.
- Lipid profile: total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and triglycerides.

The following special laboratory tests were carried out:

- Serum IFNγ was performed by a solid-phase sandwich enzyme linked-immunosorbent assay (ELISA) (Diaclone Research, France). The lower detection limit of the assay is < 5 pg/mL and there is no cross-reactivity with other human cytokines.
- Serum IL-10 was assayed by a solid-phase sandwich ELISA (Diaclone Research, France). The lower detection limit of the assay is < 5 pg/mL and it recognizes both natural and recombinant human IL-10.
- Serum sICAM-1 was assayed using a solid-phase sandwich ELISA (Diaclone Research, France). The lower detection limit of the assay is < 0.1 ng/mL and there is no cross-reactivity with other human adhesion molecules
- Soluble sE-selectin was performed with a quantitative sandwich ELISA (R&D Systems, MN, United States of America). The minimum detectable dose of sE-selectin is typically < 0.1 ng/mL and no significant cross-reactivity is observed with natural human IgG or natural human P-selectin.

Statistical analysis

Numerical data were expressed as mean and standard deviation (SD). Multiple inter-

group comparisons were made using 1-way ANOVA. If a significant change was found in intergroup comparisons, *post hoc* multiple comparison analysis with the Tukey–Kramer multiple comparison test was performed. Correlations were computed using the Spearman correlation coefficient. P values < 0.05 were considered statistically significant. *SPSS*, version 10 for Windows, was used for data analysis.

Results

Table 1 shows the clinical characteristics and laboratory data of the four study groups. Serum creatinine showed a statistically significant elevation in the ESRD group compared with the control, diabetic and DN groups ($P < 0.001$). Fasting blood glucose levels were significantly higher in diabetic, DN, and ESRD groups compared with the control group ($P < 0.001$, $P < 0.001$, $P < 0.05$ respectively).

IFNγ showed a significant elevation in both the DN and ESRD groups compared with the control group ($P < 0.01$) and diabetic group ($P < 0.05$) (Figure 1). IL-10 also showed a significant elevation in both DN and ESRD groups versus the control and diabetic groups ($P < 0.001$) (Figure 1). Both IFNγ and IL-10 levels were significantly increased after initiation of HD when compared with their values in the ESRD group before the start of dialysis ($P < 0.05$ and $P < 0.01$ respectively).

We found a significant elevation in sICAM-1 and sE-selectin in diabetic, DN and ESRD groups compared with the control group ($P < 0.001$). Soluble ICAM-1, but not sE-selectin, showed a statistically significant increase after HD initiation when compared with its level in ESRD before the start of dialysis ($P < 0.001$) (Figure 1).

Table 1 **Clinical characteristics and laboratory data of the study groups: healthy controls, patients with diabetes, diabetic nephropathy (DN) and end-stage renal disease (ESRD) before haemodialysis**

Variable	Controls (n = 15) Mean (SD)	Diabetes (n = 17) Mean (SD)	DN (n = 22) Mean (SD)	ESRD (n = 19) Mean (SD)
No. of subjects (males/females)	15 (4/11)	17 (7/10)	22 (8/14)	19 (6/13)
Age (years)	39.6 (15.3)	47.9 (8.9)	55.9 (9.3)	52.8 (8.8)
Serum albumin (g/dL)	3.7 (0.4)	3.3 (0.5)	2.8 (0.5)[b,d]	3.0 (0.5)[b]
Serum creatinine (mg/dL)	1.0 (0.2)	1.1 (0.3)	2.1 (1.0)	7.6 (2.5)[c,f,h]
Serum urea (mg/dL)	28.9 (6.7)	30.6 (11.7)	70.7 (37.9)[b,e]	132.6 (45.1)[c,f,h]
Fasting blood glucose (mg/dL)	94.6 (13.5)	182.1 (57.7)[c]	149.9 (37.6)[c]	137.5 (30.0)[a,f]
Postprandial blood glucose (mg/dL)	120.3 (111.7)	233.6 (74.3)[c]	215.2 (67.6)[b]	166.6 (23.3)[d]
Serum total cholesterol (mg/dL)	190.3 (29.4)	210.9 (38.9)	241.9 (28.7)[b,d]	212.3 (28.5)[g]
Serum triglycerides (mg/dL)	114.4 (23.1)	279.2 (32.4)[c]	275.7 (28.1)[c]	163.6 (60.0)[b,f,h]
Serum HDL-C (mg/dL)	43.5 (7.9)	32.1 (8.0)[b]	32.9 (8.9)[b]	30.4 (7.8)[b]
Serum LDL-C (mg/dL)	80.8 (24.12)	143.5 (41.9)[c]	147.8 (42.7)[c]	89.9 (23.7)[f,h]

[a]$P < 0.05$, [b]$P < 0.01$, [c]$P < 0.001$ *versus control group;* [d]$P < 0.05$, [e]$P < 0.01$, [f]$P < 0.001$ *versus diabetic group;* [g]$P < 0.05$, [h]$P < 0.001$ *versus DN group.*

SD = standard deviation.

HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol.

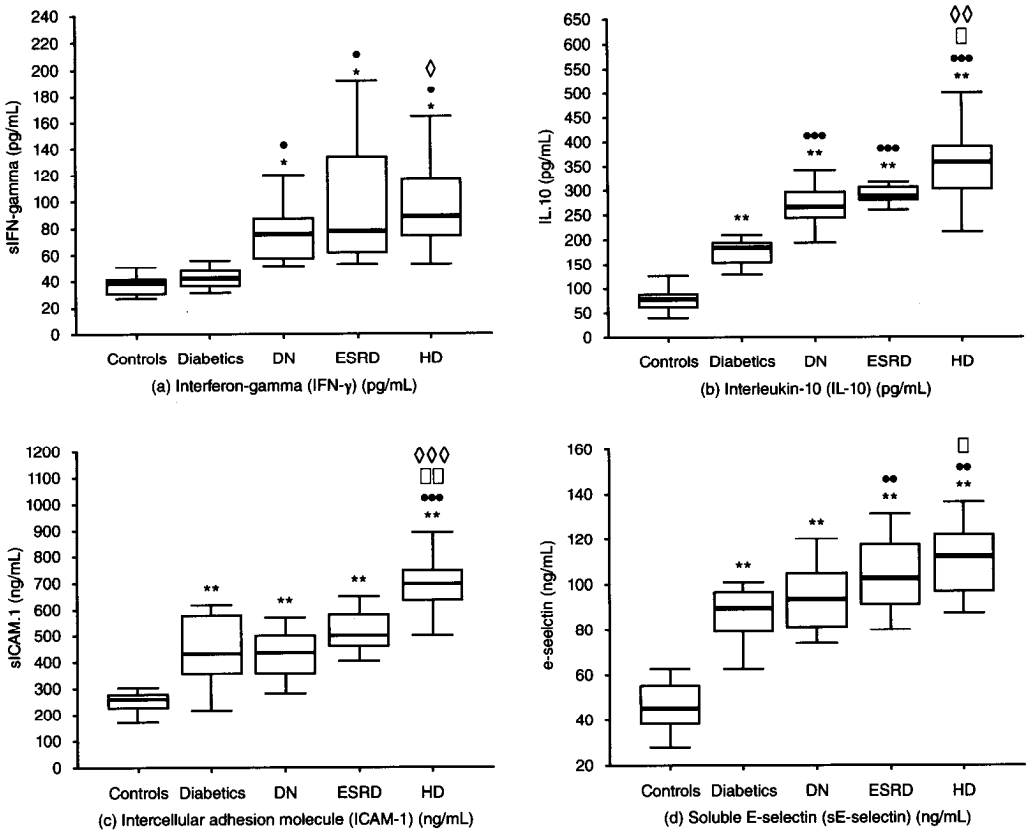


Figure 1 **Serum levels of biomarkers in the study groups: healthy controls, patients with diabetes, diabetic nephropathy (DN) and end-stage renal disease (ESRD) before and after haemodialysis (HD). Top and bottom horizontal lines of the boxplots indicate 25th and 75th percentiles respectively; lines within the box indicate median values (*$P < 0.01$, **$P < 0.001$ versus control group; ·$P < 0.05$, ··$P < 0.01$, ···$P < 0.001$ versus diabetes group ; □$P < 0.01$, □□$P < 0.001$ versus DN group; ◊$P < 0.05$, ◊◊$P < 0.01$, ◊◊◊$P < 0.001$ versus ESRD group before haemodialysis)**

There was a positive correlation between the levels of IFNγ and IL-10 ($r = 0.444$, $P < 0.01$) (Figure 2). Our study showed a positive correlation between sICAM-1 and serum creatinine ($r = 0.362$, $P < 0.05$). We also found a positive correlation between E-selectin and both serum urea ($r = 0.330$, $P < 0.05$) and serum creatinine ($r = 0.309$, $P < 0.05$)

Discussion

DN is a leading cause of ESRD and is a growing concern given the increasing incidence of type 2 diabetes. The suggested causes of inflammation in ESRD include decreased renal function, volume overload, co-morbidity, factors associated with the dialysis procedure and genetic factors [*8*]. An

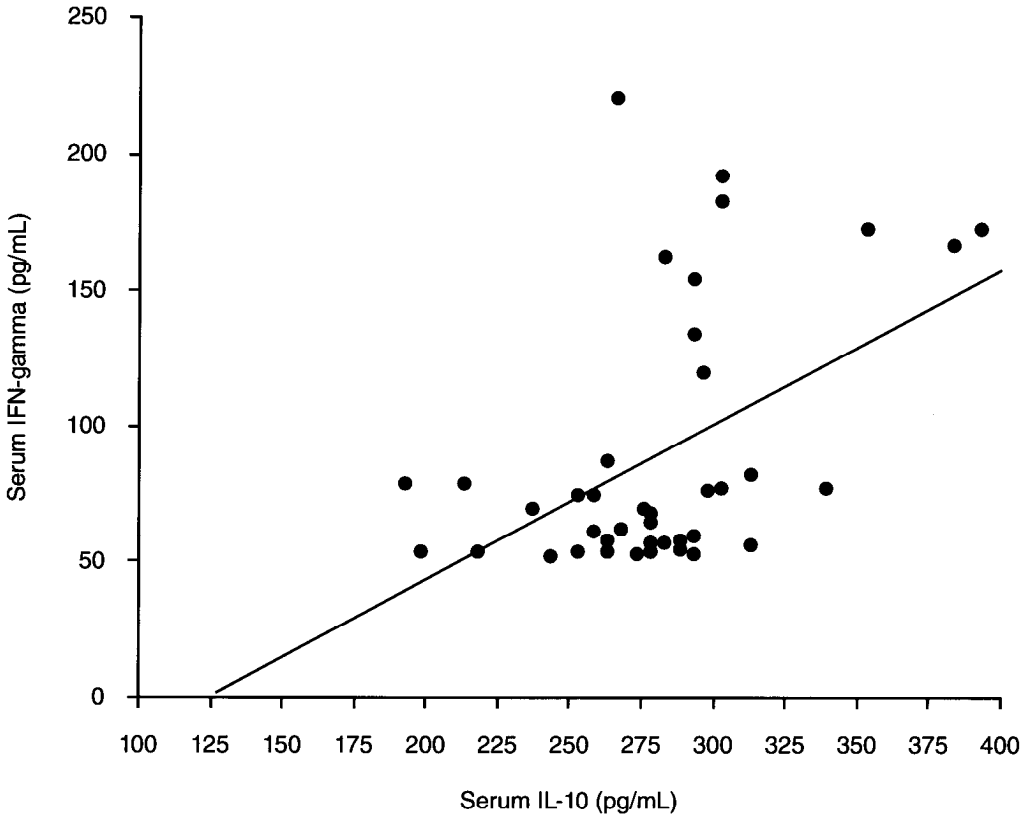


Figure 2 **Correlation between serum interleukin-10 (IL-10) and serum interferon-gamma (IFN-gamma) levels in all 41 patients with diabetic nephropathy (*n* = 22) and end-stage renal disease (*n* = 19) (*r* = 0.444, *P* < 0.01)**

altered balance of Th1/Th2 and endothelial dysfunction has been associated with ESRD [*9*].

In our study, IFNγ (reflecting Th1 activity) and IL-10 (reflecting Th2 activity) showed significant elevations in both DN and ESRD groups compared with both the control group and patients with diabetes. This agrees with another study on the effects of renal failure on the Th1/Th2 lymphocyte profile which showed that the intracellular content of IFNγ, IL-2, IL-4, and IL-10 was significantly higher in patients with chronic renal failure [*10*]. Our results also agree with studies on renal failure patients in whom spontaneous activation of T-lymphocytes was detected [*11,12*].

Our study revealed that both IFNγ level and IL-10 levels were significantly increased after initiation of HD when compared with their values in the ESRD group before the start of dialysis. Daichou et al. also found that IFNγ production by Th1 cells was significantly higher in HD patients yet, in contrast, they showed that production of IL-4 and IL-10, which affect humoral immunity, were significantly lower in HD patients than in controls. They concluded

that cellular immunity induced by Th1 and humoral immunity induced by Th2 are both decreased in HD patients, but that improved IL-12 secretion by macrophages activates natural killer cells to produce IFNγ, which in turn induces macrophage activity [*11*].

In contrast to our results, Pupim et al. found that initiation of maintenance HD did not significantly influence plasma concentrations of IL-10, suggesting that HD is ineffective in controlling inflammation and oxidative stress in renal failure [*13*]. However, Brunet et al. demonstrated increased spontaneous synthesis and secretion of IL-10 in HD patients, which is evidence of the well-documented state of activation of monocytes and lymphocytes in HD patients due to contact with the dialyser membrane [*14*].

Girndt et al. explained the increased IL-10 levels in HD patients in their study as due to the fact that in healthy subjects there is a distinct population of monocytes producing exclusively IL-10 when stimulated, but that these regulating monocytes are reduced in dialysis patients so that there is overproduction of pro-inflammatory factors [*15*]. Fodor et al. demonstrated higher levels of IFNγ in CD4+ T-cells of HD patients, explained by activation of peripheral T-cells with increased production of Th1 cytokines (IFNγ, IL-2) and decreased synthesis of Th2 cytokines (IL-4, IL-13) [*16*]. They explained the elevated expression of IL-10 in CD4+ and CD8+ (Th2) cells as a counter-regulatory Th2 activation in response to the Th1 effect.

The results of our study show that both the pro-inflammatory cytokine IFNγ and the potent anti-inflammatory cytokine IL-10 were significantly elevated in DN and ESRD patients as compared to diabetic patients. We explain this concomitant rise of both cytokines by the fact that increased production of IL-10 may represent an auto-regulatory response to increased production of pro-inflammatory cytokines by monocytes. We also found a more pronounced increase of both cytokines after HD sessions as evidence of the activation of monocytes and lymphocytes due to contact with the dialyser membrane.

In our study the levels of the soluble endothelial markers serum sICAM-1 and sE-selectin showed a significant increase in the diabetic, DN and ESRD patient groups as compared with the control group, which is in accordance with previous data demonstrating that serum levels of sICAM-1 and sE-selectin were elevated in diabetic patients [*17,18*] and undialysed patients with chronic renal failure [*5,19–21*]. Our results contrast, however, with other workers who found a non-significant rise in serum sE-selectin levels in ESRD patients [*22*], and no elevation of sICAM-1 levels in type 2 diabetic patients [*23,24*]. The discrepancy among studies regarding the levels of soluble serum endothelial markers in diabetes could be attributed to differences in the number of patients studied, their physical characteristics, the grade of metabolic control, the presence of hypertension or lipid levels.

Levels of the soluble adhesion molecule ICAM-1 showed a statistically significant increase after the start of HD compared with its level in ESRD patients before the start of dialysis. Similarly, elevated sICAM-1 levels in HD patients were previously demonstrated [*19,25–27*]. Others found that sICAM-1 levels post-HD were significantly higher than pre-HD and suggested that sICAM-1 is shed from the surface of mononuclear cells (lymphocytes and monocytes) and released into the circulation stimulated by dialysis membranes [*28*]. The significant increase in ICAM-1 levels in HD patients indicates that its membrane-adsorptive properties do not exert a major influence on its clearance.

In view of the large size of the molecule it is unlikely that it could be cleared intact through the membranes used.

On the other hand, no significant elevation in E-selectin levels was detected after initiation of HD compared with ESRD values before the start of HD. This result contrasts with previously published data from patients on continuous ambulatory peritoneal dialysis or HD [*21*].

Our study showed a positive correlation between sICAM-1 and serum creatinine in DN and ESRD patients ($r = 0.362$). This is in accordance with other researchers, who found that in undialysed patients with chronic renal failure the levels of serum sICAM-1 increased with decreasing renal function [*19,25*]. We also found a positive correlation between E-selectin and both serum urea ($r = 0.330$), and serum creatinine in DN and ESRD patients ($r = 0.309$). Similarly, others have found a linear relation between serum creatinine and adhesion molecule levels [*29*]. These findings suggest that the kidney may play an important role in the catabolism of adhesion molecules.

Our results concerning markers of endothelial cell activation could be explained by the effects of cytokines on the endothelium or by reduced clearance of endothelial products. However, since renal dysfunction was the primary abnormality, it is likely that increases in sICAM-1 and sE-selectin are secondary to CRF. This is supported by the correlation between soluble endothelial cell markers and creatinine levels, suggesting that renal clearance may affect circulating cytokine levels. In dialysed patients, there was no reduction in the levels of sE-selectin, which are large enough to be excluded from dialysis, and the levels of sICAM-1 were further increased.

We also found a positive correlation between the levels of IFNγ and IL-10 in DN and ESRD patients ($r = 0.44$). IL-10 is known as the most important anti-inflammatory cytokine found in the human immune response and its activity acts as an inhibitory factor in cytokine synthesis; yet several studies have suggested IL-10 has immunostimulatory properties [*30*]. Our results are in accordance with a study that reported a direct correlation between serum IL-10 values and those of IFNγ in HD patients, suggesting an immunomodulatory role of IL-10 in this setting [*31*]. We conclude that the production of IL-10 represents an autoregulatory response to the increased production of the pro-inflammatory cytokines by monocytes.

In conclusion, although other pro- and anti-inflammatory cytokines may be of importance, our data suggest that the anti-inflammatory cytokine IL-10 and the pro-inflammatory cytokines IFNγ play important roles in the development of T-helper cell imbalance in renal failure. The reasons for the increased risk of inflammation in diabetic ESRD patients appear to be complex, including non-dialysis- as well as dialysis-related factors. The combination of an impaired immune response and persistent immune stimulation are factors in the low-grade systemic inflammation and altered cytokine balance that characterize renal failure and which may result in an increased risk of vascular disease. Several interrelated processes are involved in DN, such as oxidative stress, endothelial dysfunction and vascular calcification, in an environment of constant low-grade inflammation, with an altered balance of Th1/Th2 cells as well as a dysregulated cytokine network. Further studies are needed to evaluate whether general or targeted anticytokine treatment strategies could be effective in diabetic patients with ESRD. Also therapies that improve endothelial dysfunction may prove important in management of type 2 diabetes and its costly, morbid complications.

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Colorectal cancer: case–control study of sociodemographic, lifestyle and anthropometric parameters in Riyadh

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سرطان القولون والمستقيم: دراسة حالات وشواهد للمتثابتات الاجتماعية والديموغرافية ولأنماط الحياة والمتثابتات الأنتروبولوجية في الرياض

خالد بن سعد المرشد

الخلاصة: قارن الباحثون في دراسة للحالات والشواهد المتغيرات الاجتماعية والديموغرافية، وأنماط الحياة وبعض المتثابتات الأنثروبيولوجية لدى 50 مريضاً أدخلوا مستشفى للإحالة في الرياض لإصابتهم بسرطان القولون والمستقيم مقابل 50 من الشواهد الذين يوافقونهم من حيث العمر والجنس. ومن بين الحالات كانت الإناث أكثر إصابة بالأعراض المعدية المعوية، وكان لدى 4٪ من الذكور سوابق عائلية لسرطان القولون والمستقيم. ولم يكن هناك اختلاف في مَنْسَب كتلة الجسم بين الحالات والشواهد، وذلك على عكس الوزن والطول؛ إلا أن ضعف المعلومات حول النُظم الغذائية الغنية بالألياف كان من العوامل الهامة. وقد أظهر التحليل الاسترجاعي أن كلاً من انخفاض المستوى التعليمي والبطالة وعدم القيام بتمرينات منتظمة هي عوامل اختطار هامة للإصابة بسرطان القولون والمستقيم. ويوصَى بتحسين التثقيف ورفع مستوى الوعي حول تحرِّي سرطان القولون والمستقيم.

ABSTRACT This case–control study compared sociodemographic variables, lifestyle and certain anthropometric parameters of 50 patients hospitalized with colorectal cancer with those of 50 age- and sex-matched controls at a referral hospital in Riyadh. Among cases, females were generally more affected by gastrointestinal symptoms and 4% of male patients had a family history of colorectal cancer. Unlike weight and height, body mass index did not differ between cases and controls, but poor knowledge of high-fibre diets was a significant factor. Regression analysis showed low education level, unemployment and not taking exercise regularly were significant risk factors for colorectal cancer. Better education and awareness of colorectal cancer screening is recommended.

Cancer colorectal : une étude cas/témoins des paramètres sociodémographiques, relatifs au mode de vie et anthropométriques à Riyad

RÉSUMÉ Cette étude cas/témoins a comparé les variables sociodémographiques, le mode de vie et certains paramètres anthropométriques de 50 malades hospitalisés pour un cancer colorectal, par rapport à 50 témoins appariés sur l'âge et le sexe dans un hôpital de recours de Riyad. Parmi les cas, les femmes étaient généralement plus concernées par les symptômes gastro-intestinaux et 4 % des hommes avaient des antécédents familiaux de cancer colorectal. Contrairement au poids et à la taille, l'indice de masse corporelle n'était pas différent entre les cas et les témoins, mais la méconnaissance des régimes riches en fibres était un facteur significatif. L'analyse de régression a montré que le faible niveau d'instruction, le chômage et le manque d'exercice régulier étaient des facteurs de risque significatifs du cancer colorectal. Il est recommandé de renforcer l'information et la prise de conscience à propos du dépistage du cancer colorectal.

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Introduction

According to the World Health Organization cancer is considered a leading cause of death worldwide, accounting for 7.6 million, or 13%, of all deaths from a total of 58 million deaths reported in year 2005. Although the overall prevalence of cancer is higher in developed nations, about 70% of all cancer deaths in 2005 occurred in low- and middle-income countries [*1*].

Colorectal cancer is associated with significant morbidity and mortality in the industrialized world, including the United Kingdom, United States of America and Japan [*2–5*]. Age-standardized incidence rates vary from 23–35 per 100 000 population in North America to 5–15 per 100 000 in the developing countries of Africa and Asia [*6–8*]. The disease is uncommon in Africa, Asia and South America, which might suggest a possible link with a diet rich in animal fat in developed nations [*9*].

This epidemiological trend is, however, changing in Asian countries, and incidence of colorectal carcinomas is on the rise [*10*]. Global geographic variations in incidence of colorectal adenoma and cancer are thought to be due to multiple factors: sociodemographic, lifestyle, environmental and genetic. Hereditary factors play a definite role, but gene–environment interactions are also important in the pathogenesis [*11*]. Approximately 70% of the risk of colorectal cancer can be related to environmental factors, and identification of these may help prevent the development of the disease [*12*].

Risk factors for colorectal cancer include diets from animal sources that are low in fibre and high in fat, hypertriglyceridaemia, physical inactivity, high body mass index (BMI), obesity, type 2 diabetes mellitus, alcohol and smoking [*13–19*]. Conversely, protective factors for colorectal cancer include physical activity, regular exercise, younger age, higher education level, hormone (estrogen) replacement therapy, intake of calcium, vitamin D, folate, some antioxidant vitamins and minerals such as gamma-tocopherol and selenium, nonsteroidal anti-inflammatory drugs and a diverse diet including yogurt and resistant starches [*20–22*]. Women who consumed diets rich in vegetables had a 20% lower risk for colon cancer than women who did not consume vegetables [*23*].

Saudi Arabia is a low-risk country for colorectal cancer [*24,25*]. The GLOBOCAN database estimated the crude incidence rate (per 100 000) at 6.0, and the crude mortality rate at 3.7; this compares with a crude incidence rate in the world of 17.6 and 15.4 for males and females respectively [*2,3*].

King Faisal Specialist Hospital and Research Centre in Riyadh is a national referral hospital and the principal centre for tumour registry and therapy. Between June 1975 and December 1989, 622 patients were registered with malignant colorectal and anal tumours (383 males, 239 females; average age 53.5 and 47.8 years, respectively). The majority of patients were of Saudi Arabian nationality. The single most common site for large bowel malignancy was the rectum.

To the author's knowledge, no study has been carried out in Saudi Arabia to investigate the association between lifestyle risk factors and colorectal cancer. Moreover, the literature is scanty compared to the industrialized world. Therefore, the objective of this case–control study was to investigate the association between certain sociodemographic and lifestyle factors and colorectal cancer.

Methods

Sample

The sample for this case–control study was 50 newly diagnosed colon cancer pa-

tients selected consecutively over the period 1 November 2003–1 November 2004 from the inpatients attending King Faisal Specialist Hospital and Research Centre. A group of 50 sex- and age-matched (± 3 years) controls were selected consecutively from those attending the outpatient departments. All cases and controls were aged over 30 years and of Saudi Arabian nationality. A case was operationalized as a newly diagnosed colon cancer patient, free from other chronic diseases such as diabetes, hyperlipidaemia or hypertension, or other cardiac, liver and renal diseases. Female cases were not pregnant or lactating. Controls were free from cancer or chronic diseases.

This research was approved by the ethics committee of the Research Centre, and all patients and controls gave informed, written consent for participation.

Data collection

A questionnaire was used to collect sociodemographic data from cases and controls that included: age; sex; region [Riyadh (Central), Eastern, Western, Northern and Southern]; marital status (married or single); education level (illiterate, primary, secondary or university); employment status (employed or unemployed); and general level of physical activity level (bedridden, mild, moderate or high activity). Questions were also asked about whether the patients took exercise and, if yes, the degree of exercise (light, moderate or heavy). Both patients and controls were also asked to name 3 foods that are high in fibre in order to assess their dietary knowledge.

In addition, any family medical history of colon cancer (grandparents, parents, siblings or cousins) was ascertained among patients. Appetite problems (poor, good or excellent) also were noted. Any gastrointestinal problems such as vomiting, diarrhoea or constipation were also recorded. These data were collected for cases only. Weight and height of patients and controls were also measured to calculate BMI.

Statistical analysis

Data analysis was done using *SPSS*, version 14.0. The frequency distribution and descriptive statistics for each variable were calculated. The chi-squared test was used to analyse categorical variables and the *t*-test for analysing continuous variables. Odds ratios (OR), and univariate and logistic regression analysis were computed to assess the significance of each variable to the outcome. *P*-value < 0.05 was considered statistically significant.

Results

The sociodemographic and other characteristics of participants are shown in Table 1. The majority of patients (76%) and controls (86%) were aged 30–60 years; when age was dichotomized into 30–60 years and > 60, there was no significant association between age and colorectal cancer ($P > 0.05$). This was expected because controls and cases were age-matched.

Similar proportions of controls (50%) and cases (48%) were from the Riyadh region and when this geographical variable was categorized into Riyadh versus other regions, chi-squared analysis revealed no significant association between region and colorectal cancer ($P > 0.05$).

The majority of the patients (86%) and the controls (82%) were married; marital status did not differentiate between cases and controls with regard to colorectal cancer ($P > 0.05$).

When education was dichotomized into illiterate/primary and secondary/university level, it was found that a significant proportion of cases were less educated than

Table 1 **General characteristics of colon cancer cases and controls by sex**

Variable	Controls						Cases						OR
	Males (*n* = 25)		Females (*n* = 25)		Both sexes (*n* = 50)		Males (*n* = 25)		Females (*n* = 25)		Both sexes (*n* = 50)		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Age (years)													
30–40	6	24	10	40	16	32	6	24	9	36	15	30	
41–50	5	20	7	28	12	24	5	20	7	28	12	24	
51–60	8	32	7	28	15	30	7	28	4	16	11	22	
61–70	3	12	1	4	4	8	4	16	5	20	9	18	
> 70	3	12	0	0	3	6	3	12	0	0	3	6	
Region													
Riyadh	12	48	13	52	25	50	11	44	13	52	24	48	
Eastern	4	16	5	20	9	18	5	20	5	20	10	20	
Western	2	8	2	8	4	8	2	8	2	8	4	8	
Northern	2	8	4	16	6	12	2	8	4	16	6	12	
Southern	5	20	1	4	6	12	5	20	1	4	6	12	
Marital status													
Married	20	80	21	84	41	82	23	92	20	80	43	86	
Single	5	20	4	16	9	18	2	8	5	20	7	14	
Education													8.3[a]
Illiterate	3	12	3	12	6	12	10	40	12	48	22	44	
Primary	2	8	3	12	5	10	8	32	5	20	13	26	
Secondary	6	24	7	28	13	26	2	8	1	4	3	6	
Higher	14	56	12	48	26	52	5	20	7	28	12	24	
Employment status													3.7
Employed	23	92	15	60	38	76	18	72	5	20	23	46	
Unemployed	2	8	10	40	12	24	7	28	20	80	27	54	
Activity level													
Bedridden	0	0	0	0	0	0	0	0	1	4	1	2	
Mild	7	28	5	20	12	24	3	12	2	8	5	10	
Moderate	11	44	17	68	28	56	22	88	22	88	44	88	
High	7	28	3	12	10	20	0	0	0	0	0	0	
Exercise													8.3
Yes	9	36	15	60	24	48	3	12	2	8	5	10	
No	16	64	10	40	26	52	22	88	23	92	45	90	
Type of excercise													8.5[b]
Light	6	67	7	46	13	54	3	100	2	100	5	100	
Moderate	1	11	7	46	8	33	0	0	0	0	0	0	
Heavy	2	22	1	6	3	13	0	0	0	0	0	0	

Table 1 **General characteristics of colon cancer cases and controls by sex** *(concluded)*

Variable	Controls						Cases						OR
	Males (*n* = 25)		Females (*n* = 25)		Both sexes (*n* = 50)		Males (*n* = 25)		Females (*n* = 25)		Both sexes (*n* = 50)		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Knowledge of higher fibre foods (no. of items named)													17.0[c]
0	1	4	2	8	3	6	15	60	11	44	26	52	
1	6	24	13	52	19	38	0	0	3	12	3	6	
2	6	24	7	28	13	26	4	16	6	24	10	20	
3	12	48	3	12	15	30	6	24	5	20	11	22	

[a]*Illiterate/primary versus secondary/higher;* [b]*Light versus moderate/heavy;* [c]*0 versus ≥ 1 items.*
OR = odds ratio.

the control group (OR = 8.3, $P < 0.05$). Employment status also differentiated significantly between controls and patients, with more cases being unemployed (54% versus 24%) (OR = 3.7, $P < 0.05$).

When the general activity levels bedridden and mild were pooled and analysed against moderate and high activity levels it was observed that general activity was not significantly associated with cancer ($P > 0.05$). However, a significantly higher proportion of patients reported not taking regular exercise (90% versus 52%) (OR = 8.3, $P < 0.05$) and likewise significantly more controls did moderate or heavy amounts of exercise (OR = 8.5, $P < 0.05$).

A significantly higher proportion of cancer patients had poor knowledge of foods rich in fibre compared with controls (52% versus 6% could not name any high-fibre foods) (OR = 17, $P < 0.05$).

The medical history of patients is shown on Table 2. Only 4% of the cases had a family history of colorectal cancer. For diarrhoea there was slight trend towards female sex with colon cancer ($P = 0.058$). No other symptoms differentiated between the sexes ($P > 0.05$). In general, however, women with colorectal carcinoma tended to have more gastrointestinal symptoms.

When the means of male cases and controls were compared and likewise female cases and controls using *t*-test analysis, there were significant differences in all anthropometric indicators for males (mean weight, height and BMI were all significantly lower in cancer cases) ($P < 0.05$) (Table 3). However, for females only height was significantly different ($P > 0.05$).

Table 4 shows the results of the logistic regression model when all sociodemographic factors were put into the model. Unemployment, low education level and not taking exercise were the significant factors after controlling for other variables.

Discussion

In this case–control study, the majority of cases and controls were between 30 and 60 years of age, which is consistent with the results of other studies [*24,26*]. As age was matched between the cases and controls, there was no differentiation between them with regard to colon cancer. However, the disease tends to be more frequent in late middle-age populations in both sexes compared to other age bands. Colon cancer is less prevalent in postmenopausal than

Table 2 **Medical history of the colon cancer cases by sex**

Variable	Male		Female		Both sexes	
	No.	%	No.	%	No.	%
Family history						
Yes	2	8	0	0	2	4
No	23	92	25	100	48	96
Appetite						
Poor	2	8	5	20	7	14
Good	8	32	12	48	20	40
Excellent	15	60	8	32	23	46
Diarrhoea						
Yes	4	16	10	40	14	28
No	21	84	15	60	36	72
Vomiting						
Yes	0	0	2	8	2	4
No	25	100	23	92	48	96
Constipation						
Yes	8	32	11	44	19	38
No	17	68	14	56	31	62

premenopausal women and these sex- and age-divergent variations are explained by, among other factors, obesity [*13*].

Almost half the cases in this study were from Riyadh, which is in agreement with another study [*24*]. This regional trend was attributed to the fact that this study was conducted only in Riyadh and so most of the referrals were from Riyadh and the surrounding areas. However, there are reported geographical variations with regard to the epidemiology of colon cancer worldwide, which are mostly explained by dietary and lifestyle factors. The prevalence of colon cancer is higher in industrialized nations than in the developing world [*6,7,9,10*].

A significantly greater proportion of controls had higher education levels com-

Table 3 **Anthropometric measurements of cases and controls by sex**

Variable	Controls			Cases			*P*-value
	Mean	SD	Range	Mean	SD	Range	
Weight (kg)							
Male	83.8	13.3	56–110	67.0	18.5	38–111	0.001
Female	69.0	14.5	41–94	63.1	14.4	41–94	0.158
Height (cm)							
Male	171.3	7.0	160–185	165.5	8.0	147–180	0.009
Female	158.6	6.0	145–171	152.0	7.6	126–166	0.002
Body mass index (kg/m²)							
Male	28.5	3.7	22–35	24.30	5.8	16–39	0.004
Female	27.3	5.5	16–37	27.16	5.4	20–38	0.918

SD = standard deviation.

Table 4 **Logistic regression model for the effect of different sociodemographic variables on the colorectal cancer**

Variable	*P*-value	OR	95% CI	
			Lower	Upper
Region (Riyadh versus others)	0.876	0.97	0.67	1.41
Marital status (married versus single)	0.510	0.58	0.11	2.97
Education (illiterate/primary versus secondary/university)	0.002	2.40	1.38	4.18
Employment (unemployed versus employed)	0.035	0.29	0.09	0.92
Activity level (bedridden/mild versus moderate/high)	0.324	0.60	0.22	1.66
Regular exercise (no versus yes)	0.002	0.14	0.04	0.47
Knowledge of high-fibre diet (score 0 versus 1/2/3)	0.304	0.76	0.45	1.29
Constant	0.029	265.4		

OR = odds ratio; CI = confidence interval.

pared to patients with colon cancer, which is in agreement with other research [*23,27*]. Reportedly, younger age, diverse diets and higher education protect individuals from developing colon cancer. The other disadvantage of poor education is that the patients are usually seen at an advanced stage of colorectal cancer in Saudi Arabia, and this epidemiological trend is attributed to poor patient awareness of the disease. This may change in the future, however, as a result of improvements in the levels of education and employment and the extensive awareness campaigns about cancer screening in this country. Early identification by screening is recommended for improving survival rates and overall outcomes in colorectal cancer. In line with other research [*28*], it is suggested that effective preventive strategies to control colorectal cancer should include efforts to improve public knowledge of the risk and protective factors linked with colorectal cancer. Concerted efforts at all levels, governmental and nongovernmental, should be continued to encourage regular screening in the middle-aged population at risk. The results of this study showed a greater number of patients were unemployed, which suggests that continuing stress coupled with unemployment might trigger colon cancer.

The present study showed that 90% of the cancer cases did not take regular exercise; there is strong evidence from other studies that physical activity reduces the risk of colon cancer and it is highly efficient in prevention of other cancers [*18,21,29*]. Similarly, lack of physical activity or a sedentary lifestyle is associated with increased risk of colon cancer. Physical activity reduces bowel transit time, which shortens the duration of contact between faecal carcinogens and colon mucosa [*30*]. In this study, the majority of the cases had no knowledge of a high-fibre diet, which has been shown to be protective against the development of colorectal cancer. Increasing knowledge of cancer may reduce negative public perceptions of the disease, which may encourage people to participate in cancer screening and lifestyle modifications [*10,31,32*].

The present study showed that 4% of the cases had a family history of colorectal cancer, which is in agreement with other research showing that a family history of colorectal cancer increases the risk

of having this disease [*10,13,14,26*]. As reported, the implication of this finding is that patient-reported family cancer histories for first-degree relatives are accurate and valuable for colon cancer and breast cancer risk assessment [*33*].

The frequency of poor appetite, diarrhoea, vomiting and constipation were in agreement with others [*34,35*]. An implication of this finding is that the emergence of a cluster of such symptoms should alert the individual to consult physicians to exclude any potential colon cancerous diseases.

There is converging evidence that markers of obesity have been associated with higher risk of colorectal cancer [*13,36*]. The findings of this study were not consistent with this: BMI was significantly higher among the control group. The explanation may be that, although cases were newly diagnosed, they were in the advanced stages of carcinoma and this would reduce their weight, and therefore BMI. Though this is not in agreement with the literature, it is still suggested that colorectal cancer prevention programmes should aim to reduce obesity both by encouraging regular exercise and consumption of diets rich in fibres, fruits, fresh vegetables and resistant starches.

The limitations of this study come mainly from the small sample size (50 cases and 50 controls), which may be justified by the low incidence of the disease in the population. In addition, the study was limited to only 1 hospital, which was the largest referral hospital in Saudi Arabia for oncology patients. This may introduce an element of selection bias for both cases and controls. Also, the use of waist circumference and waist–hip ratio would be a better measure than BMI because these are more indicative of visceral obesity and are sex-specific.

In conclusion, lower education and being unemployed, together with taking no regular exercise, were risk factors for colon cancer in this referral hospital in Saudi Arabia. Therefore, improving education, employment and exercise, and encouraging a diverse diet, may protect people from developing colorectal cancer in Saudi society. In the light of this study and reviewed literature, the following recommendations are made: an education programme to enhance public awareness of the protective role of regular exercise and physical activity against colon cancer; inclusion of active lifestyle education programmes in health promotion activities at primary health care centres; screening for patients over 50 years of age with average risk factors for the disease; and additional studies recruiting larger samples from different regions of Saudi Arabia to determine the relationship between sociodemographic, lifestyle, genetics and anthropometric parameters with colorectal cancer risk.

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Risk factors for hypertension among the adult Moroccan population

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عوامل اختطار فرط ضغط الدم بين البالغين في المملكة المغربية

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الخلاصة: استمد الباحثون في هذه الدراسة المعطيات من المسح الوطني المغربي لعام 2000 للتعرُّف على عوامل الاختطار الرئيسية لفرط ضغط الدم في عينة ممثِّلة من السكان الذين يزيد عمرهم عن 20 عاماً. وقد وجد الباحثون أن اختطار فرط الضغط يزداد بمعدَّل ثابت مع تقدم العمر ليصبح على أعلى مستوى له بين القرويين (نسبة الأرجحية 1.42) والسكريين (نسبة الأرجحية 1.72). ويزداد الاختطار مع ازدياد منسب كتلة الجسم وقياس محيط الخصر وفرط كولسترول الدم. كما ينقص اختطار فرط ضغط الدم بمقدار 36٪ لدى من يمشي لمدة 30 – 60 دقيقة يومياً وبمقدار 46٪ لدى من يمشي لمدة تزيد عن 60 دقيقة يومياً. كما ترافق استهلاك السمك والفواكة الطازجة أكثر من مرة أسبوعياً باختطار أقل. ومن بين المصابين بفرط ضغط الدم لم يشخَّص إلا 21.9٪ منهم، ولم يحظ بالمعالجة الدوائية إلا 8.8٪ منهم.

ABSTRACT This study used data from the Moroccan national survey in 2000 to identify the principle risk factors for hypertension in a representative sample of the population age 20+ years. The risk of hypertension increased steadily with age and was higher among rural residents (OR = 1.42) and those with diabetes (OR = 1.72). The risk increased with increased body mass index, waist size and hypercholesterolaemia. The risk of hypertension decreased by 36% and 46% respectively for those who walked 30–60 min and > 60 min daily. Consumption of fish and fresh fruits 1+ times per week was associated with a lower risk. Among those with hypertension, only 21.9% were previously diagnosed and 8.8% were under medical treatment.

Facteurs de risque d'hypertension dans la population adulte marocaine

RÉSUMÉ Cette étude a exploité les données de l'enquête nationale marocaine de 2000 afin de recenser les principaux facteurs de risque d'hypertension dans un échantillon représentatif de la population âgé de 20 ans et plus. Le risque d'hypertension augmentait régulièrement avec l'âge et il était plus élevé chez les personnes vivant en milieu rural (OR = 1,42) et les diabétiques (OR = 1,72). Il augmentait également si l'indice de masse corporelle, le tour de taille et l'hypercholestérolémie étaient élevés. Le risque d'hypertension diminuait de 36 % chez les personnes qui marchaient entre 30 et 60 minutes par jour et de 46 % chez celles qui marchaient plus de 60 minutes par jour. La consommation de poisson et de fruits frais au moins une fois par semaine était associée à un risque plus faible. Parmi les sujets hypertendus, seuls 21,9 % avaient été diagnostiqués auparavant et 8,8 % étaient sous traitement médical.

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Introduction

It is well established that hypertension is prevalent not only among developed nations but also in developing countries [*1–3*]. The available data for several countries in the Eastern Mediterranean Region indicates that hypertension and its associated complications constitute an important cause of morbidity and mortality [*4,5*]. It has also been reported that well-established risk factors for cardiovascular diseases such as obesity, high serum cholesterol, diabetes and smoking pose a greater risk in those with hypertension than in those with normal blood pressure (BP) levels [*6*].

In Morocco, the high prevalence of hypertension is a serious public health problem. The results of the 2000 national survey on cardiovascular disease risk factors showed that 33% of individuals aged 20 years and over had hypertension [*3*]. With knowledge of the principle risk factors of hypertension, the segments of the population most exposed, as well as the rate of its increase in Morocco, an effective strategy to combat hypertension and its associated complications can be initiated.

The objective of this study was to identify the principal risk factors for hypertension and to determine the rate of detection, treatment and control of hypertension in a representative sample of the Moroccan population.

Methods

Population and sample

The survey conducted in 2000 used a representative sample of the Moroccan population aged 20+ years. The sample selection was conducted through a multi-stage clustering technique. A total of 2000 people were selected from 100 communes, in clusters of 20 persons per commune. Morocco is divided into 68 administrative provinces and prefectures, each of which is composed of several communes. The number of clusters selected at random in a province or prefecture was proportional to the number of its inhabitants. Likewise, the number of clusters selected at random in urban and rural areas was proportional to the distribution of the Moroccan population in urban and rural areas, i.e. 53% and 47% respectively. Twenty (20) households were selected at random from each commune included in the survey, and 1 person aged 20+ years from each household was selected at random to take part in the survey. Pregnant women and bed-ridden terminally-ill people were excluded.

Data collection

Data collection took place at the participants' place of residence. On the first day of the survey the investigator filled in the questionnaire and took the BP and anthropometric measurements of the respondent. A blood sample was taken the next day in order to determine serum glucose, total cholesterol and high-density lipoprotein (HDL) cholesterol levels. The blood sample was centrifuged within the following hour and sent to the laboratory at the Moroccan League for the Prevention of Cardiovascular Disease at the Ibn Sina Hospital in Rabat. The methodology of this survey was reported in detail in a previous article [*3*].

The survey questionnaire included questions on demographic data (age, sex, place of residence, level of education), socioeconomic status (monthly income, occupation), personal and family history of hypertension, diabetes and hypercholesterolaemia, as well as questions regarding smoking habits, alcohol consumption, physical exercise and dietary habits.

Socioeconomic status was classified based on type of residence and monthly

income as: satisfactory (residence in a villa and/or monthly income > US$ 500), low (residence an apartment/traditional house and/or monthly income US$ 300–500) or very low (residence in a shantytown/rural house and/or monthly income < US$ 300).

Smoking and alcohol use were defined as: non-smoker (never smoked cigarettes), smoker (current smoker) or ex-smoker (quit smoking) and non-drinker (never drank alcohol), drinker (current drinker of alcohol) or ex-drinker (quit drinking).

Body mass index (BMI) was defined as: normal (< 25 kg/m^2), overweight (≥ 25 to < 30 kg/m^2) or obese (≥ 30 kg/m^2). Waist size and hip size were measured at the beginning of the great trochanter and the beginning of the umbilicus respectively. Waist size was defined as: normal (men < 88 cm; women < 80 cm), high (men ≥ 88 to < 102 cm; women ≥ 80 to < 88 cm) or very high (men ≥ 102 cm; women ≥ 88 cm). The waist–hip ratio (WHR) as a measure of abdominal obesity was defined as: normal (men < 1; women < 0.85) or high (men ≥ 1; women ≥ 0.85).

Physical activity was defined as: vigorous (accelerated breathing), moderate (rhythmic breathing) or walking. Only physical activity that lasted > 10 minutes was considered. Each activity was measured in terms of average time spent/day (minutes).

Data about diet was based on the frequency of consumption of the main foods habitually consumed by the Moroccan population: frequently (1+ times per week), moderately (< 1 time per week) or rarely (< 1 time per month).

If one of the parents of the participant was known to have hypertension, the person was considered to have a family history of hypertension. A person was considered diabetic if his/her fasting blood sugar was ≥ 1.26 g/L and/or s/he took medication for diabetes. Hypercholesterolaemia was defined as cholesterol level ≥ 2.00 g/L and low HDL cholesterol as ≤ 0.29 g/L for men and ≤ 0.35 g/L for women.

Measurement of hypertension

Hypertension was measured using a Vaquez-type sphygmomanometer. BP measurements were taken from both arms with the subject in a sitting position after a 10 min rest, after which a 3rd BP measurement was taken from the arm with the highest BP. The systolic BP and the diastolic BP values were averaged and done on the same side. A large armband was used when the width of the arm was > 33 cm. A person was considered hypertensive with systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg and/or under treatment with antihypertensive medication. In our survey, 63 people were taking medication for hypertension.

Statistical analysis

The chi-squared test was used for the comparison of the given categories and the *t*-test for the comparison of the given means and standard deviation (SD) within groups. A non-conditional logistic regression model was utilized to analyse the association between the risk of hypertension (dependent variable) and the different risk factors of interest (independent variables). During the first analysis, a univariate analysis was conducted in order to select the covariates significantly associated with the risk of hypertension, with an alpha error less than 10%. During the second analysis, a multivariate logistic regression (stepwise logistic model) was utilized in order to study the association between hypertension and the significant risk factors identified in the univariate analysis. Only those variables with a *P*-value < 0.05 were retained in the final model.

We also examined the interactions between the different risk factors retained in

the final model. The estimated odds ratios (OR) are presented along with the 95% confidence intervals (CI). The analysis was conducted using *SPSS*, version 10.

Results

In total, 1802 people (90.1%) participated in the questionnaire survey and blood pressure/anthropometric measures (755 men and 1047 women); 1662 of these (92.2%) gave blood samples the next day for serum glucose, total cholesterol and HDL cholesterol levels. The blood sample was insufficient to test HDL cholesterol in 21 people.

Prevalence of hypertension

The prevalence of hypertension was 39.6% and 33.6% after standardizing for the Moroccan population by age and by sex (men 30.2%; women 37.0%) [3]. The prevalence of hypertension increased significantly with age in both sexes (Figure 1) from 17.5% among those aged 20–29 years (men 17.5%; women 17.4%) up to 73.9% among those 70+ years (men 71.4%; women 77.2%).

Women had significantly higher mean systolic and diastolic BP levels than men (systolic 134.0 versus 131.3 mmHg, $P = 0.017$; diastolic 78.7 versus 76.0 mmHg, $P = 0.0002$). Systolic and diastolic BP increased with age in both sexes. For men, mean BP was 123.2/72.2 mmHg in those aged 20–29 years and 148.3/81.6 mmHg in those 70+ years, reflecting an increase in systolic BP of 20% and an increase in diastolic BP of 13%. Among women, the mean values were 120.6/72.0 mmHg and 157.0/87.3 mmHg respectively in those 20–29 years and 70+ years, reflecting a 30% increase in systolic BP and 21% increase in diastolic BP.

The distribution of hypertensives and non-hypertensives in the population according to the measured variables is presented in Tables 1 and 2. Mean age was 50.6 years

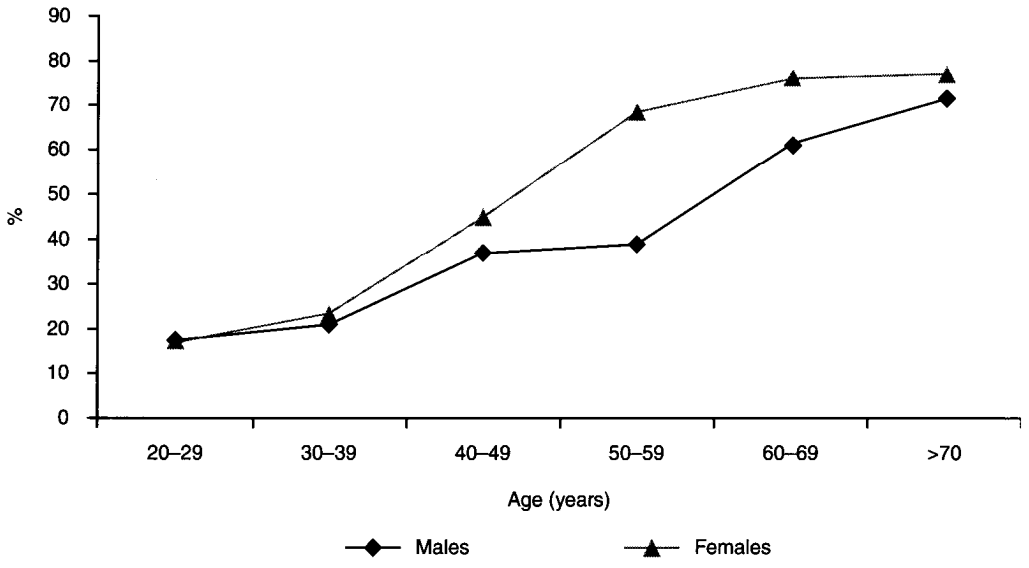


Figure 1 **Prevalence of hypertension by age and sex: national health survey, Morocco 2000**

Table 1 **Hypertension risk factors of participants ≥ 20 years according to hypertension status and prevalence of hypertension: national health survey, Morocco 2000**

Variable	Non-hypertensives		Hypertensives		Prevalence of hypertension	*P*-value
	No.	%	No.	%	%	
Age (years)						< 0.001
20–34	460	42.2	109	15.3	19.2	
35–44	313	28.7	134	18.8	30.0	
45–54	175	16.1	183	25.7	51.1	
55–64	81	7.4	140	19.6	63.3	
≥ 65	60	5.5	147	20.6	71.0	
Mean (SD)	38.7 (13.3)		50.6 (15.1)*			
Sex						0.082
Male	474	43.5	281	39.4	37.2	
Female	615	56.5	432	60.6	41.3	
Place of residence						0.046
Urban	566	52.0	336	47.1	37.3	
Rural	523	48.0	377	52.9	41.9	
Marital status[a]						< 0.001
Single	211	19.4	51	7.2	19.5	
Married	785	72.1	528	74.1	40.2	
Widow	59	5.4	117	16.4	66.5	
Divorced	30	2.8	16	2.2	34.8	
Education level[b]						< 0.001
None	607	55.7	509	71.4	45.6	
Koranic school	69	6.3	47	6.6	40.5	
Primary	185	17.0	86	12.1	31.7	
Secondary	175	16.1	52	7.3	22.9	
University	51	4.7	18	2.5	26.1	
Socioeconomic status						0.677
Satisfactory	26	2.4	17	2.4	39.5	
Low	473	43.4	296	41.5	38.5	
Very low	590	54.2	400	56.1	40.4	
Family history of hypertension						0.988
No	961	88.2	630	88.4	39.6	
Yes	128	11.8	83	11.6	39.3	
Cigarette smoking						< 0.001
Never smoked	826	75.8	576	80.8	41.1	
Current smoker	179	16.4	65	9.1	26.6	
Ex-smoker	84	7.7	72	10.1	46.2	

Table 1 **Hypertension risk factors of participants aged 20 years and over according to hypertension status and prevalence of hypertension: national health survey, Morocco 2000** *(continued)*

Variable	Non-hypertensives		Hypertensives		Prevalence of hypertension	*P*-value
	No.	%	No.	%	%	
Alcohol drinking						0.066
Never drank	958	88.0	650	91.2	40.4	
Current drinker	36	3.3	14	2.0	28.0	
Ex-drinker	95	8.7	49	6.9	34.0	
Moderate physical activity (min/day)						0.004
≤ 120	477	43.8	365	51.2	43.3	
121–240	300	27.5	184	25.8	38.0	
> 240	312	28.7	164	23.0	34.5	
Mean (SD)	187.6 (161.5)*		159.9 (157.0)			
Intense physical activity (min/day)						< 0.001
≤ 60	860	79.0	607	85.1	41.4	
> 60	229	21.0	106	14.9	31.6	
Mean (SD)	62.5(135.9)*		39.2(105.3)			
Walking (min/day)						< 0.001
≤ 30	313	28.8	298	41.8	48.8	
31–60	301	27.6	175	24.5	36.8	
61–120	261	24.0	137	19.2	34.4	
> 120	214	19.7	103	14.4	32.5	
Mean (SD)	88.5 (97.5)*		69.1 (86.8)			
BMI[a] (kg/m²)						< 0.001
< 25	697	64.0	308	43.2	30.6	
25–29	269	24.7	234	32.8	46.5	
≥ 30	121	11.1	168	23.6	58.1	
Mean (SD)	24.2 (4.4)		26.7 (5.3)*			
Waist size[b](cm)						< 0.001
Normal	737	67.7	296	41.5	28.7	
High	171	15.7	151	21.2	46.9	
Very high	177	16.3	266	37.3	60.0	
Mean (SD)	80.8 (11.1)		88.6 (12.2)*			
Waist–hip ratio[c]						< 0.001
Normal	880	81.1	468	65.6	34.7	
High	205	18.9	245	34.4	54.4	
Mean (SD)	0.84 (0.08)		0.88 (0.08)*			

Table 1 **Hypertension risk factors of participants aged 20 years and over according to hypertension status and prevalence of hypertension: national health survey, Morocco 2000** *(concluded)*

Variable	Non-hypertensives		Hypertensives		Prevalence of hypertension	*P*-value
	No.	%	No.	%	%	
Fasting blood sugar[d] (g/L)						< 0.001
< 1.26	957	87.9	565	79.2	37.1	
≥ 1.26	48	4.4	91	12.8	65.5	
Missing data	84	7.7	57	8.0	40.4	
Mean (SD)	0.94 (0.34)		1.06 (0.48)*			
Cholesterol[d] (g/L)						< 0.001
< 2.0	750	68.9	349	48.9	31.8	
2.0–2.2	122	11.2	113	15.8	48.1	
> 2.2	133	12.2	195	27.3	59.5	
Mean (SD)	1.76 (0.39)		2.00 (0.46)*			
Missing data	84	7.7	56	7.9	40.0	
HDL cholesterol[e] (g/L)						0.462
Normal	955	87.7	610	85.6	39.0	
Low	42	3.9	34	4.8	44.7	
Mean (SD)	0.50 (0.15)		0.51 (0.14)			
Missing data	92	8.4	69	9.7	42.9	

**P < 0.001.*
[a]Unknown for 5 people; [b]unknown for 3 people; [c]unknown for 4 people.
[d]1662 people consented to give a blood sample.
[e]Blood sample was insufficient to test high-density lipoprotein cholesterol in 21 people.
Mean (SD) systolic/diastolic blood pressure was 118.5 (10.8)/69.4 (8.7) mmHg in the non-hypertensive group and 154.9 (22.0)/90.1 (14.1) mmHg in the hypertensive group (P < 0.01).
SD = standard deviation; HDL= high-density lipoprotein.

and 38.7 years respectively among those with and without hypertension ($P < 0.001$). The mean systolic and diastolic BP levels were 154.9 (SD 43.1)/90.1 (SD 27 6) mmHg and 118.5 (SD 21.2)/69.4 (SD 17.4) mmHg respectively among those with and without hypertension.

Risk factors for hypertension

The univariate analysis indicated an increased risk of hypertension among rural residents, widowers and individuals with low levels of education. The risk of hypertension was positively associated with age, BMI, waist size and WHR. Hypertension was also positively associated with diabetes, high cholesterol and lowered levels of HDL cholesterol. Those without hypertension more frequently consumed fish, lamb, chicken, eggs, beans and dried fruits. The risk of hypertension was lower among those who smoked cigarettes, drank alcohol and participated in more physical activity or walking, and was not based on socioeconomic status or family history of hypertension.

The multivariate analysis indicated that age, place of residence, BMI, waist size, diabetes, high cholesterol, walking, the consumption of fish and fresh fruits were all independent risk factors associated with

Table 2 **Dietary habits of participants aged 20 years and over according to hypertension status and prevalence of hypertension: national health survey, Morocco 2000**

Frequency of food consumption	Non-hypertensives		Hypertensives		Prevalence of hypertension	*P*-value
	No.	%	No.	%	%	
Beef						0.644
Rarely	286	26.3	203	28.5	41.5	
Moderately	181	16.6	117	16.4	39.3	
Frequently	622	57.1	393	55.1	38.7	
Lamb						0.002
Rarely	474	43.5	370	51.9	43.8	
Moderately	231	21.2	134	18.8	36.7	
Frequently	384	35.3	209	29.3	35.2	
Chicken						0.004
Rarely	197	18.1	159	22.3	44.7	
Moderately	246	22.6	187	26.2	43.2	
Frequently	646	59.3	367	51.5	36.2	
Fish						<0.001
Rarely	237	21.8	232	32.5	49.5	
Moderately	228	20.9	160	22.4	41.2	
Frequently	624	57.3	321	45.0	34.0	
Eggs						<0.001
Rarely	188	17.3	178	25.0	48.6	
Moderately	166	15.2	100	14.0	37.6	
Frequently	735	67.5	435	61.0	37.2	
Fresh vegetables						0.348
Rarely	10	0.9	12	1.7	54.5	
Moderately	19	1.7	11	1.5	36.7	
Frequently	1060	97.3	690	96.8	39.4	
Beans						<0.001
Rarely	351	32.2	295	41.4	45.7	
Moderately	307	28.2	164	23.0	34.8	
Frequently	431	39.6	254	35.6	37.1	
Fresh fruits						0,015
Rarely	91	8.4	81	11.4	47.1	
Moderately	132	12.1	108	15.1	45.0	
Frequently	866	79.5	524	73.5	37.7	
Dried fruits						0.014
Rarely	719	66.0	515	72.2	41.7	
Moderately	196	18.0	112	15.7	36.4	
Frequently	174	16.0	86	12.1	33.1	

Table 2 **Dietary habits of participants aged 20 years and over according to hypertension status and prevalence of hypertension: national health survey, Morocco 2000** *(concluded)*

Frequency of food consumption	Non-hypertensives		Hypertensives		Prevalence of hypertension	*P*-value
	No.	%	No.	%	%	
Olive oil						0.982
Rarely	279	25.6	184	25.8	39.7	
Moderately	83	7.6	53	7.4	39.0	
Frequently	727	66.8	476	66.8	39.6	
Vegetable oil						0.338
Rarely	54	5.0	40	5.6	42.6	
Moderately	14	1.3	14	2.0	50.0	
Frequently	1021	93.8	659	92.4	39.2	
Butter						0.526
Rarely	438	40.2	306	42.9	41.1	
Moderately	145	13.3	95	13.3	39.6	
Frequently	506	46.5	312	43.8	38.1	
Dairy						0.674
Rarely	223	20.5	155	21.7	41.0	
Moderately	144	13.2	102	14.3	41.5	
Frequently	722	66.3	456	64.0	38.7	
Tea						0.757
Rarely	40	3.7	31	4.3	43.7	
Moderately	12	1.1	9	1.3	42.9	
Frequently	1037	95.2	673	94.4	39.4	
Coffee						0.877
Rarely	642	59.0	423	59.3	39.7	
Moderately	98	9.0	67	9.4	40.6	
Frequently	349	32.0	223	31.3	39.0	

hypertension (Table 3). The risk of hypertension increased with age. Hypertension was 8 times more likely among those age 65+ years compared with those 20–34 years old ($P < 0.001$). The risk of hypertension increased among rural residents (OR = 1.42). The risk of hypertension increased by 36% among overweight individuals and 79% among obese individuals, compared with those of a normal weight. Similarly, the risk of hypertension increased by 77% and 130% respectively when waist size was high and very high. The risk of hypertension was 1.7 times higher among diabetics and 1.4 times and 1.9 times higher respectively when cholesterol levels were 2.0–2.2 g/L or > 2.2 g/L.

Individuals who consumed fish and fresh fruits at least once per week were at low risk for hypertension (43% and 31%, respectively) than those who consumed these items less than once per month (the reference category).

Walking was also associated with a low risk of hypertension. The decrease in risk was 36% for those who walked 30–60 min/day and 46% for those who walked more than 60 min daily.

Table 3 **Association between hypertension and potential risk factors: national health survey, Morocco 2000**

Variable	Multivariate analysis		Odds ratio
	P-value step 0	*P*-value final	(95% CI)
Age (years)	< 0.001	< 0.001	
20–34			1
35–44			1.41 (1.03–1.93)
45–54			3.21 (2.33–4.43)
55–64			5.53 (3.79–8.06)
≥ 65			8.00 (5.37–11.9)
Place of residence	0.017	0.005	
Urban			1
Rural			1.42 (1.11–1.81)
Sex	0.210	0.526	
Marital status	0.355	0.417	
Education level	0.849	0.912	
Cigarette smoking	0.337	0.473	
Alcohol drinking	0.745	0.763	
Walking (min/day)	< 0.001	0.001	
≤ 30			1
31–60			0.64 (0.48–0.85)
61–120			0.53 (0.39–0.71)
> 120			0.54 (0.39–0.75)
Moderate physical activity	0.913	0.600	
Intense physical activity	0.991	1.000	
BMI (kg/m²)	0.021	0.023	
< 25			1
25–29			1.36 (1.00–1.83)
≥ 30			1.79 (1.17–2.74)
Waist size (cm)	0.001	< 0.001	
Normal			1
High			1.77 (1.28–2.44)
Very high			2.30 (1.59–3.31)
Waist-hip-ratio	0.991	0.955	
Diabetes	0.024	0.011	
No			1
Yes			1.72 (1.12–2.63)
Cholesterol (g/L)	0.001	0.0003	
< 2.0			1
2.0–2.19			1.39 (1.00–1.93)
≥ 2.20			1.88 (1.39–2.55)

Table 3 **Association between hypertension and potential risk factors: national health survey, Morocco 2000** *(concluded)*

Variable	Mulitvariate analysis		Odds ratio (95% CI)
	P-value step 0	*P*-value final	
Consumption of:			
Fish	0.005	< 0.001	1
Rarely			0.85 (0.62–1.17)
Moderately			0.57 (0.43–0.76
Frequently			
Fresh fruits	0.065	0.015	
Rarely			1
Moderately			1.07 (0.67–1.68)
Frequently			0.69 (0.48–1.01)
Lamb	0.190	0.129	
Chicken	0.200	0.130	
Eggs	0.225	0.176	
Beans	0.272	0.186	
Dried fruits	0.990	0.856	

CI = confidence interval; BMI = body mass index; HDL = high-density lipoprotein.

Sex, level of education, marital status, drinking alcohol, smoking and moderate or intense physical activity were not significantly associated with the risk of hypertension.

Treatment of hypertension

In our survey, 156 (21.9%) of those with hypertension had been diagnosed beforehand (men 13.5%; women 27.3%) and 63 of those (40.4%) were taking antihypertension medication (men 26.3%; women 44.9%). Only 8/63 (12.7%) cases with hypertension and under antihypertension treatment were controlled (i.e. BP < 140/90 mmHg) (men 20.0%; women 11.3%). Thus of those with hypertension, only 8.8% were under medical treatment (men 3.6%; women 12.3%) and only 1.1% were controlled (men 0.7%; women 1.4%).

Discussion

Our study has the advantage of using a representative sample of the Moroccan population and including a number of potential important risk factors of hypertension.

Similar to other studies, the risk of hypertension increased with age [*7–12*]. This progressive increase is linked with rising systolic BP, increasing with age to an average value close to 140 mmHg in the 7th decade [*13*].

The rural population was more at risk of hypertension. In the first report we suggested a possible link between stress and rural residence, the majority of such residents work in agriculture, due to the drought in Morocco over the past 2 decades [*3*]. Stress is known to be a risk factor of hypertension, but other studies are necessary to confirm or refute this [*14*].

The prevalence of hypertension in our survey was slightly higher among women [*3*]. However, multivariate analysis indicated that women did not have a higher risk of hypertension than men. Similarly, marital status, level of education and socioeconomic

status, as defined in our study, were not significant risk factors for hypertension in the multivariate analysis. But in other studies a high risk of hypertension has been associated with low education level [*10*] and with a higher socioeconomic status [*15*].

Many studies have examined the effect of smoking on the prevalence of hypertension. In our study, smoking was not a significant risk factor for hypertension. A similar result was found in the study of Mohsen Ibrahim in Egypt [*16*]. Certain studies indicate that smokers and ex-smokers are more at risk [*17–19*]. It has also been suggested that BP among ex-smokers is higher than that of smokers as well as those who have never smoked [*20*]. The increased risk of hypertension among ex-smokers has been attributed to the number of cigarettes smoked daily prior to cessation of smoking and not to the duration of smoking [*21*]. Recently, it was suggested that smoking was associated with an increase in systolic BP among older men and not among women [*22*] and an increase in the incidence of hypertension [*23*]. Other studies have indicated an inverse relationship between smoking and BP and the risk of hypertension [*7,14,20*]. These contradictory results indicate that the relationship between smoking and hypertension is complicated. This is further complicated by the finding that those who smoke may consume a different diet from those who do not smoke [*24*]. However, it is important to note that the relationship between other factors may contribute to the risk of hypertension, such as the age at which one starts smoking and the time elapsed since smoking cessation.

The positive association between obesity and hypertension observed in our study has been reported in numerous studies [*8,10–12,14,16,19,25,26*]. The Framingham study indicated that 70% of new-onset hypertension may be attributed to obesity or weight gain [*25*]. The mechanism through which obesity and BP are related has yet to be fully elucidated. Resistance to insulin and peripheral hyperinsulinaemia due to overweight and obesity play a role in the development of hypertension [*27*].

Waist size reflects abdominal obesity and is considered a good indicator of obesity. The positive association observed in our study between waist size and hypertension has been reported in other studies [*12,15,16,28*]. Some of those studies indicated that abdominal obesity was a risk factor for hypertension independently of BMI [*12,15,28*]. Ledoux reported that obesity (BMI) and the abdominal distribution of fat (waist size or WHR) are equally associated with the presence of hypertension [*29*]. Similar to the study by Perez [*14*], physical activity was not associated with the risk of hypertension in our study. However, walking did seem to have a protective role against hypertension. In the study of Singh et al. in India, lower physical activity was weakly but significantly associated with hypertension [*15*].

The results of our study confirm those of similar studies which indicate that there is an increased risk of hypertension among diabetics [*14,16,26*] and those with hypercholesterolaemia [*16*]. The association between hypercholesterolaemia and the risk of hypertension may explain some of the mechanisms: first, hypertension and hypercholesterolaemia are linked to atherosclerosis which is associated with reduced vascular compliance [*30*]; secondly, high cholesterol is associated with vascular diseases, which are linked to changes in the endothelium [*31,32*]; thirdly, food rich in fat and cholesterol may cause a disturbance in the metabolism of prostaglandins [*33*]; and fourthly, hypertension and hypercholesterolemia are present in familial dyslipidaemia and hypertension [*34*].

In our study, drinking alcohol was not significantly associated with hypertension, similar to the results of Perez et al. [*14*], although other studies have found an association [*7,25,35*]. A Japanese study found not only a dose–effect relationship between the quantity of alcohol consumed and the level of BP but also a higher prevalence of hypertension among heavy drinkers of alcohol [*35*]. Another study showed that BMI and the consumption of alcohol are strong predictors of hypertension [*25*].

The frequent consumption of fresh fruit and fish seems to have a protective role against hypertension. Sacks et al. suggested that consumption of fresh fruits and vegetables are associated with a low risk of hypertension [*36*]. A number of studies indicate that fish has a protective effect against coronary artery disease [*37–39*] but there are few available data concerning the relationship between the consumption of fish and BP. Similar to the study conducted by Perez et al [*14*], the consumption of animal products high in fat were not found to be associated with an increased risk of hypertension. Concerning the relationship between the risk of hypertension and the other foods, few data are available in the international literature.

In this study, family history of hypertension was not found to be associated with hypertension. This contrasts with a number of other studies indicating a positive association suggesting a hereditary component to hypertension [*14,19,26*].

The detection rate for hypertension (1 in 5 patients) and the proportion under treatment for hypertension (26% for men and 45% for women) remains very low in Morocco. This situation is of further concern because only 1 in 8 patients under medical treatment had a normal level of BP. According to our study, of 100 people with hypertension only 1 had their BP controlled. The reduction in the prevalence of hypertension and its associated complications requires the reduction of the known risk factors and early and adequate assistance for hypertensive patients. It is important to educate the population, in particular those at high risk (obese, diabetic, sedentary lifestyle, etc), who must be identified and assisted.

Our study had certain limitations. The measures of BP were only taken during 1 visit, thus it was not possible to confirm with complete certainty the presence of hypertension among those with elevated BP [*18*]. The number of cigarettes smoked per day, the quantity of alcohol consumed and the duration of smoking and drinking alcohol were not measured. The food consumption evaluation, which measured the frequency of consumption of certain foods, was an imprecise measure and may have introduced bias, as people in the survey may not have remembered or may not have wanted to declare what they ate and because the quantity of the different foods consumed and nutrient content (carbohydrates, fats, etc.) were not taken into account.

Conclusions

The study results suggest that to reduce the prevalence of hypertension among the Moroccan population necessitates a reduction of certain risk factors, notably obesity and high serum cholesterol, but also the promotion of a healthy lifestyle with regular walking and a balanced diet rich in fresh fruits and fish.

The percentage of individuals with hypertension who are diagnosed and treated is low in Morocco and greater efforts are needed to improve the situation in order to reduce the complications associated with hypertension, most notably stroke.

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Antioxidant status and lipid peroxidation activity in evaluating hepatocellular damage in children

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وضع مضادات الأكسدة وفعالية الأكسدة الفائقة للّبيدات في تقييم الضرر في خلايا الكبد لدى الأطفال

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الخلاصة: قام الباحثون بالتعرف على المستويات المصلية للإنزيمات المختزلة للغلوتاثيون وناقلة الغلوتاثيون α- وألدهيد المالونيل لتقييم فائدتها في تشخيص الضرر في الخلايا الكبدي لدى 75 طفلاً مصاباً بمرض كبدي بواسطة قياس الممتز المناعي المرتبط بالإنزيم. وباستثناء مستوى مختزلة الغلوتاثيون لدى مرضى التهاب الكبد بي، فإن مختزلة الغلوتاثيون وناقلة الغلوتاثيون α- وألدهيد المالونيل ارتفعت ارتفاعاً يُعْتَد به لدى المرضى بالمقارنة ما عليه لدى الشواهد. وعندما كانت النوعية 100٪ بلغت قيم الحساسية لمختزلة الغلوتاثيون لالتهاب الكبد بي 16.7٪ ولالتهاب الكبد سي 100٪ وللعدوى بالبلهارسيات 17.7٪ فيما بلغت قيم الحساسية لناقلة الغلوتاثيون α- لالتهاب الكبد بي 33.3٪ ولالتهاب الكبد سي 62.1٪ وللعدوى بالبلهارسيات 38.2٪، وبلغت قيم الحساسية لألدهيد المالونيل لالتهاب الكبد بي 25٪ ولالتهاب الكبد سي 10.3٪ للعدوى بالبلهارسيات 29.4٪. وقد كانت مختزلة الغلوتاثيون أكثر حساسية في التهاب الكبد سي، فيما عكست ألدهيد المالونيل تبدلات الكبد في الفحص بالأمواج فوق الصوت، وكانت ناقلة الغلوتاثيون α- أفضل مؤشر على التبدلات النسيجية والباثولوجية.

ABSTRACT Serum levels of glutathione reductase (GR), glutathione S-transferase-α (GST-α) and malondialdehyde (MDA) were determined to evaluate their use in diagnosing hepatocellular damage in 75 children with liver disease. Except for level of GR in patients with HBV, GR, GST-α and MDA were raised significantly in patients compared with controls. At 100% specificity, the sensitivity of the 3 markers for detecting hepatitis B virus, hepatitis C virus and schistosomiasis infection respectively were: 16.7%, 100.0% and 17.7% for GR; 33.3%, 62.1% and 38.2% for GST-α; and 25.0%, 10.3% and 29.4% for MDA. GR was more sensitive in hepatitis C infection, while MDA reflected changes in liver ultrasound and GST-α was the best indicator for histopathological changes.

Rôle du statut antioxydant et du processus de péroxydation des lipides dans l'évaluation des lésions hépatocellulaires chez l'enfant

RÉSUMÉ Nous avons déterminé les taux sériques de glutathion-réductases (GR), d'α-glutathion-S-transférases (α-GST) et de malondialdéhyde (MDA) afin d'évaluer leur rôle dans le diagnostic des lésions hépatocellulaires chez 75 enfants souffrant d'une maladie hépatique. À l'exception du taux de GR chez les patients atteints du virus de l'hépatite B (VHB), les taux de GR, d'α-GST et de MDA étaient significativement plus élevés chez les malades que chez les témoins. Avec une spécificité de 100 %, la sensibilité des trois marqueurs pour le dépistage du VHB, du VHC et de la schistosomiase était respectivement de 16,7 %, 100,0 % et 17,7 % pour les GR ; de 33,3 %, 62,1 % et 38,2 % pour les α-GST ; et de 25,0 %, 10,3 % et 29,4 % pour le MDA. Les GR étaient plus sensibles dans le cas de l'infection par le VHC, alors que le MDA témoignait de changements à l'échographie du foie et que les α-GST étaient le meilleur indicateur des changements histopathologiques.

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Introduction

The liver is one of the main organs that generates free radicals in different pathological conditions [*1*]. Oxidative stress has been demonstrated to be implicated as a cause of hepatic fibrosis. Ito cells, the principal collagen-producing cells and the main storage sites of retinoids, have been demonstrated to be activated by free radicals as well as by malondialdehyde (MDA) [*2*].

Glutathione is a naturally occurring antioxidant that plays an important role against oxidative stress by reducing bisulfide linkage of proteins or by scavenging hydroperoxides and free radicals. Under normal conditions, more than 99.5% of total glutathione is in the reduced form (GSH) and less than 0.5% in the oxidized form (GSSG) which may be cytotoxic. Cells have 2 antioxidant mechanisms for ensuring a high GSH/GSSG ratio. First, in contrast to GSH, GSSG can be transported out of the cell. Second, GSSG can be reduced back to GSH by the enzyme glutathione reductase (GR) [*3*].

Glutathione S-transferase (GST) is a detoxification enzyme that catalyses the addition of glutathione to various xenobiotics [*4*]. GSTs are divided into 5 main classes: alpha, mu, pi, theta and zeta. GST-α is present in high concentration in hepatocyte cystosol [*5*]. The molecules most exposed to damage by free radicals are the polyunsaturated fatty acids of biological membranes. Deprived of 1 electron, they undergo lipid peroxidation, which can lead to cellular membrane damage. This is one of the mechanisms of hepatocyte injury. One of the lipid peroxidation products is MDA [*1*].

Currently, liver function tests such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST) are used in the diagnosis and management of liver diseases. A disadvantage of these markers is that they are not distributed uniformly throughout the liver, the periportal concentration being greater than the centrilobular region [*6*]. In contrast, GST-α has been found to be equally distributed in both these regions [*4*]. Centrilobular hepatocytes are very susceptible to damage in a variety of clinical conditions including allograft rejection [*7*], viral hepatitis [*8*], chronic active hepatitis [*9*] and hepatotoxicity [*10*].

The aim of this study was to determine the serum levels of the antioxidant enzymes GR and GST-α and the lipid peroxidation product MAD to estimate their clinical usefulness in evaluating liver disease in children, and to correlate the changes of these markers with the changes of serum liver function tests and liver ultrasound and biopsy.

Methods

This work was done at the National Research Centre (NRC), Cairo, Egypt from 2001 to 2004, in accordance with the ethical principles of the NRC, in collaboration with the National Liver Institute of Menoufyia University, Egypt.

A total of 75 patients were enrolled in the study from the inpatient and outpatient clinics of the National Liver Institute. In addition 30 apparently healthy children with no liver disease were selected as controls from the paediatric clinic of the NRC. Medical history was obtained and clinical examination was carried out for all individuals. The participants were classified into the following groups:

- Hepatitis B virus (HBV) group: 12 patients (10 male; 2 female) (age range 3–15 years).

- Hepatitis C virus (HCV) group: 29 patients (22 male; 7 female) (age range 2–16 years).
- Schistosomiasis group: 34 patients (34 male; 0 female) (age range 6–15 years).
- Control group: 30 apparently healthy children (22 male; 8 female) (age range 3–15 years), with no history or clinical evidence of liver disease or any other diseases.

Specimen collection

Using aseptic techniques 5 mL of blood was taken from the patients and controls. Each blood sample was divided into 2 portions: 1 portion (1.8 mL) had sodium citrate anticoagulant (3.8%) (0.02 mL) added to obtain plasma; the other portion was allowed to clot. Serum was separated and stored at –80 °C until tested, while the plasma sample was used immediately to measure prothrombin time and concentration.

Serological analysis

Hepatitis B surface antigen, hepatitis B core antibody IgM and hepatitis B core antibody IgG were measured using an enzyme-linked immunosorbent assay (ELISA) kit (Dia-Sorin, Italy) by standard methods [*11–13*]. Anti-HCV was detected by a 3rd generation ELISA kit (Biochem Immunosystem, Canada) [*14*], while HCV-RNA extraction was carried out by reverse transcriptionpolymerasechainreaction[*15*].Anti-schistosomal antibodies were measured with an indirect haemagglutination test kit (Fumoze, France) [*16*].

Liver function tests

Serum levels of AST, ALT, alkaline phosphatase (ALP), total and direct bilirubin, total protein, serum albumin and gamma glutamyl transpeptidase (GGT) were measured using enzymatic assay (Ektochem 750 XRC, Eastman Kodak, United States of America). Prothrombin time and concentration were also estimated in plasma [*17*].

Antioxidants and free radicals markers

ELISA kits were used for serum GR (Randox Laboratories, United Kingdom) [*3*] and serum GST-α (Biotrin, Ireland) [*18*]. Serum MDA was measured photometrically with a standard kit (Oxis Research International, United States of America) [*19*].

Abdominal ultrasonography

The size and echo pattern of the liver, the size of the spleen and presence of ascites or any other abnormalities in the abdomen of all patients were assessed using ultrasound (RT-X200 Prob 3.5 MHz convex, General Electric Company, United States of America).

Liver biopsy

For patients who gave informed consent and who had pyruvate carboxylase activity above 60% (26 patients), ultrasound-guided liver biopsy was done by true-cut needle followed by histopathological examination of the specimen using haematoxylin and eosin, orcein stain, Pert's stain and periodic acid Schiff stain and examined for staging and grading, according to the methods of Ishak et al. [*20*].

Statistical analysis

The data obtained were presented as means and standard errors. The difference between 2 groups was calculated using unpaired *t*-test, while the difference between more than 2 groups was calculated using the *F*-test [1-way analysis of variance (ANOVA)]. Correlation of variables was tested by the

Pearson test. The analysis was made using *SPSS*, version 10. Sensitivity, specificity and cut-off values were calculated using the standard equations according to Sox et al. [*21*].

Results

Patients with chronic liver diseases were divided into 3 groups according to the etiology: 12 patients with HBV, 29 with HCV infection and 34 with schistosomiasis. Mean age was 10.8 [standard deviation (SD) 1.0] years, 11.5 (SD 0.6) years and 11.8 (SD 1.5) years respectively. The control group was 30 sex-matched children with normal livers with a mean age of 10.5 (SD 0.5) years.

The mean serum levels of GR, GST-α and MDA for patients with HBV, HCV and schistosomiasis were significantly higher than in the control group. This was also true for each patient group separately (HBV, HCV and schistosomiasis groups) (Table 1). The highest level for GR was observed in HCV patients.

Liver function tests for the HBV, HCV, schistosomiasis and control groups are presented in Table 2. Except for total protein, the levels of all the measured parameters (AST, ALT, ALP, total bilirubin, direct bilirubin, albumin, GGT and prothrombin concentration) were significantly raised in HBV and HCV patients ($P < 0.05$). AST, ALT and prothrombin were raised in the schistosomiasis patients.

Using Pearson correlation between the studied markers and liver function tests, the GST-α level showed a significant correlation with serum ALT ($r = 0.239$, $P = 0.039$) and the MDA level showed a significant correlation with total bilirubin ($r = 0.233$, $P = 0.044$) and with direct bilirubin ($r = 0.294$, $P = 0.011$) (not tabulated).

On correlating the serum levels of the GR, GST-α and MDA with the liver ultrasound findings presented in Table 3, using ANOVA, serum MDA level showed a significant increase in relation to findings of coarse texture with periportal/periseptal inflammation ($F = 3.268$, $P = 0.007$) (not tabulated).

On correlating the serum levels of the 3 markers with the liver ultrasound findings using ANOVA, the serum MDA level showed a significant increase in relation to findings of coarse texture with periportal/periseptal inflammation ($F = 3.268$, $P = 0.007$) (not tabulated).

Pearson correlation between serum levels of GR, GST-α and MDA with histopathological scoring (Table 4) revealed a significant correlation between GST-α with portal

Table 1 **Serum levels of liver damage markers of the study children with liver disease**

Marker	Mean (SE) level				
	Control ($n = 30$)	HBV ($n = 12$)	HCV ($n = 29$)	Schist ($n = 34$)	Total ($n = 75$)
GR (U/L)	11.1 (0.3)	10.7 (0.6)	28.3 (5.4)*,[a]	13.8 (1.1)*	18.9 (2.3)*
GST-α (μg/L)	12.4 (0.3)	15.5 (0.9)*	20.5 (1.6)*	18.3 (1.1)*	18.7 (0.8)*
MDA (μM)	2.7 (0.07)	3.3 (0.2)*	3.2 (0.04)*	3.3 (0.02)*	3.3 (0.06)*

**Significant difference compared with control group ($P < 0.05$).*
[a]Significant difference compared with HBV or HCV groups ($P < 0.05$).
HBV = hepatitis B virus; HCV = hepatitis C virus; Schist = schistosomiasis.
GR = glutathione reductase, GST-α = glutathione S-transferase-α; MDA = malondialdhyde.
SE = standard error.

inflammation ($r = 0.565$, $P = 0.003$), periportal/periseptal inflammation ($r = 0.590$, $P = 0.002$) and histological activity index ($r = 0.578$, $P = 0.002$) (not tabulated).

Scatter diagrams of the 3 biochemical markers in the 3 different groups are presented in Figures 1, 2 and 3. The horizontal lines represent the cut-off values of the markers (mean + 2 SD of control). The sensitivity and specificity of each maker were also calculated. The sensitivity of GR for diagnosing HCV patients was 100%, while in HBV and schistosomiasis the sensitivity levels were 16.7% and 17.7% respectively at specificity level 93.3%. For GST-α, the sensitivity levels were 33.3%, 62.1% and 38.2% for HCB, HCV and schistosomiasis. The MDA sensitivity level was 25.0% for HBV, 10.3% for HCV

Table 2 **Liver function tests of the study children with liver disease**

Liver function test	Mean (SE) level				
	Control ($n = 30$)	HBV ($n = 12$)	HCV ($n = 29$)	Schist ($n = 34$)	Total ($n = 75$)
AST (U/L)	18.4 (0.7)	71.2 (10.8)*	120.0 (21.8)*	44.4 (3.8)*	77.9 (9.6)*
ALT (U/L)	20.5 (0.9)	72.6 (12.4)*	107.0 (28.1)*	38.0 (3.4)*	70.4 (11.6)*
ALP (U/L)	74.3 (9.4)	214.0 (41.2)*	165.0 28.9)*	77.0 (5.6)	133.0 (14.9)*
Total bilirubin (mg/dL)	0.8 (0.02)	1.8 (0.2)*	1.3 (0.1)*	0.9 (0.02)	1.2 (0.08)*
Direct bilirubin (mg/dL)	0.16 (0.02)	1.3 (0.2)*	0.6 (0.1)*	0.2 (0.02)	0.5 (0.07)*
Total protein (g/dL)	6.9 (0.1)	6.8 (0.2)	6.7 (0.1)	7.1 (0.1)	6.9 (0.08)
Albumin (g/dL)	4.0 (0.02)	3.5 (0.2)*	3.6 (0.1)*	3.8 (0.02)	3.7 (0.06)*
GGT (U/L)	26.0 (2.1)	54.0 (16.0)*	59.9 (11.1)*	36.0 (4.4)	48.2 (0.05)*
Prothrombin (%)	93.0 (1.3)	69.4 (6.0)*	65.6 (2.5)*	75.0 (1.9)*	70.6 (0.02)*

**Significant difference compared with control group ($P < 0.05$).*
AST = aspartate aminotransferase; ALT = alanine aminotransferase; ALP = alkaline phosphatase; GGT = gamma glutamyl transpeptidase.
HBV = hepatitis B virus; HCV = hepatitis C virus; Schist = schistosomiasis.
SE = standard error.

Table 3 **Liver ultrasound findings of the study children with liver disease**

Liver ultrasound finding	HBV ($n = 12$)		HCV ($n = 29$)		Schist ($n = 34$)		Total ($n = 75$)	
	No.	%	No.	%	No.	%	No.	%
Hepatomegaly	2	16.7	8	27.6	3	8.8	13	17.3
Shrunken liver	1	8.3	1	3.9	0	0	2	2.7
Periportal/periseptal inflammation	0	0	0	0	25	73.5	25	33.3
Diffuse pathology	4	33.3	8	27.6	0	0	12	16.0
Inflammation + diffuse pathology	1	8.3	0	0	3	8.8	4	5.3
Coarse texture	4	33.3	10	34.5	0	0	14	18.7
Diffuse pathology + coarse texture	0	0	2	6.9	3	8.8	5	6.7
Ascites	10	83.3	25	86.2	25	73.5	60	80.0
Splenomegaly	7	58.3	19	65.5	31	91.2	57	76.0

HBV = hepatitis B virus; HCV = hepatitis C virus; Schist = schistosomiasis.

Table 4 **Histopathology scoring of the study children with liver disease**

Histopathology finding	Mean (SE) histopathology score			
	HBV (*n* = 5)	HCV (*n* = 13)	Schist (*n* = 8)	Total (*n* = 26)
Portal inflammation	1.6 (0.2)	1.3 (0.2)	2.1 (0.4)	1.7 (0.2)
Periportal/periseptal inflammation	1.6 (0.2)	1.3 (0.2)	2.1 (0.4)	1.6 (0.2)
Confluent necrosis	0.4 (0.2)	0.8 (0.9)	1.0 (0.5)	0.8 (0.3)
Spotty necrosis	2.2 (0.4)	2.0 (0.2)	1.8 (0.2)	2.0 (0.2)
Histological activity index	5.8 (1.0)	5.6 (0.8)	7.0 (1.1)	6.1 (0.5)
Fibrotic score	4.8 (0.7)	5.6 (0.5)	3.9 (0.7)	4.0 (0.4)

HBV = hepatitis B virus; HCV = hepatitis C virus; Schist = schistosomiasis.
SE = standard error.

and 29.4% for patients with schistosomiasis at a specificity level of 100%.

Discussion

Both liver fibrosis and cirrhosis formation are multifactorial processes, and possible mechanisms leading to those diseases have not been yet clarified. Increasing evidence points to free-radical damage as an important contributor to the diseases [*22,23*]. Several host mechanisms are in place to neutralize the harmful effect of free radicals; these include a system of nutritional and endogenous enzymatic antioxidant defences that generally restrain the production of free radicals and prevent oxidant stress and subsequent tissue damage [*24*]. The body's key antioxidant and protectant is GSH, rather than GSSG, which may be cytotoxic. GR is responsible for maintaining GSH in the reduced form by catalysing the reduction of GSSG to GSH [*3*].

In the present study, serum levels of GR were significantly increased in HBV-, HCV- and schistosomiasis-infected patients compared with the control group. The highest elevation of GR was observed in HCV patients. Its sensitivity to diagnose HCV patients was 100%, while in HBV and schistosomiasis the sensitivity levels were 16.7% and 17.7% respectively, at a specificity level of 93.3%. These results are in accordance with the findings of previous studies [*25–27*] that GR was highly specific for GSSG and could be used in the detection of liver injury. So the increased activity of GR in our study could be explained by the fact that the increased production of reactive oxygen metabolites might be actively scavenged by GSH, resulting in the formation of GSSG, which is rapidly converted to GSH by GR.

We observed a significant increase in GST-α level in the 3 groups of patients compared with the control group. At a specificity level of 100%, the sensitivity level was 33.3% for HBV, 62.1% for HCV and 38.2% for patients with schistosomiasis. The activity of GST-α has been shown to rise by oxygen radical to detoxify the toxic metabolites from lipid peroxidation caused during oxidative stress [*28*]. GST-α was significantly correlated with portal inflammation, periportal/periseptal inflammation and histologic activity index from histopathological examination. These results are in accordance with Beckett and Hayes [*29*], who found that the GST-α level correlated better with histological

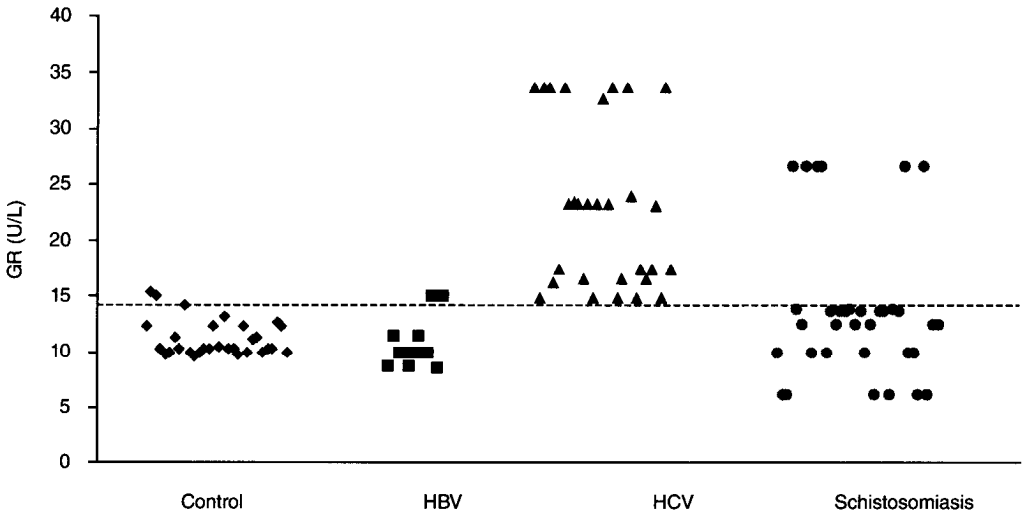


Figure 1 **Scatter diagram of glutathione reductase (GR) level. The horizontal line represents the cut-off value of 14.3 U/L (mean + 2 SD of controls). Sensitivity is 16.7%, 100% and 17.7% for patients with hepatitis B virus (HBV), hepatitis C virus (HCV) and schistosomiasis respectively at a specificity level of 93.3%.**

abnormalities. Others have concluded that the measurement of GST-α in the serum or plasma is probably the most sensitive biochemical test available for monitoring and reflecting the changes in hepatocellular injury [*30*]. Since we obtained a positive significant correlation between serum ALT and GST-α among our patients, we suggest that the association of plasma GST-α with ALT may improve the biochemical assessment of liver damage.

Regarding the changes induced in the levels of serum MDA, there was a significant increase in its level in the studied groups of patients compared to the control group. The MDA sensitivity level was 25% for the HBV group, 10.3% for the HCV group and 29.4% for patients with schistosomiasis at a specificity level of 100%. The results indicate significant changes in the antioxidant capacity of cirrhotic tissue, which leads to enhanced action of oxygen radicals, leading to lipid peroxidation.

Lebensztein et al. reported elevated MDA levels in children with chronic hepatitis B [*31*], while Abd El-Ghaffar et al. reported the same significant elevation of MDA levels in chronic hepatitis C patients before and after interferon-α therapy [*1*]. These findings concur with our findings of a significant elevation of MDA levels in HBV- and HCV-infected patients, as well as in patients with schistosomiasis, but with a low sensitivity rate. Moreover, we found a significant positive correlation between serum MDA and total and direct bilirubin, as well as a significant elevation in of MDA in patients with coarse texture with periportal/periseptal inflammation findings by ultrasonic examination of the liver.

Our results are in accordance with the finding of Socha et al. who found that raised

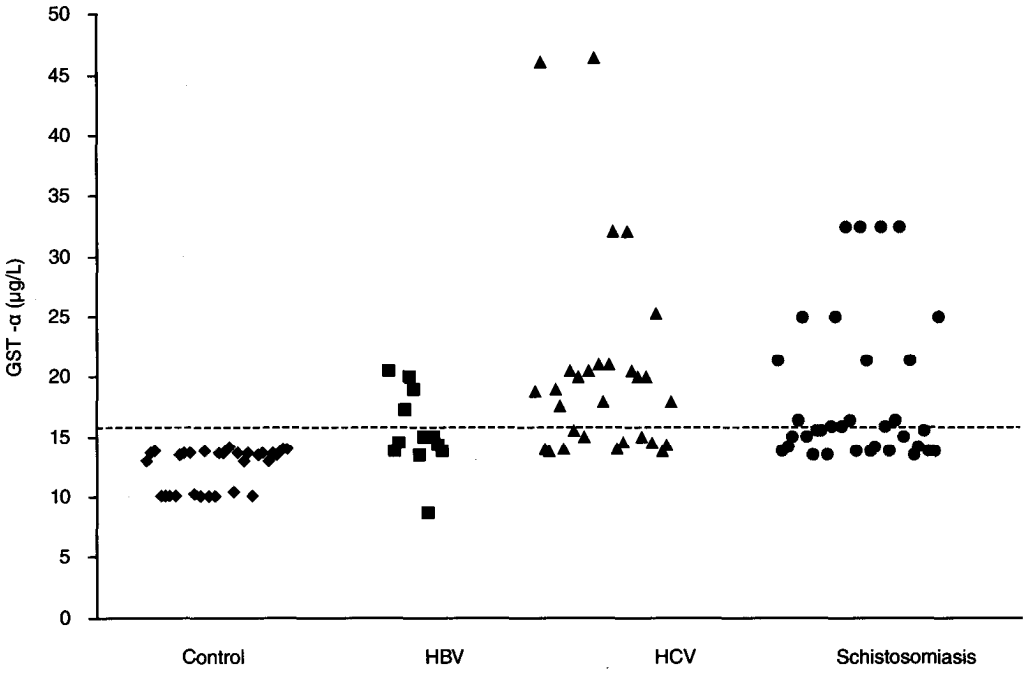


Figure 2 **Scatter diagram of glutathione S-transferase-α level (GST). The horizontal line represents the cut-off value of 15.8 µg/L (mean + 2SD of controls). Sensitivity is 33.3%, 62.1% and 38.2% for patients with hepatitis B virus (HBV), hepatitis C virus (HCV) and schistosomiasis respectively at a specificity level of 100%.**

MDA in liver disease may be attributed to disturbances in blood circulation and oxygenation, e.g. ischaemia, which in turn cause lipid peroxidation and subsequently increase in MDA concentration [*32*]. Another hypothesis has been raised by Farinati et al. that hepatitis-related liver damage is characterized by increased iron storage [*33*], which elicits a free-radical mediated peroxidation via the Fenton reaction [*34*]. Hydroxyl radicals may react by either hydroxylation or hydrogen abstraction, setting off free-radical chain reactions that subsequently increases MDA concentration [*26,34*].

To sum up, our results agree with other studies that have shown increased MDA level and changes in activities of GSH-related enzymes [*27*]. These findings indicate that the glutathione antioxidant system is imbalanced in hepatocellular damage, and they support the hypothesis that oxidative stress plays an important role in the development of these liver diseases. One critical question is whether this abnormality is one of the causes of these liver diseases or is just one of the consequences of their progression. This question remains to be answered by additional research.

In conclusion, serum GR, GST-α and MDA measurements are useful in monitoring hepatocellular damage in children. GR levels are a more sensitive indicator for HCV infection, MDA reflects the changes in liver

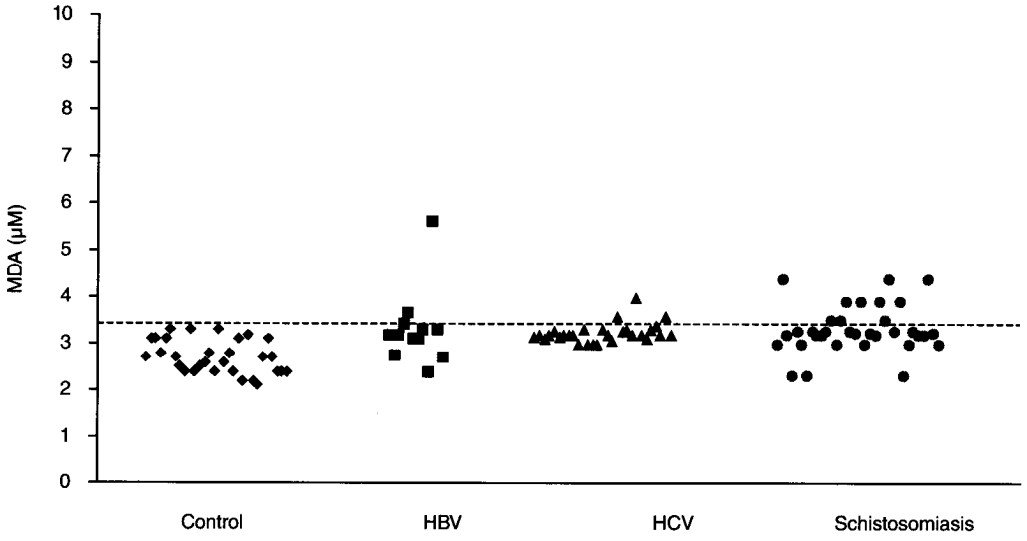


Figure 3 **Scatter diagram of malondialdehyde level (MDA). The horizontal line represents the cut-off value of 3.43 µM (mean + 2SD of controls). Sensitivity is 25.0%, 10.3% and 29.4% for patients with hepatitis B virus (HBV), hepatitis C virus (HCV) and schistosomiasis respectively at a specificity level of 100%.**

ultrasonography, while GST-α is the best indicator for histopathological changes.

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High frequency of low serum levels of vitamin B_{12} among patients attending Jordan University Hospital

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ارتفاع معدَّل المستويات المنخفضة للفيتامين B_{12} بين المرضى في مستشفى الجامعة الأردنية

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الخلاصة: تهدف هذه الدراسة لتقدير وضع مستويات فيتامين B_{12} في المصل لدى المرضى في مستشفى الجامعة الأردنية في عمّان، مع دراسة العلاقة بينهم وبين المعطيات الديموغرافية والأمراض المزمنة والعادات الغذائية والمتثابتات الدموية والأعراض المتعلّقة بمستويات الفيتامين B_{12}. فمن بين 838 مريضاً استكملوا الاستمارات وأعطوا عينات من دمائهم كان لدى 44.6٪ منهم عوز في فيتامين B_{12} (أقل من 180 بيكوغرام/ ميلي لتر)، ولدى 34.2٪ منهم نقص في الفيتامينات (180 – 300 بيكو غرام/ ميلي لتر). وقد ترافق عَوَز الفيتامين B_{12} مع اختلال الذاكرة، وانخفاض في تناول اللحم واتباع نظام غذائي نباتي صارم. وإن المعدَّل المرتفع لنقص مستوى فيتامين B_{12} يتطلّب إعداد استراتيجية لتصحيح هذه المشكلة في الأردن.

ABSTRACT This study aimed to estimate the status of serum vitamin B_{12} level in patients attending Jordan University Hospital in Amman, and to examine the relationship with demographic data, chronic illness, dietary habits, haematological parameters and symptoms related to vitamin B_{12} levels. A total of 838 patients completed a questionnaire and gave blood samples; 44.6% were vitamin B_{12} deficient (< 180 pg/mL) and 34.2% had hypovitaminosis (180–300 pg/mL). Vitamin B_{12} deficiency was associated with memory impairment, low meat intake and strict vegetarian (vegan) diets. The high frequency of low vitamin B_{12} warrants the development of a strategy to correct this problem in Jordan.

Fréquence élevée de faibles taux de vitamine B_{12} sériques chez les patients de l'hôpital universitaire de Jordanie

RÉSUMÉ Cette étude visait à estimer les taux de vitamine B12 sériques chez les patients de l'hôpital universitaire de Jordanie à Amman, et à examiner la relation avec les données démographiques, les maladies chroniques, les habitudes alimentaires, les paramètres hématologiques et les symptômes liés à ces taux. Au total, 838 patients ont rempli un questionnaire et ont été soumis à une prise de sang ; 44,6 % présentaient une déficience en vitamine B12 (< 180 pg/mL) et 34,2 % une hypovitaminose (180-300 pg/mL). La déficience en vitamine B12 était associée à des troubles de la mémoire, de faibles apports carnés et un régime végétarien strict (végétalien). La fréquence élevée de faibles taux de vitamine B12 justifie l'élaboration d'une stratégie visant à corriger ce problème en Jordanie.

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Introduction

Vitamin B_{12} is an essential vitamin derived from food of animal origin. The recommended average daily intake for adults is 2–4 μg [*1*]. The liver is the largest reservoir for B_{12} in the body; it stores up to 3 mg, which is sufficient for several years before the neurological and haematological sequelae of deficiency become evident [*2*]. B_{12} deficiency is a common but under-recognized disorder with a prevalence of 3%–40% in the adult population [*3–7*]. There is, however, considerable debate concerning the definition of the lower limits of vitamin B_{12} levels in healthy adults [*8,9*].

Prevention of micronutrient deficiency enhances human development and economic wellbeing. The rate of anaemia among women of childbearing age in Jordan is 32% and the rate among children is 20% according to the results of a joint study conducted by the Jordanian Ministry of Health, United Nations Children's Fund (UNICEF) and the World Health Organization (WHO).

The study highlights the importance of regular monitoring of micronutrient status in young children (< 5 years) and women of childbearing age (15–49 years) in Jordan. UNICEF and WHO embarked on a flour fortification campaign in 2002. As a result, bread has been fortified with iron and other micronutrients such as vitamin A.

We aimed to estimate serum vitamin B_{12} levels in patients attending clinics at Jordan University Hospital in Amman, and to examine any relationship between demographic data, chronic illness, dietary habits, haematological parameters and symptoms related to B_{12} levels.

Methods

All patients presenting to the family medicine clinic and the diabetic foot clinic at Jordan University Hospital from October 2005 to January 2006 were evaluated for vitamin B_{12} deficiency. Attendees at family medicine clinics are mostly healthy adults coming for minor ailments, acute problems or administrative reasons; a few have chronic illness. Patients attending the diabetic foot clinic are by definition suffering from a chronic illness. The 2 groups were chosen to ensure representation of both healthy and ill adults.

A total of 838 adults aged 18–78 years were included in the study (18 years was the cut-off). All persons attending the 2 clinics were offered the chance to be included in the study. Exclusion criteria were pregnant females, patients currently on vitamin B_{12} or any other multivitamin supplements and those on anticonvulsant drugs. Informed consent was obtained from each participant and the study was approved by the scientific research committee at the Faculty of Medicine, University of Jordan.

The data collected included age, sex, presence of any chronic illness and dietary habits. Chronic illness was defined as any disease lasting more than 3 months, such as diabetes mellitus, hypertension, coronary artery disease, hyperlipidaemia and peptic ulcer disease, confirmed by a review of medical records and medication intake.

Dietary habits were assessed by asking respondents to state quantity and frequency for consumption of: meat and chicken (1 serving = 70 g), eggs (1 serving = 1 egg) and dairy products (1 serving = 8 oz or 1 cup of milk or yogurt or 35 g white cheese), and whether they were strict vegetarians (i.e. vegan, eating a diet of exclusively vegetable origin).

Participants were also asked if they suffered from tiredness, fatigue, numbness or paraesthesias, impaired memory, irritability or depression to assess symptoms of possible B_{12} deficiency.

Fasting blood samples were collected from each patient for the measurement of haemoglobin level (normal: females 14 ± 2 g/dL, males 16 ± 2 g/dL; low: females < 12 g/dL, males < 14 g/dL), ferritin level (normal: females 14–150 µg/L, males 17–230 ug/L), folic acid level (normal: > 2.5 ng/mL), mean corpuscular volume (high: > 100 fL, normal: 80–100 fL, low: < 80 fL) and peripheral blood smear (normal; hypochromic; hypersegmented).

Serum vitamin B_{12} level was measured by chemiluminescent microparticle immunoassay (Abbot Laboratories, Illinois, United States of America). The range of the assay is 180–1162 pg/mL. Using the reference range provided by the manufacturer, participants were divided into 3 groups according to B_{12} level: normal (> 300 pg/mL), hypovitaminosis (180–300 pg/mL), vitamin B_{12} deficiency (< 180 pg/mL).

The data were analysed using *SPSS*, version 11.0 for Windows. Cross-tabulation and chi-squared tests were used to evaluate the variables that can influence vitamin B_{12} level or predict the presence of B_{12} deficiency. Statistical significance was set at $P < 0.05$.

Results

The results were based on analysis of 838 patients—280 (33.4%) males and 558 (66.6%) females—seen at the family medicine and diabetic foot clinics at Jordan University Hospital. The number of women was greater than men as they attend facilities more often than men as patients and as the companions of patients.

Table 1 shows the demographic features in relation to serum levels of vitamin B_{12}. Deficiency (< 180 pg/mL) was detected in 374 patients (44.6%). The frequency of B_{12} deficiency was 51.8% among the age group 18–24 years and was higher in men (52.1%) than in women (41.0%) ($P < 0.001$). B_{12} hypovitaminosis (180–300 pg/mL) was seen in 287 patients (34.2%), more in women (36.0%) than in men (30.4%).

There was no significant association between serum level of vitamin B_{12} and the clinical signs of B_{12} deficiency (fatigue, numbness), except for memory impairment, which was found in significantly more patients with B_{12} deficiency than other patients ($P < 0.05$) (Table 2). More patients with normal ferritin level were found to be B_{12}

Table 1 **Serum vitamin B_{12} levels according to age and sex**

Variable	Total	Normal B_{12}		B_{12} hypovitaminosis		B_{12} deficiency		*P*-value
	No.	No.	%	No.	%	No.	%	
Age (years)								
18–24	195	26	13.3	68	34.9	101	51.8	0.001
25–39	213	41	19.2	82	38.5	91	42.7	
40–54	250	57	22.8	75	30.0	119	47.6	
55–64	114	34	29.8	33	28.9	47	41.2	
> 64	54	17	31.5	24	44.4	13	24.1	
Missing	12	–	–	–	–	–	–	
Sex								
Female	558	128	22.9	201	36.0	229	41.0	0.008
Male	280	49	17.5	85	30.4	146	52.1	
Total	838	177	21.1	287	34.2	374	44.6	

deficient than those with low ferritin level (Table 3). There was no statistically significant relationship between serum levels of folic acid and B_{12} levels.

No significant association was found between vitamin B_{12} level and hypertension, coronary artery disease or peptic ulcer disease (Table 4). Patients with diabetes and hyperlipidaemia had significantly higher B_{12} levels than nondiabetic patients or patients with normal lipid profile ($P < 0.01$ and $P < 0.05$, respectively).

Low meat intake and strict vegetarian diets were associated with B_{12} deficiency ($P < 0.05$) (Table 5). Patients who ate meat less than twice per month were more likely to have vitamin B_{12} deficiency (56.4%) than those who ate meat daily (43.3%).

Discussion

Severe B_{12} deficiency (< 180 pg/mL) resulting in neurological and haematological manifestations is comparatively rare, especially in developed countries such as the United States of America and European countries [*10,11*]. However, suboptimal serum levels of vitamin B_{12} (hypovitaminosis) are common and the prevalence is rising among lactovegetarians and patients older than 60 years [*12*]. In North America the deficiency is particularly observed in elderly, institutionalized patients [*10,13*].

The frequency of vitamin B_{12} deficiency in this study was 44.6%. This is similar to a previous report from north Jordan on 216 healthy individuals by Fora and Mohammad where a suboptimal (< 222 pg/mL) serum level of B_{12} was observed in 48.1% of patients [*14*], and also similar to reports from Israel by Masalha et al. (49%) and Gielchinsky et al. (31%) [*15,16*]. Similar reports of high prevalence in this region came from Turkey (46.8%) [*17*] and the Islamic Republic of Iran (26.7%) [*18*]. These are higher than the reported global prevalence, which ranges from 3% to 40% of the adult population [*3–7*]. Some evidence suggests that this variation is mainly related to ethnic variations, dietary habits, geographical variation and intestinal malabsorption problems, or to different cut-off values for serum vitamin B_{12} level in the definition of deficiency [*17,18*].

Most reported studies have shown a gradual rise in the incidence of vitamin B_{12} deficiency with age. In our study, the highest frequency of deficiency was observed in

Table 2 **Symptoms related to vitamin B_{12} deficiency and serum vitamin B_{12} levels**

Variable	Total (*n* = 838)	Normal B_{12} (*n* = 177)		B_{12} hypovitaminosis (*n* = 287)		B_{12} deficiency (*n* = 374)		*P*-value
	No.	No.	%	No.	%	No.	%	
Fatigue								
Yes	306	76	24.8	108	35.3	122	39.9	0.05
No	532	101	19.0	179	33.6	252	47.4	
Numbness								
Yes	307	71	23.1	99	32.2	137	44.6	0.47
No	531	106	20.0	188	35.4	237	44.6	
Memory impairment								
Yes	235	61	26.0	66	28.1	108	46.0	0.02
No	603	116	19.2	221	36.7	266	44.1	

the age group 18–24 years (51.8%), while B_{12} hypovitaminosis was mostly observed in patients aged > 64 years (44.4%). These results were based only on B_{12} levels, without measuring methylmalonic acid and/or homocysteine, which was a limitation to this study.

We also noted that men had lower levels of vitamin B_{12} compared to women. The same result has been noted in other studies [*14,18*].

Our study demonstrated a negative correlation between diabetes and vitamin B_{12} deficiency ($P < 0.01$) and between hyperlipidaemia and B_{12} deficiency ($P < 0.04$). Diabetic patients and patients with hyperlipidaemia were less likely to have B_{12} deficiency.

Similar to the results reported by Fora and Mohammad from northern Jordan [*14*], the values of several haematological parameters were normal in most patients and there were no obvious clinical manifestations of vitamin B_{12} deficiency in this study. This could be explained by a mild and early form of B_{12} deficiency according to Herbert's classification [*19*].

Mild memory impairment was the only clinical manifestation correlated with vitamin B_{12} deficiency ($P < 0.02$). Reports of mental disturbances are frequent and are

Table 3 **Haematological parameters and serum vitamin B_{12} levels**

Variable	Total (n = 838)	Normal B_{12} (n = 177)		B_{12} hypovitaminosis (n = 287)		B_{12} deficiency (n = 374)		*P*-value
	No.	No.	%	No.	%	No.	%	
Haemoglobin level[a]								
Low	33	10	30.3	8	24.2	15	45.2	0.30
Normal	805	167	20.7	279	34.7	359	44.6	
Folic acid level[b]								
Low	10	3	30.0	4	40.0	3	30.0	0.62
Normal	827	174	21.0	283	34.2	371	44.8	
Ferritin level[c]								
Low	233	42	18.0	95	40.8	96	41.2	0.04
Normal	605	135	22.3	192	31.7	278	46.0	
Mean corpuscular volume[d]								
High	4	0	0.0	0	0.0	4	100.0	0.20
Normal	666	137	20.6	229	34.4	300	45.0	
Low	168	40	23.8	58	34.5	70	41.7	
Peripheral blood smear								
Normal	672	136	20.2	231	34.4	305	45.4	0.07
Hypochromic	94	30	31.9	29	30.9	35	37.2	
Hypersegmented	72	11	15.3	27	37.5	34	47.2	

[a] *Normal: females 14 ± 2 g/dL, males 16 ± 2 g/dL; low: females < 12 g/dL, males < 14 g/dL.*
[b] *Normal: > 2.5 ng/mL.*
[c] *Normal: females 14–150 µg/L, males 17–230 µg/L.*
[d] *High: > 100 fL; normal: 80–100 fL; low: < 80 fL.*

sometimes the only neurological manifestations of vitamin B_{12} deficiency [*1,2,20–22*].

We observed a 56.4% rate of vitamin B_{12} deficiency among patients getting less than 2 servings of meat per month compared with 43.3% in those who ate meat on a daily basis. This measure relied only on patients' estimates of the amount eaten, which is a limitation of the study, although we tried to minimize this by cross-referencing the servings they reported to culturally-determined servings in order to validate the amount of meat consumed. The validity and reliability of respondents' reporting has always been questioned. It is surprising that 43.3% of those who ate meat daily had vitamin B_{12} values < 180 pg/mL; this may be related to absorption problems, which needs further evaluation. In this study, vitamin B_{12} deficiency was also noted among 62.3% of strict vegetarians compared with 43.4% of nonvegetarians, suggesting that nutritional deficiency is an important cause of low serum levels of vitamin B_{12}.

The only current mass public health control and prevention of micronutrient deficiencies in Jordan depends on iron and vitamin A fortification of bread, in addition to dispensing multivitamin and mineral tablets weekly to students at public elementary schools.

This study looked at a sample drawn from attendees at 1 hospital in the capital city, so the results cannot be generalized to Jordan as a whole. However, the results may have important public health consequences and warrant further research in collaboration with the Jordanian Ministry of Health and WHO to evaluate B_{12} status in Jordan as a whole and to develop a strategy to correct this problem if similar results are found at a national level.

Table 4 **Presence of chronic diseases and serum vitamin B_{12} levels**

Variable	Total (*n* = 838)	Normal B_{12} (*n* = 177)		B_{12} hypovitaminosis (*n* = 287)		B_{12} deficiency (*n* = 374)		*P*-value
	No.	No.	%	No.	%	No.	%	
Diabetes mellitus								
Yes	95	31	32.6	30	31.6	34	35.8	0.01
No	743	146	19.7	257	34.6	340	45.8	
Hypertension								
Yes	157	43	27.4	51	32.5	63	40.1	0.10
No	681	134	19.7	236	34.7	311	45.7	
Coronary artery disease								
Yes	35	12	34.3	11	31.4	12	34.3	0.14
No	803	165	20.5	276	34.4	362	45.1	
Hyperlipidaemia								
Yes	93	28	30.1	33	35.5	32	34.4	0.04
No	745	149	20.0	254	34.1	342	45.9	
Peptic ulcer disease								
Yes	39	14	35.9	13	33.3	12	30.8	0.05
No	799	163	20.4	274	34.3	362	45.3	

Table 5 **Food consumption and serum vitamin B_{12} levels**

Variable	Total (n = 838)	Normal B_{12} (n = 177)		B_{12} hypovitaminosis (n = 287)		B_{12} deficiency (n = 374)		*P*-value
	No.	No.	%	No.	%	No.	%	
Meat[a]								
Daily	67	15	22.4	23	34.3	29	43.3	0.02
1–3 times/week	608	137	22.5	218	35.9	253	41.6	
< 2 times/month	163	25	15.3	46	28.2	92	56.4	
Chicken[a]								
Daily	79	19	24.1	25	31.6	35	44.3	0.44
1–3 times/week	681	143	21.0	241	35.4	297	43.6	
< 2 times/month	78	15	19.2	21	26.9	42	53.8	
Eggs[b]								
Daily	98	27	27.6	30	30.6	41	41.8	0.20
1–3 times/week	472	105	22.2	158	33.5	209	44.3	
4+ times/week	268	45	16.8	99	36.9	124	46.3	
Dairy products								
Daily	443	97	21.9	151	34.1	195	44.0	0.92
1–3 times/week	237	50	21.1	83	35.0	104	43.9	
< 2 times/month	158	30	19.0	53	33.5	75	47.5	
Strict vegetarian								
No	785	166	21.1	278	35.4	341	43.4	0.01
Yes	53	11	20.8	9	17.0	33	62.3	

[a] *1 serving = approximately 70 g.*
[b] *1 serving = 1 egg.*

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Hymen care for unmarried Muslim females: role of the forensic consultant in gynaecology interventions

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العناية بغشاء البكارة لدى المسلمات غير المتزوجات: دور استشاري الطب الشرعي في التدخلات النسائية

حسن عبد الرحمن

الخلاصة: توضح هذه السلسلة من الحالات دور استشاري الطب الشرعي في العناية بغشاء البكارة لدى المسلمات غير المتزوجات اللاتي يتعرَّضن لتدخلات نسائية. وقد بلغ المدَى العمري لـ 12 أنثى راجعن مستشفى الجامعة الأردنية في عمّان 35 يوماً إلى 28 عاماً. وشملت التدخلات النسائية استخدام المنظار المهبلي، والشقّ الهلالي لغشاء البكارة في حالات الرتق الولادي، وتفريغ خراج عجاني وتقييم غشاء بكارة متمزِّق. ويقوم استشاري في الطب الشرعي بدور قيِّم في تطمين المريضات وآبائهن حول الإجراءات المستخدمة لتفادي تمزيق غشاء البكارة وفي حماية حقوق الطبيب النسائي وحقوق المريض بتقديم التقارير عن وضع غشاء البكارة قبل وبعد التدخُّل إذا لم يكن ثـمَّة مفرّ من تعرضه للضرر.

ABSTRACT This case series illustrates the role of the forensic consultant in hymen care for unmarried Muslim females exposed to gynaecology interventions. The age range of the 12 females attending University of Jordan Hospital in Amman was 35 days to 28 years. Gynaecology interventions included the use of a vaginoscope, circular resection of the hymen in cases of congenital imperforate hymen, evacuation of perineal abscess and evaluation of a torn hymen. The forensic consultant provides a valuable role in reassuring patients and parents about procedures used to avoid rupturing the hymen, and in protecting the gynaecologist's and patients' rights by providing reports of the status of the hymen before and after intervention in cases where damage is unavoidable.

Protection de l'hymen chez les femmes musulmanes non mariées : le rôle du conseiller en médecine légale lors d'interventions gynécologiques

RÉSUMÉ Cette série de cas illustre le rôle du conseiller en médecine légale du point de vue de la protection de l'hymen chez les musulmanes non mariées susceptibles de subir une intervention gynécologique. Les 12 patientes de l'hôpital universitaire de Jordanie à Amman étaient âgées de 35 jours à 28 ans. Les interventions gynécologiques comprenaient l'utilisation d'un vaginoscope, la résection circulaire de l'hymen en cas d'imperforation hyménéale congénitale, l'évacuation d'un abcès périnéal et l'évaluation d'un hymen rompu. Le conseiller en médecine légale joue un rôle précieux en rassurant les patientes et les parents à propos des procédures appliquées pour éviter la rupture de l'hymen, et en protégeant les droits des gynécologues et des patientes grâce à la communication d'informations sur l'état de l'hymen avant et après l'intervention, lorsque les dommages sont inévitables.

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Introduction

Virginity, defined as an intact hymen, is considered a sign of sexual purity in Islamic societies and represents the honour of a woman and her family [*1–4*]. The loss of virginity before marriage is still a concern in many other cultures too, such as Chinese and Mediterranean societies [*3*]. In Jordan, as in many other Muslim countries, an intact hymen has such important social value that serious problems, crime or even blood feuds may arise if a newly married girl is found not to be a virgin [*1–3,5,6*].

Most people believe incorrectly that fingers or other objects can never be inserted into the vagina for a fear of injuring the hymen [*3*]. Although in most cases the hymen will accommodate small intrusions without great difficulty, some gynaecologists and gynaecologic nurse practitioners are wary about examining unmarried women because of the fear of breaking the hymen, and often do pelvic examinations per rectum. Young females suffer a broad array of genital conditions which may need clinical evaluation and intervention: for example sexual abuse, gynaecological infections, trauma and more complex problems such as vaginal bleeding and benign and malignant conditions affecting the internal and external genitalia. Evaluation and treatment of such cases may need intervention via the hymen [*7,8*].

Ethnic and crosscultural differences in women's attitudes in reproductive health care have not been adequately reported [*9,10*]. An electronic database search of the research literature published between 1965 and 2006 showed little attention to religious and cultural beliefs or values such as premarital virginity in the Muslim community in gynaecological health care [*11*]. In fact there was no published work discussing the proper way of dealing with gynaecological intervention in virgins.

This case series documents 12 cases to illustrate the important role of the forensic physician in cases of gynaecological intervention in unmarried Muslim females: first, the assurance to the patient and her parents that good medical practice respects cultural attitudes towards the hymen and endeavours to safeguard the intact hymen; and, second, the protection of the gynaecologist's and the patient's rights in case the intervention necessitates damaging the hymen. It is hoped that this approach will be considered seriously by medical associations and agencies throughout the world in their guidelines for providing intimate examinations for Muslim and other communities.

Methods

In 2005, while working in the Department of Forensic Medicine, University of Jordan Hospital, the author was consulted to witness and to evaluate 20 preadolescent girls and single women who needed gynaecological intervention. The interventions were carried out around or through the hymen area under general anaesthesia by gynaecologists at the Department of Gynaecology and Obstetrics. The forensic role was mainly concerned with formal documentation of the pre- and postintervention state of the hymen. Parents of minors, or the patient herself if over 18 years, signed consent forms in compliance with the hospital standards.

The Department of Forensic Medicine, a university-affiliated department, evaluates female patients and children each year for possible abuse, sexual offences and anogenital trauma. The department is available for cases referred by law enforcement agencies and emergency departments and clinics throughout the University of Jordan Hospital, as well as self-referrals. The Department of Forensic Medicine policy/

protocols dictate that any case with hymenal trauma and or any medicolegal case will be followed up in the forensic clinic and a formal medicolegal report will be issued.

Results

The mean age of the 20 females was 16.4 years (range: 35 days to 28 years). Due to the similarity in the clinical presentation between some cases, only 12 cases were chosen to represent the different aspects of hymen care (Table 1).

The first 2 cases were girls with vaginal foreign bodies. Case 1 was an 8-year-old girl who had rolled-up pieces of toilet tissue in the vagina, while case 2 was a 6-year-old girl who had a metallic hairpin inserted. Both children were complaining of bloody vaginal discharge. Removal of the toilet tissue needed 2 rounds of operations under general anaesthesia, and forensic consultation took place during the second operation. The hymen of the first child was found to be intact while that of the second one showed an old tear at 8 o'clock.

The next 2 cases were trauma cases. Case 3 was a 4-year-old girl who sustained a direct genital trauma while playing. She had a straddle injury to the genitalia. Local examination revealed contusion of the labia majora and minora together with a recent hymenal tear at 6 o'clock. Plastic surgical repair was carried out 1 month later but without success and the hymen remained torn. Case 4 was an 8-year-old girl who

Table 1 **Gynaecological interventions in girls and young unmarried women involving forensic consultation: summary of 12 cases**

Case no.	Age (years)	Diagnosis	Procedure[a]	Hymen status	Forensic documentation
1	8	Vaginal foreign body	Exploration and removal	Intact	File notes
2	6	Vaginal foreign body	Removal	Old tear	Report
3	4	Fall with genital injury	Exploration and repair	Recent tear	Report
4[b]	8	Road accident with pelvic injury and fractures	Exploration and repair	Recent tear	Report
5	22	Suspected vesicovaginal fistula	Exploration	Absent, with small remnant of hymen	Report
6	27	Suspected recto-vaginal fistula	Exploration	Intact	File notes
7	20	Large cervical polyp protruding through hymen	Exploration and excision	Intact	File notes
8	28	Cervical polyp	Exploration and excision	Intact	File notes
9	21	Imperforate hymen	Partial excision	Annular	Report
10[b]	35 days	Imperforate hymen	Partial excision	Annular	File notes, report postponed
11	19	Abscess in labia minora	Evacuation	Unexamined	File notes
12	19	Perineal abscess	Evacuation	Unexamined	File notes

[a]*Procedures were carried out under general anaesthesia.*
[b]*Consultation of these cases for the gynaecologist and the forensic physician was carried out by a paediatric surgeon.*

was involved in a road traffic accident. She had severe pelvic injury and fractures. The hymen was found to be torn at 7 o'clock. Examination of the case after 6 months revealed the same appearance of the hymen.

Case 5 had been involved in a road traffic accident when she was 8 years old. She suffered from severe pelvic trauma with fractures and severe lacerations. She developed recurrent vaginal discharge and burning micturition. After 14 years, exploration of this case to rule out the possibility of vesicovaginal fistula revealed that the hymen was completely absent with just a small remnant of hymenal tissue in place.

Cases 6, 7 and 8 illustrate the use of the vaginoscope introduced through the hymenal orifice to the vagina. Case 6 had had a previous surgical operation in the anus. Exploration of the vagina was done to exclude the possibility of rectovaginal fistula. Case 7 had a large cervical polyp protruding through the hymenal orifice. Resection of the polyp was done. Case 8 had resection of a polyp followed by dilatation of the cervix by Hegar's dilators to explore the uterus for the presence of uterine polyps. After the end of the operation, in both cases the hymen remained intact.

Cases 9 and 10 were had congenital imperforate hymen which required circular resection of the hymen. Case 9 had no menstruation, so laparatomy and vaginal exploration was needed to rule out the possibility of vaginal and cervical atresia. Vaginal adhesion was found when Hegar's dilators were used. Case 10 presented with a pelvi-abdominal mass. Exploration showed that the mass was an enlarged uterus. The hymen was examined and found to be imperforate. Due to the fear of reclosure of the hymen or the need for further gynaecological intervention, a repeat follow-up for case 10 was decided. In both cases, the remaining part of the hymen was annular.

In cases 11 and 12, evacuation of an abscess in the labia minora and in the perineal region took place. No effort was made to examine the hymen, as it was not involved in the investigation.

Forensic notes were written on the patient's file for all cases. They included detailed consent, history, clinical diagnosis, medical manipulation and the pre- and post-operative condition of the hymen. Forensic re-examination of cases 2, 3, 4, 5 and 9 was done and formal medicolegal reports were issued. Issuing a report for case 10 was postponed until cure was complete. Evaluation of cases 1, 2 and 3 showed no evidence of sexual abuse.

Discussion

In cases where gynaecological intervention is indicated in single girls around and/or through the hymen, the patient and or her parents usually express deep concern about the integrity of the hymen. Moreover, the gynaecologists are afraid of future allegations. In Jordan, the role of the forensic physician is starting to be appreciated in cases of gynaecological intervention in unmarried females. The above-mentioned cases were used to set an example of cases where a forensic doctor was consulted by the gynaecologists.

The age of the studied cases ranged from 35 days to 28 years. Thus they fall into very different groups with different gynaecological needs. In all cases there was extreme concern about the integrity of the hymen.

Gynaecological surgical interventions were indicated in case of acute genital trauma (cases 3 and 4), imperforate hymen (cases 9 and 10), foreign bodies in the vagina (cases 1 and 2), polyps or tumours (cases 7 and 8), genital abscesses (cases 11 and 12) and for diagnostic purposes (cases 5 and 6).

Bleeding from the vulva or vagina in young girls should be promptly evaluated because it causes both the child and her parents considerable concern. This was evident in case 3 and 4 with a tear to the hymen and in cases 1 and 2 with vaginal foreign bodies. Surgical and diagnostic procedures may also cause genital bleeding. The witness of a forensic doctor is important, as the source of bleeding should be promptly evaluated. The patient or her parents probably cannot pinpoint the source of the bleeding and may mistakenly believe it is from the hymen, as seen in case 11 with labial abscess.

For many women in our society, loss of virginity virtually ends any possibility of marriage. Any physical rupture of the hymen, regardless of whether it is unconnected to sexual activity, is considered evidence of lost virginity [*3*]. In case 3, where the hymen was found to be torn, the family was worried when forensic examination revealed a non-healed injury. They requested plastic surgery repair of the hymen, which was unsuccessful on 2 attempts. Although the girl is a still young, her parents were very concerned about her future marriage prospects. In case 5, the girl and her parents were extremely shocked when informed about the hymen. Although they knew that their daughter had suffered a severe trauma in the past, they did not know that the hymen was damaged. Their focus of concern then moved from the medical problem to the hymen. The hymen issue is so crucial that in some cases, as in case 7, a young woman may contemplate suicide rather than being injured during gynaecological intervention.

There are limited published cases on the healing of hymenal tears. The hymen usually has a better chance of healing in cases of partial tear than complete ones. Full transection of the hymen cannot heal without surgical repair. Even then, only a small percentage of fully transected hymens can be successfully repaired [*12*]. This was evident in case 3 where surgical repairs were tried and in the follow-up of case 4 without surgical repair.

Although it is acceptable in some societies for a single girl to do surgical widening of the hymen, especially in cases of microperforate and septate types, to be able to get a tampon into her vagina, it is completely prohibited in other societies due to the fear of loss of virginity. Moreover, in cases of imperforate hymen, as in cases 9 and 10, it is recommended to open the hymenal membrane using a circular incision following the lines of the normal annular hymenal configuration.

Although the majority of the patients examined were Muslims, case 8 was a Christian woman. This illustrates the cultural importance of the hymen issue. Although in many societies young women today do not give any thought to the status of their hymen, the focus on female virginity is not exclusive to Jordan. In societies as diverse as other Muslim countries, Asia, South America, and even Europe and North America, female virginity is emphasized as an important social norm that operates as a means of controlling women's behaviour [*3*].

In Jordan, forensic physicians are considered to be the most qualified doctors for dealing with virginity examinations, while in other countries the examination is still also carried out by gynaecologists and even by general practitioners [*13*]. The attendance at and follow-up of the gynaecology procedures by forensic physicians can assure both the gynaecologist and the patient and her family of the soundness of the procedures.

An advantage of the forensic physician is to encourage the gynaecologist to do everything possible to protect the hymen. For example, when the doctor's attention is focused on performing procedures such

as colposcopy or hysteroscopy, the forensic physician can watch the status of the hymen. The gynaecologist can then feel more secure in carrying out the appropriate vaginal intervention, as seen in cases 1, 9 and 10. This is also explained by forensic consultations in cases of gynaecological intervention outside the region of the hymen, as noted in case of labial abscess (case 11) and perineal abscess (case 12). Although these last 2 cases did not need any object to be passed through the hymen into the vagina, their inclusion aims to highlight the extent of worry experienced by parents when medical interventions approach the anogenital area.

The presence of a forensic physician also protects doctors against false allegations of malpractice during an intimate examination. Gynaecologists are generally wary of examining single women for fear of future allegations, especially in cases of repeated gynaecological intervention, as shown in cases 1 and 9, or when there is a tear in the hymen, as seen in cases 2, 3 and 5. In addition, the forensic physician has to rule out the possibility of sexual molestation, as in case 3 with a hymen tear and in cases 1 and 2 with vaginal foreign bodies.

The patient and/or her family feel more comfortable and less anxious when there is a forensic consultant involved. In many instances, parents believe that issuing a formal forensic report protects their daughter's reputation by providing tangible "proof" that the girl or woman remains a virgin despite gynaecological intervention through the hymen (cases 1, 6, 7, 8) or by establishing with medical evidence that the girl or woman's hymen was ruptured in an accident and not as a result of extramarital sexual activity (cases 2, 3, 4, 5). On the other hand, the patient and her family can also be assured that every effort will be taken not to break the hymen (cases 1, 6, 7, 8) or even not to touch it at all (case 11, 12). Moreover, in case of imperforate hymen, surgical incision will be done in a way to keep the hymen annular and intact (cases 9, 10).

Recommendations

Although implementation is far from universal in clinical practice, the care of unmarried females can be improved if their gynaecological health is addressed with the cooperation of a forensic physician.

- The first step in forensic documentation is to take a complete history. Then the gynaecologist discusses the case with the girl and/or her family, with the help of the forensic doctor, in order to explain the gynaecological procedures and the expected effect on the hymen, if any. The doctor must make sure that both the patient and the legal guardian are capable of understanding the nature and possible dangers of the operation. The possibility of hymenal tear and injuries during surgical intervention must be made clear.
- Contrary to the consent for other medical procedures which is usually taken from the patient herself or in case of minors from her parents, written consent from parents is obligatory for all gynaecology interventions involving minors and even adult single women.
- When talking with the patient and her parents, in case of simple intervention and in procedures that will not affect the hymen, it is important to carefully explain that the girl's hymen will not be altered in any way by the examination, because many parents do not fully understand the anatomy of the vagina and hymen. They mistakenly believe that anything which enters the vagina will automatically tear the hymen. Basic

diagrams of the anatomy may be helpful in discussions.

- The forensic doctor should witness the gynaecology procedure from its start to its end and write a detailed description of the pelvic examination, the diagnostic tools used or the surgical procedures done and the effect if any on the hymen. He/she should issue a report in cases of hymenal tear.
- Finally, it is important that, whenever possible during interventions, every effort should be made to keep the hymen intact. The extreme concern and pressure upon medical practitioners and women in Islamic cultures to preserve the integrity of the hymen may be difficult for those from other cultures to comprehend. In spite of that, the role for forensic medicine proposed in this paper is an example of how physicians throughout the world can improve their gynaecological health care to unmarried Muslim women by taking care of the hymen.

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Caesarean delivery rates, determinants and indications in Makassed Hospital, Jerusalem 1993 and 2002

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معدَّل الولادات القيصرية ومحدِّداتها ودواعي إجرائها في مستشفى المقاصد، في القدس بين عامَيْ 1993 و2002

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الخلاصة: قام الباحثون باستقصاء الارتفاع المتزايد في معدَّلات الولادات القيصرية عما كان عليه عام 1993 (9.4٪) وما آل إليه عام 2002 (14.4٪)، والعوامل المصاحبة لذلك الارتفاع والتي تشمل دواعي إجراء العمليات القيصرية والصفات السريرية والاجتماعية والسكانية التي تستند إلى سجلات مستشفى تعليمي كبير في فلسطين. وقد تناقَص معدَّل الولادات بالاستعانة بالأدوات من 12.6٪ عام 1993 إلى 4.4٪ عام 2002. وتناقصت إصابة الجنين بالضائقة كمؤشر للعملية القيصرية، فيما ساهم في الزيادة المجيء المقعدي والعمليات القيصرية السابقة. وتمسُّ الحاجة عند اتخاذ القرار حول إجراء العمليات القيصرية إلى الموازنة بين منافع وأخطار التدخلات في سياق يتضمَّن مجمل دورة الحياة الإنجابية للمرأة والمعايير المتاحة للرعاية، وتجنُّب العمليات القيصرية غير الضرورية والمكلفة، وذلك لإنقاص المضاعفات الناجمة عن الإجراءات الطبية وللمحافظة على الموارد.

ABSTRACT This study investigated the rising rate of caesarean section (CS) deliveries between 1993 and 2002 (9.4% to 14.4%) and associated factors, including indications for CS and sociodemographic and clinical characteristics based on the register of a major Palestinian teaching hospital. Instrumental deliveries declined from 12.6% to 4.4%. Fetal distress decreased as an indication for CS, while previous CS and breech presentations contributed to the increase. Decision-making for CS needs to frame the benefits and risks of the intervention within the context of women's entire reproductive life-cycle and existing standards of care, avoiding unnecessary and costly CS deliveries to reduce iatrogenic complications and conserve resources.

Taux, déterminants et indications en matière d'accouchements par césarienne à l'hôpital Makassed de Jérusalem entre 1993 et 2002

RÉSUMÉ Cette étude a examiné l'accroissement du taux d'accouchements par césarienne entre 1993 et 2002 (de 9,4 à 14,4 %) et les facteurs associés, notamment les indications de césarienne et les caractéristiques sociodémographiques et cliniques, d'après le registre du plus grand hôpital universitaire palestinien. Les accouchements instrumentaux ont chuté de 12,6 % à 4,4 %. La part de la détresse fœtale dans les indications de césarienne a baissé, alors que les antécédents de césarienne et la présentation par le siège ont contribué à l'augmentation du nombre de ces accouchements. Avant de prendre une décision en matière de césarienne, il convient de définir les avantages et les risques de l'intervention sous l'angle de l'ensemble de la période de procréation de la femme et du niveau de soins existant, en évitant des césariennes inutiles et coûteuses afin de réduire les complications iatrogènes et de préserver les ressources.

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Introduction

The appropriate use of caesarean delivery has been a public health concern for decades. However, determining what is appropriate in a specific context is a complex question. While research in many settings is focusing on the controversy of maternal request for a caesarean section (CS) operation [*1*], the rising trend in CS births in some developing countries raises questions about the implications for weak and under-resourced health systems and the consequences for maternal and neonatal health. This study aimed to investigate the reasons for the rising CS operation rate over the past decade in the leading Palestinian teaching and referral hospital by conducting a comparative record audit of 2 years of the hospital maternity register.

The risk of maternal death with CS delivery is 3–7 times greater than for vaginal delivery [*2*]. A higher risk of serious neonatal respiratory problems has also been associated with CS [*3*]. The national, population-based CS delivery rate in the Palestinian Territory has almost doubled in 8 years, increasing from 6.8% in 1996 to 12.4% in 2004 [*4*]. While this rate is still considerably lower than in some Latin American countries [*5*], the rapid increase is alarming, particularly in the light of the high total fertility rate of 4.6 [*4*] and the associated risk of complications in the postpartum period and in subsequent pregnancies after a CS delivery [*6,7*]. With the aim of preventing unnecessary operations in suboptimal conditions which could increase short- and long-term maternal and neonatal mortality and morbidity and health care costs [*8*], it is timely to investigate the causes for this rise, as it is difficult to reduce the rate once it has increased [*9*].

As no published research exists on CS operations in Palestine aside from the national population rate mentioned previously, we investigated the rising trend and indications for CS operations of singleton deliveries in Makassed Hospital in Jerusalem. Auditing the change in clinical indications in 1993 and in 2002 was a first step in identifying policies and practices which contributed to the obstetricians' decisions favouring CS operation over vaginal birth.

Methods

Data on singleton deliveries in 1993 and 2002 were collected from the birth register of Makassed Hospital. This charitable hospital was chosen as it is the major teaching and referral hospital and thus influences obstetric practice throughout the country. Unlike some private maternity facilities, the obstetricians and midwives at Makassed use the same standardized guidelines and models of care. Midwives are responsible for most normal births, and high-risk cases are conducted by the doctors.

The rates of CS and instrumental deliveries and selected CS determinants and indications were studied for each year. Variables included: the baseline characteristics of the study group (locale, region, age, antenatal booking visits); current obstetric conditions (parity, previous CS, antepartum haemorrhage, pregnancy-induced hypertension, weeks of gestation, weight and presentation of the baby); and current medical conditions (diabetes, haematological disorders, etc.). Indications for CS deliveries included fetal distress, previous CS, antepartum haemorrhage, pre-eclampsia/eclampsia, dystocia and breech presentation. All the indications that were written in the register were included in the study. In certain cases there was more than 1 indication for a CS, but the indications were not listed in any order of importance.

Statistical analysis

The data in the register were coded by midwives and analysed using *SPSS*, version 12, software. The chi-squared test was used to compare frequencies. Statistical significance was set at P-value < 0.05. Multiple logistic regression was used first to study changes in the CS rate among groups with different characteristics in both years, and then to study the association between the mode of delivery and certain sociodemographic characteristics and current obstetric and medical conditions. Indications for CS delivery were compared using the difference between proportions.

Results

In 1993 the hospital CS rate was 9.7% of all deliveries and 9.4% of singleton deliveries, which increased in 2002 to 15.3% of all deliveries and 14.4% of singleton deliveries. As mentioned above, this study included only the singleton deliveries, which totalled 6804 (3356 in 1993 and 3448 in 2002).

While around two-thirds of the women came from urban areas in both years, fewer came from the West Bank in 2002 (5.8%) compared with 1993 (38.0%). The ratio of primiparas to multiparas remained the same (1:3). More women came to the hospital without antenatal booking in 2002 (54.9%) than in 1993 (40.0%) (Table 1).

More women were admitted with ≥ 1 previous CS in 2002 (12.9%) than in 1993 (8.6%) (Table 1). Recorded obstetric and medical conditions also differed between the 2 years. In 1993 there were almost twice as many cases of pregnancy-induced hypertension and antepartum haemorrhage than in 2002, whereas the number of pregnant women diagnosed with diabetes increased in 2002. Preterm and post-term deliveries were fewer in 2002 than in 1993.

The mode of delivery changed significantly between the 2 years (Figure 1). The instrumental delivery rate decreased from 12.6% (423 deliveries) to 4.4% (153 deliveries) with vacuum delivery declining from 4.7% (159 deliveries) to 2.3% (80 deliveries) and forceps delivery from 7.4% (249 deliveries) to 2.0% (70 deliveries). The overall CS rate increased considerably from 9.4% (316 deliveries) in 1993 to 14.4% (497 deliveries) in 2002, including a rise in the emergency CS rate from 7.7% (257 deliveries) to 10.2% (350 deliveries) and the elective CS rate from 1.8% (59 deliveries) to 4.3% (147 deliveries). This increase in the CS rate was not accompanied by a decrease in the normal vaginal delivery rate; from 78.0% (2617 deliveries) in 1993 to 81.1% (2798 deliveries) in 2002. The rate of vaginal birth after CS (VBAC) was 57.4% in 1993 (166 out of 289 women with previous CS) while in 2002 it was reduced to 53.2% (238 out of 447 women with previous CS).

Among CS cases, there was an increase in the CS rate in groups with different characteristics in 2002 compared to 1993: more specifically in age groups 20–35 years and > 35 years, in women coming from Jerusalem, the West Bank and the Gaza Strip, in both primiparous and multiparous women, in women with a first CS, in cases of hypertension and pre-eclampsia, in other conditions related to pregnancy, in full-term, preterm and post-term babies and in cases of low birth weight, high birth weight and normal birth weight (Table 2). However, when the CS rate was compared in these groups in a logistic regression model, the only characteristic which remained significant was region (being from the West Bank and Gaza Strip).

The results of multiple logistic regressions of selected determinants associated

Table 1 **Baseline characteristics of women who gave birth at Makassed Hospital in the two study years**

Baseline characteristics	1993 (*n* = 3356) %	2002 (*n* = 3448) %	*P*-value
Age (years)			
15–19	16.5	11.5	< 0.001
20–35	77.0	79.7	
> 35	6.5	8.9	
Region			
Jerusalem	62.0	94.2	< 0.001
West Bank and Gaza Strip	38.0	5.8	
Locale			
Urban	69.0	71.4	< 0.001
Rural	28.1	23.7	
Refugee camp	2.9	4.9	
No. of booking visits			
0	40.0	54.9	< 0.001
1+	60.0	45.1	
Parity			
Primipara	26.3	24.9	0.18
Multipara	73.7	75.1	
No. of previous caesarean sections			
0	91.4	87.1	< 0.001
1	6.3	9.5	
> 1	2.3	3.4	
Antepartum haemorrhage	5.3	2.0	< 0.001
Pregnancy induced hypertension/ pre-eclampsia/eclampsia	4.7	2.1	< 0.001
Other conditions related to pregnancy[a]	10.0	7.5	< 0.001
Weeks of gestation			
Preterm (< 37)	13.3	8.7	< 0.001
Term (37–41)	78.2	88.9	
Post-term (> 41)	8.4	2.4	
Weight of baby (kg)			
≤ 2.5	13.5	8.7	< 0.001
> 2.5–≤ 4	81.2	86.4	
> 4	5.3	4.9	
Current medical conditions			
Haematological disorder	6.8	7.0	0.77
Diabetes	0.7	2.7	< 0.001
Other medical conditions	4.1	2.6	0.001

[a]*Including infertility related conditions, uterine and amniotic fluid abnormalities, pregnancy complications other that those mentioned in the table.*

with CS are presented in Table 3. This model shows that irrespective of the year, region (being from the West Bank), having a previous CS, having other conditions related to pregnancy, having antepartum haemorrhage, having pregnancy-induced hypertension, younger age group (15–19 years) and older age group (> 35 years), small and large babies, preterm babies and primiparity were all associated with CS.

The indications for CS changed over the 2 years (Table 4). The main indications in 1993 were fetal distress (38.3%) and previous CS (38.9%), while in 2002 they were previous CS (42.1%) and breech presentation (24.7%). Fetal distress, antepartum haemorrhage and dystocia decreased significantly as indications for CS in 2002, while breech presentation increased significantly in the same year. The indications of previous CS and breech presentation out of all deliveries also increased significantly in 2002. As indications for CS, previous CS almost doubled in 2002 compared to 1993 (from 3.7% to 6.1%) and breech presentation almost tripled (from 1.1% to 3.6%).

Some of the indications for CS changed markedly between the 2 study years. Fetal distress went down from 38.3% of CS deliveries in 1993 to 13.9% in 2002 ($P < 0.001$) (Table 4). Dystocia($P < 0.001$) and antepartum haemhorrage ($P = 0.03$) also went down significantly while breech presentation increased from 11.4% of CS deliveries in 1993 to 24.7% in 2002 ($P < 0.001$).

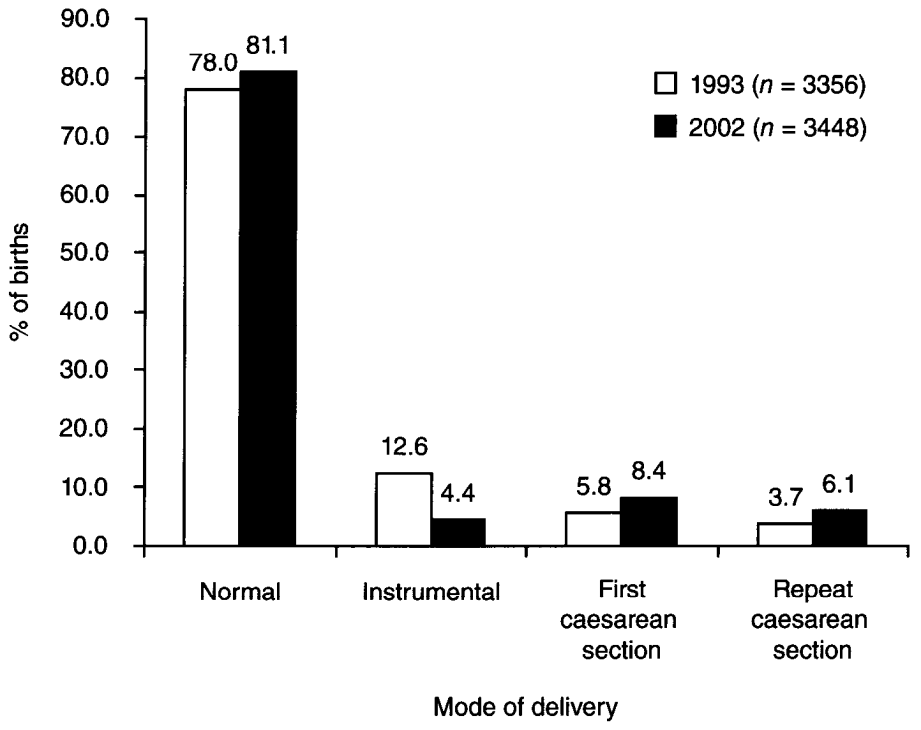


Figure 1 **Distribution of mode of delivery in the two study years for births at Makassed Hospital**

Table 2 **Changes in caesarean section (CS) rate comparing the two study years according to selected demographic, obstetric and medical characteristics**

Selected characteristics	CS rate		Unadjusted *P*-value[a]	Adjusted *P*-value[b]
	1993 (*n* = 3356) %	2002 (*n* = 3448) %		
Age (years)				
15–19	4.7	7.9	0.04	0.07
20–35	9.6	13.7	< 0.001	
> 35	18.8	30.7	0.002	
Region				
Jerusalem	5.9	13.5	< 0.001	< 0.001
West Bank and Gaza Strip	14.9	30.7	< 0.001	
Parity				
Primipara	9.4	13.1	0.009	0.12
Multipara	9.4	14.9	< 0.001	
No. of previous caesarean sections				
0	6.3	9.6	< 0.001	0.69
1+	42.6	47.0	0.14	
Antepartum haemorrhage				
No	8.8	13.4	< 0.001	0.27
Yes	20.1	60.0	< 0.001	
Pregnancy-induced hypertension/ pre-eclampsia/eclampsia				
No	8.6	13.8	< 0.001	
Yes	26.6	41.9	< 0.001	0.19
Other conditions related to pregnancy[c]				
No	8.6	12.7	< 0.001	0.30
Yes	16.7	36.0	< 0.001	
Weeks of gestation				
Preterm (< 37)	17.5	33.4	< 0.001	0.74
Term (37–41)	8.3	12.5	< 0.001	
Post-term (> 41)	7.9	17.3	0.01	
Weight of baby (kg)				
≤ 2.5	16.9	30.5	< 0.001	0.94
> 2.5–≤ 4	8.1	12.1	< 0.001	
> 4	11.2	24.9	0.001	
Other medical conditions[d]				
No	9.0	14.0	< 0.001	0.17
Yes	18.7	28.6	0.08	

[a] *Bivariate analyses, P-value for change in CS rate between the 2 years and individual variable.*
[b] *Logistic regression for CS cases testing the change of selected variables (identified as significant in the bivariate analysis) between the 2 years.*
[c] *Including infertility related conditions, uterine and amniotic fluid abnormalities, pregnancy complications other than those mentioned in the table.*
[d] *Including medical conditions other than diabetes and haematological disorders.*

Table 3 **Multiple logistic regression models for the relationship between mode of delivery and selected demographic, obstetric and medical determinants in the two study years**[a]

Selected characteristics	OR	95% CI	*P*-value
Year of birth			
1993	1		
2002	2.00	1.66–2.40	< 0.001
Age (years)			
15–19	0.44	0.32–0.61	< 0.001
20–35	1		
> 35	2.40	1.85–3.11	< 0.001
Region			
Jerusalem	1		
West Bank and Gaza Strip	1.39	1.16–1.66	< 0.001
Parity			
Primipara	1		
Multipara	0.42	0.34–0.52	< 0.001
No. of previous caesarean sections			
0	1		
1+	11.78	9.60–14.46	< 0.001
Antepartum haemorrhage			
No	1		
Yes	2.87	2.04–4.05	< 0.001
Pregnancy-induced hypertension/ pre-eclampsia/ eclampsia			
No	1		
Yes	3.25	2.29–4.61	< 0.001
Other conditions related to pregnancy[b]			
No	1		
Yes	2.81	2.21–3.57	< 0.001

Discussion

The study focused primarily on a comparison of the medical indications for CS between the 2 years, as some of the non-medical factors contributing to the rise in CS mentioned in other studies [*10*] did not seem to apply here. Financial incentives did not play a major role as women from Jerusalem have compulsory health insurance which reimburses the hospital a global fee regardless of the mode of delivery. Maternal request for CS was also not a significant issue as women's preferences are not usually solicited in clinical decision-making about childbirth care. The policies and practices of the obstetricians were thus the main target for investigation of the increase in the CS rate.

These 2 years were selected as they represented a span of almost a decade where the CS rate rose rapidly. It was also a period when considerable changes occurred

Table 3 **Multiple logistic regression models for the relationship between mode of delivery and selected demographic, obstetric and medical determinants in the two study years**[a] *(concluded)*

Selected characteristics	OR	95% CI	*P*-value
Weight of baby (kg)			
≥ 2.5	1.56	1.16–2.09	0.004
> 2.5–≤ 4	1		
> 4	1.86	1.33–2.60	< 0.001
Weeks of gestation			
Preterm (< 37)	1.50	1.11–2.02	0.008
Term (37–41)	1		
Post-term (> 41)	1.24	0.83–1.85	0.28
Other medical conditions[c]			
No	1		
Yes	1.45	0.99–2.12	0.06

[a] *"Diabetes" was excluded from the model because of the small number of cases; "booking" was excluded because it was not significant in the bivariate analysis; "locality" was excluded because of the high colinearity with "region."*
[b] *Including infertility related conditions, uterine and amniotic fluid abnormalities, pregnancy complications other than those mentioned in the table.*
[c] *Including medical conditions other than diabetes and haematological disorders.*
OR = odds ratio; CI = confidence interval.

in the political situation, limiting the access of West Bank Palestinians to Jerusalem, which, in turn, changed the configuration of the hospitals. Most women from the West Bank and some of the staff could not access the hospital in 2002. Makassed could no longer serve as the major referral hospital for the West Bank, which explained the decrease in high-risk cases in 2002. In 1993, most of these high-risk cases were referred from the West Bank to Makassed, whereas in 2002 these women were obliged to give birth in the West Bank. The change in some of the hospital staff may have partially explained the adoption of different clinical policies and practices (such as elective CS for breech presentation) in 2002, reflecting changes in individual obstetricians' practice. The reduction in the proportion of women who received antenatal care at Makassed in 2002 (booking visits) did not reflect a decrease in antenatal coverage but rather a change in the type of health insurance. Women attended antenatal clinics elsewhere and went to Makassed only to give birth without previous booking.

The trends in the mode of delivery for the 2 years indicated that the rise in the CS rate was accompanied by a decrease in the instrumental delivery rate, with a decline in the use of both forceps and vacuum, but a greater reduction for forceps. This decrease in the forceps delivery rate was consistent with the trend in other countries such as England [*11*]; however, while England maintained the instrumental delivery rate at around 11% by increasing the use of vacuum, at Makassed the decrease seems to have been compensated for by an increase in the CS rate.

When the determinants of CS were compared to vaginal delivery, irrespective of the year the same determinants were associated with women having a CS, indicating that the rising CS rate could not be attributed to a change in the sociodemographic, obstetric or medical characteristics of the women with CS.

The most significant finding of the study was that the indications for CS changed over the 2-year period. Fetal distress as an indication decreased, probably owing to the change in policy from continuous to intermittent fetal monitoring and better interpretation of fetal heart traces. Antepartum haemorrhage decreased as an indication because the referred cases from the West Bank were treated in West Bank hospitals in 2002. The reduction of dystocia as an indication was most likely due to better management of labour, including more accurate diagnosis of active labour, mobility during labour, eating and drinking as desired, intermittent monitoring of the fetal heart, use of the partogram and support from female relatives [*12*]. The indications that were likely to have contributed to the rise in the CS rate were primarily breech presentation and repeat CS.

Makassed Hospital adopted a policy of routine elective CS for term breech after the study of the Term Breech Trial [*13*]. This trial concluded that planned CS delivery is better than planned vaginal delivery for term breech presentation, based on the findings that perinatal and neonatal mortality or serious neonatal morbidity were significantly lower in the planned CS group. The findings were more evident in countries with a low perinatal mortality rate. This randomized controlled trial was very effective in rapidly changing obstetric practice, even in countries such as Palestine which did not have a low perinatal mortality rate. The study has since been shown to have major methodological problems. The inclusion criteria were not always adhered to; there were great inter-institutional differences in the standard of care and in the attendance of clinicians with adequate expertise; and inadequate methods of antepartum and intrapartum fetal assessment methods were used [*14,15*]. Moreover, the subsequent analysis of longer-term outcomes of the infants in the study up to 2 years of age did not show any difference between those born vaginally or by CS [*16*].

Obstetricians in the Palestinian Territory need to be engaged in the debate regarding the most appropriate management of breech presentation. For the most part, they were quick to adopt a policy of elective CS for breech presentation, without regard for the different context of this country, which has a high fertility rate and suboptimal conditions for CS delivery in many hospitals. The decision to perform CS should be based on strong evidence, given the increased risk of complications associated with this intervention in the postpartum period, in subsequent pregnancies, including ectopic pregnancy and placenta praevia [*17*], and after multiple repeat CS operations [*18*]. In addition, routine CS for breech presentation

Table 4 **Indications for caesarean section (CS) in the two study years as a percentage of CS deliveries and as a percentage of total deliveries**

Indications	No. of cases		% of CS deliveries[a]			% of total deliveries		
	1993	2002	1993	2002	*P*-value	1993	2002	*P*-value
Previous CS	123	209	38.9	42.1	0.17	3.7	6.1	0.05
Fetal distress	121	69	38.3	13.9	< 0.001	3.6	2.0	0.09
Dystocia	45	17	14.2	3.4	< 0.001	1.3	0.5	0.12
Breech presentation	36	123	11.4	24.7	< 0.001	1.1	3.6	0.007
Antepartum haemorrhage	30	36	9.5	7.2	0.03	0.9	1.0	0.44
Pre-eclampsia/eclampsia	13	26	4.1	5.2	0.23	0.4	0.8	0.22

[a]*Total is more than 100% as there could be more than 1 indication for each CS.*

will lead to a loss of expertise and confidence in delivering breech births vaginally, which will always remain a needed skill for obstetricians in case of emergency. Lack of access to maternity hospitals in this country has led to numerous cases of emergency vaginal breech birth. One doctor in a village clinic north of Jerusalem cut off from the city described how she was obliged to assist women with breech presentation who arrived at her clinic fully dilated. As this had not been part of her obstetric training, she had to refer back to her old textbooks for guidance [*19*]. Furthermore, a trial of external cephalic version should be carried out whenever possible for all breech presentations, as it has been shown to reduce the CS rate [*20*]. For the remaining breech presentations, the policy of selective vaginal breech deliveries should be reconsidered, given the overall contextual factors mentioned above.

Repeat CS was the other indication that partially explained the rise in the CS rate at Makassed Hospital. This has been a principal indication contributing to the rise in the CS rate in many countries and VBAC was a major strategy in reducing the rate in the United States of America until the late 1990s [*21*]. While VBAC has been established as a safe alternative to repeat CS in many cases [*22*], more recent studies have reopened the debate and certainly contributed to the decline in the number of obstetricians and women who choose the option of trial of labour after a previous CS [*23*].

Pre-eclampsia/eclampsia was an indication for CS in a small percentage of our cases (4.1% in 1993 and 5.2% in 2002 of CS deliveries), but immediate CS delivery has not been shown to confer any benefit to patients with severe eclampsia [*24*].

Even though the rise in the CS rate at Makassed was attributed primarily to breech and repeat CS, other strategies should be considered in addition to reducing these 2 indications. Avoiding early admission to the labour ward [*25*] and unnecessary induction of labour [*26*], continuing the policy of companionship [*27*], adopting upright or lateral positions for the second stage of labour [*28*], and increasing the use of vacuum delivery rather than CS for the management of poor progress in the second stage of labour [*17*] might be strategies.

Conclusion

Obstetricians' decision-making for CS is a complex process which needs to frame the benefits and risks of the intervention within the context of the woman's entire reproductive life-cycle and the existing standards of health care. Avoiding unnecessary CS would spare precious resources in the health care system and, most importantly, reduce iatrogenic complications for mothers and neonates.

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Global status report on road safety

Approximately 1.3 million people die each year on the world's roads, and between 20 and 50 million sustain non-fatal injuries. This report is the first broad assessment of the road safety situation in 178 countries, using data drawn from a standardized survey. According to the results, road traffic injuries remain an important public health problem, particularly for low- and middle-income countries. Pedestrians, cyclists and motorcyclists make up almost half of those killed on the roads, highlighting the need for these road users to be given more attention in road safety programmes. In many countries road safety laws need to be made more comprehensive, while enforcement should be strengthened. The findings of this report clearly show that significantly more action is needed to make the world's roads safer.

Further information and a link to the full report can be found at: http://www.who.int/violence_injury_prevention/road_safety_status/2009/en/index.html

Prevalence estimate of intimate partner violence in Jordan

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تقدير انتشار العنف مع القرين الحميم في الأردن

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الخلاصة: درس الباحثون معدَّل انتشار العنف الذي يمارسه القرين الحميم في الأردن في عينة تتألف من 517 امرأة ممن يراجعن عيادات الصحة الإنجابية. وقاس الباحثون العنف الذي يمارسه القرين الحميم باستخدام الاستبيان الذي أعدته منظمة الصحة العالمية حول العنف المنزلي والذي عُدِّل نتيجة مناقشات مجموعات بؤرية في عمّان. وكانت النسب المئوية للنساء اللاتي عانين من شكل واحد على الأقل من أشكال العنف أو القهر منذ زواجهن كالتالي: 97٪ من القهر، 73.4٪ من العنف النفسي، 31.2٪ من العنف الجسدي، و18.8٪ من العنف الجنسي، وقد كان تعديل الاستبيان الذي أعدَّته منظمة الصحة العالمية ضرورياً لقياس القهر والعنف النفسي في الأردن. وقد يكون القيام بتعديلات مماثلة ضرورياً عند إجراء البحوث في الإقليم.

ABSTRACT This study examined the prevalence of intimate partner violence in Jordan among a sample of 517 reproductive health clinic attendees. Intimate partner violence was measured using the World Health Organization's domestic violence questionnaire which was modified by the results of focus group discussions conducted in Amman. The percentages of women experiencing at least 1 form of control or violence since marriage were: control, 97.2%; psychological violence, 73.4%; physical violence, 31.2%; and sexual violence, 18.8%. Modifications of the WHO questionnaire were needed to measure control and psychological violence in Jordan. Similar modifications might be required when conducting research in the Region.

Estimation de la prévalence de la violence exercée par le partenaire intime en Jordanie

RÉSUMÉ Cette étude portait sur la prévalence de la violence exercée par le partenaire intime en Jordanie sur un échantillon de 517 personnes fréquentant des centres de santé génésique. Cette violence a été mesurée au moyen du questionnaire sur la violence familiale de l'Organisation mondiale de la santé, qui a été modifié suite à des réunions de groupe de discussion tenues à Amman. Les pourcentages de femmes ayant subi au moins une forme de comportement autoritaire ou de violence depuis le mariage se décomposaient comme suit : comportement autoritaire, 97,2 % ; violence psychologique, 73,4 % ; violence physique, 31,2 % ; et violence sexuelle, 18,8 %. Les modifications apportées au questionnaire de l'OMS étaient nécessaires pour mesurer les comportements autoritaires et la violence psychologique en Jordanie. Il sera peut-être nécessaire de procéder à des modifications similaires aux fins de la réalisation de travaux de recherche dans la région.

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Introduction

Intimate partner violence is a global public health crisis because of its high prevalence [*1,2*] and its association with deleterious physical, mental, and reproductive health outcomes [*2–6*]. Efforts to examine the prevalence, consequences, and causes of intimate partner violence cross-culturally have increased over the past decade. Examples include the World Health Organization (WHO) multi-country study on women's health and domestic violence against women, the WorldSAFE initiative, and implementation of domestic violence modules in some Demographic and Health Surveys (DHS) [*1,7,8*]. Despite these international initiatives, Jordan still lacks methodologically sound data on intimate partner violence, particularly an estimate of the prevalence.

Studies from other Middle Eastern countries indicate a high prevalence of intimate partner violence in the region. According to a nationally representative sample of Egyptian women, at least 1 in 3 was subjected to physical violence following marriage, and these acts were perpetrated almost exclusively by their husbands [*9*]. In 2 different nationally representative samples of Palestinian women in the West Bank and Gaza Strip, over half the respondents reported experiencing at least 1 act of physical violence from their husbands in the 12 months preceding the survey [*10*]. Among primary health care clinic attendees in Aleppo, Syria, 23.1% of respondents reported experiencing physical violence at least 3 times in the year preceding the survey, most frequently by their husbands [*11*].

These figures demonstrate high prevalence estimates of intimate partner violence in the region, but they cannot be automatically applied to Jordan as each country has its own set of social, cultural, political and economic circumstances. Therefore, Jordan needs a context-specific estimate. This need must be weighed against the benefits of standardization and comparability. A standardized estimate, however, does not necessarily translate into a valid measurement of the prevalence of intimate partner violence unless it captures the most commonly occurring violent experiences [*12*].

The gap between a comparable and a valid measurement of intimate partner violence can be bridged by the inclusion of qualitative research to identify the types of violence that women experience. Qualitative research can illuminate forms of abuse that may not be included in standardized questionnaires [*13*]. It also can capture meaning and context [*14*], providing a basis from which to judge the applicability of standardized questionnaires. A combined quantitative and qualitative approach balances concomitant goals of standardization and validity. The present study used a combined approach to estimate the prevalence of intimate partner violence in Jordan.

Methods

Overview

Focus group discussions conducted with women in Amman identified the types of violence that women experience within the family. This information was used to modify the WHO domestic violence questionnaire [*1*] to better measure women's experiences of violence in Jordan. The revised questionnaire was then administered to clients attending selected clinics of the Jordanian Association for Family Planning and Protection (JAFPP) throughout the country to estimate the prevalence of intimate partner violence.

The institutional review board at Harvard School of Public Health and faculty mem-

bers of the University of Jordan approved this study.

Focus group discussions

Sample

To ascertain the types of violence that Jordanian women experience, 18 focus group discussions, including 1 pilot test, were conducted with women in and around Amman. The groups were organized on the basis of marital status (never-married, currently married, divorced, and widowed) by the study's partner organizations. These organizations served a varied clientele. The Sisterhood is Global Institute provided access to women receiving legal, social and psychological counselling for domestic violence. The Young Women's Christian Association provided access to young secretarial students and residents of a refugee camp who were participating in their programmes. The United Nations Relief and Works Agency for Palestinian Refugees in the Middle East provided access to women dwelling in refugee camps or other women who participated in activities geared toward women. The University of Jordan Faculty of Nursing and Community Service Office provided access to faculty and students. Finally, the Single Parents' Club provided access to women who were either divorced or widowed. Overall, the women who participated via these organizations were diverse in terms of age, number of children and years of education (Table 1).

Process

Each discussion, which lasted between 1.5 and 2 hours, was held in facilities provided by the partner organizations and was conducted by a professional focus group moderator and a notetaker/translator. After obtaining oral consent from the participants, the moderator facilitated the sessions using a guide that covered the following content areas: definition of domestic violence, causes and consequences of domestic violence and assistance for victims. The same questions were asked of each group in a directive manner [*15*], which produced a structured discussion [*16*]. However, the moderator adjusted her level of control to ensure that spontaneity and group interaction were not sacrificed for standardization.

To protect the participants' identities, number badges were substituted for name badges for note-taking purposes. Participants were instructed not to mention personal details or names. Participants were asked to respect the privacy of the group by not mentioning the content of the discussion with anyone outside the group.

Survey instrument development

All transcripts were translated from Arabic to English. Selected community members and the notetaker/translator were asked to clarify the meaning of some colloquial terms to validate the primary investigator's interpretation. Categories and sub-categories of types of violence were then coded using an open coding methodology [*17*] and mapping. This process was informed by, but not restricted to, the study's working definition of intimate partner violence as "any behaviour (including 'control') within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship" [*2*].

The participants' perceptions and experiences of violence that were categorized as physical, psychological, sexual or control were compared to the behaviour-specific questions on the WHO's Women's Health and Domestic Violence Against Women questionnaire [*1*]. The questionnaire items were considered to be valid representations of women's experiences if they captured the events that the participants described within each of these categories. For physi-

Table 1 **Demographic characteristics of the focus group discussion participants**

Marital status and recruiting organization (location)	No. of participants	Mean age (years)	Mean no. of children	Mean years of education
Pilot study				
UNRWA (Al Wihdat refugee camp)[a]	NA	NA	NA	NA
Never married				
UJ (community service office)	6	19.7	0.0	14.8
UNRWA (Al Wihdat refugee camp)[a]	6	20.7	0.0	12.7
UNRWA (Jabal Hussein refugee camp)	8	20.8	0.0	12.6
YWCA (headquarters)	9	19.0	0.0	12.0
Currently married				
SIGI (headquarters)	9	36.4	4.9	11.7
UJ (faculty of nursing)	6	45.3	3.7	18.0
UNRWA (Al Wihdat refugee camp)[a]	6	34.8	6.3	10.3
UNRWA (Al Wihdat refugee camp)[a]	6	NA	NA	NA
UNRWA (Jabal Hussein refugee camp)	6	29.8	3.2	12.2
YWCA (headquarters)	6	33.5	1.5	14.3
Divorced				
SPC (member's house)	4	43.3	1.5	15.0
SIGI (headquarters)	4	37.3	3.3	12.0
UNRWA (Al Wihdat refugee camp)	5	29.8	2.4	10.2
YWCA (Al Baqa'a refugee camp)	4	30.3	3.0	3.5
Widowed				
SPC (member's house)	3	45.7	3.3	15.3
UNRWA (Jabal Hussein refugee camp)	8	41.4	5.6	9.4
YWCA (Al Baqa'a refugee camp)	9	45.9	6.2	5.4

NA = not available; UJ = University of Jordan Faculty of Nursing and Community Service Office; SPC = Single Parents' Club; SIGI = Sisterhood is Global Institute; UNRWA = United Nations Relief and Works Agency for Palestinian Refugees; YWCA = Young Women's Christian Association.

[a]*Wihdat refugee camp = Amman new camp.*

cal violence, no changes were made. For control and psychological violence, several behaviour-specific items were added. For control, not allowing dialogue or not taking the respondent's opinion, restricting the respondent's movement outside the home, and restricting visitors to the home or the respondent's ability to visit others were added to the questionnaire. For psychological violence, questions were appended by the following experiences: being accused of not fulfilling obligations toward husband and children, being blamed for events that happened in the household and being threatened with divorce or remarriage. For sexual violence, fear in relation to sexual intercourse was removed from the questionnaire because sexual violence was discussed in the focus groups in only the most extreme terms. The measurement of sexual violence was limited to forced or degrading sexual experiences.

The revised questionnaire was translated to Arabic and back-translated to English to verify that the meaning of the questions had not changed during translation.

Survey

Sample

A representative sample of literate, ever-married (married, divorced or widowed) women attending 1 of 7 selected JAFPP reproductive health clinics was drawn using systematic probability proportionate to size methodology. Beginning with the second client on the list, every other client was invited to participate except in the 2 busiest clinic, where the interval was increased to every third or fourth client. Women accompanying the selected respondents were ineligible to participate. Overall, 517 (70%) of the selected respondents agreed to participate.

A clinic-based sample was chosen because privacy could not be guaranteed in women's homes, where family members, friends and neighbours might be present. In the clinic setting, a woman could more easily be separated from those accompanying her. The recruitment process mimicked normal clinic procedures so that persons accompanying the client would not be made aware of the client's participation.

Process

The questionnaire was self-administered in private rooms in the clinics after JAFPP family planning counsellors or volunteers ascertained the client's eligibility and obtained her oral consent. To ensure confidentiality, each client was asked not to write her name on the form, and to seal the completed questionnaire in an envelope. Each participant was also offered a copy of the informed consent form and information about domestic violence services in the area.

Data analysis

The percentage of women who reported having ever experienced intimate partner violence since marriage was calculated separately for every item of the following outcomes: control, psychological violence, physical violence and sexual violence. A measure of ever-experience of any of the acts of violence since marriage was calculated for each type of violence investigated. The ever-experience measures for control and psychological violence were calculated twice: once with all the items in the outcome and once restricted to the items in the WHO questionnaire. External validity of the sample was examined by conducting univariate tests comparing the respondents' characteristics to the 2002 Demographic and Health Survey (JPFHS), which is a nationally-representative sample of ever-married women of reproductive age in Jordan [*18*].

Results

Table 2 presents the respondents' characteristics. The mean age of the respondents was 31.4 years [standard deviation (SD) 7.8]. Almost all the women (99.0%) were married at the time of the survey; 3.7% were in polygamous marriages. A total of 85.5% of the respondents had at least secondary education, 12.9% were employed outside the home and 97.7% were Muslim. When compared to the 2002 JPFHS, our sample was significantly younger, more likely to be married, more likely to be employed, better educated, less likely to be living in central Jordan and less likely to be in a polygamous relationship. The respondents were not statistically different, however, in terms of religion.

A total of 479 women (97.2%) reported experiencing at least 1 form of control. When restricted to the WHO questionnaire items, this dropped to 408 (82.9%). The most frequently reported form of control was the husband not accepting the respondent's opinion or allowing dialogue about family issues (84.3%). Jealousy was the second

Table 2 **Distribution of survey respondents (*n* = 517) by sociodemographic characteristics**

Characteristic	No.	%
*Age (years)**		
15–19	20	3.9
20–24	98	19.1
25–29	122	23.8
30–34	119	23.2
35–39	84	16.4
40–44	45	8.8
45+	24	4.7
*Marital status**		
Married	508	99.0
Divorced/separated/ widowed	5	1.0
*Polygamous relationship**		
No	490	96.3
Yes	19	3.7
*Educational level**		
None	2	0.4
Primary	11	2.2
Preparatory	61	12.0
Secondary	248	48.6
Higher	188	36.9
*Employed outside the home**		
No	444	87.1
Yes	66	12.9
*Region**		
North	222	42.9
Central	219	42.4
South	76	14.7
Religion		
Muslim	499	97.7
Christian	12	2.4

**Significant difference (P < 0.05) compared with the 2002 Jordan Demographic and Health Survey [24]. Percentages may not add to 100% due to rounding. There are some missing values throughout.*

most reported form of control (57.5%), followed by being required to ask permission before seeking health care (53.7%). Suspicion about the respondent's fidelity (4.2%) and being locked in the house or having her movements outside the home curtailed (9.1%) were the least commonly reported.

For psychological violence, 348 (73.4%) of the respondents reported experiencing at least 1 form. When restricted to only the items included in the WHO questionnaire this dropped to 237 (50.2%). The most prevalent experiences of psychological violence, reported by between 43.5% and 44.7% of the women, included: being blamed for things that happened to her husband or to the household, being insulted or made to feel bad and being accused of not fulfilling marital obligations towards her husband (Table 4). The least frequently reported form of psychological violence was being threatened with harm to herself or someone she cared about (7.5%).

For physical violence, 146 (31.2%) of the respondents reported ever-experiencing at least 1 form since marriage. The most prevalent form of physical violence was being slapped or being the target of a dangerous thrown object (23.4%) (Table 5). The most lethal forms of violence, such as being choked or experiences involving weapons, were the least often reported forms of violence at approximately 1.0%.

At least 1 of the 2 forms of sexual violence investigated was experienced by 87 (18.8%) respondents. Being physically forced to have sexual intercourse was reported by 16.5% and being forced into degrading or humiliating sexual acts by 6.9% (Table 5).

Discussion

Our findings suggest that a large proportion of women in Jordan have experienced intimate partner violence at some point during their marriage. The proportion of respondents who reported experiencing at least one form of control or violence since marriage were: control, 97%; psychological violence, 73%; physical violence, 31%; and sexual

Table 3 **Survey participants having experienced control according to type**

Type of control	Control experienced (%)		Total no.
	Yes	No	
Does not allow dialogue or does not take your opinion on issues that affect you or the family[a]	84.3	15.7	483
Gets angry if you speak with another man	57.5	42.5	485
Expects you to ask his permission before seeking health care for yourself	53.7	46.3	484
Insists on knowing where you are at all times	33.6	66.4	476
Restricts your ability to visit others or have visitors in the home[a]	15.0	85.0	487
Tries to restrict contact with your family of birth	13.9	86.1	483
Ignores you and treats you indifferently	10.4	89.6	479
Tries to keep you from seeing your friends	10.4	89.6	481
Restricts your movement outside the home or physically locks you in the home[a]	9.1	90.9	483
Is often suspicious that you are unfaithful	4.2	95.8	479

[a]*Items added to the WHO questionnaire from results of focus group discussions.*

violence, 19%. The estimates for control and psychological violence dropped to 83% and 50% respectively when the analysis was restricted to the WHO questionnaire items. This difference in prevalence was expected given that estimates tend to increase in response to broader definitions of violence [*12,19,20*].

Table 4 **Survey participants having experienced psychological violence by type and frequency**

Type of psychological violence	Psychological violence experienced (%)					Total no.
	No	Yes				
		Ever	Once	A few times	Many times	
Blamed you for things that happen to him or the household[a]	55.3	44.7	8.2	29.2	7.3	463
Insulted you or made you feel bad about yourself	56.3	43.7	11.9	23.2	8.5	469
Accused you of not fulfilling your obligations to him[a]	56.5	43.5	13.6	25.7	4.3	464
Accused you of not fulfilling your obligations to your children[a]	75.7	24.3	6.7	14.7	2.9	449
Threatened to divorce you or remarry[a]	77.3	22.7	9.3	7.8	5.6	463
Belittled or humiliated you in front of other people	78.0	22.0	6.7	11.1	4.1	460
Did things to scare or intimidate you on purpose (e.g. by the way he looked at you, by yelling and smashing things)	77.9	22.1	7.7	11.3	3.1	452
Threatened to hurt you or someone you care about	92.5	7.5	3.3	2.7	1.6	453

[a]*Items added to the WHO questionnaire from results of focus group discussions.*
Percentages may not add to 100% due to rounding.

Table 5 **Experience of physical or sexual violence according to type and frequency**

Type of physical or sexual violence	Physical/sexual violence experienced (%)					Total no.
	No	Yes				
		Ever	Once	A few times	Many times	
Slapped you or threw something at you that could hurt you	76.6	23.4	13.1	6.2	4.1	465
Hit you with his fist or with something else that could hurt you	82.7	17.3	8.0	5.2	4.1	461
Pushed or shoved you or pulled your hair	83.3	16.7	7.6	5.4	3.7	460
Kicked you, dragged you or beat you up	86.3	13.7	3.7	7.6	2.4	460
Choked or burned you on purpose	98.7	1.3	0.4	0.7	0.2	458
Threatened to use or actually used a gun, knife or other weapon against you	99.1	0.9	0.4	0.4	0.0	455
Physically forced you to have sexual intercourse when you did not want to	83.5	16.5	6.1	8.3	2.2	460
Forced you to do something sexual that you found degrading or humiliating	93.1	6.9	4.1	2.2	0.7	461

Percentages may not add to 100% due to rounding.

The study sought to balance standardization and validity through the inclusion of both quantitative and qualitative methodologies. In many instances, the focus group information confirmed the congruence between items on the WHO questionnaire and women's experiences of violence. This evidence supports calls for the use of standardized cross-cultural research on intimate partner violence [*2,21*], particularly when it is accompanied by qualitative research. The qualitative component of the study, however, also demonstrated that additional research is needed to more accurately measure women's experiences of control and psychological violence, as these domains required considerable augmentation in the Jordanian context.

This study has several limitations. First, 30% of the women approached for the survey eventually did not participate. Secondly, the qualitative study relied on women who participated in organizations. These organizations attract diverse women to their services and activities, but, ultimately, these women's perceptions and experiences may not reflect those of women who are unable or unwilling to benefit from such organizations. Thirdly, the survey relied on women who attended one of a series of privately run reproductive health clinics. Although these clinics are located throughout the country, the respondents selected from these clinics were significantly different from a nationally representative sample of women on several demographic variables, indicating that the results cannot be extended beyond the sample. Finally, consensus on a definition of violence was not an objective of the study. Therefore, it is unclear the extent to which the items listed matched each participant's definition of violence. Further research is needed to clarify the issue.

This study, however, is the first to provide an estimate of intimate partner violence in Jordan beyond refugee camp populations. The study of refugee camp populations used an instrument similar to the WHO questionnaire to measure physical intimate partner violence and found a life-time prevalence of 42.5% [*22*]. The refugee camp study also included men, of whom 48.9% reported

ever physically abusing their wives. These figures are considerably higher than those established by our study, a difference likely attributable to the added stress of refugee camp life. Refugee camp households in Jordan are larger, have higher dependency ratios, lower economic status and lower educational attainment than those not in camps [*23*]. The relationship between low socioeconomic status and a greater risk of intimate partner violence is well established.

The prevalence estimate of physical intimate partner violence in this study is within the range of most sites investigated in the WHO multi-country study (23%–49%) [*1*], as is the prevalence estimate for sexual violence (10%–50%) [*1*]. However, the removal of one of the sexual violence questions resulted in a narrower definition. As a result, the prevalence estimate established might be an underestimate when compared to others involving all 3 sexual violence questions.

In terms of psychological violence and control, most women experienced at least 1 form, particularly when findings from the focus group discussions were included. The additional items represent aspects of control and psychological violence that are relevant to women in Jordan but are not included in the WHO instrument. However, these experiences have salience outside the country. Two studies conducted among women in the West Bank and Gaza Strip defined psychological abuse to include several experiences similar to those added to the WHO questionnaire in this study. These items included having their husband finish an argument and make his own decision about a matter that concerns both of them, experiencing interference in doing what they wanted (the study provided the example of visiting relatives or friends) and having been accused of being lazy, indifferent and failing to fulfil her obligations to her husband and the household [*10*]. While these items demonstrate some similarity in abusive experiences, further research is needed to ascertain the extent to which the items added to the WHO questionnaire for this study represent major forms of suffering for women throughout the Middle East region and beyond. Furthermore, it remains to be determined whether these items also have an impact on women's health that is similar to those found with other forms of psychological violence and control [*5,24*].

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Implications of the use of the new WHO growth charts on the interpretation of malnutrition and obesity in infants and young children in Oman

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تأثيرات استخدام مخططات النمو الجديدة لمنظمة الصحة العالمية على تفسير سوء التغذية والبدانة بين الرضّع وصغار الأطفال في عُمان

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الخلاصة: قد درس الباحثان الاختلافات في تقديرات معدّلات الانتشار لمؤشرات الحصائل في كلٍّ من المرجع المعياري لقياس نمو الأطفال ومرجع المركز الوطني للإحصائيات الصحية/ منظمة الصحة العالمية مستخدمين مجموعة معطيات مستمدَّة من مسح سوء التغذية للبروتين والطاقة. واستناداً إلى مرجع منظمة الصحة العالمية/ المركز الوطني للإحصاءات الصحية كانت التقديرات الإجمالية لمعدّل انتشار نقص الوزن 17.8% وللهزال 7.4% وللتقزّم 10.9% ولفرط الوزن 1.3%. بينما بلغت هذه التقديرات الإجمالية، وفقاً للمرجع القياسي لنموّ الأطفال لمنظمة الصحة العالمية لعام 2006، لنقص الوزن 11.3% وللهزال 7.6%، وللتقزّم 13.0% ولفرط الوزن 1.9%. وقد أظهر التقزّم وفرط الوزن تقديرات أعلى بشكل يعتد به إحصائياً، فيما كان تقدير نقص الوزن أقل بشكل يعتد به إحصائياً أيضاً. ولم تكن هذه الفروق متّسقة عبر مجموعات الأعمار.

ABSTRACT We examined the difference in the prevalence estimates of the outcome indicators for the new World Health Organization (WHO) child growth standard reference (WHO 2006) and the National Center for Health Statistics (NCHS)/WHO reference using the National Protein–Energy Malnutrition Survey dataset. Based on the NCHS/WHO reference, overall prevalence estimates of underweight, wasting, stunting and overweight were 17.8%, 7.4%, 10.9% and 1.3% compared to 11.3%, 7.6%, 13.0% and 1.9% respectively calculated according to the WHO 2006 reference: stunting and overweight showed statistically significantly higher estimates, whereas underweight was statistically significantly lower. The differences were not consistent across age groups.

Impact de l'utilisation des nouvelles courbes de croissance de l'OMS sur l'interprétation de la malnutrition et de l'obésité chez le nourrisson et le jeune enfant à Oman

RÉSUMÉ Nous avons examiné la différence entre les estimations de prévalence associées aux indicateurs de résultats pour les nouvelles normes OMS de croissance de l'enfant (WHO Anthro) et la référence du *National Center for Health Statistics* (NCHS)/de l'OMS, en utilisant l'ensemble de données de l'enquête nationale sur la malnutrition protéino-énergétique. D'après la référence NCHS/ OMS, les estimations de la prévalence globale de l'insuffisance pondérale, de l'émaciation, du retard de croissance et du surpoids étaient de 17,8 %, 7,4 %, 10,9 % et 1,3 %, contre respectivement 11,3 %, 7,6 %, 13,0 % et 1,9 % d'après la référence WHO Anthro : s'agissant du retard de croissance et du surpoids, les estimations étaient significativement plus élevées d'un point de vue statistique, mais moins en ce qui concerne l'insuffisance pondérale. Les différences n'étaient pas homogènes dans tous les groupes d'âge.

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Introduction

Growth charts are used universally in paediatric care for growth monitoring of infants and young children [*1*], as well as for research and the promotion of child health in the community. The development of an internationally accepted tool for growth monitoring was initiated in 1995 by the World Health Organization (WHO) working group following an evaluation of infant growth. The group recommendation was to develop a new reference that takes into account socioeconomic factors and child feeding as well as maternal nutrition and health status [*2–5*]. A multi-centre study was initiated by WHO and involved Brazil, Ghana, India, Norway, Oman and the United States of America, and the new WHO reference was published in April 2006 [*6*]. The transition from the National Center for Health Statistics (NCHS)/WHO charts [*7*] to the WHO 2006 child growth charts should be accompanied by appropriate training that will equip policy-makers and public health workers with the skills necessary for adequate interpretation of the new curves. In addition, it is necessary to understand the implications on child growth parameters and resultant public health actions.

Background and rationale

In Oman, protein–energy malnutrition (PEM) indicated by weight-for-age, fell from 62.9% among children below the age of 5 years in 1980 to 24.4% in 1992 and remained at that level over the next few years (it was 23.6% in 1995) [*8–10*]. The National PEM Survey carried out in 1999 showed a prevalence of 17.9%, with no significant difference between males and females [*11*]. On average, underweight decreased by about 2.4% per year from 1980 to 1999, mostly during the first 12 years. De Onis et al. compared the results of the 1995 Oman Family health Survey and Mussaigher's 1992 study, and observed that the annual rate of decrease in stunting was about 1% [*12*], a trend that continued until 1999.

Since then, several interventions have been implemented to control PEM in Oman, including early screening and management of cases, a social marketing campaign and the introduction of the complementary feeding policy as well as the adoption of the WHO global strategy for infant and young child feeding [*13*].

The prevalence of overweight was 0.6% over all age groups in the national PEM survey 1999 [*11*]. Overweight was not perceived as a public health problem in these age groups at the time in view of the low prevalence estimates. However, recent evidence suggests a worldwide increase in obesity among children, and prevention strategies need to be considered [*14*].

The launching of the new WHO reference poses a question regarding the magnitude of the impact of the current interventions in Oman, and probably in many parts of the world where child malnutrition exists. With the emergence of the obesity epidemic, it also raises the question of the validity of current estimates of obesity among infants and young children.

Our objective was to compare the overall prevalence estimates of underweight, stunting and wasting, as well as overweight and obesity, using the NCHS/WHO and WHO 2006 references. This would allow a greater understanding of the expected change in prevalence estimates in PEM, i.e. how much of the change was real and how much was due to the reference used. We also investigated the age-specific differences and standard deviations and examined the implications of those differences on the interpretation and programme management of infant and young child nutrition.

Methods

Raw data from the national PEM study in Oman [*11*] were compared for the NCHS/WHO and the new WHO 2006 growth references using WHO *Anthro* software to determine the difference in the prevalence estimates generated for malnutrition and obesity. Data collection was carried out in 1999 on a representative sample of 16 000 infants and young children in Oman. The sample was selected from the total population of children aged 0–5 years in the child health registers of primary health care institutions in Oman. The sample was drawn 2 weeks before data collection to ensure adequate sampling of infants aged under 1 month. Sample selection, data collection and analysis have been described previously [*11*].

The z-scores of weight-for-age, height-for-age, and weight-for-height were created in *Anthro 2005* based on the NCHS/WHO and the WHO 2006 reference populations independently; the files were then exported to *SPSS*, version 14.0, and merged to carry out data analysis.

Data analysis was performed using the complex samples crosstabs; descriptives and logistic regression procedures in *SPSS* to generate the prevalence estimates, means and confidence intervals and to calculate whether the prevalence estimates were significantly different for the NCHS/WHO and WHO 2006 estimates.

Results

The overall mean weight-for-age z-score was –0.98 [95% confidence interval (CI): –1.03, –0.92] calculated according to the NCHS/WHO reference compared to –0.82 (95% CI –0.87, –0.77) with WHO 2006 (Table 1). The prevalence estimates for underweight (weight-for-age < –2 z-scores) are illustrated in Table 2; the overall prevalence was 17.8% using NCHS/WHO compared to 11.3% based on WHO 2006; this difference was statistically significant ($P < 0.01$). Underweight according to WHO 2006 was statistically significantly greater for age group 0–5 months; and lower for all other groups. There was no statistically significant difference between males and females.

The mean height-for-age z-scores for WHO 2006 was –0.78 (95% CI: –0.84, –0.72) and for NCHS/WHO it was–0.64 (95% CI: –0.69, –0.58) (Table 3).

The prevalence of stunting (height-for-age < –2 z-scores) calculated using both references is shown in Table 2. The overall stunting based on the WHO 2006 reference was 13.0% compared 10.9% according to the NCHS/WHO reference. The peak of the estimates based on the WHO 2006 reference was for age group 24–35 months, 16.4% (95% CI: 13.2, 20.1), whereas it was highest for age group 12–23 months using the NCHS/WHO reference, 18.6% (95% CI: 16.9, 20.4). The WHO 2006 reference generated higher stunting prevalence estimates overall and in all age groups except 12–23 months. These difference were statistically significant ($P < 0.05$).

The mean weight-for-height z-scores for WHO 2006 was –0.55 (95% CI: –0.59, –0.51) and for NCHS/WHO it was–0.69 (95% CI: –0.74, –0.66) (Table 4).

The difference in the prevalence estimates for wasting (weight-for-height < –2 z-scores) overall was not statistically significant: 7.6% according to the WHO 2006 reference compared to 7.4% according to the NCHS/WHO reference ($P = 0.92$) (Table 2). The prevalence was statistically significantly higher according to the WHO 2006 reference for age groups 0–5 months (3.6%–10.2%) and 48–60 months (5.4%–7.3%) ($P < 0.01$). The prevalence for

Table 1 **Mean z-scores of weight for age according to the WHO/NCHS and WHO 2006 references for a sample of Omani children aged of 0–60 months**

Age (months)	No.	Mean z-score	SE	95% CI (min, max)
0–5				
NCHS/WHO	1 371	0.35	0.05	0.25, 0.46
WHO 2006	1 371	–0.14	0.06	–0.26, –0.02
6–11				
NCHS/WHO	1 455	–0.54	0.03	–0.59, –0.43
WHO 2006	1 455	–0.37	0.03	–0.43, –0.31
12–29				
NCHS/WHO	2 497	–1.09	0.04	–1.18, –1.00
WHO 2006	2 497	–0.67	0.04	–0.76, –0.59
24–35				
NCHS/WHO	2 716	–1.19	0.04	–1.28, –1.10
WHO 2006	2 716	–0.95	0.04	–1.04, –0.86
36–47				
NCHS/WHO	2 644	–1.21	0.05	–1.31, –1.12
WHO 2006	2 644	–1.06	0.05	–1.15, –0.97
48–60				
NCHS/WHO	2 706	–1.16	0.02	–1.21, –1.10
WHO 2006	2 706	–1.06	0.03	–1.11, –1.00
Total				
NCHS/WHO	13 389	–0.98	0.03	–1.03, –0.92
WHO 2006	13 389	–0.82	0.02	–0.87, –0.77

SE = standard error; CI = confidence interval.

age group 12–23 months was significantly lower using the WHO 2006 reference, 12.6%, compared to 7.7% for the NCHS/WHO reference ($P < 0.01$).

We compared the prevalence estimates for overweight/obesity based on the weight-for-height z-scores (> +2 standard deviations) (Table 2) and found that, although prevalence was low for both references, the difference was statistically significant for the overall sample, 1.9% for the WHO 2006 reference compared to 1.3% for the NCHS/WHO ($P < 0.01$). From age 12 months on, the WHO 2006 reference consistently generated higher prevalence estimates. The differences were statistically significant ($P < 0.01$).

Discussion

Growth charts are used almost universally in paediatric care: 68% of the countries of the world used the NCHS/WHO standard as a reference in 2004 [*15*]. The trend is supported by the realization of the nutrition and medical community that child growth, along with such indicators as per capita gross domestic product and the human development index, is the gold reference for measuring human development [*16*].

Poor growth in children is associated with child morbidity and mortality as well as chronic diseases in adulthood. A synergistic relationship seems to exist between infection and faltered growth; moreover

Table 2 **Comparison of prevalence estimates calculated according to WHO 2006 and NCHS/WHO references for wasting, stunting, underweight and overweight across age-groups for a sample of Omani children aged 0–60 months**

Age (months)	No.	WHO 2006		NCHS/WHO		*P*-value
		< –2 SD (%)	95% CI	< –2 SD (%)	95% CI	
Underweight (weight for age)						
0–5	1 394	5.8	4.7–7.2	1.9	1.6–2.4	< 0.01
6–11	1 467	5.3	4.3–6.7	6.4	5.2–7.7	0.99
12–23	2 789	9.7	7.7–12.2	27.7	25.3–30.2	< 0.01
24–35	2 723	13.5	10.8–16.8	20.3	16.7–24.4	< 0.01
36–47	2 657	14.9	12.4–17.7	19.2	16.2–22.6	0.65
48–60	2 702	12.3	10.6–14.4	16.4	14.0–19.1	< 0.01
Total	13 861	11.3	10.2–12.6	17.8	16.2–19.4	< 0.01
Wasting (weight for height)						
0–5	1 410	10.2	7.9–13.0	3.6	2.0–6.3	< 0.01
6–11	1 508	4.5	2.9–6.9	3.3	2.1–5.3	0.89
12–23	2 800	7.7	6.0–9.7	12.6	10.6–15.0	< 0.01
24–35	2 759	6.7	5.5–8.2	6.8	5.7–8.1	0.99
36–47	2 691	9.3	7.5–11.4	8.1	6.7–9.9	0.89
48–60	2 822	7.3	6.3–8.4	5.4	4.5–6.4	< 0.01
Total	14 119	7.6	7.0–8.3	7.4	6.6–8.2	0.92
Stunting (height for age)						
0–5	1 394	4.5	3.4–5.9	2.2	1.7–2.9	< 0.01
6–11	1 474	7.3	5.6–9.6	5.6	3.8–8.2	0.99
12–23	2 789	13.6	12.2–15.0	18.6	16.9–20.4	< 0.01
24–35	2 738	16.4	13.2–20.1	9.0	6.9–11.6	< 0.01
36–47	2 663	15.6	13.4–18.1	10.3	8.0–13.2	< 0.01
48–60	2 718	12.8	10.6–15.4	11.4	9.4–13.9	< 0.01
Total	13 905	13.0	11.8–14.3	10.9	9.9–11.8	< 0.01
Overweight[a] (weight for height)						
0–5	1 412	2.5	1.3–4.7	2.6	1.4–4.9	1.00
6–11	1 508	4.0	3.2–4.9	4.1	3.3–5.2	1.00
12–23	2 808	1.3	1.0–1.8	0.8	0.6–1.2	< 0.01
24–35.	2 762	1.1	0.8–1.5	0.4	0.3–0.5	< 0.01
36–47	2 699	2.3	0.9–5.5	1.3	0.7–2.5	< 0.01
48–60	2 825	1.6	0.9–3.0	0.9	0.4–1.7	< 0.01
Total	14 144	1.9	1.3–2.8	1.3	1.0–1.8	< 0.01

[a] *> +2 SD.*

SD = standard deviation; CI = confidence interval.

a reduction of low weight-for-age by 5% could reduce childhood mortality by 30% [*17–19*].

Malnutrition, indicated by poor growth during infancy, is associated with increased risk of ischaemic heart disease; this relationship is corroborated with findings from developing countries [*20,21*]. It is therefore important to monitor the nutrition situation of children on both sides of the growth curve. Our results indicate that overall reported prevalence estimates of underweight

Table 3 **Mean z-scores of height-for-age calculated according to the WHO/NCHS and WHO Anthro references for a sample of Omani children at the age of 0–60 months across age groups**

Age (months)	No.	Mean z-score	SE	95% CI (min, max)
0–5				
NCHS/WHO	1 371	0.29	0.07	0.16, 0.43
WHO 2006	1 371	0.29	0.07	0.12, 0.46
6–11				
NCHS/WHO	1 455	–0.32	0.03	–0.38, –0.25
WHO 2006	1 455	–0.24	0.04	–0.31, –0.16
12–23				
NCHS/WHO	2 496	–0.75	0.04	–0.82, –0.25
WHO 2006	2 496	–0.75	0.04	–0.31, –0.16
24–35				
NCHS/WHO	2 716	–0.59	0.06	–0.71, –0.48
WHO 2006	2 716	–0.99	0.06	–1.11, –0.09
36–47				
NCHS/WHO	2 644	–0.80	0.03	–0.87, –0.74
WHO 2006	2 644	–1.04	0.03	–1.10, –0.97
48–60				
NCHS/WHO	2 706	–0.93	0.05	–1.02, –0.83
WHO 2006	2 706	–1.03	0.05	–1.13, –0.94
Total				
NCHS/WHO	13 388	–0.64	0.03	–0.69, –0.58
WHO Anthro	13 388	–0.78	0.03	–0.84, –0.72

SE = standard error; CI = confidence interval.

will drop significantly for children under 5 years; but higher estimates should be reported for children under 6 months old. A global decline in malnutrition is anticipated but an increase in obesity rates has also been observed in both developed and developing countries. Many countries are witnessing the coexistence of both problems although obesity rates are seldom reported as part of child nutrition outcomes [*22,23*].

As indicated from our results, the NCHS/WHO reference ocnsistently underestimated stunting among most age groups and in the overall population of children aged 0–60 months, which implies that higher rates of stunting will be reported as countries adopt the new standard.

The reported prevalence estimates of wasting should not differ significantly as a result of adopting the new growth charts, however, children in the age group 0–5 months will show higher estimates. For populations with higher rates of overweight than Oman, the reported estimates are expected to increase using the new reference.

Countries that choose to change the standards used from the NCHS/WHO to the WHO 2006 will require significant investment and will have to make important decisions on which indicators to choose. A balance between the expected outcome and the required equipment, manpower and training is needed for optimum results of the use of the new charts [*24*]. It is therefore

Table 4 **Mean z-scores of weight-for-height calculated according to the WHO/NCHS and WHO 2006 references for a sample of Omani children aged 0–60 months**

Age (months)	No.	Mean z-score	SE	95% CI (min, max)
0–5				
NCHS/WHO	1 391	0.03	0.05	–0.52, –0.31
WHO 2006	1 396	–0.41	0.04	–0.05, 0.11
6–11				
NCHS/WHO	1 490	–0.33	0.05	–0.43, –0.23
WHO 2006	1 490	–0.23	0.05	–0.35, –0.13
12–23				
NCHS/WHO	2 519	–0.83	0.04	–0.91, –0.76
WHO 2006	2 519	–0.42	0.02	–0.51, –0.34
24–35				
NCHS/WHO	2 741	–0.87	0.02	–0.92, –0.82
WHO 2006	2 741	–0.61	0.02	–0.66, –0.56
36–47				
NCHS/WHO	2 678	–0.84	0.04	–0.93, –0.75
WHO 2006	2 678	–0.69	0.05	–0.79, –0.59
48–60				
NCHS/WHO	2 810	–0.74	0.04	–0.82, –0.67
WHO 2006	2 808	–0.66	0.04	–0.75, –0.57
Total				
NCHS/WHO	13 629	–0.69	0.02	–0.74, –0.66
WHO 2006	13 632	–0.55	0.02	–0.59, –0.51

SE = standard error; CI = confidence interval.

important to understand the implications on child nutrition indicators.

Our findings show that 0–6 months, 12–23 months and 48–60 months are the age groups where the indicators will show the most significant changes in the reported estimates.

The reference cohort of the study was exclusively breastfed for 4 months, whereas the general rate of exclusive breastfeeding in Oman was 26% in 1999, which is an indication that, since exclusively breastfed children have a higher rate of growth at 0–6 months [*25*], if the rate of breastfeeding was increased in these children, growth would also improve. In spite of the well-documented benefits of breastfeeding; exclusive breastfeeding remains low in many parts of the world [*26*]. The adoption of the new charts will require countries to put more vigorous efforts into promotion and counselling of exclusive breastfeeding.

The other age groups of concern are the 12–24 months and 48–60 months, where percentages increased significantly using the WHO 2006 charts as a reference. The literature available discusses the age group 0–5 years, and therefore we could not find any comparable data pertaining to those specific age groups. More research is needed to understand the socioeconomic factors related to feeding and nutrition at this age.

Our study is the first to address the comparison of overweight and obesity among children between the NCHS/WHO and WHO 2005 references. Although the overall rates are small in this population; the percentages were significantly different at older age groups. Beyond the fourth year the prevalence of both underweight and overweight were greater when using the WHO 2006 reference. Both underweight and obese children are at higher risk of ischaemic heart disease, obesity and diabetes later in life. Countries of the world signed a resolution to adopt the Global Strategy on Diet, Physical Activity and Health, which emphasizes the importance of developing national food-based dietary guidelines [*26*]. These guidelines target the population from 2 years onwards; however very little emphasis is placed on children aged 3–5 years compared to adults. Better guidelines should be developed for diet and physical activity at this age.

Our findings were consistent with an earlier comparison [*27*]: in summary, countries that adopt the new growth reference will show an increase in prevalence estimates for underweight, stunting and overweight. In order to improve the nutritional status of pre-school children age specific interventions should be considered.

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Waist circumference: a better index of fat location than WHR for predicting lipid profile in overweight/ obese Iranian women

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محيط الخصر: منسب لتوضع الشحم أفضل من نسبة الورك إلى الخصر للتنبؤ بنمط الشحوم في الإيرانيات البدينات والمفرطات الوزن

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الخلاصة: وقد نفّذ الباحثون دراسة سريرية شاملة للقطاعات شملت 728 امرأة بدينة ومفرطة الوزن ممن تتراوح أعمارهن بين 20 و60 سنة خلال الفترة بين تموز/ يوليو 2005، وأيار/ مايو 2006 في سيستان وفي بلوخستان في جمهورية إيران الإسلامية. وقد اتضح أن مَنْسَب كتلة الجسم ومحيط الخصر لهما ارتباط يُعْتَدُّ به إحصائياً مع مستويات الكولسترول الكلي وثلاثي الغليسيريد وكولستيرول البروتينات الشحمية المنخفضة الكثافة. وبعد إجراء التصحيح حسب العمر ومَنْسَب كتلة الجسم وجد أن ذلك الارتباط صحيح أيضاً بين محيط الخصر وبين الكولسترول الكلي وثلاثي الغليسيوليد. ولم يكن هناك مثل هذا الارتباط بين نسبة الخصر إلى الورك وبين نمط توزع الشحوم، ومن هنا فإن محيط الخصر يُعَد مَنْسَباً أفضل للقياسات البشرية لتوضع الشحم من نسبة الخصر إلى الورك في تقدير نمط الشحوم في النساء البدينات ومفرطات الوزن.

ABSTRACT We carried out a clinical cross-sectional study on 728 overweight and obese women aged 20–60 years during July 2005–May 2006 in Sistan and Baluchestan, Islamic Republic of Iran. Body mass index (BMI) and waist circumference (WC) showed significant correlation with total cholesterol (TC), triglycerides (TG) and low-density lipoprotein cholesterol. After adjustment for age and BMI, this was also true for WC with TC and TG. There was no such correlation between waist-to-hip ratio (WHR) and lipid profile. Hence, WC was a better anthropometric index of fat location than WHR to estimate lipid profile in overweight and obese adult women.

Tour de taille : un meilleur indice de localisation de la graisse que le rapport tour de taille/tour de hanches (RTH) pour la prédiction du profil lipidique chez les Iraniennes en surpoids ou obèses
RÉSUMÉ Il est essentiel de définir un meilleur indice anthropométrique de localisation de la graisse pour prédire le profil lipidique de telle ou telle population. Nous avons réalisé une étude clinique transversale sur 728 femmes en surpoids et obèses âgées de 20 à 60 ans, entre juillet 2005 et mai 2006, dans la province de Sistan-Balouchestan (République islamique d'Iran). L'indice de masse corporelle (IMC) et le tour de taille présentaient une corrélation significative avec le cholestérol total (CT), les triglycérides (TG) et le cholestérol LDL. Après ajustement en fonction de l'âge et de l'IMC, cette corrélation existait également entre le tour de taille d'une part, et le CT et les TG d'autre part. Elle n'existait pas entre le rapport tour de taille/tour de hanches (RTH) et le profil lipidique. Le tour de taille est donc un indice anthropométrique de la localisation de la graisse permettant d'estimer, de façon plus juste que le RTH, le profil lipidique des femmes adultes en surpoids et obèses.

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Introduction

Nowadays, obesity is not only one of the major causes of life-threatening disease in western societies but also it has become one of the most important health problems in developing countries, including south-east Asia [*1,2*]. The effects of obesity on health, such as diabetes, cardiovascular disease, hypertension, disease of the gallbladder and dyslipidaemia are well recognized [*3*]. Anthropometric measurements have been used for interpretation of some kinds of obesity: generalized obesity is measured by body mass index (BMI); abdominal obesity, which is closely associated with intra-abdominal fat, is measured either by waist circumference (WC) or waist-to-hip ratio (WHR) [*4*].

Some studies have indicated that WC may be a better reflection of the accumulation of intra-abdominal or visceral fat than WHR [*5*]. Also, more evidence indicates that WC coupled with BMI predicts cardiovascular disease risk factors better than BMI alone [*6*]. Other studies have shown that WHR and WC, markers of central adiposity, were more predictive of cardiovascular disease risk factors than BMI, a marker of general obesity [*4,7,8*].

There is much controversy about the best anthropometric index; this may be explained in part by differences in body composition and fat distribution in different racial groups [*9,10*], age groups [*11*] and sexes [*12*]: according to the literature, obesity is more prevalent among women than among men [*13,14*]. For this reason we evaluated the interrelationship of anthropometric indices for general and central obesity, and the relationship of these indices with the lipid profile in women as the aim of this study.

It should be noted that, in order to evaluate the association of markers of fat location with lipid profile, analysis should be adjusted for overall adiposity. Therefore, a second aim of our study was to determine the effectiveness of WC and WHR (after adjustment for age and general obesity) for predicting lipid profile and to establish which is a better anthropometric index of fat location.

Methods

Participants and geographical area

This cross-sectional study was carried from July 2005 to May 2006 on women in Sistan and Baluchestan who had been referred to either of the 2 nutrition clinics in Zahedan, a city in the centre of the province, which is situated in the south-east of Iran, bordering Pakistan.

A total of 1224 women were referred during the study period. Exclusion criteria were: age below 20 years, those with BMI ≤ 24.9 or ≥ 40 kg/m^2; and those having dietary treatment for blood lipids and weight loss in the previous 2 months. Pregnant women were also excluded. Applying these criteria, 728 overweight and obese women were eligible to participate in the study. All participants gave their informed consent before recruitment into the study.

Measurements

All anthropometric measurements were made by trained staff in accordance with WHO standards during clinic visits [*15*]. Height was measured to the nearest 0.5 cm with the participant standing without shoes, heels together and head in the horizontal plane. Body weight was measured to the nearest 0.1 kg using a SECA scale. All measurements of circumference (waist and hip girth) were taken to the nearest 0.5 cm. WC was measured midway between lower rib margin and the iliac crest in the hori-

zontal plane. Hip-circumference (HC) was measured at the point yielding the maximum circumference over the buttocks. BMI was calculated as weight (kg) divided by the square of the height (m^2) and WHR was calculated as WC (cm) divided by HC (cm).

Blood lipids

For determining serum blood lipids, a blood sample was drawn between 07:00 and 08:00 into Vacutainer tubes after a 12-hour overnight fast. The samples were taken in a sitting position and centrifuged within 30–45 minutes of collection. All serum lipid analysis was done at Zahedan Blood Transfusion Laboratory 1 hour after collection. The analysis of samples was performed using the Alcyon Abbott 300 (Abbott, Illinois, United States of America). Total cholesterol (TC) and triglycerides (TG) were assayed using enzymatic colorimetric tests with cholesterol esterase, cholesterol oxidase and glycerol phosphate oxidase (Total cholesterol and triglycerides kits, Pars Azmon Inc., Tehran). High-density lipoprotein cholesterol (HDL-C) was measured after precipitation of the apolipoprotein B-containing lipoproteins with phosphotungstic acid. Low-density lipoprotein cholesterol (LDL-C) was calculated according to the Friedewald equation [*16*].

Statistical analysis

All statistical analysis was performed using *SPSS* software. Pearson correlation coefficient (r) was used to measure the degree of association between anthropometric indices and lipid profile. Partial Pearson correlation coefficient was used for determining the relationship between WC and WHR and lipid profile after adjustment for age and BMI. The z-test for Fisher's zeta transformation was used to determine any significant difference between the 2 coefficients. $P < 0.05$ was considered statistically significant.

Results

The characteristics of the study subject are presented in Table 1. The mean age of the women was 32 [standard deviation (SD) 9] years. The mean values for BMI, WHR and WC were 32.0 (SD 3.5) kg/m^2, 0.89 (SD 0.13) and 99.8 (SD 12.0) cm respectively. Although the participants in our study were overweight and obese women, the mean values for all of the blood lipids were in the normal range (Table 1).

The interrelations between anthropometric indices and their correlation with lipid profile are shown in Table 2. There was a positive significant correlation between BMI and age ($r = 0.17$; $P < 0.001$), WHR ($r = 0.11$; $P = 0.003$) and WC ($r = 0.49$; $P < 0.001$). For WC, the correlation was generally of the same order of magnitude for age and WHR. There was no significant correlation between WHR and age ($r = 0.04$; $P = 0.2$). The correlation between BMI, WHR and WC with lipid profile is also shown in Table 2. The Pearson correlation coefficient revealed that BMI and WC indices showed statistically significant positive correlation with TC,

Table 1 **Characteristics of study participants (n = 728)**

Characteristic	Mean	SD	95% CI
Age (years)	32	9	31–33
BMI (kg/m^2)	32.0	3.5	31.0–32.0
WHR	0.89	0.13	0.88–0.91
WC (cm)	99.8	12.0	98.0–101.0
TC (mg/dL)	192	46	186–197
TG (mg/dL)	134	72	126–143
LDL-C (mg/dL)	119	36	114–123
HDL-C (mg/dL)	48	8	47–49

SD = standard deviation; CI = confidence interval; BMI = body mass index; WHR = waist-to-hip ratio; WC = waist circumference; TC = total cholesterol; TG = triglycerides; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol.

Table 2 **Interrelation between anthropometric indices and their correlation with lipid profile in overweight and obese women (*n* = 728)**

Variable	BMI		WHR		WC	
	r	*P-value*	*r*	*P-value*	*r*	*P-value*
Age	0.17	< 0.001	0.04	0.2	0.18	< 0.001
WHR	0.11	0.003	–	–	0.3	< 0.001
WC	0.49	< 0.001	0.3	< 0.001	–	–
TC (mg/dL)	0.17	< 0.001	0.05*	0.2	0.16*	< 0.001
TG (mg/dL)	0.17	< 0.001	0.05*	0.2	0.18*	< 0.001
HDL-C (mg/dL)	0.05	0.17	0.06	0.1	–0.004	0.92
LDL-C (mg/dL)	0.11	0.003	0.03[a]	0.4	0.11[a]	0.004

**Difference between the 2 coefficients significant (P < 0.05) with z-test for Fisher's zeta transformation.*
[a]Difference between the 2 coefficients not significant (P ≥ 0.05) with z-test for Fisher's zeta transformation.
BMI = body mass index; WHR = waist-to-hip ratio; WC = waist circumference; TC = total cholesterol; TG = triglycerides; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol.

TG and LDL-C. A test of significance for the difference between the 2 coefficients was done using the *z*-test for Fisher's zeta transformation. The coefficients of WC with TC and TG were significantly greater ($P < 0.05$) than the coefficients of WHR with TC and TG. Although the correlation coefficient of WC with LDL was greater than the correlation coefficient of WHR with LDL (0.11 vs 0.03), the test was not significant (Table 2).

Table 3 **Partial correlation between waist circumference (WC) and waist-to-hip ratio (WHR) with lipid profile in overweight and obese women after adjustment for age and body mass index (*n* = 728)**

Variable	WC		WHR	
	r	P	r	P
TC	0.10[a]	0.01	0.03[a]	0.4
TG	0.14*	0.001	0.02*	0.5
HDL	–0.01	0.7	0.08	0.06
LDL	0.03[a]	0.4	0.004[a]	0.9

**Statistically significant (P < 0.05) with z-test for Fisher's zeta transformation*
[a]Difference between the 2 coefficients not significant (P ≥ 0.05) with z-test for Fisher's zeta transformation..

Partial correlation between WC and WHR with lipid profile after adjustment for age and BMI is presented in Table 3. Significant correlations were also found between WC index and TC ($P < 0.01$) and TG ($P < 0.001$) concentrations after adjustment for age and BMI. Although the partial correlation coefficient (*r*) for WC with TC, TG and LDL-C was greater than the correlation coefficient for WHR with the same lipids, the z-test for Fisher's zeta transformation was only significant for TG ($P < 0.05$). There was no significant correlation between WHR and any of the variables (Table 3).

Discussion

We found that WC was strongly correlated with BMI. Similar findings have been observed in other studies [*17,18*]. A number of studies have also shown that high WC and BMI values precede the onset of morbidity due to diabetes and coronary heart disease [*19,20*]. However, 1 study found that both overall obesity and abdominal obesity were

associated with the risk of CHD in women [*21*]. The utility of BMI and WC in predicting obesity-related health risk factors has been recognized by the National Heart, Lung, and Blood Institute of the National Institutes of Health, whose guidelines indicate that the health risk factors increase in a graded fashion when moving from the normal weight through the obese BMI categories, and that within each BMI category men and women with high WC values are at greater health risk than those with normal WC values [*22*]. Thus, it is assumed that BMI and WC have independent effects on obesity-related health risk factors. In fact, recent findings indicate that WC is a stronger marker of health risk than BMI [*23*].

The correlations observed between WC and lipid profile in the analysis changed after removing the total adiposity effect. The partial correlation and *z*-test for Fisher's zeta transformation suggested that WC had more effect on lipids/lipoproteins than WHR in women. A study in Danish men and women 35–65 years of age showed that more of the lipid variation was explained by overall obesity in men and more of the variation was explained by abdominal obesity in women [*24*]. Therefore, this issue needs to be further investigated.

After adjustment for BMI and age, WC remained significantly correlated with plasma TC and TG. Iranians are predisposed to raised serum lipid levels due to a diet rich in saturated fats and low physical activity [*25,26*]. Our study did not show strong significant correlations between WC and LDL-C and HDL-C after adjustment for BMI and age.

The main significant abnormalities of lipids/lipoproteins related to central obesity were increased TC and TG for WC index. It seems that in women, WC was more associated with abnormal lipid/lipoprotein profiles than WHR. However, further investigation is needed on women in Sistan and Baluchestan to prevent and treat obesity because of its association with diabetes, coronary heart disease and other serious health conditions.

In conclusion, although several studies have analysed the association between serum lipids and anthropometric markers, some researchers, including ourselves, conclude that WC is a better anthropometric index of fat location for predicting lipid profile in overweight and obese adult women [*5*].

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Global Database on Body Mass Index: an interactive surveillance tool for monitoring nutrition transition

The global epidemic of overweight and obesity – "globesity" – is rapidly becoming a major public health problem in many parts of the world. Paradoxically coexisting with undernutrition in developing countries, the increasing prevalence of overweight and obesity is associated with many diet-related chronic diseases including diabetes mellitus, cardiovascular disease, stroke, hypertension and certain cancers.

The Global Database on Body Mass Index provides both national and sub-national adult underweight, overweight and obesity prevalence rates by country, year of survey and gender. The information is presented interactively as maps, tables, graphs and downloadable documents and can be accessed at: http://apps.who.int/bmi/index.jsp

Osteoporosis knowledge among female school students in Jordan

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المعارف حول تَخَلْخُل العظام بين طالبات المدارس في الأردن

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الخلاصة: رغم أن تَخَلْخُل العظام من الأمراض التي يمكن توقّيها والتي تصيب ملايين الناس فإن الوعي لدى الناس حولها لايزال ضئيلاً. وقد استخدم الباحثان في هذه الدراسة تصميماً شبه تجريبي قبل وبعد الاختبار لاستقصاء المعارف حول تَخَلْخُل العظام بين المراهقات والطالبات في الأردن. وقد وزّع الباحثان الاستبيانات على 148 طالبة ممن اختارهن الباحثان من المدارس الثانوية من مدينة إربد، وذلك قبل وبعد سلسلة من الحصص التثقيفية المرتكزة على نموذج المعتقدات الصحية. وقد لاحظ الباحثان حدوث ازدياد يُعْتَدُّ به في الأحراز الإجمالية للمعارف حول تَخَلْخُل العظام (فقد كان وسطي الأحراز قبل الاختبار 24.1 وبعده 29.8 بقيمة احتمال P أقل من 0.01). ويوصي الباحثان بإجراء المزيد من البحوث لمتابعة المعلومات المحصَّلة والتغيرات السلوكية التي تتغير بمرور الوقت.

ABSTRACT Although osteoporosis is a preventable disease affecting millions of people, public awareness remains low. This study used a pretest–posttest quasi-experimental design to explore osteoporosis knowledge among adolescent female students in Jordan. A questionnaire was administered to 148 students recruited from a secondary school in the city of Irbid before and after a series of health education sessions based on the health belief model. A significant increase in overall scores for osteoporosis knowledge was seen (mean score pretest = 24.1 and posttest = 29.8, $P < 0.001$). Further research geared toward the follow-up of attained knowledge and behavioural change over time is greatly needed.

Connaissances sur l'ostéoporose chez les jeunes filles scolarisées en Jordanie

RÉSUMÉ Bien que l'ostéoporose soit une maladie évitable qui touche des millions de personnes, la population y est toujours peu sensibilisée. Cette étude a suivi une structure quasi-expérimentale pré-test–post-test pour analyser les connaissances de cette maladie chez des adolescentes scolarisées en Jordanie. Un questionnaire a été remis à 148 élèves recrutées dans un établissement d'enseignement secondaire de la ville d'Irbid avant et après une série de séances d'éducation sanitaire fondées sur le modèle des croyances relatives à la santé. On a observé une augmentation significative des scores généraux en matière de connaissances sur l'ostéoporose (score moyen pré-test = 24,1 et post-test = 29,8, $P < 0,001$). Une intensification de la recherche axée sur le suivi des connaissances acquises et sur le changement comportemental avec le temps est plus que nécessaire.

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Introduction

Osteoporosis is characterized by decreased bone density leading to a higher susceptibility to strains and fractures [*1–10*]. Although it is a preventable disease, osteoporosis affects an estimated 25 million people worldwide, leading to 1 million fractures, 40 000 annual deaths and health costs of billions of dollars [*4–6*]. An estimated 1 in 2 women and 1 in 8 men over the age of 50 years will have osteoporosis-related fractures in their lifetime [*3,6*].

Public awareness of osteoporosis remains low, especially in less-developed countries. Health education programmes have been shown to be effective in improving knowledge and awareness among the public [*1,5,7–10*] and in retaining the knowledge over time [*8,9*]. Nonetheless, researchers have emphasized that osteoporosis education programmes seldom change beliefs and behaviours [*1,4,5*]. Schools can be one of the best venues for increasing knowledge of osteoporosis and inducing lasting behavioural change during adolescence, the period of peak bone density [*9,11–13*].

Jordan is currently in a stage of epidemiological transition, represented by increasing numbers of females entering peak childbearing years, a growing elderly population, the majority of whom are women, and a lack of health care services for postmenopausal women [*14*]. Studies on osteoporosis in Jordan have been limited, mainly focusing on exploring osteoporosis risk factors and its prevalence in Jordanian society, especially among middle-aged women. The reported prevalence of osteoporosis in Jordan ranges from 13% to 44% [*15,16*]; these researchers have recommended increasing public awareness and implementing intensive screening programmes as effective means of preventing and managing osteoporosis in Jordanian society.

Considering the limited studies focusing on osteoporosis in Jordan, the purpose of this study was to assess osteoporosis knowledge among adolescent female Jordanian school students. The study could serve as the basis for developing and implementing future health promotion programmes geared towards Jordanian youth.

Methods

A pretest–posttest quasi-experimental design was used to assess osteoporosis knowledge among adolescent female school students in Jordan before and after a series of health education sessions. The theoretical basis for the health education programme was the health belief model, which hypothesizes that the perceived threat of a disease (severity and susceptibility) and perceived benefits of the treatment can induce behavioural change [*8,17–19*].

Sample and setting

The study was conducted at a major secondary school for girls located in the city of Irbid in the northern part of Jordan. This school has 23 class sections, 727 students and 57 teachers. The school is well-equipped with rooms appropriate for conducting educational sessions for students and with audiovisual aids (e.g. television, video cassette recorder, overhead projector). A convenience sample of 148 female school students in the 11th grade was used.

Data collection

A 12-item questionnaire was developed for this study after an extensive literature review. The questionnaire had a multiple-choice format in which the student was instructed to choose the correct answer from a group of answers. The questionnaires were scored based on correct answers and

given a score out of 54 in the pre- and posttest. It assessed knowledge of: osteoporosis prevalence and risk factors; manifestations, diagnosis and treatment; and nutritional prevention and calcium-rich foods. Internal consistency reliability of the questionnaire was 0.49. Content validity was established by a panel of 3 nursing faculty members.

Permission to conduct the study was obtained from the Jordan University of Science and Technology Human Research Committee, the Ministry of Education office in Irbid and the school principal. Consent was obtained from the participants before starting the sessions. Participation in this study was voluntary and the results were reported in aggregate form to avoid personal identification.

After permissions were obtained, the school principal, teachers and researchers collaborated on preparing the sessions. Over a period of 6 weeks in 2002, a researcher (L.B.) gave a series of 6 lectures about osteoporosis. Initial assessment of osteoporosis knowledge was made after students had attended a general osteoporosis lecture. The first 3 lectures represented the pretest component and were followed by 3 posttest lectures that focused on areas of osteoporosis knowledge where students showed weakness, after which students took the knowledge test a second time. Each lecture lasted 45 minutes and the content included manifestations of osteoporosis, risk factors, complications and preventive measures. Each lecture started with a theoretical component that incorporated active interactions with students, while at the end of the session, time was allowed for questions and comments. Osteoporosis pamphlets were distributed to the students at each lecture.

The questionnaire on osteoporosis knowledge was given to the students before the sessions (pretest) and repeated after the intervention on the same students (posttest). The maximum score on the test was 54. These scores were converted to overall percentages, then the percentage of correct answers in the pretest was compared to the percentage of answers in the posttest. *P*-values were calculated for the overall percentage. Then the overall mean score for the pretest was compared to the overall mean score of the posttest.

Results

The sample consisted of 148 female students, age range 16–18 years.

Pretest and posttest analysis revealed a significant overall increase in osteoporosis knowledge scores among the students after the health education sessions (mean score pretest = 24.1; posttest = 29.8, $t = 9.6$, $P < 0.001$) (Table 1).

Significant increases in the percentage of students scoring correct responses were observed for 8 of the 12 knowledge items. There was no change in scores for 4 items, indicating the need for further education and more focus. These items included fracture risk factors, osteoporosis diagnosis, treatment of osteoporosis and fracture pain (Table 2).

Discussion

The purpose of this study was to explore the extent of osteoporosis knowledge among adolescent female students in Jordan, who represent an understudied target group. A significant increase in overall osteoporosis knowledge was detected among the students after attending health education sessions. This finding is similar to results reported by other studies of osteoporosis education on youth [*9–13*]. Other researchers too acknowledged that osteoporosis health

Table 1 **Mean scores of adolescent female students (n = 148) to each item of osteoporosis knowledge questionnaire before and after education sessions**

Osteoporosis knowledge item	Pretest score		Posttest score		*t*-value	*P*-value
	Mean	SD	Mean	SD		
Prevalence	5.5	2.0	7.2	2.0	7.51	< 0.001
Age of onset	0.8	0.4	0.8	0.4	0.61	0.543
Fracture risk factors	1.7	0.9	1.7	0.9	0.13	0.900
Reasons for fracture	5.7	2.0	6.9	2.0	5.24	< 0.001
Fracture pain	3.9	1.1	3.9	1.3	0.00	1.000
Fracture and height	1.6	0.7	2.0	0.9	4.04	< 0.001
Fracture sites	2.1	1.4	3.1	1.6	5.69	< 0.001
Diagnosis	0.5	0.5	0.5	0.5	0.58	0.562
Diagnostic tests	0.4	0.5	0.8	0.4	6.61	< 0.001
Prevention	0.5	0.5	0.9	0.3	8.14	< 0.001
Treatment	0.9	0.3	1.0	0.2	0.97	0.332
Calcium and vitamin D sources	0.4	0.5	0.7	0.5	5.40	< 0.001
All	24.1	5.3	29.8	5.0	9.55	< 0.001

SD = standard deviation.

education programmes are instrumental in improving and enhancing public knowledge among different age groups [*1,4,5*]. In Jordan, most of the osteoporosis studies so far have focused on middle-aged women. Studies focusing on other age groups such as adolescents are warranted in this area.

Table 2 **Percentage of adolescent female students (n = 148) giving correct responses to each item of osteoporosis knowledge questionnaire before and after health education sessions**

Osteoporosis knowledge item	Pretest % correct	Posttest % correct
Prevalence	55	72
Age of onset	40	70
Fracture risk factors	80	80
Reasons for fracture	50	90
Fracture pain	90	90
Fracture and height	40	80
Fracture sites	21	31
Diagnosis	17	17
Diagnostic tests	57	69
Prevention	16	19
Treatment	39	39
Sources of calcium and vitamin D	50	90

Nonetheless, our results also showed that no health education programme is perfect in all aspects. Some areas of osteoporosis knowledge such as fracture risk factors, osteoporosis diagnosis, treatment of osteoporosis and fracture pain did not show significant differences between the pretest and posttest scores, indicating a need to focus on these areas on future osteoporosis education programmes as well as adopting need-focused education programmes. This result differed somewhat from other researchers who reported that responses on all questionnaire items had increased in the posttest [*4,5,9,11*]. They explained their findings as methodological problems related to pretest–posttest designs. Another methodological concern was finding reliable and valid questionnaires to assess osteoporosis knowledge. In our study the 12-item questionnaire had a reliability of 0.49, which is weak. Reported reliabilities

of the Healthy Bones Knowledge Questionnaire range from 0.51–0.74, which also indicates fairly low consistency reliability [*9*]. Thus, finding reliable and valid osteoporosis instruments remains an area of concern for researchers.

In order to meet the challenges and threats of osteoporosis, prevention efforts in Jordan need to be geared toward establishing and sustaining educational programmes for young girls and women. An important step has been the establishment of the Jordanian Osteoporosis Prevention Society in February 1998. The Society is a founding member of the Pan Arab Osteoporosis Society, which was founded in 1997 and is a member of the International Osteoporosis Foundation [*20*]. The Jordanian Osteoporosis Prevention Society aims at improving awareness regarding osteoporosis, preventing osteoporosis, enhancing research and helping patients through special programmes [*20*].

There is a great need for more research with various samples and different age groups when exploring osteoporosis among Jordanian women. The challenge remains in turning knowledge gained from health education into lifelong practices and adopting new health behaviours. Further research geared toward the follow-up of attained knowledge and behavioural change over time is needed.

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Health and development through physical activity and sport
(WHO/NMH/NPH/PAH/03.2)

The world is witnessing a significant increase of the global burden of non-communicable diseases (NCD). The increasing global epidemic of relates closely to respective changes in lifestyles. The risk factors, including physical inactivity, contribute significantly to the overall burden of NCD worldwide.

Among other benefits, regular physical activity:

- helps prevent osteoporosis, reducing the risk of hip fracture
- reduces the risk of dying from heart disease or stroke
- helps to prevent/reduce hypertension
- helps build and maintain healthy bones, muscles, and joints
- promotes psychological well-being and reduces stress

This document can be downloaded at: http://whqlibdoc.who.int/hq/2003/WHO_NMH_NPH_PAH_03.2.pdf

Beliefs, perceptions and practices about asthma among Iranian asthma patients

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المعتقدات والمدركات والممارسات حول الربو بين المصابين به في إيران

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الخلاصة: أجرى الباحثان مقابلات لـ 123 مريضاً في قسمين من أقسام العيادات الخارجية في مستشفيات طهران بغرض تقييم المعتقدات والمدركات حول مختلف جوانب حالات المرضى الذين شخصت لديهم الإصابة بالربو. ولم يتذكر معظم المرضى أي سوابق مرضية للربو. وكان الكثير ممن لديه سوابق استخدام المنشقات الفموية لم يستخدموها بشكل منتظم (41.9٪)، وكان السبب الرئيسي الذي أبلغوا عنه أنهم لم يشعروا بالحاجة لاستخدام الأدوية في الفترات التي لا تظهر فيها الأعراض. ولم يوضح سوى 32 مريضاً (30.5٪) الأسلوب الصحيح لاستخدام المنشقة الفموية. ويحتاج مرضى الربو إلى المزيد من التثقيف حول الوقاية من الأعراض ومكافحتها. ومن العوامل الأخرى التي تثير القلق عدم اكتراث الأطباء بالمبادرة العالمية لإعداد دلائل إرشادية لتدبير الربو.

ABSTRACT To evaluate the beliefs and practices of patients diagnosed with asthma about various aspects of their condition we interviewed 123 patients attending 2 outpatient departments of hospitals in Tehran. Most of the participants did not recall their past medical history of asthma. Many patients with a history of using oral inhalers did not use these regularly (41.9%); the major reason reported was feeling no need to use medication during symptom-free intervals. Only 32 (30.5%) patients demonstrated the correct technique for using their oral inhaler. Patients with asthma need more education about prevention and control of symptoms. Neglect by physicians of the Global Initiative for Asthma management guidelines was another major concern.

Croyances, opinions et pratiques relatives à l'asthme parmi les sujets asthmatiques iraniens

RÉSUMÉ Afin d'évaluer les croyances et les pratiques des asthmatiques concernant différents aspects de leur maladie, nous avons interrogé 123 patients fréquentant deux services de consultations externes d'hôpitaux de Téhéran. La plupart des participants ne se souvenaient pas de leurs antécédents d'asthme. Bon nombre de ceux qui utilisaient des inhalateurs ne le faisaient pas régulièrement (41,9 %) ; la principale raison invoquée était qu'ils n'éprouvaient pas le besoin de prendre des médicaments pendant les intervalles asymptomatiques. Seuls 32 (30,5 %) patients appliquaient la bonne technique pour utiliser leur inhalateur. Les asthmatiques doivent être mieux informés sur la prévention et la suprpession des symptômes. La non-observance par les médecins des principes directeurs en matière de prise en charge de l'asthme mis au point par l'Initiative mondiale pour l'asthme (GINA) était également très préoccupante.

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Introduction

Asthma affects an estimated 300 million people worldwide, not only impinging on patients' quality of life but also accounting for approximately 1 in every 250 deaths and 15 million disability-adjusted life years lost per year [*1*]. In recent years the prevalence of asthma has shown a steady increase, with a corresponding increase in its social and economic impact [*2*].

Asthma care requires a partnership between the patient and the health care professional [*2*]. Successful management of asthma requires attention not only to observable behaviour but also to the underlying attitudes and beliefs which drive that behaviour [*3*]. It is well accepted that patients' views should be taken into account during medical decision-making, particularly in diseases such as asthma [*4*]. In addition, patients' beliefs about their illness play a key role in determining their adherence to treatment [*5*], which is an important aspect of self-management [*6*].

Only a few studies have attempted to investigate asthma patients' beliefs in the Islamic Republic of Iran, so the objective of this study of outpatients in Tehran was to evaluate the beliefs, perceptions and practices of asthma patients about various aspects of their condition.

Methods

Study design and population

A convenience sample of 123 patients with physician-diagnosed asthma were selected from the outpatient departments of 2 tertiary hospitals (Milad and Fayaz-Bakhsh hospitals) in Tehran, Islamic Republic of Iran from June 2005 to September 2005. All of those approached agreed to take part and were interviewed.

The inclusion criteria were age above 16 years and history of asthma and the exclusion criterion was a history of chronic respiratory diseases other than asthma. Asthma was diagnosed by a pulmonologist, according to a combination of both clinical and spirometry (reversibility to bronchodilators) criteria. Asthma severity was defined based on the Global Initiative for Asthma (GINA) guidelines [*2*] and patients' clinical and/or spirometry parameters.

Data collection and analysis

Data were collected via a questionnaire that was designed to examine patients' perceptions of asthma management in light of the revised asthma management guidelines published by GINA in 2004 [*2*]. The survey questions were not validated. Patients' demographic data, asthma severity and history, medical history, history of prescribed medication for asthma and/or other chronic diseases and smoking status were recorded. The questionnaire included both closed and open-ended questions. The second author conducted all the interviews.

The answers to open-ended questions were read several times to become familiar with the data. After highlighting the more common answers, all the data were grouped for analysis. *SPSS*, version 10.0.5 software was used for statistical analysis.

Results

All 123 patients were interviewed. Mean age was 46.46 (standard deviation 14.86; range 16–83) years. The demographic data of participants are shown in Table 1. About three-quarters of the patients had less than high school education, more than half had grade 1 and 2 asthma and about one-quarter were active or passive smokers.

Table 1 **Demographic data of asthma patients (*n* = 123)**

Variable	No.	%
Age (years)		
Mean (SD)	46.46 (14.86)	
Min–max	16–83	
Sex		
Female	73	59.3
Male	50	40.7
Literacy/education level		
Illiterate	27	22.0
Low literate	12	9.8
Elementary school	26	21.1
Guidance school	27	22.0
High school	23	18.7
College	8	6.5
Length of time with diagnosis of asthma (months)		
Mean (SD)	84.42 (102.13)	
Min–max	0–600	
Employment		
Employed	66	53.6
Unemployed[a]	57	46.4
Immigration status		
Immigrant	81	65.9
Native	34	27.6
Living in other cities	8	6.5
Smoking status		
Active	7	5.7
Passive	25	20.3
Non-smoker	73	59.3
Ex-smoker	18	14.6
Disease history		
Family history of asthma	51	41.5
History of other chronic disease	39	31.7
History of taking medication for other chronic disease	42	34.1
Asthma grade		
1	34	27.6
2	43	35.0
3	40	32.5
4	6	4.9

[a]*Women who were housekeepers were categorized as unemployed.*
SD = standard deviation.

Triggers for asthma

Patients were asked what factors were triggers for their asthma. Most of the patients (108, 87.8%) were familiar with the concept of triggers for asthma, 7 (5.7%) patients mentioned no triggers for the disease and 8 (6.5%) were uncertain about the triggers. Environment, smoking and air pollution were perceived as major trigger factors. The second major trigger factor was nutritional. None of the participants mentioned drugs as an asthma trigger. The less commonly reported triggers were exercise, infection and emotional and occupation factors. Despite knowledge of active and passive smoking as triggers of asthma, 7 (5.7%) patients were active smokers and 25 (20.3%) were exposed as passive smokers.

Physician visits and medication use

A majority of patients (74, 60.1%) had only partial or no recall about their last visit to a physician. Of 97 patients who recalled their last physician visit completely or partially, 16 (16.5%) had made at least 1 visit to a general practitioner (GP) for their asthma.

A number of patients had no recall (19, 15.4%) or only partial recall (73, 59.3%) of their history of medication use (Table 2). There was no relation between asthma grade and recollection of past medication history among patients who had a history of medication use ($P = 0.205$). The most frequently reported medications were various types of metered dose inhaler (MDI), theophylline, antibiotics, antihistamines and expectorants.

Using metered dose inhaler drugs

Some patients (18, 14.6%) had not been prescribed any kind of oral inhaled mediciation. Of these, 11 were new cases of asthma who had made no previous visits to a physician, but the other 7 had had the diagnosis

Table 2 **Patients' recall of past medication history in relation to asthma grade (*n* = 123)**

Asthma grade	Recall of medication use							
	No recall		Partial recall		Complete recall		No medication history	
	No.	%	No.	%	No.	%	No.	%
1	1	0.8	19	15.4	8	6.5	6	4.9
2	9	7.3	23	18.7	7	5.7	4	3.3
3	8	6.5	28	22.8	4	3.3	0	0.0
4	1	0.8	3	2.4	2	1.6	0	0.0
Total	19	15.4	73	59.3	21	17.1	10	8.2

of asthma for a while. These 7 patients had asthma grade 2 or more. The 105 remaining ptients who had a history of using oral inhalers were asked if they were prescribed oral inhalers at every consultation for asthma: 15 of them (14.3%) did not remember, 26 (24.8%) did not have an inhaler prescription at every visit and 64 of (60.9%) were always prescribed oral inhalers.

Of 105 patients using oral inhalers, 44 (41.9%) did not take their medication as prescribed. Feeling that there was no need for medication during symptom-free intervals was the most commonly given reason for non-compliance. Drug side-effects were the second reason. Other reasons were fear of dependency and pessimistic beliefs about medicines.

After these questions, the patients were asked to show and explain how they used their metered doses inhalers. Only 32 (30.5%) patients used their oral inhaler correctly; 73 had some problems in using their inhaler.

Managing asthma attacks

Half of the patients (62, 50.4%) reported that they did not suffer from asthma attacks; 30 of these had grade 3 or 4 asthma (Table 3). The remaining 61 patients were asked about how they managed their asthma attacks. Most of them (60, 98.4%) were familiar with using the "blue spray" (salbutamol inhaler) at the time of attack but they also used other treatment methods (51, 83.6%); for example making an emergency hospital visit, getting in a comfortable position and breathing fresh air. One patient did not use any treatment at the time of asthma attacks.

Table 3 **Patients' reports of previous asthma attacks in relation to asthma grade (*n* = 123)**

Asthma grade	Ever had asthma attack				Had asthma attack in previous year			
	Yes		No		Yes		No	
	No.	%	No.	%	No.	%	No.	%
1	10	29.4	24	70.6	3	8.8	31	91.2
2	21	48.8	22	51.2	11	25.6	32	74.4
3	27	67.5	13	32.5	23	57.5	17	42.5
4	3	50.0	3	50.0	3	50.0	3	50.0
Total	61	49.6	62	50.4	40	32.5	83	67.5

Exercise

Almost half the patients (58, 47.2%) believed that exercise affected their asthma; 42 (34.1%) believed that exercise improved their asthma and 16 (13.0%) that it exacerbated their disease. Among those who believed that exercise improved their condition, 24 took regular exercise and 18 did not, and among the patients who reported exacerbation of asthma after exercise, 3 took regular exercise and 13 did not. A total of 44 patients (35.8%) took regular exercise.

Nutrition

A majority of participants (93, 75.6%) reported food-induced asthma. Nuts (55, 44.7%), fried foods (41, 33.3%) and sweets (37, 30.1%) were the most frequently reported by participants as asthma triggers. Many participants (75, 61.0%) reported overeating as an asthma trigger. Only 18 patients (14.6%) reported feeling better by consuming some kind of food.

Dietary advice had been offered to 66 (53.7%) participants. Of these, 52 had tried to modify their diet as advised, while 56 had modified their diets independent of dietary advice. Physicians were the most common source of dietary advice (61, 92.4%). Other sources were patients' family and relatives.

Learning about asthma

All the participants were asked about what effect having more knowledge about asthma would make to their condition. A majority (76, 61.8%) agreed that learning about asthma would improve their condition, 10 (8.1%) believed it would not have any effect and 37 (30.1%) believed that having better knowledge and learning would have a partial effect. Only 19 (15.4%) participants, however, had tried to learn more about their condition.

Alternative medicine

A total of 74 patients (60.2%) had been advised to use herbal medicines and 58 (47.2%) had used them. Of these patients 28 (48.2%) mentioned beneficial effects after use. The most common advised drugs were: pennyroyal (*Mentha pulegium*), borage (*Echium amoenum*), quince seed (*Cydonia oblonga*), basil seed (*Ocimum basilicum*), flixweed (*Descurainia sophin*), plantain seed (*Plantago major*), linseed (*Linum usitatissium*) and thyme (*Thymus vulgaris*), although 32 participants did not know the names of the herbal medicines. Pennyroyal and thyme were most frequently reported as effective (by 17.6% and 16.2% of users respectively).

Most of the participants (91, 74.0%) had not used any vitamin or mineral supplements. All of the participants were asked about the effect of supplements on their condition; 102 (82.9%) did not have any ideas about the subject, 13 (10.6%) believed that supplements had no effect on their disease and only 8 patients (6.5%) believed that supplements improved their condition.

Discussion

Because patients' beliefs and practices play a role in understanding, defining and responding to illness, it is important to understand that such beliefs may vary between ethnic groups. Patients often use alternative medicines and practices alongside conventional medical ones, and clinicians should be aware of these in order to optimize health education and clinical management [7].

In spite of knowledge about active and passive smoking as triggers of asthma, 5.7% of our patients were active smokers and 20.3% passive smokers. An active antismoking education campaign is a useful tool for preventing exacerbation of asthma

[2,8]. Due to the important role of air pollution in the control and exacerbation of asthma [9] and the high air pollution in Tehran and other large cities of the Islamic Republic of Iran, control of this problem is a major factor in control of asthma or exacerbation of asthma attacks.

Asthma is a chronic disease and patients need regular supervision, monitoring and support by health care professionals who are well-informed about asthma [2]. According to Hertzman et al. [10], all health carers at the primary care (nurses and GPs) and higher stages of the health care system should be involved in the care of asthma patients. It has been shown that the participation of GPs in managing asthma leads to better asthma control and improved asthma care [11]. Unfortunately only a minority of our patients made regular GP visits and the rest of the patients were treated randomly by various physicians. This can be an important factor in frequent exacerbations of asthma and ever higher mortality due to uncontrolled asthma [11]. We suggest that an asthma control management plan should be integrated into health system programmes similar to those for chronic diseases such as tuberculosis [12].

Educating patients to improve their self-management skills is the cornerstone of good asthma care [13,14]. In our study, there was no difference in recall of past medication history between different asthma grades and most of the patients only partially remembered their past medication history. In addition, only about one-third of the patients had the correct technique for using their MDI drugs. Thus it seems that all asthma patients, regardless of their asthma severity, need more education to improve their self-management skills. The patients' negative beliefs about MDI drugs must also be considered a major part in their education as 35.7% of our patients were irregular users of MDI drugs due to these beliefs.

The medicines most frequently prescribed to our patients were theophylline, antibiotics, antihistamines and expectorants. This differs from GINA guidelines: theophylline is not the first-line drug for asthma and has side-effects and the others have no place in asthma management [2]. In addition, although MDI drugs are the best medication for asthma management [2], 26 participants did not have a regular prescription for MDI drugs and 7 patients with grade 2 or greater asthma were not prescribed any MDI drugs from the beginning of their diagnosis.

Educational programmes should also target physicians. A study in 2004 reported the lack of universal definitions among physicians, especially between GPs and specialists, regarding essential notions of asthma care, such as promoting asthma control or avoiding exacerbation [15].

With increasing asthma grade, there was an increase in the rate of patients who suffered attacks. Around half the grade 3 and 4 asthma patients were uncontrolled. This poor control of severe asthma among our patients requires that more attention be paid to management of these patients.

It was believed by 13.0% of the patients that exercise exacerbated their disease. Although exercise has been reported to be a trigger, it has been shown that short episodes of exercise may be beneficial for people with asthma [16]. Even professional athletes with asthma can exercise regularly, with accurate diagnosis and classification and appropriate preventive measures and pharmacological intervention; thus it is possible for athletes to participate in the sport of their choice in nearly all situations [17].

A majority of patients reported food-induced asthma. Since existing data about the effect of food and nutrients on asthma are

controversial [*18*], more detailed and interventional studies are needed to evaluate this kind of association with precise measuring of food and nutrient intake and asthma status to ascertain whether any modifications of food intake could be beneficial in the prevention or amelioration of asthma.

A high proportion of patients had been advised to take herbal medicine. There are some studies evaluating the effect of herbal medicine in asthma, but there is a general lack of scientific data to support the use of these herbs in asthma [*19*]. As half of our patients using herbal medicine reported relief from symptoms, it emphasizes the need for evaluation of these therapies in proper controlled trials.

Few patients had used vitamin or mineral supplements. There is some epidemiological evidence about the effect of vitamins and minerals in asthma, but the results of controlled trials are controversial [*19–21*], so more controlled trials are needed to evaluate the effect of supplements in asthma.

We are aware that our study has some limitations. All of the participants were chosen from 2 outpatient clinics of tertiary hospitals, where most of the subjects had low socioeconomic status. Furthermore, all of the interviews were conducted by the first author of the study. This might result in a bias by leading the patients to certain answers. For future research, to reduce the sample bias, more community-based investigations should be undertaken to represent the full spectrum of people with asthma. In addition, more standardized questionnaires should be used to assess patients' knowledge, attitude and behaviour in order to assess the relation between these data and asthma control.

Improvement of the quality of care in asthma requires a comprehensive knowledge of patients and the management of their asthma. It has been suggested that patients are relatively unaware that most of their asthma-related problems are due to inadequate control, and that more appropriate behaviour toward asthma control therapy could improve this situation [*15*]. Therefore, it had been suggested that better patient education is necessary in order to improve the management of asthma. Previous studies have reported that better knowledge of the disease by patients improved adherence to treatment and changed their perception of the disease [*22*]. In addition, when patients were better educated about their disease they were less likely to experience asthma-related adverse events. Education should stress the importance of regular use of asthma control medications. Explanation and demonstration of how to use inhaler devices should not be overlooked [*15*].

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Knowledge, attitudes, beliefs and practices in Lebanon concerning HIV/AIDS, 1996–2004

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المعارف والمواقف والمعتقدات والممارسات حول الإيدز والعدوى بفيروسه في لبنان 1996 – 2004

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الخلاصة: استهدفت هذه الدراسة الشاملة للقطاعات تقييم أثر التدخلات الوقائية من فيروس الإيدز في لبنان منذ عام 1996. وقد أجريَت هذه الدراسة بين شهرَيْ كانون الثاني/ يناير 2004 وتموز/ يوليو 2004 وشملت 3200 من اللبنانيين الذين تتراوح أعمارهم بين 15 و49 عاماً. ومن بين المشاركين ذوي النشاط الجنسي كان لدى 13٪ من الرجال و2.6٪ من الإناث علاقات مع قرين آخر غير الزوج، إلا أن 25٪ منهم فقط استخدموا العازل الذكري في آخر جماع لهم. على جانب آخر، كان لدى 16.8٪ علاقات جنسية عابرة، وأن 71.7٪ من هؤلاء استخدموا العازل الذكري. وقد تراجعت المعلومات حول الممارسات الوقائية من الإيدز والعدوى بفيروسه عما كانت عليه عام 1996 (94.9٪) لتصل إلى 85.7٪. أما الإبلاغ الذاتي عن الأعراض التي تشير إلى الأمراض المنقولة جنسياً فقد أصبح 9.1٪ مقارنةً بما كان عليه عام 1996 (5.6٪).

ABSTRACT This cross-sectional study, aimed at evaluating the impact of HIV prevention interventions in Lebanon since 1996, was performed between January 2004 and July 2004 on 3200 Lebanese aged 15–49 years. Of the sexually active respondents, 13.0% of men and 2.6% of women had regular partners other than the spouse but only 25.0% used a condom in their last sexual intercourse. However, 16.8% had sex with casual partners and 71.7% of those used a condom. Knowledge about preventive practices against HIV/AIDS has regressed since 1996, 85.7% compared to 94.9%. Self reports of symptoms suggestive of sexually transmitted disease were 9.1% compared to 5.6% in 1996.

Connaissances, attitudes, croyances et pratiques au Liban à propos du VIH/sida de 1996 à 2004

RÉSUMÉ Cette étude transversale, qui visait à évaluer l'impact des interventions de prévention du VIH au Liban depuis 1996, a été réalisée de janvier à juillet 2004 sur 3 200 Libanais âgés de 15 à 49 ans. Parmi les personnes sexuellement actives interrogées, 13,0 % des hommes et 2,6 % des femmes avaient régulièrement d'autres partenaires que leur conjoint, mais seulement 25,0 % avaient utilisé un préservatif au cours de leur dernier rapport. Par ailleurs, 16,8 % avaient des rapports avec des partenaires occasionnels et 71,7 % d'entre eux utilisaient un préservatif. Les connaissances relatives aux pratiques de prévention contre le VIH/sida ont diminué depuis 1996, en passant de 94,9 % à 85,7 %. Le pourcentage de personnes déclarant présenter des symptômes évocateurs d'une maladie sexuellement transmissible était de 9,1 %, contre 5,6 % en 1996.

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Introduction

Background

Worldwide, up to the end of 2002, the human immunodeficiency virus (HIV) had infected approximately 67 million people. More than 25 million have already died from acquired immunodeficiency syndrome (AIDS) (about 3.1 million deaths in 2002 alone, including 610 000 children), ranking it as one of the leading causes of death. The remaining 42 million have been living with HIV infection or AIDS [*1*].

In the World Health Organization Eastern Mediterranean Region, an estimated 700 000 people are living with HIV/AIDS, but only 14 198 AIDS cases have been officially registered since the start of the epidemic [*2*]. Complete data were lacking for 11 of the 22 countries of the Region for 2003. Based on available figures, the Regional epidemic is being driven largely by heterosexual transmission, which represents almost 80% of the cumulative total of AIDS cases reported.

In Lebanon, the first reported AIDS case was in 1984 [*3*]; the number steadily increased to 765 reported cases by July 2004 [*4*]. Although a significant proportion of these (around 45%) were linked to travel and migration to (and return from) endemic areas, local spread had become a reality. The most frequent mode of transmission was sexual (77.25%), mainly heterosexual (52.70%) [*4*].

The highest number of cases was in the age group 31–40 years, with a ratio of men:women of 8.5:1 [*4*]. The majority of the cases reported to the National AIDS Programme (NAP) were increasingly at the stage of AIDS disease rather than asymptomatic HIV infection. This indicates that the individuals probably acquired the infection at a younger age, yet had not been tested for HIV until they were symptomatic. Moreover, an increasing trend of new reports of HIV and AIDS cases was noticed within the younger population (15–29 years) compared to a horizontal trend in the other age groups.

As a national response to the epidemic, the Lebanese government declared in 1988 that HIV/AIDS was a threat to public health, and in 1989 the NAP was established. It primarily performed activities based on short-term action plans in accordance with the local epidemiological situation; needs assessment; knowledge, attitudes, beliefs and practice studies; and World Health Organization directives [*5*].

Interventions

In July 1994, a consensus workshop formulated a medium-term plan that set priorities for NAP activities for 1995–2000 [*6*]. It identified target groups, described barriers and proposed solutions and intervention priorities. These interventions were:

- promoting safe sex,
- promoting condom use and increasing availability,
- promoting safe behaviour to avoid sexually transmitted diseases,
- promoting the application of universal precautions in the health centres,
- promoting and controlling the safety of blood,
- increasing awareness on the risks of HIV transmission among the intravenous drug users,
- providing support and care to persons infected with HIV/AIDS and their families,
- conducting research targeting groups that are at a higher risk of HIV transmission.

For the implementation of the above, the NAP developed awareness campaigns and support materials. It organized advocacy campaigns through community participation and capacity-building. Along with the Infectious Diseases Society, it developed protocols for disease management, updated on a yearly basis. In addition, several acts or mandates related to HIV control were put into laws or decrees, e.g. those related to the safety of blood, mandatory declaration, confidentiality, non-discrimination, compulsory testing of high-risk groups (e.g. female sex workers) and work permits for foreigners.

Assessment

In 1996, an assessment study on knowledge, attitudes, beliefs and practices (KABP) of the general population in Lebanon showed almost universal awareness of HIV/AIDS (95.5%) [5].

The present study is an evaluation of the HIV/AIDS indicators and makes comparisons with those measured in 1996. It is a re-assessment among the general population of:

- trends of change in risky practices,
- knowledge of modes of transmission,
- knowledge of preventive practices,
- prevalence of risky sexual behaviours,
- incidence of self-reported sexually transmitted disease (STD) symptoms.

Methods

Sample population

This cross-sectional study was conducted on a representative sample of 3200 participants from Lebanon aged 15–49 years.

Using Altman's nomogram for sample size calculation yields a sample size of 3200 for a power between 70 and 80, a standardized difference of 10 and a significance level of 0.1

This survey was carried out during the period January 2004–March 2004 using a stratified cluster sample design. The country was first stratified by governorate (*mohafazat*) and district levels in order to select the primary sampling units. Once these were identified, they were subdivided into clusters, and then by systematic random sampling, households were selected for interviewing. Sample size in each governorate was proportional to the population.

All persons aged 15–49 years were included whether they were regular residents of the household or had spent the night before the interview in the household. Regular household members who were temporarily away from home were included as household members and interviewed during a later visit.

Survey instrument and data collection

The survey instrument was a questionnaire that was adapted and adopted for repeated survey of the general population as described in *Evaluation of a national AIDS programme: a methods package* [7]. It consisted of 2 parts, Part A, the household schedule, the purpose of which was to identify all persons eligible for the individual interview and Part B, the individual questionnaire for men and women aged 15–49 years. This was divided into 8 sections: (1) identification and demographic data, (2) background characteristics, including source of information on health issues and media, (3) marriage and regular partners, (4) non-regular commercial sex, (5) condoms, (6) STDs and health issues (divided into 2 parts, one for men only and the second for women only), (7) knowledge of AIDS, (8) risk perception, behaviour change and attitudes to persons with HIV/AIDS.

The average time taken to complete each questionnaire was 20–25 minutes. The questionnaire was used as a verbatim instrument after translation into Arabic and being pre-tested on 100 people.

The interviewers worked in teams of 1 male and 1 female in addition to the supervisor. Male respondents were interviewed by men and female respondents by women.

Results

Population characteristics, sample validity and sampling

The sample consisted of 3200 respondents; 58.6% (1876) were males, giving an overall male/female ratio of 1.4.

The average number of respondents per household (2.2) was low: in many cases, after 1 person in the family answered the questions and discovered that they were very sensitive and touched on very personal issues, the rest of the family apologized for not continuing. It was estimated by supervisors and interviewers that around 15% in the cities and up to 25% elsewhere refused to participate in the study despite the anonymous nature of the exercise. However, the overall response rate per household was better than the 1.41 reported in 1996.

The sample represents well a relatively young population: 64.5% were < 35 years old (Table 1). The great majority, 96.0% (3073), had attended school, however, 10.7% (343) had attended only primary school, so if literacy is considered as being educated beyond primary school, then 14.7% would be considered illiterate (comparable to the illiteracy rate often reported for Lebanon, i.e. about 10%–15%), mostly in the age category 45–49 years. These rates were similar to those in the 1996 survey. However, a higher percentage of people, 7.1% compared to 6.3% in 1996, reported that they could not read (Table 2).

Table 1 **Marital status and sex, age and education level of respondents, 2004**

Characteristic	Total		Married	
	No.	%	No.	%
Total[a]	3200	100.0	760	23.8
Sex				
Male[b]	1876	58.6	503	26.8
Female[c]	1324	41.4	257	19.4
Age (years)				
15–24	1040	32.5	43	5.7
25–34	1024	32.0	255	33.6
35–44	768	24.0	294	38.7
45–49	368	11.5	168	22.1
Education level				
No school	127	4.0	37	29.1
Primary	343	10.7	125	36.4
Complementary[d]	795	24.8	240	30.2
Secondary	786	24.6	176	22.4
University student	286	8.9	1	0.3
University graduate	863	27.0	181	21.0

[a] *1996: 1504 (100.0%) and 581 (44.2%) respectively.*
[b] *1996: 760 (50.5%) and 243 (32.0%) respectively.*
[c] *1996: 744 (49.5%) and 338 (45.4%) respectively.*
[d] *Age 14–16 years.*

Media and information on health issues

The highest daily rate for media use was for TV, 97.6%. Health articles or reports proved to be almost equally read in newspapers and magazines, 32.5%, as listened to on the radio, 31.3%, however health reports were mostly watched on TV, 54.4%, and this was considered the best primary source of health information, 33.6% (Table 2).

Marriage and regular partnerships

We found 52.0% of the sample had ever been married compared to 44.2% in 1996 (Table 3). Just under half of those ever married were still married at the time of the study compared to 87.4% in 1996. Females got married earlier than males: 35.6% of females were married before the age of 20 years compared to only 5.0% of males

Table 2 **Selected sociodemographic parameters, 1996 and 2004**

Variable	1996 (*n* = 1504)	2004 (*n* = 3200)		*P* for 90% CI
	%	No.	%	
Education				
Attended school	97.8	3073	96.0	0.0008
Primary school only	11.6	343	10.7	NS
Low education	14.0		14.7	NS
Cannot read	6.3	277	7.1	NS
Married	44.2	760	23.8	> 0.0001
Mobility[a]	5.3		1.3	> 0.0001
Sexually active	63.8		66.8	0.0222
Media daily use				
TV	88.2	3124	97.6	> 0.0001
Radio	63.8	1355	42.3	> 0.0001
Magazines	27.3	594	18.6[b]	> 0.0001
Health reports				
Read	49.1	996[c]	33.5	> 0.0001
Listen to	41.8	796[d]	31.3	> 0.0001
Watch	56.9	1700[e]	54.4	0.0668
Best source of health information	79.3		54.4	
Television	39.1	1075	33.6	> 0.0001
Newspaper	27.8	522	16.3	> 0.0001
Radio	12.4	144	4.5	> 0.0001
Married < 20 years				
Females	44.2	272[f]	35.6	–
Males	9.6	45[g]	5.0	–

[a]People living ≤ 1 year in the community; [b]20% of literate; [c]n = 2973 newspaper/magazine readers; [d]n = 2543 radio listeners; [e]n = 3124 viewers; [f]n = 764; [g]n = 901.
CI = confidence interval; NS = not significant.

(Table 2). The comparable figures for 1996 were 44.2% and 9.6%.

Unmarried respondents comprised 76.2% compared to 61.4% in 1996 (Table 3). Just over half the males 56.3% (1373) were not married, more living in urban areas and more with university education. Early marriage (under age 20 years) was reported more among females (272/764; 33.6%), among whom the higher the level of education the lower the rate of marriage.

Sexual activity was experienced early in life: 36.0% first had sexual intercourse at ≤ 20 years in 2004 compared to 64.5% in 1996 (Table 4). Among the males, if we include those who were ever married and those who were unmarried but sexually active, in 2004 70.5% of males were sexually active; among females this was 61.6% (Table 5). The corresponding values for 1996 were 73.2% for males and 54.3% for females.

Therefore, a good proportion of sexually active, unmarried young people, mostly males, were engaging in sex with a regular partner (13.0%), multiple partners (19.4%

Table 3 **Marriage and partners according to sex (1996 and 2004) and age (2004) in the sexually active participants**

Variable	Ever married		Now married[a]		Regular partner apart from spouse		Ever had sex outside regular relationship		Polygamy[b]		Multiple partners[c]		Belief in fidelity of partner[d]		Used condom with partner[d] in last intercourse		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
1996 (n = 1504)																	
Sex																	
Male	280	36.8	243	86.8	168	30.2	276	36.3	10	4.1	57	33.9	311	75.7	136	33.1	760
Female	385	51.7	338	87.8	17	4.2	19	2.6	7	2.1	3	17.6	270	76.1	48	13.5	744
Total	665	44.2	581	87.4	185	19.3	295	19.6	17	2.9	60	32.4	581	75.8	184	24.0	1504
n	1504		839		960		665		581		185		766		766		
2004 (n = 3200)																	
Sex																	
Male	901	48.0	503	55.8	244	18.4	422	22.5	19	3.8	52	21.3	578	77.4	224	30.0	1876
Female	764	57.7	257	33.6	34	4.2	51	3.9	4	1.6	2	5.9	145	49.8	35	12.0	1324
Total	1665	52.0	760	45.6	278	13.0	473	14.9	23	3.0	54	19.4	723	69.7	259	25.0	3200
n	3200		1535		2138[f]		1665[e]		760[f]		278		1038[g]		1038[h]		
Age (years)																	
15–24	113	33.4	43	38.1	87	25.7	225	66.6	1	2.3	16	29.6	72	52.2	45	34.6	338
25–34	541	72.3	255	47.1	118	15.8	207	27.7	8	3.1	30	55.6	240	64.3	93	24.9	748
35–44	665	94.9	294	44.2	57	8.1	36	5.1	5	1.7	6	11.1	267	76.1	88	25.1	701
45–49	346	98.6	168	48.6	16	4.6	5	1.4	9	5.4	2	3.7	144	78.3	33	17.9	351
Total	1665	77.9	760	45.6	278	13.0	473	22.1	23	3.0	54	100.0	723	69.7	259	25.0	2138

[a] *As percentage of ever married.*
[b] *As percentage of now married.*
[c] *As percentage of those having a regular partner (not married).*
[d] *Spouse or regular partner.*
[e] *901 males, 764 females.*
[f] *503 males, 257 females.*
[g] *Sexually active.*
[h] *Have regular partnership; 747 males, 291 females.*

of the 278 having regular partners), or casual partners (16.8%) (Tables 3 and 5).

Among those who had a regular partner apart from the spouse, most were educated beyond primary school level. The highest rates of condom use in this group were for students, 36.8% (14 out of 38) and university graduates, 33.7% (87 out of 258) (data not shown).

Younger respondents (< 25 years) who were not married and were sexually active constituted the category that had the highest rate of condom use during their last sexual intercourse, 34.6% (45 of 130 who ever used a condom), and the highest rates of having a regular partner, 25.7% (Table 3) (comparable data from 1996 not available).

Males showed a complete dominance in having sex outside marriage and having multiple partners (Table 3). Using a condom with a regular partner was also much more frequent in males. However, it was evident that the rate of sexual activity, for both non-married and married, was much higher than the rate of condom use.

Casual partners and commercial sex

As shown in Table 5, 16.8% (360 out of 2138) of the sexually active respondents had had casual sex in the previous 12 months in the 2004 survey compared to 22.4% (215 of 960) in 1996. These were predominantly young, urban males, mostly students. Around two-thirds

Table 4 **Age of first sexual intercourse in sexually active participants**

Age (years)	1996		2004	
	No.	%	No.	%
≥ 10	16	1.7	1	< 1.0
11–14	152	15.8	36	1.7
15–20	451	47.0	711	33.3
21–25	162	16.9	169	7.9
26+	64	6.7	54	2.5
Did not respond	115	12.0	1167	54.6
Total	960	100.0	2138	100.0

Table 5 **Casual sex in the previous 12 months according to sex and age of respondent, 1996 and 2004**

Variable	Sexually active[a]		Casual sex				Commercial sex				Used condoms				Had sex at first meeting			
	1996	2004	1996		2004		1996		2004		1996		2004		1996		2004	
	No.	No.	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sex																		
Male	556	1323	207	37.2	324	90.0	74	35.7	106	32.7	144	69.6	234	72.2	62	30.0	88	27.2
Female	404	815	8	2.0	36	10.0	4	50	7	19.4	5	62.5	24	66.7	2	25	7	19.4
Age (years)																		
15–24		338			128	37.9			28	21.9			78	60.9			29	22.7
25–34		748			152	20.3			57	37.5			116	76.3			44	28.9
35–44		701			60	8.6			17	28.3			50	83.3			15	25.0
45–49		351			20	5.7			11	55.0			14	70.0			7	35.0
Total	960	2138	215	22.4	360	16.8	78	36.3	113	31.4	149	69.3	258	71.7	64	29.8	95	26.4

[a] *Ever married + ever had sex while not married.*

(238 of 360) had ≥ 2 partners. Just over 30% of those involved with non-regular partners stated that they gave or received money or gifts in exchange for sex (commercial sex); for 26.4% of these the sexual encounter was during the first meeting.

Age was a prominent factor in casual sex: in 2004 37.9% of the sexually active respondents aged 15–24 years had casual sex and this decreased with age (Table 5). However, the proportion having commercial sex and sex at their first meeting generally increased with age. The corresponding figure for 1996 was 29.8%.

Condom use

Within marriage or regular partnership, the use of condoms at the last intercourse was only 25.0% in 2004, similar to the 23.7% in 1996 (Table 3). Condom use was relatively much lower in the youngest age group (Table 5). Although 84.1% had heard about condoms, only 15.3% overall had used one, which compares unfavourabl with the 95.1% and 32.5% respectively in 1996 (Table 6). Compared with the 1996 survey, we noted a decrease in rates for all parameters except for having seen a condom and use with regular and with non-regular partners (Tables 6 and 7).

Sexually transmitted disease

Self reported symptoms of STD (pain during urination or discharge from penis) in the previous 12 months were reported by 12.4% of sexually active males in 2004 (Table 8), a statistically significant increase compared to 1996 (5.6%) ($P < 0.0001$). They were almost equally distributed between rural 9.9% (68 of 689) and urban 8.4% (53 of 634). A higher number of episodes were reported in those aged ≥ 35 years (Table 8).

Just over 35% of those reporting having symptoms of STD sought professional treatment in 2004, while 15.1% said they did nothing (Table 9); corresponding values for 1996 were 78.5% and 16.7%. Attitude towards partners varied greatly, 37.2% told their partners about their suspected STD and 43.8% took preventive or curative measures (mainly refraining from sexual intercourse) in 2004; this compares poorly with 59.5% and 73.8% respectively in 1996. What aggravated risky behaviour was the presence of recurrent episodes in many cases (19.0% in 2004 and 47.6% in 1996). There were also a number of respondents who had multiple, non-regular sex partners, and condoms were only occasionally used as a protective measure.

Of the sexually active women participating in the study, 13.9% had had a child in the previous 2 years, 92.4% of whom had seen a health worker. This was excellent coverage since 98% of these reported having had an examination of the vagina.

Knowledge of AIDS

Awareness about HIV/AIDS was 98.2% in 2004. Those who were not aware of HIV/AIDS were predominantly non-schooled, female, and lived in the South or the Bekaa.

Table 6 **Comparison of condom knowledge, 1996 and 2004**

Knowledge item	1996 (n = 1504)		2004 (n = 3200)		P for 90% CI
	No.	%	No.	%	
Heard about condoms	1430	95.1	2692	84.1	< 0.0001
Seen a condom	1071	71.2	2558	79.9	NS
Knowledge of outlets	1355	90.1	2398	74.9	< 0.0001
Used a condom	489	32.5	490	15.3	< 0.0001

CI = confidence interval; NS = not significant

Table 7 **Condom use by sexually active participants, 1996 and 2004**

Use category	1996			2004		
	Sample size	No.	%	Sample size	No.	%
Used by the sexually active	960	489	50.9	2138	312	14.6
Used with regular partners	778	184	23.7	760	246	32.4
Used with non-regular partners	215	149	69.3	363	257	70.8
Used by those who self report STD symptoms	42	13	31.0	152	22	14.5
Know that condoms protect from HIV	1496	1326	88.6	3141	2743	87.3

STD = sexually transmitted disease.

A comparison of the prevention indicators in Lebanon in 1996 and 2004 is shown in Table 10. Knowledge of preventive practices and condom availability had statistically significantly deteriorated and the rate for self-reported STDs had significantly increased.

Knowledge of valid practices such as staying faithful to one partner, use of clean needles and syringes or using condoms as means of protection from HIV/AIDS had worsened since the 1996 survey and the situation regarding invalid measures had also deteriorated (Table 11). The most common misconception in both surveys was to avoid public toilets. The next most common was to avoid insect bites, 27.7% in 1996 and 27.3% in 2004.

Effect on beliefs, attitudes and lifestyle in people who had heard about HIV/AIDS

Our data showed that 6.8% of the participants knew someone with HIV/AIDS in 2004 (Table 12). Nevertheless, 67.5% perceived no risk of being infected with HIV. Only 1.1% felt they had a good chance of acquiring the infection. Actually, only 24.1% reported having made behavioural changes because of HIV/AIDS, and 20.2% of those had made the changes in the previous 12 months.

The perception of being protected against contracting HIV was greater among females (Table 12). They reported fewer changes in sexual behaviour than males, 19.8% compared to 27.1%, and they were more willing to care for a family member with AIDS: 65.8% compared to 55.2%.

About two-thirds stated that people having HIV/AIDS should be allowed to continue their work and not be discriminated against in the workplace (Table 12). Positive attitudes were not dependent on the respondents' education or area of residence. In contrast, however, only 29.1% believed that HIV positivity should not be revealed. These questions were not included in the 1996 survey, so it was not possible to make a comparison.

Table 8 **Self-reported symptoms of sexually transmitted disease in sexually active men in Lebanon during the previous 12 months according to age, 2004**

Age (years)	Total	Symptomatic[a]	
	No.	No.	%
15–24	**225**	26	11.6
25–34	**459**	45	9.8
35–44	**385**	57	14.8
45–49	**254**	36	14.2
25–49	**1098**	138	12.6
Total	**1323**	164	12.4

[a]*Pain during urination or discharge from penis.*

Table 9 **Comparison of attitude and practices in men reporting symptoms of sexually transmitted disease (STD), 1996 and 2004**

Variable	1996 (*n* = 760)		2004 (*n* = 1323)		*P* for 90% CI
	No.	%	No.	%	
Self-reported episode of STD	42	5.6	152	11.5	0.0001
Action					
Sought professional treatment	33	78.5	57	37.5	< 0.0001
Recurrent episode	20	47.6	23	15.1	0.0001
Advice of a friend	20	47.6	35	23.0	0.0003
Did nothing	7	16.7	23	15.1	NS
Used self-medication	7	16.7	33	21.7	NS
Attitude to partner					
Took preventive measures	31	73.8	53	34.9	< 0.0001
Informed partner	25	59.5	45	29.6	< 0.0001
Refrained from sexual intercourse	23	54.8	120	78.9	NS
Used condoms	13	30.9	30	19.7	0.0023
Advised partner to have medical consultation	7	16.7	6	3.9	0.0001

CI = confidence interval; NS = not significant.

Discussion

It was clear from the pre-testing stage that we were dealing with a very sensitive issue and that we were exploring the intimate personal life of the respondents. This was reflected in the low average number of respondents per household (2.2). However, the overall response rate was better than the 1.41 per household reported in 1996 [5]. This increased rate may be a result of the increased awareness and perceived risk of the problem among the population.

Many families were young and did not have children in the eligible age group at home. This is evident from the relatively higher numbers in the young age groups in the sample and the higher percentage of marriages in the age group 25–34 years [5].

Media and information on health issues

Health programmes were mostly watched on TV, which was considered the best primary source on health information. There was an overall decrease with respect to

Table 10 **Comparison of HIV/AIDS prevention indicators, 1996 and 2004**

Indicator	1996			2004			*P* for 90% CI
	Total	No.	%	Total	No.	%	
Knowledge of preventive practices	1504	1427	94.9	3200	2743	85.7	< 0.0001
Condom availability outside city centre	1504	1355	90.1	3200	2333	72.9	< 0.0001
Condom use with non-regular sex partners	205	145	70.7	361	257	71.2	0.4562
Non-regular sexual partners	825	205	24.8	2138	361	16.9	< 0.0001
Self-reported STD (men)	760	42	5.5	1323	121	9.1	< 0.0001

CI = confidence interval; STD = sexually transmitted disease.

Table 11 **Knowledge of HIV prevention methods, valid and invalid**

Method	1996 (n = 1496)		2004 (n = 3142)		P
	No.	%	No.	%	
Valid					
Using clean needles for injections	1447	96.7	2702	86.0	–
Staying faithful to one partner	1398	93.4	2747	87.4	–
Using condoms during sexual intercourse	1326	88.6	2743	87.3	–
Invalid					
Avoid public toilets	439	29.3	1028	32.7	0.0001
Avoid insect bites	415	27.7	858	27.3	NS
Avoid sharing food with someone who has HIV/AIDS	210	14.0	638	20.3	< 0.0001
Avoid touching someone who has HIV/AIDS	148	9.9	431	13.7	0.0001
Have a good diet	53	3.5	258	8.2	< 0.0001

NS = not significant.

newspapers and magazines as well as the radio. Similar results were found in an Iranian study in 2002 [*8*].

Marriage and regular partnerships

Almost 70% of respondents were sexually active. Males, in general, got married at later ages than females. If we consider those who have had sex and were not married and those who had regular partners apart from spouse, especially since some had multiple partners, the rates are close to those in some studies in other countries, for example, 13% in St. Petersburg in Russia [*9*]. Since there was a high belief in the fidelity of the partner, the risk for sexual transmission of HIV could be exacerbated.

Cumulatively, all the risk factors will be predisposing to HIV transmission among married couples, especially among the young and middle-aged couples. The risk is augmented when the time of first sexual experience is taken into consideration. About one-third first experienced sexual intercourse before the age of 21 years and more than half did not respond. This can be compared with reports on young people in the United States of America, which indicate that over two-thirds of the youth participated in heterosexual intercourse prior to age 17 years [*10*]. Such behaviour is associated with higher risk, and young men rapidly evolve towards engaging in risky behaviours, probably an indication of the education and awareness vacuum in which young people "come of age" in Lebanon and elsewhere [*10,11*]. Therefore, all parameters that add to the risk of acquiring HIV infection were present to a significant extent.

Condom use

Although 16.8% of the sexually active people were at risk of HIV infection in 2004, only 71.7% used condoms in relations with non-regular partners, behaviour which increases the risk of HIV transmission.

More work should be done with a view to promoting a basic change in the attitude of younger males towards condom use—students had the highest rate for casual sex but the lowest rate for condom use—

Table 12 Relationship between sex and attitude, behaviour and practices with regard to HIV/AIDS, 2004

Sex	Knows someone who has HIV/AIDS		No chance of contracting HIV		Changed sexual behaviour				Willing to take care of family member with AIDS		Keep positive status secret		HIV/AIDS patients should continue working		HIV/AIDS patients should receive more health care		Total
					Overall		In past 12 months										
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	N
Male	114	6.2	1188	64.3	501	27.1	90	18.0	1020	55.2	519	28.1	1200	65.0	1394	75.5	1847
Female	99	7.6	934	72.1	257	19.8	63	24.5	852	65.8	395	30.5	973	75.1	936	72.3	1295
Total	213	6.8	2122	67.5	758	24.1	153	20.2	1872	59.6	914	29.1	2173	69.2	2330	74.1	3142

and making condoms more available in suburban and rural areas. In addition, the issue of "fidelity of the partner" should be addressed. No clear-cut conclusion could be reached with regard to females because of the small number that used condoms. It is of interest to point out that no one mentioned the cost of condoms as a barrier.

Despite the fact that 87.3% of the participants knew that condoms could protect from HIV/AIDS, less than 15% of those who were sexually active had used them, a great deterioration from about 50% in 1996. Although the utilization rate was low, it was still better than in some studies, for example, the utilization rate was only 6% in one American study, and many of the respondents did not believe condoms protected against AIDS transmission [*12*].

The prevention indicators related to condoms showed that they were available and accessible, but to a lesser extent than in the 1996 survey. There is no doubt about the availability of condoms in the market (pharmacies, supermarkets, gas stations) but the total number available would constitute only a small fraction of the projected needs for the sexually active population fraction.

Sexually transmitted diseases and health issues

Significant efforts should be deployed towards proper management of STDs since in many cases those reporting having symptoms were not seeking professional treatment. Attitude to the partner had also worsened for many indicators.

Similar efforts should be oriented towards the promotion of proper protective measures, especially the use of condoms since they were not used as the first choice in prevention methods in risky behaviours.

More effort should be deployed to encourage all those who suspected they may have STD to seek professional help since

over 20% still said they had sought the advice of a friend or a relative first rather than professional advice. Comparing the 2004 data with that of 1996 survey, we noted an increased reporting rate and a statistically significant decrease in recurrent episodes. This could be a sign of increased awareness and improved management since fewer said they would get advice from a friend or do nothing. However, more people would use self-medication rather than get professional advice. This could be an indication of low accessibility to health care or particularly inadequate health-care-seeking behaviour.

Knowledge of AIDS

The survey results indicated that awareness of AIDS had become almost universal in Lebanon by 2004. Nevertheless, over one-third of the participants endorsed some inappropriate practices for prevention and the rates for most of these misconceptions had deteriorated significantly since 1996. Clearly, inappropriate and invalid practices should be tackled in future campaigns. In addition, some work should be deployed to clarify another important misconception: the fact that persons who have HIV/AIDS do not always show symptoms.

The respondents had a low perception of personal risk: only a quarter had introduced behavioural changes in their lifestyle during the previous year. This perception of low vulnerability was greater in females and is probably reflected in their more positive attitudes towards the HIV/AIDS patients. The only negative point in this context was the view of the majority of respondents that HIV status should be revealed. This issue of confidentiality is still raising debate, and needs to be addressed in future campaigns.

Comparison of the prevention indicators in 1996 and 2004 shows a decrease in awareness, knowledge of protection methods and belief in personal protection. This indicates that a certain level of misconception was still prevailing in the population, which could lead to negative attitudes towards HIV/AIDS patients. The data suggest that current education programmes regarding sex and AIDS are not impacting on the Lebanese people. Similar findings were encountered in a Russian study [*9*].

HIV/AIDS effect on beliefs, attitudes and lifestyle

The perception of personal risk could have been the basis for many risky behaviours and lifestyles adopted by a significant proportion of respondents (casual sex, not using condoms, multiple partners, etc.). Coupled with the high rate of belief in self-protection, this did not, as expected, lead to significant behaviour changes. This was a reflection of the respondents' own perception of low vulnerability to infection generally in those who were well educated, young, and well aware of the methods of protection against the disease.

Recommendations

Taking into consideration the diversity of the Lebanese society and the differences demonstrated in this study, interventions should be more targeted, addressing specific communities and groups for better outreach and impact.

Risk perception should be addressed more in future campaigns, along with misconceptions. The concept of "safe sex" needs to be emphasized and prevention (condoms) need to be better promoted and made more accessible.

More studies need to be done to assess the prevalence and type of STDs, with emphasis on determinants of sexual behaviour as well as health seeking behaviour in patients with STDs.

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Relationship of pharmacist interaction with patient knowledge of dispensed drugs and patient satisfaction

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العلاقة بين تفاعل الصيدلي مع معارف المرضى عن الأدوية الموصوفة لهم وإرضائهم

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الخلاصة: أجرى الباحثون دراسة استباقية تناولت مهام الصيادلة ومعارف المرضى وإرضاءهم في 35 من الصيدلات المجتمعية التي تم اختيارها عشوائياً في تبريز في جمهورية إيران الإسلامية. وقد استحق التفاعل الإجمالي لدى الصيادلة حرزاً وسطياً مقداره 3.05 من أصل 5. وقد استحق تقديم توجيهات كتابية حول استخدام الدول أعلى الأحراز 0.93 من أصل 1. كما أحرز المرضى 3.18 من 5 للمعارف حول أدويتهم. وكان هناك ارتباط وثيق بين معارف المرضى عن الأدوية المصروفة لهم وتفاعل الصيادلة (معامل الارتباط= 0.95). وكان وسطي الوقت الإجمالي لتقديم الوصفة 7.6 دقائق إلا أن 1.4 دقيقة فقط قضاها الصيادلة في توعية المرضى. وإن تفاعل الصيادلة مع المرضى يزيد من معارف المرضى حول ما يُصْرَف لهم من أدوية ويزيد من رضاهم عن أنشطة الصيادلة.

ABSTRACT A prospective survey of pharmacists' tasks and patients' knowledge and satisfaction was conducted in 35 randomly selected community pharmacies in Tabriz, Islamic Republic of Iran. The total pharmacist interaction received a mean score of 3.05 out of 5. Providing written directions for use attained the highest score of 0.98 out of 1. Patients scored 3.18 out of 5 for knowledge about their medicines. There was a close correlation between patients' knowledge of dispensed drugs and pharmacist interaction (r = 0.95). Mean total prescription filling time was 7.6 min, but only 1.4 min was spent on pharmacist–patient counselling. The interaction between pharmacist and patient increases patients' knowledge about dispensed medicines and their satisfaction with the pharmacist's activities.

Rapport entre le dialogue pharmacien-patient, les connaissances du patient relatives aux médicaments délivrés et la satisfaction de ce patient

RÉSUMÉ Une étude prospective sur le rôle des pharmaciens et sur les connaissances et la satisfaction des patients a été réalisée dans 35 pharmacies de secteur sélectionnées au hasard à Tabriz (République islamique d'Iran). Le dialogue avec le pharmacien a obtenu un score moyen de 3,05 sur 5. L'écriture par le pharmacien de la posologie a donné lieu au score le plus élevé, à savoir 0,98 sur 1. Le score de 3,18 sur 5 a été atteint sur le point des connaissances des patients concernant leurs médicaments. Il existait une étroite corrélation entre les connaissances des patients sur les médicaments délivrés et le dialogue avec le pharmacien (r = 0,95). La durée totale moyenne de l'exécution de l'ordonnance était de 7,6 minutes, mais le pharmacien ne consacrait que 1,4 minute à dispenser des conseils aux patients. Le dialogue entre le pharmacien et le patient permet à celui-ci d'avoir une meilleure connaissance des médicaments délivrés et augmente sa satisfaction vis-à-vis de la fonction du pharmacien.

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Introduction

Rational use of drugs, which has become an important concern of the World Health Organization (WHO) and many countries in recent years, is critical for effective treatment [*1,2*]. Dispensing is one of the main steps in pharmacotherapy and has an important influence on the rationality of drug use. The process necessitates the correct understanding of the instructions of the prescriber and the precise preparation and labelling of the medicine to increase patients' adherence with treatment. These elements are so crucial that any negligence could lead to treatment failure or put the care and health of the patient at risk [*3,4*]. Appropriate and adequate knowledge of prescribed medicines is essential for patient adherence. The quality of labelling, the time spent informing the patient and the communication skills of the dispenser all contribute to the patient compliance rate and therefore patient outcomes [*5,6*]. Furthermore, prescribing and dispensing errors are often discovered by pharmacists during the consultation with patients [*7*].

Patient satisfaction is also a key aspect of health care, and it has been shown that there is a strong relationship between communication and patient satisfaction [*8*]. It is suggested that the attitude of the pharmacist and specialized activities such as providing information and explanations and the convenience of opening hours are not only judged to be important by patients but also influence their satisfaction [*9,10*]. The ultimate goal of patient satisfaction is to improve patient care. Satisfied patients are more likely to adhere to their regimens and exhibit greater continuity with regard to appointments.

Pharmacists are responsible for continuously evaluating the success of the care they provide to ensure quality processes and outcomes. Interaction with the pharmacist can change patients' expectations and satisfaction in areas directly related to pharmaceutical care [*11*]. Pharmacy nowadays is moving toward a more intervention-oriented practice. Pharmacists who work as a team with the patient providers can assist in maximizing clinical benefits and decreasing negative outcomes [*12*].

In the Islamic Republic of Iran the general presumption is that a pharmacist is only a medicine provider, with no real impact on patient outcomes. On the other hand, polypharmacy, inappropriate use of medications, short consultation times and poor patient compliance are common patterns of irrational use of drugs in this country [*13,14*]. Previous Iranian studies have tended to focus on the prescribing pattern of medicines and have rarely evaluated the pharmacy itself or the work of the pharmacist. To answer the question whether patient satisfaction and information about drugs, as key indicators of patient outcomes, are enhanced by effective pharmacist–patient interaction, we aimed to assess the quality of Tabriz pharmacy services by measuring aspects of pharmacist interaction and to assess patient knowledge of the dispensed drugs and satisfaction with the interaction.

Methods

Study design

A prospective study was conducted with a sample of 700 outpatients who received pharmaceutical care from 35 out of 181 community pharmacies in Tabriz from December to March 2005 (20 patients from each pharmacy). The pharmacies and patients were selected randomly. Patients were informed about the study objectives and procedures and that the data collected would be used only for the stated research

purpose. A prestudy assessment was made of the study procedures and data collection forms in 10 community pharmacies, using 50 outpatients. After making changes in the procedures and questionnaires based on the comments of the survey team, a pilot study was carried out in a pilot pharmacy using 90 questionnaires from 90 outpatients.

Structured observation

A structured observation was carried out by a trained and experienced observer, who observed each pharmacist–patient interaction and the pharmacy activities. To minimize observer bias, the observer was instructed not to interfere with the consultations or dispensing process. The pharmacy staff were not informed about the nature of the survey. The observer recorded the time that the patient spent at the dispensing counter (total dispensing time) and the time during which the patient was being informed about the dispensed medicines (consultation time).

To measure pharmacist–patient interaction we created 5 dichotomous-type questions about specific pharmacist tasks. The questions enquired whether the pharmacist: asked about the patient's history and communicated with the patient verbally; provided written directions for use on the drug package; provided verbal instructions for use, if possible in laymen's terms; ensured the patient's understanding of the instructions; and answered the patient's questions about the medications in a considerate way. Questions were scored as task performed (score 1) or task not performed (score 0). To calculate the performance level of each community pharmacy in a specific task the scores were averaged for the 20 patients (maximum score per task). The total pharmacist interaction score for each pharmacy was calculated by summing the task mean scores (maximum score 5 per pharmacy).

Patient knowledge

Using an interview questionnaire, the same patient's knowledge of dispensed drugs was registered by a second survey team pharmacist, who assessed the patient's recall of: the name of dispensed drugs; the dosage; the duration of treatment; the side-effects; and the reason for the medications. Each attribute was scored as correct (score 1) or incorrect (score 0). For each attribute patient's knowledge scores were averaged (maximum score 1 per attribute).

To calculate the overall patient knowledge score, the mean scores of attributes for each pharmacy were summed. Therefore, a total patient knowledge score of 5 indicated patient's correct information about all the questions asked. Misspelling of the names of drugs was disregarded and general explanations about the reasons for medication were considered correct. To assess the influence of pharmacy facilities on patients' satisfaction and knowledge, waiting place area and height of dispensing counter of pharmacies were also measured.

Patient satisfaction

Five questions enquiring about the overall and differential satisfaction of patients with different aspects of pharmacy services were located at the end of the interviewing questionnaire. The questions asked about the patient's satisfaction with: the waiting time for prescription filling; the pharmacist's explanation and consultation; the availability of the drugs; the prescription costs; and the overall excellence of the services provided. The satisfaction with each item was scored as excellent (score 2), good (score 1) or poor (score 0); range 0–2 points. Scores for questions were summed to produce an overall patient satisfaction score (maximum score 10).

Data analysis

All data were expressed as mean and standard deviation (SD) or mean score and 95% confidence interval (CI). Mean values were compared using the Student *t*-test, as appropriate. Patient knowledge and satisfaction (dependent variables) were correlated against the total pharmacist interaction score and its attributes, dispensing and consultation time, and pharmacy facilities using the Pearson correlation analysis. Stepwise multiple linear regression analysis was employed to discover the most significant factors contributing to pharmacist interaction, patient knowledge and patient satisfaction scores. The factors were selected from among total pharmacist interaction time and its attributes, pharmacy facilities, and dispensing and consultation times. The level of significance in all analyses was set at 0.05. Statistical calculations were performed with either *SPSS*, version 11.5, or *Instat,* version 2, software packages.

Results

To evaluate the physical and functional status of Tabriz pharmacies, we collected 35 observation questionnaires from 35 randomly selected pharmacies. All the pharmacies had at least 1 and a maximum of 5 staff members as dispensers. According to the Iranian Drug Action Law, the pharmacy services should be delivered only in the presence of a pharmacist who has a PharmD degree and is responsible for dispensing the prescribed drugs as well as counselling the customers. At the time of the study, the pharmacist delivered the drug to the patient in 66% of cases and in the rest a pharmacy technician acted as dispenser.

In this study, the overall waiting time for prescription filling was 7.6 (SD 3.0) min, but only 1.4 (SD 1.3) min of that was spent on the pharmacist–patient interaction, which included verbal communication between the pharmacist and patient and providing written directions for use on the drug package. The mean surface area of the waiting place was 14.4 (SD 7.5) m^2 and the mean height of the dispensing counter was 1.16 (SD 0.12) m.

Table 1 shows the mean scores for pharmacist–patient interaction, patient knowledge of dispensed drugs and patient satisfaction with the interaction. The pharmacist interaction received a total mean score of 3.05 out of 5 (range 2.80 to 3.30). The highest contribution to the total interaction score was from the provision of written directions for use on the drug(s) package (mean score 0.98 out of 1). Providing verbal instruction for use to patients, ensuring the patient's understanding of the directions and answering the patient's questions obtained mean scores of 0.68, 0.25 and 0.92 out of 1 respectively. Asking about the patient's history and giving a short introduction attained the lowest mean score, 0.19.

The total mean score for patient knowledge of dispensed drugs was 3.18 out of 5. Recalling the name of the drug(s) (mean score 0.93 out of 1) and duration of treatment (mean score 0.85 out of 1) were the highest contributing factors to the total score. Recall by the patient of the reason for the medication and the correct dosage received lower mean scores of 0.72 and 0.65 respectively. Patient knowledge of the possible side-effects was very poor (mean score 0.01 out of 1).

The total score for patient knowledge of dispensed drugs varied significantly depending on whether the prescription was dispensed by the pharmacist or by a pharmacy staff member ($P < 0.002$). The total mean score for patient knowledge was higher [mean score 3.32 (SD 0.35)] for patients who received their medication from the pharmacist in comparison with those

Table 1 **Mean pharmacist interaction scores and patient knowledge and satisfaction scores in Tabriz community pharmacies**

Dimension/evaluation item	Mean score (95% CI)
Pharmacist interaction score	
Total[a]	3.05 (2.80 to 3.30)
Obtaining patient's history[b]	0.19 (0.12 to 0.26)
Providing written directions for use[b]	0.98 (0.95 to 1.02)
Providing verbal instructions for use[b]	0.68 (0.55 to 0.81)
Ensuring patient's understanding of instructions[b]	0.25 (0.16 to 0.33)
Answering patient's questions about medications[b]	0.92 (0.85 to 0.99)
Patient knowledge score	
Total[a]	3.18 (3.04 to 3.32)
Recalling name of dispensed drugs[b]	0.93 (0.91 to 0.96)
Recalling correct dosage of dispensed drugs[b]	0.65 (0.58 to 0.72)
Recalling duration of the treatment[b]	0.85 (0.81 to 0.89)
Recalling side-effects of dispensed drugs[b]	0.01 (0.00 to 0.02)
Recalling reason for medications[b]	0.72 (0.66 to 0.78)
Patient satisfaction score	
Total[c]	5.20 (4.90 to 5.50)

[a]Maximum score 5; [b]maximum score 1; [c]maximum score 10.
CI = confidence interval.

who obtained it from a pharmacy technician [mean score 2.85 (SD 0.29)]. The estimate for the difference was 0.45 (95% CI 0.18–0.72). However, patient satisfaction was not significantly different comparing those receiving services from a pharmacist [mean score 5.36 (SD 0.86)] and those receiving services from a pharmacy technician [mean score 4.90 (SD 0.66)] ($P = 0.120$).

The effect of the performance level of pharmacies on patient knowledge of dispensed drugs and patient satisfaction was investigated using correlation analysis. The analysis was performed between patient knowledge or patient satisfaction scores as the dependent variable and total pharmacist interaction score or its contributing elements (pharmacists' tasks), total dispensing time, consultation time, surface area of waiting place and height of dispensing counter as independent variables. There was a strong positive relation between the total pharmacist interaction score and patient knowledge ($r = 0.93$; $P = 0.0001$) (Table 2). The degree of satisfaction was also significantly associated with the total pharmacist interaction score ($r = 0.44$; $P = 0.008$). Close positive correlations were observed between patient knowledge of dispensed drugs and some of the specific pharmacist tasks, including mean scores for obtaining patient's history, provision of verbal directions (explanation of labelling) and ensuring patient understanding. Only mean score for provision of verbal directions, however, was associated significantly with the patient satisfaction score ($r = 0.57$; $P = 0.0003$). There was no correlation between patient knowledge or satisfaction scores with the area of the pharmacy waiting room or the height of the dispensing counter ($P > 0.35$). Although patient knowledge of dispensed drugs was not related to the total dispensing time, it was markedly associated with counselling time ($r = 0.64$; $P = 0.0001$). A significant inverse relationship ($r = -0.56$; $P = 0.0005$)

Table 2 **Pearson correlation analysis of factors associated with patient knowledge of dispensed drugs and their satisfaction**

Variable	Knowledge		Satisfaction	
	r (95% CI)	*P*-value[a]	*r* (95% CI)	*P*-value[a]
Pharmacist interaction score				
Total pharmacist interaction score	0.93 (0.86 to 0.96)	0.0001	0.44 (0.12 to 0.67)	0.008
Obtaining patient's history	0.79 (0.62 to 0.89)	0.0001	0.26 (–0.08 to 0.55)	0.132
Providing written directions for use	0.33 (–0.01 to 0.60)	0.054	–0.07 (–0.39 to 0.27)	0.689
Providing verbal instruction for use	0.80 (0.64 to 0.89)	0.0001	0.57 (0.29 to 0.76)	0.0003
Ensuring patient's understanding of instructions	0.84 (0.70 to 0.92)	0.0001	0.32 (–0.01 to 0.59)	0.055
Answering patient's questions about medications	0.35 (0.01 to 0.61)	0.041	0.11 (–0.24 to 0.42)	0.545
Interaction time				
Total dispensing time	–0.01 (–0.34 to 0.32)	0.943	–0.56 (–0.75 to –0.28)	0.0005
Consultation time	0.64 (0.34 to 0.80)	0.0001	0.38 (0.05 to 0.63)	0.025
Pharmacy facilities				
Floor space of waiting area	–0.15 (–0.46 to 0.19)	0.384	–0.06 (–0.39 to 0.27)	0.720
Height of dispensing counter	–0.10 (–0.42 to 0.24)	0.578	–0.08 (–0.40 to 0.26)	0.658

[a] *Two-tailed P-value.*
r = correlation coefficient; CI = confidence interval.

was observed between total dispensing time and patient satisfaction score. Consultation time, however, had a positive and significant influence on patient satisfaction ($P < 0.05$).

In order to identify the factors which were most influential on patient satisfaction and knowledge, stepwise regression analyses were performed between patient satisfaction or knowledge scores as the dependent variable and the possible underlying factors of total interaction score and its attributes, total dispensing time, consultation time, surface area of waiting room and height of dispensing counter as the independent variables (Tables 3 and 4). A significant and marked correlation was observed between pharmacist–patient interaction (beta = 0.82; $P = 0.0001$) as well as pharmacist consultation time (beta = 0.21; $P = 0.005$) and patient knowledge score. Likewise, pharmacist consultation time and waiting room area had positive and significant influences on patient satisfaction ($P = 0.0001$; $P = 0.01$). Again, a significant inverse relationship was identified between total dispensing time and satisfaction score (beta = –0.77; $P = 0.0001$).

Total interaction score, as the underlying factor in patient knowledge, was further analysed through stepwise regression in order to identify the specific tasks with higher promoting effects as the predictors. The most effective tasks in promoting the pharmacist–patient interaction score were provision of verbal instructions (beta = 0.39; $P = 0.0001$) and obtaining patient's history (beta = 0.32; $P = 0.0001$) (Table 5). Provision of written directions was the least effective parameter (beta = 0.09; $P = 0.013$).

Discussion

In this study the mean scores of 3.05 and 3.18 for pharmacist–patient interaction and

Table 3 **Stepwise regression analysis of patient knowledge of dispensed drugs[a]**

Variable	Unstandardized coefficient		Standardized coefficient	*t*-value	*P*-value
	B	SE	Beta		
(Constant)	1.790	0.099	–	18.080	< 0.001
Total pharmacist interaction score	0.426	0.035	0.82	12.006	< 0.001
Consultation time	0.067	0.022	0.21	3.055	0.005

[a]Total patient knowledge of dispensed drugs analysed against total pharmacist interaction score, total dispensing time, dispensing consultation time, floor space of waiting area and height of dispensing counter. Correlation coefficient of multiple regression equation was 0.945; only parameters with P < 0.05 were accepted.
SE = standard error.

patient knowledge represent 61% and 63% of the total scores respectively. Patient knowledge of the dispensed drugs is one of the essential prerequisites for patient compliance with treatment. On the other hand, the quality of the consultation and information provided by pharmacy staff is the important determinant of patient knowledge [*15,16*]. A strong and positive relationship between the pharmacist–patient interaction and patient knowledge and satisfaction in this study confirms the essential role of the pharmacist in promoting patient adherence to medications.

The mean dispensing consultation time in Tabriz was 1.35 (SD 1.3) min. In comparison with the total prescription filling time [7.6 (SD 3.0) min] the consultation time was short, but compared to some other studies the time was relatively good. In a Nigerian study the mean dispensing counselling time was 13 s [*17*] and in a study from Botswana it was 25 s [*4*]. The counselling time during dispensing, which includes verbal communication between the pharmacist and the patient, is an effective indicator of better patient knowledge and satisfaction.

Among the pharmacist tasks, the communicative tasks such as "obtaining patient's history", "providing verbal instructions for use", and "ensuring patient's understanding of instructions" had the most positive relationship with patient knowledge. Although "providing written directions for use" on the drug package attained a high mean score of 0.98 out of 1, it had no significant effect on patient knowledge. This indicates that written directions are useful only when they are accompanied by an explanation. The person dispensing the drugs is in a position to reinforce the information about the medications.

In this study we found that, compared to the general dispensing staff, pharmacists imparted a more satisfactory level of knowledge to patients. This shows that the level of qualification and education of dispensers is one of the main determents of patient knowledge of dispensed drugs. However, patient satisfaction did not differ between patients who received service from a pharmacist or those who received service from a staff member. Patient expectations and attitudes play important roles in their evaluation of a service; therefore we believe that real satisfaction occurs when it matches knowledge. It has been shown that communication with the pharmacist at community pharmacies or communication with the physician during the examination is strongly related to patient satisfaction [*9,18*].

In addition to consultation time, provision of verbal directions by pharmacists considerably influenced patient satisfaction, while total waiting time at the counter had the reverse effect on satisfaction.

Table 4 **Stepwise multiple linear regression analysis of predictors associated with patient satisfaction**

Variable	Unstandardized coefficient		Standardized coefficient	*t*-value	*P*-value
	B	SE	Beta		
(Constant)	5.789	0.284	–	20.351	< 0.001
Total dispensing time	–0.215	0.033	–0.77	–6.476	< 0.001
Consultation time	0.383	0.074	0.61	5.154	< 0.001
Floor space of waiting area	0.036	0.013	0.34	2.771	0.009

Correlation coefficient of multiple regression equation was 0.798; only parameters with P < 0.05 were accepted. SE = standard error.

Total pharmacist interaction score was the most important parameter in increasing patient knowledge, and consultation time was the second most important factor that leads to greater patient knowledge. Although more robust investigation is required to assess the outcome of pharmacy-based intervention on the knowledge and attitudes of patients, this preliminary finding could have interesting implications with regard to the feasibility of effective education for patients through community pharmacies. This is because, with the majority of patients receiving written directions for use, the variation in this task has become limited.

Although obtaining the patient's history and provision of verbal instruction were the most effective factors in increasing the total pharmacist interaction score, it cannot be concluded that they are the prominent factors affecting patient knowledge. Therefore, patient knowledge was directly correlated against specific pharmacist tasks using stepwise regression. The standardized coefficients value of various tasks showed that ensuring patient understanding and provision of verbal drug information were the most effective tasks in promoting patient knowledge. In the interpretation of this result it should be borne in mind that, clearly, ensuring patient understanding is not possible without first providing verbal drug information. Therefore it is only logical to assume that, although ensuring patient understanding is a more significant parameter than provision of verbal drug information according to the statistical analysis, it cannot be concluded that the latter is a less effective factor in promoting patient knowledge.

Patient satisfaction, the other key factor investigated in this study, was influenced by total dispensing time, consultation time and waiting room area in descending importance according to the standardized coefficients. Total dispensing time inversely affected patient satisfaction, whereas patients appreciated consultation time and the waiting room area. Increasing significance level to $P < 0.10$, a fourth parameter (providing verbal instructions to patients) will be permitted in the multiple regression analysis with a positive effect on patient satisfaction.

Conclusions

This study showed that the interaction and consultation of pharmacists with patients increases patient knowledge of dispensed medicines and satisfaction. Communicative tasks had the most positive relationship on patient knowledge and satisfaction. However, writing directions for use on the drug package, which is the routine practice of pharmacists, had no significant effect on

Table 5 **Stepwise regression analysis of total pharmacist interaction score and total patient knowledge score against specific pharmacist tasks**

Evaluation item/variable	Unstandardized coefficient		Standardized coefficient	*t*-value	*P*-value
	B	SE	Beta		
Pharmacist interaction score					
(Constant)	–0.072	0.423	–	–0.170	0.866
Obtaining patient's history	1.284	0.180	0.32	7.127	< 0.001
Providing verbal instructions for use	0.831	0.092	0.39	9.001	< 0.001
Answering patient's questions about medications	1.012	0.140	0.26	7.225	< 0.001
Ensuring patient's understanding of instructions	0.912	0.138	0.29	6.593	< 0.001
Providing written instructions for use	1.172	0.443	0.09	2.646	0.013
Patient knowledge score					
Constant	2.385	0.100	–	23.885	< 0.001
Ensuring patient's understanding of instructions	0.747	0.108	0.46	6.937	< 0.001
Providing verbal instructions for use	0.382	0.071	0.34	5.359	< 0.001
Obtaining patient's history	0.601	0.139	0.29	4.320	< 0.001
Answering patient's questions about medications	0.252	0.109	0.12	2.305	0.028

Correlation coefficients of multiple regression equations were 0.985 for total pharmacist interaction score and 0.964 for total patient knowledge score; only parameters with significance level P < 0.05 were accepted.
SE = standard error.

patient knowledge, indicating that written directions are useful only when they are accompanied by an explanation. The most effective tasks in promoting the pharmacist–patient interaction score were provision of verbal instruction and obtaining patients' history. We also showed that, compared to dispensing by pharmacy technicians, dispensing by pharmacists resulted in a higher level of knowledge in patients.

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Effects of a continuous care model on perceived quality of life of spouses of haemodialysis patients

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تأثيرات نموذج الرعاية المتواصلة على إدراك جودة الحياة لدى أزواج المرضى الخاضعين لتصفية الدم

أبو الفضل رحيمي، فاطمة الحاني، فضل الله أحمدي، محمود غلياف، محمد رضا آخوند

الخلاصة: أجرى الباحثون دراسة شبه تجريبية لعينة عشوائية بسيطة للتعرُّف على تأثيرات تطبيق نموذج الرعاية المتواصلة على جودة الحياة لدى 36 من أزواج المرضى الخاضعين لتصفية الدم في همدان، بجمهورية إيران الإسلامية. وقد ساهم المشاركون في الدراسة في مناقشات جماعية وفي تدريبات حول أسلوب الرعاية المتواصلة، واستكملوا استمارة إدراك جودة الحياة قبل وبعد هذا التدخُّل. وقد لوحظ ازدياد في وسطي الأحراز للأبعاد المادية والاجتماعية والمعرفية وكذلك تلك الخاصة بالسعادة، مع ازدياد يُعْتَدُّ به إحصائياً في إجمالي الأحراز بعد التدخُّل. وكان لتطبيق نموذج الرعاية المتواصلة تأثيرات إيجابية على القائمين على إيتاء الرعاية للمرضى المزمنين.

ABSTRACT We carried out a semi-experimental study with simple randomized sampling to study the effects of applying a continuous care model on the quality of life of 36 spouses of haemodialysis patients in Hamedan, Islamic Republic of Iran. Participants took part in group discussions and training on the continuous care approach and completed the Perceived Quality Of Life (PQOL) questionnaire before and after the intervention. Mean scores on the physical, social and cognitive dimensions, as well as happiness and total scores significantly increased after the intervention. Applying a continuous care model has positive effects on the caregivers of chronic patients.

Effets d'un modèle de soins continus sur la qualité de vie ressentie par les conjoints de sujets hémodialysés

RÉSUMÉ Nous avons réalisé une étude semi-expérimentale sur la base d'un échantillonnage aléatoire simple afin d'étudier les effets de l'application d'un modèle de soins continus sur la qualité de vie de 36 conjoints de sujets hémodialysés à Hamedan (République islamique d'Iran). Les participants ont participé à des discussions de groupe et à des formations sur le concept de soins continus et ont complété le questionnaire sur la qualité de vie ressentie (PQOL) avant et après l'intervention. Les scores moyens relatifs aux aspects physiques, sociaux et cognitifs, de même que le score relatif au bonheur et les scores totaux, ont augmenté de façon significative après l'intervention. L'application d'un modèle de soins continus a des effets positifs sur les aidants de patients chroniques.

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Introduction

Despite improvements in health and medical sciences, the number of people suffering from renal failure has been steadily increasing worldwide, and accordingly the number of haemodialysis (HD) patients undergoing medical treatment has increased. For example, in Germany approximately 156 per million people develop end-stage renal disease each year, with prevalence slightly more than 700 per million [*1*].

Chronic illness affects not only the lives of those suffering from the disease, but also those family members who care for them [*2*]. Caregivers of patients with chronic disease are affected differently depending on the characteristics of the caregiver and the patient [*3*,4]. Family caregivers report missing work, taking personal days and quitting work or retiring early to provide care [*5*]. Caregiving is also an independent risk factor for higher levels of depression [*6*], anxiety and stress [*7*], mental disease, changes in family functioning [*8*] and mortality [*9*].

Studies of HD emphasize patient adaptation to dialysis, yet few studies deal directly with the spouse of the dialysis patient, who is intimately involved with the patient's treatment [*10*]. Caregivers of HD patients may feel a heavy burden because they are obliged to play an important role in supporting patients on dialysis [*11*]. Depression in the caregivers of persons with multiple sclerosis was related to the physical, emotional and health status of the patients at baseline and/or at 12-months follow-up [*12*]. Caregivers of HD patients may experience a significant burden and an adverse effect on the emotional dimension of their quality of life (QOL). Therefore, social support and psychological interventions should be considered to improve caregivers' lives and patients' outcomes [*13*].

Ahmadi has developed a continuous care model for patients with coronary artery disease in the Islamic Republic of Iran (Figure 1) [*14*]. The aim was to establish and maintain a dynamic and continuous care relationship so as to raise awareness about the caring performance and to improve and promote the QOL of the clients. A continuous and effective care relationship isa dynamic, interactive and mutual relationship between the nurse and the patient and his/her family. In the development of such a relationship, both the quality of care and the content, method and nature of the services offered come to the fore. The continuous care model aims to be dynamic/flexible, client/family-oriented, empowering/self-enabling, holistic and collaborative.

In view of the importance of QOL for HD patients, this research aimed to study the effects of applying a continuous care model on the QOL of the spouses of HD patients.

Methods

Study design and sample

We carried out a quasi-experimental study from February to September 2005 of 36 spouses of HD patients in a referral dialysis centre in Hamadan, Islamic Republic of Iran. The participants were selected using simple randomized sampling; the inclusion criteria were the spouses of patients who had undergone HD for more than 6 months and who agreed to enter the study. The study was approved by the ethics committee of Hamedan University of Medical Sciences.

Data collection

Two questionnaires were used. The first collected the spouses' characteristics, such as age, sex, number of family members,

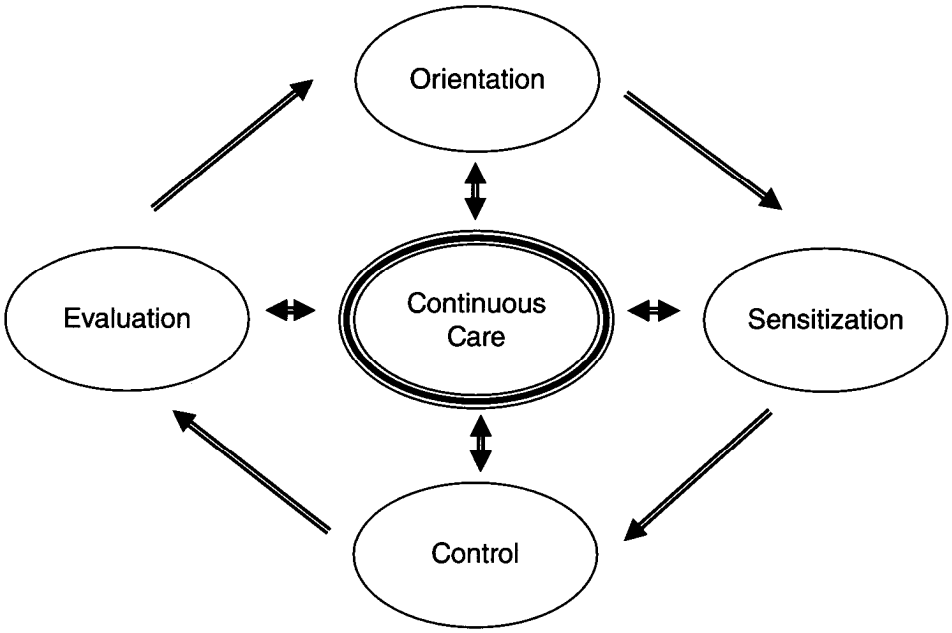


Figure 1 **Stages of the continuous care model [source: *15*]**

education, job, insurance cover and family income level (self-defined). The second was the Perceived Quality of Life (PQOL) questionnaire of Patrick et al. which was aimed at evaluating the QOL of the spouses. PQOL is a 20-item tool, with 19 items in 3 subscales (physical, social and cognitive health satisfaction), plus 1 item for rating happiness, a self-report measure that assesses satisfaction with the major categories of fundamental life needs and categories of functioning [*15*]. All items used a 0–10 scale (very dissatisfied/unhappy to very satisfied/happy). To measure the validity and reliability of the questionnaire, content validity and Cronbach alpha coefficient ($\alpha = 0.9$) were assessed.

Before the intervention participants were familiarized with and briefed on the research goals and how to complete the questionnaires. They repeated the questionnaires 3 months after the intervention.

The intervention was carried out with 36 participants divided into 3 groups. The process proceeded in 4 phases: familiarization, sensitization, control and evaluation.

- The familiarization phase aimed at an accurate diagnosis of problems with HD care, motivating the clients and determining their needs for the care process. The researchers coordinated a meeting which lasted 15–30 minutes during which the patient and his/her family were familiarized with the process, briefed on mutual expectations and advised about the continuation of the care–treatment relationship.
- The sensitization process aimed to engage the patient and the family in the application of the continuous care ap-

proach. Negotiating this phase is critical to the success of the plan. The participants tok part in counselling sessions, group discussions, presentations and question-and-answer sessions (in 3 groups) about the nature and diversity of needs and problems facing the HD patient and his/her family to diagnose new problems, and to sensitize and motivate the clients to persevere with the process. There were 4–6 sessions lasting 1–2 hours. When the problem was not within the scope of the researchers' knowledge and expertise, the patient and the family were referred to a specialist.

- The remaining time was devoted to the continuation of the caring process (control phase), and weekly sessions were held with the participants. Problem checklists were completed regularly with the aim of reviewing and dealing with new care problems, considering the dynamic nature of health and disease, and starting the sensitization phase for new problems.
- The fourth step was the evaluation, which continued throughout all stages of the model.

Analysis

The PQOL score was from 0–100 and categorized as: weak (score 0–33.3, average (score 33.4–66.6) and good (66.7–100). Descriptive, multiple regression and paired *t*-test statistical tests were used to analyse the collected data.

Results

There were 36 research participants: 50% were men; 41.7% were in the age range 40–59 years; 72.2% were illiterate or had only primary education; 44.4% were housewives and 66.7% reported their family income level as poor (Table 1).

Before the intervention, spouses' scores in the PQOL were weak in the physical [mean 33.9; standard deviation (SD) 16.3] and cognitive (mean 12.7; SD 6.3) dimensions, but less so for social relations (mean 57.6; SD 26.7).

After the intervention there was a significant improvement in the mean scores for spouses' QOL in all dimensions of the PQOL: physical ($P = 0.0001$), social ($P = 0.0001$) and cognitive ($P = 0.0001$) (Table 2). There was also a significant increase in the self-reported level of happiness experienced by spouses, from a mean score of 4.7 (SD 2.8) to 5.3 (SD 2.5) ($P = 0.001$) (Table 2). The mean total PQOL score increased significantly from 54.9 (SD 23.4) before to 64.8 (SD 21.9) after the intervention ($P = 0.001$) (Table 2).

Table 1 **Demographic characteristics of the research participants**

Variable	No.	%
Sex		
Male	18	50.0
Female	18	50.0
Income		
Good	0	0
Average	12	33.3
Poor	24	66.7
Age (years)		
20–39	12	33.3
40–59	15	41.7
≥ 60	9	25.0
Education		
Illiterate	12	33.3
Primary	14	38.9
High school	7	19.5
University	3	8.3
Job		
Housewife	16	44.4
Employee	7	19.4
Self-employed	7	19.4
Manual worker	6	16.7

Multiple regression analysis showed no significant difference ($P < 0.05$) in the QOL level (total and by dimension) perceived by the participants in relation to their individual characteristics (e.g. age, sex, income level, education level and job) ($P < 0.05$) (Table 3).

Discussion

Attending to the impact of chronic illness on family members is important because the physical and emotional health of family caregivers has the potential to influence the health, welfare and successful rehabilitation of persons with such illness [2].

Uncontrollable variables in this research were the clients' knowledge, background, prior experience and interest in accepting the model and its details, and the mental and emotional status and cultural roots of the patients' and their families'. Another limitation of the research was that the long-term effects of the process were not assessed.

Table 2 **Mean scores of participants for subscales of the Perceived Quality of Life questionnaire, happiness and the total score before and after the intervention**

Variable	Mean score	SD	*t*-value	*P*-value
Physical				
Before	33.9	16.3	–9.5	< 0.001
After	37.8	15.9		
Social				
Before	57.6	26.7	–12.6	< 0.001
After	66.8	25.2		
Cognitive				
Before	12.7	6.3	–7.4	< 0.001
After	14.7	5.6		
Happiness				
Before	4.7	2.8	–3.5	< 0.001
After	5.3	2.5		
Total				
Before	54.9	23.4	–14.9	< 0.001
After	64.8	21.9		

SD = standard deviation.

Table 3 **Interactive effect of participants' demographic features on their total scores of Perceived Quality of Life questionnaire after the intervention**

Model	Reference category	Parameter	SE	*t*-value	*P*-value
Age		0.38	0.87	0.437	0.666
Sex	Male	20.06	29.87	0.674	0.507
Female		–9.23	36.35	–0.254	0.802
Job	Manual worker	4.62	32.46	0.142	0.889
Housewife		10.30	27.46	0.373	0.713
Self-employed		6.84	20.47	0.334	0.741
Education	Illiterate	28.61	32.74	0.874	0.391
Primary		–2.12	53.84	–0.039	0.969
High school		37.87	48.39	0.783	0.441
University		–64.31	67.35	–0.955	0.349
Income	Poor	59.59	52.79	1.129	0.27
Average		0.38	0.87	0.437	0.666
Good		20.06	29.87	0.674	0.507
(Intercept)		59.59	52.74	1.129	0.27

SE = standard error.

Our findings show that before the intervention the QOL scores of spouses of HD patients were weak (except in social relations). However, the participants' mean score of different dimensions of QOL and their total score of QOL increased significantly after the intervention. Therefore, it can be concluded that the application of the individual, group and family training in the continuous care model promoted improvements in the 3 dimensions of spouses' QOL. Previous studies in the Islamic Republic of Iran showed that applying this caring model had significant effects on QOL of diabetic [*15*] and schizophrenic [*16*] patients.

Previous studies have documented how caring for chronically ill family members or significant others at home influences multiple aspects of caregivers' lives. These effects may include worsened physical health, impaired social and family life, and increased stress, anxiety and depression. A study by Belasco and Sesso on the problems and QOL of the caregivers of HD patients showed that spouses caring for patients suffering from end-stage renal disease had a lower QOL than the general population and were adversely affected in physical dimensions, mental health and joviality [*13*]. Research by Campbell et al. on patients with prostrate cancer revealed that disorders in physical and psychosocial performance are an adverse side-effect of prostrate cancer treatment. Spouses/partners of patients often face multiple demands, including helping the patient cope with side-effects of treatment, such as erectile dysfunction and urinary incontinence, and providing support [*17*].

It is important to understand and distinguish between the attitudes, attributes and psychosocial characteristics of both patients and caregivers to plan and provide effective treatment interventions with the aim of improving the QOL for both groups [*18*].

In conclusion, applying a continuous care model to the care of patients undergoing HD makes a significant improvement to all areas of the spouses' QOL.

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Food sanitation practices in restaurants of Ramallah and Al-Bireh district of Palestine

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ممارسات إصحاح الطعام في مطاعم منطقتَي رام الله والبيرة في فلسطين

عصام أحمد الخطيب، سوزان محمد المتولي

الخلاصة: يُعَدُّ التداول الآمن للطعام في المطاعم من العناصر الأساسية لتخفيف وطأة الأمراض المنقولة بالغذاء. وقد دَرَسَ الباحثان المعارف والممارسات المتعلقة بسلامة الغذاء والتي يتّبعها العاملون في تداول الطعام في مطاعم منطقتي رام الله والبيرة في فلسطين. وقد اتّضح أن نسبة كبيرة من العاملين في المطاعم لم يكن لديهم خبرة سابقة في مطاعم أخرى، وأن 63.4٪ منهم لم يتلقّوا أي تدريب حول سلامة الغذاء وإصحاحه. وتقتصر معظم المطاعم في مخيمات اللاجئين والقرى والمدن على عامل واحد. وتفتقد المطاعم الشروط الأساسية لإصحاح الغذاء وسلامته مثل توافر الماء الساخن في معظم الحالات ومواد التنظيف في بعضها. ولدى معظم العاملين ممارسات تَنُمّ عن سوء النظافة الشخصية. والحاجة قائمة لتدريب مالكي المطاعم والعاملين فيها لتحسين ممارسات ومعايير تداول الطعام.

ABSTRACT Safe handling of food in restaurants is a basic element in the reduction of foodborne illness. We investigated knowledge and practices about food safety by food-handlers in restaurants in Ramallah and Al-Bireh district of Palestine. A high proportion of workers in the restaurants had no previous experience in other restaurants and 63.4% had received no training on food sanitation and safety. Most of the restaurants in the refugee camps, villages and towns had only 1 worker. Restaurants lacked basic conditions for food sanitation and safety, such as hot water in most and cleaning materials in some. Many workers had poor personal hygiene practices. Training is needed for restaurant owners and staff to improve food handling practices and standards.

Pratiques en matière d'hygiène alimentaire dans les restaurants du district de Ramallah-Al-Bireh (Palestine)

RÉSUMÉ L'application de principes de sécurité à la manipulation des aliments dans les restaurants est un élément déterminant aux fins de la réduction des maladies d'origine alimentaire. Nous avons étudié les connaissances et les pratiques en matière de sécurité sanitaire des aliments chez les personnes qui manipulent la nourriture dans des restaurants du district de Ramallah-Al-Bireh (Palestine). Une forte proportion des employés de ces restaurants n'avait jamais travaillé dans un restaurant auparavant et 63,4 % n'avaient reçu aucune formation à l'hygiène alimentaire et à la sécurité sanitaire des aliments. Dans la plupart des restaurants situés dans les camps de réfugiés, dans les villages et les villes, les effectifs se résumaient à une personne. Les conditions élémentaires d'hygiène et de sécurité sanitaire étaient inexistantes ; dans la plupart de ces restaurants, il n'y avait pas d'eau chaude et dans certains, pas de matériel de nettoyage. De nombreux employés n'observaient pas de bonnes pratiques d'hygiène personnelle. Il est nécessaire de former les propriétaires et le personnel des restaurants afin d'améliorer les pratiques et les normes de manipulation des aliments.

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Introduction

Food contamination in restaurants results from proliferation of microbes at unsafe temperatures, handling by infected persons who practice unsanitary habits and direct exposure to microbes that cause the disease [*1*]. Good sanitation practices in restaurants are important not only to reduce direct and cross-contamination of food but also to increase the morale and efficiency of workers and to satisfy the customers from an aesthetic point of view [*2*].

Food-handlers need proper hygiene practices concerning cleanliness of hands and work clothes and correct methods of handling food and utensils. They must not smoke cigarettes while preparing or serving food [*3*] or work in any area of a food service establishment while infected with any communicable disease [*4*]. Training the staff on the principles of handling food in all its stages is important [*5*]. It has been reported that most outbreaks of foodborne diseases result from faulty food handling practices [*6,7*]. For example, improper food handling practices have contributed to approximately 97% of foodborne illnesses in homes and food-service establishments in the United States of America [*8*].

In order to decrease foodborne illness it is essential to gain an understanding of the prevailing food safety practices, beliefs and knowledge of food-handlers [*9*]. This paper presents data on food-handlers' beliefs about food safety and their self-reported practices in restaurants in the Ramallah and Al-Bireh district in Palestine, and the extent to which the workers are complying with the sound principles of food-handling in all its stages.

Methods

The fieldwork ran from December 2004 to March 2005. The study included all 236 restaurants in Ramallah and Al-Bireh district. The sample was 202 (85.6%) restaurants, as 34 (14.4%) refused to participate. Each restaurant was visited, some at a mutually agreed time and others without prior warning, and all available food-handlers, including managers, were interviewed to complete the questionnaire. A food-handler was defined as "any person involved in a food business who handles or prepares food whether open (unwrapped) or packaged (food includes drink and ice)" [*10*]. A total of 308 workers were recruited in restaurants in the following localities: 243 (78.8%) in Ramallah and Al-Bireh cities, 53 (17.2%) in villages and towns, and 12 (3.9%) in refugee camps.

Two semi-structured questionnaires were prepared. The first was for food-handlers and the second was for field observations. Pilot field visits were conducted in 5 restaurants and 8 workers were interviewed, and some modifications were made to the questionnaires. The workers' questionnaire contained personal questions including age and years of experience, daily practices of handling foods, work clothes and hygiene, training and instructions received, as well as questions about insects and rodents present and the general cleanliness of the restaurant. Participants were assured that their responses would be kept in the strictest confidence and would remain anonymous. All the questionnaires were completed and returned during the visit. This method of data collection ensured that the questionnaires were filled out; the participants did not look information up, were able to answer the questions in their work environment, were able to ask the researcher if they had any queries and could be reassured that other employees/employers would not have access to their responses [*11*].

The second questionnaire was for field observations about food handling and gen-

eral hygiene in the restaurants, such as the cleanliness of workers' hands and nails and cleanliness of the kitchen and service rooms and the food storage areas.

Data obtained from the workers' questionnaire were coded and entered into computer using *SPSS*, version 12. The data were analysed and cross-tabulated. The chi-squared test was used for statistical analysis.

Results

Selected characteristics of food-handlers in restaurants

Of the 308 food-handlers, 43.5% were aged 19–29 years (Table 1). The youngest was 14 years and the oldest was 70 years, with a mean of 31.6 years. The level of education was low among workers in the restaurants (Table 1).

A high proportion of workers (124, 40.3%) reported working for the first time in restaurants, and 43 (34.7%) of these had experience of 1 year or less (Table 2). When asked about the training they received during their work in restaurants, only 37.6% of the food-handlers reported that they had received training. Most of them believed that just working in the restaurant constituted training.

Most of the food-handlers in restaurants worked in the cities, and this was proportional to the number of restaurants in the cities. Most of the restaurants in the villages and towns had a small surface area with a small number of food-handlers (Table 3). In refugee camps, 63.6% of restaurants had only 1 food-handler who was usually the owner of the restaurant, and most of the restaurants with more than 2 food-handlers were found in the cities.

Table 1 **Distribution of food-handlers by age and education level**

Variable	No.	%
Age (years)		
14–18	17	5.5
19–29	134	43.5
30–39	89	28.9
40+	68	22.1
Education level[a]		
Preparatory or less	130	42.3
Secondary	119	38.8
Post-secondary	58	18.9
Total	308	100.0

[a]*Data missing for 1 food-handler.*

Practices, health and personal hygiene of food-handlers in the restaurants

Hand-washing

Most food-handlers reported that they always washed their hands before starting work, when moving between work with unready and ready foods, and after using the toilet; only 10.5% reported never washing their hands. Regarding the way that the food-handlers washed their hands, 22.1% reported washing their hands with water only and 76.5% reported washing their hands with water and soap. This contradicts what was observed during the fieldwork, where cleaning materials were not available near the hand-washing sinks of the kitchens (14.2% of restaurants) and toilets (37.3%). When asked about hand-washing after coughing and sneezing, 68.0% of the food-handlers reported that they always washed their hands and 21.6% that they sometimes did.

Smoking

A "no smoking" sign was found in only 2 of the 202 surveyed restaurants. Over half of the food-handlers were smokers (170/306, 55.6%). Out of these, 149 (87.6%) reported that they did not smoke while preparing and serving food. However, a number of food-

Table 2 **Distribution of food-handlers by years of experience**

Years of experience	Food-handlers who worked in restaurants for the first time		Food-handlers who had worked in restaurants before[a]		Total[a]	
	No.	%	No.	%	No.	%
≤ 1	43	34.7	4	3.1	47	18.6
2–3	30	24.2	6	4.7	36	14.3
> 3	51	41.1	118	92.2	169	67.1
Total	124	100.0	128	100.0	252	100.0

[a]*Data on years of experience missing for 56 food-handlers.*

handlers who said they did not smoke were observed smoking by fieldworkers, suggesting that the percentage of food-handlers who smoke while working was under-reported. Some of the smokers (12, 7.1%) mentioned that they sometimes smoked while working, and 8 (4.7%) admitted that they always smoked while preparing and serving food.

Food handlers' health during food handling

When food-handlers were asked how they behaved when they had a health problem such as influenza, 172 (56.0%) reported that they left work during sickness, while 76 (24.8%) reported that they sometimes took leave, and 54 (17.6%) said that they never took leave under any circumstances (5 answers were inapplicable). Regarding the reasons for taking leave, 51.5% reported that it was to rest during sickness and 36.7% to avoid infecting others and only 1.5% to avoid contaminating the food (10.3% had other reasons). Most of those who reported that they never left said it was because they could not leave the restaurant, and 11.5% reported that they were not allowed by the employer to take leave.

Workwear

When asked about the availability of workwear and their adherence to wearing it, aprons were available for 252/307 (82.1%), haircovers for 171 (55.7%), gloves for 200 (65.1%) and aprons, haircovers and gloves for 136 (44.3%).

Personal hygiene of the food-handlers

Some of the personal hygiene practices reported by the food-handlers are summarized in Table 4. Most of the food-handlers did not wear necklaces, while 46 (15.0%) and 40 (13.1%) said that they wore rings and kept long nails during work, always or sometimes, respectively.

Workers' reports of infestation

Food-handlers were asked if rodents or insects such as cockroaches were present in the restaurant: 66 (21.6%) reported that rodents or insects were sometimes seen in

Table 3 **Distribution of restaurants by locality and number of food-handlers**

Locality	No. of food-handlers in restaurant											
	1		2		3		4–6		7+		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City	18	12.5	51	35.4	23	16.0	36	25.0	16	11.1	144	100.0
Town or village	16	34.0	18	38.3	11	23.4	2	4.3	0	0.0	47	100.0
Camp	7	63.6	4	36.4	0	0.0	0	0.0	0	0.0	11	100.0
Total	41	20.3	73	36.1	34	16.8	38	18.8	16	7.9	202	100.0

Table 4 **Practices of food-handlers in restaurants concerning use of workwear (when available) and self-cleanliness**

Practice	Frequency of practice					
	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
Workwear practice[a]						
Wear apron (n = 252)	166	65.9	63	25.0	23	9.1
Wear haircover (n = 171)	105	61.4	43	25.1	23	13.5
Wear gloves (n = 199)	94	47.2	88	44.2	17	8.5
Wear apron, haircover and gloves (n = 136)	55	40.4	9	6.6	1	0.7
Other practices						
Wear necklace during work (n = 307)	18	5.9	5	1.6	284	92.5
Wear ring during work (n = 307)	41	13.4	5	1.6	261	85.0
Have long nails during work (n = 307)	14	4.6	26	8.5	267	87.0

[a]*For those reporting availability of workwear.*
n = number of responses to item.

the restaurant and 240 (78.4%) said they were not.

Discussion

Almost 73% of the restaurants in villages and towns had only 1 or 2 food-handlers, whereas in the cities 52.1% of the restaurants had 3 or more food-handlers. This may be attributed to the diversity of meals served in the city restaurants, which require a variety of experiences with food preparation on the one hand and food serving and meeting the requirements of customers on the other.

Most of the food-handlers in the restaurants we surveyed were young people with a low level of education. Many (40.4%) were working in that restaurant for the first time. Most of the food-handlers who had gained experience from working in other restaurants had worked there for more than 3 years.

In spite of having some years of experience, 62.4% of the food-handlers in restaurants had never received any training about personal hygiene. Owners and managers of restaurants themselves may lack basic knowledge about food sanitation and safety, and it should be the role of the health inspectors from the Ministry of Health to improve safety and sanitation awareness among food-handlers, restaurant owners and managers. However, there are no explicit national requirements and standards for food safety legislation or guidelines.

The absence of a special area for the food-handlers in most of the restaurants encouraged them to smoke in areas of food preparation, as they spend most of their working time there. Smoking transfers contaminants from mouth to hands and cigarettes emit particles that contribute to food contamination [*12*]. A "no smoking" sign was found in only 2 restaurants, although smoking is not allowed in public places according to Palestinian environmental law [*13*]. A study conducted in the United States of America found that the amount of indoor air contamination in restaurants that are free of smoke is 84% less than that in restaurants where smoking is allowed [*14*]. In addition, the percentage of mortality from lung cancer among food-handlers in restaurants where smoking is allowed is 50% higher

than in other people, due to passive smoking and the absence of a smoking policy that protects nonsmokers from exposure to passive smoking [*15,16*].

Another factor that contributes to food contamination in restaurants is food handling by workers while sick. Microbes can be transmitted to food from dirty hands and from sneezing and coughing unless precautions are taken [*17*]. Although Palestinian labour law requires employers to pay food-handlers a full sick-leave at the employer's expense for up to 14 days and to pay half the wage for another 14 days [*18*], the general economic situation in Palestine is difficult and food-handlers may fear loss of wages in case of sick leave.

Availability of haircovers and gloves in this study was low. Food-handlers and restaurant owners may not know about the importance of workwear, and owners may not want the expense of providing such equipment. Food-handlers in restaurants frequently use aprons in order to keep their clothes clean, but even when aprons were available, food-handlers did not always wear them. Proper workwear is also an important factor for preventing contamination by disease and for giving customers a sense of security and satisfaction.

Cleaning materials were absent near the hand-washing sinks of the kitchen and toilets (14.2% and 37.3% respectively). Hands should be washed according to good hygiene practices in order to reduce the risk of food contamination, and water should come from a safe source, both hot and cold, and with appropriate pressure. Toilets and hand-washing facilities should be convenient, accessible, well-designed and appropriately installed. The absence of hot water in many of the restaurants, which is necessary for proper hand-washing and sanitizing of food equipment and utensils, contributes to the risk of food contamination [*19*].

The food-handlers reported that they sometimes or always detected insects and rodents in the restaurants. Restaurants should have no detectable presence of insects, rodents, birds, turtles or other animals, and openings to the outside air should be protected. A favourable environment for insect and rodent proliferation is enhanced by the lack of adequate buildings, storage areas, kitchen, water supply, sanitation and solid waste management facilities, as well as poor attitudes and practices of food-handlers found in many of the restaurants in this study.

The findings of this study can be interpreted in relation to a report of a high percentage of unacceptable food samples from the restaurants of Ramallah and Al-Bireh district; 67.4%, 40.2% and 66.7% of samples tested had unacceptable levels of total aerobic count, total coliforms and faecal coliforms respectively, according to the Palestinian and WHO standards [Ramallah and Al-Bireh Directorate, Environmental Health Division, unpublished data]. Other research conducted in the province of Karak in Jordan showed samples of diary products had high viable counts of coliforms and other contaminants which indicate serious faults in production hygiene, unsatisfactory sanitation and unsuitable storage temperature [*20*].

Conclusions and recommendations

The hygiene and food sanitation knowledge and practices of food-handlers was generally unsatisfactory among the restaurants surveyed. Restaurant inspections should ensure awareness among patrons and food-handlers about food sanitation and safety in restaurants. All factors that influence the uniformity and reliability of routine restau-

rant inspections by health inspectors should be modified. This could be achieved by policies and regulations designed to ensure periodic training, inspection and systematic standardization among inspection evaluations. Implementation of new public health laws approved by the Palestinian National Authority legislative council is a priority. Upgrading the quality control system, including legislation reform, developing explicit guidelines, improving inspection and laboratory testing and taking appropriate punitive or corrective measures should be a priority.

Training in food hygiene that embodies the concept of risk should be implemented in restaurants in order to emphasize to food-handlers, especially those in managerial positions, the level of risk associated with their business. This training should be implemented with the supervision of health inspectors.

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Factors determining choice of health care provider in Jordan

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العوامل التي تحدِّد اختيار القائمين على إيتاء الرعاية الصحية في الأردن

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الخلاصة: درس الباحثان في هذه الدراسة العوامل التي تؤثر على اختيار المرضى للقائمين على إيتاء الرعاية الصحية في خدمات العيادات الخارجية في الأردن. وقد شملت الدراسة عوامل ديموغرافية واقتصادية اجتماعية، ووضع المريض من حيث التأمين، وجودة الرعاية، وحجم الأسرة وتكاليف الرعاية الصحية، وذلك باستخدام نموذج لوغاريتمي متعدد الحدود طُبِّق على 1031 من المرضى الذين يراجعون العيادات الخارجية، وذلك كجزء من مسح الانتفاع بالرعاية الصحية ونفقاتها في الأردن لعام 2000. وبيَّن أن خصائص المريض الاجتماعية والاقتصادية والديموغرافية تؤثر على اختياره للقائمين على إيتاء الرعاية الصحية. أما التأمين الصحي فلم يكن له أهمية يُعْتَدُّ بها إحصائياً في اختيار المرافق التابعة لوزارة الصحة وتفضيلها على سواها. وقد كان لدى المرضى الذين ينتفعون من القطاع العام حساسية بالنسبة للأسعار، ومن هنا فإن أي محاولة لتحسين إتاحة خدمات الرعاية الصحية في الأردن ينبغي أن تأخذ ذلك بعين الاعتبار.

ABSTRACT This paper examines factors influencing a patient's choice of provider for outpatient health care services in Jordan. Factors including demographic, socioeconomic, insurance status, quality of care, household size and cost of health care were studied using a multinomial logit model applied to a sample of 1031 outpatients from the *Jordan healthcare utilization and expenditure survey, 2000*. The patient's socioeconomic and demographic characteristics affected provider choice. Insurance was not statistically significant in choosing Ministry of Health facilities over other providers. Patients utilizing the public sector were price sensitive, and therefore any attempt to improve accessibility to health care services in Jordan should take this into consideration.

Facteurs déterminant le choix d'un prestataire de soins en Jordanie

RÉSUMÉ Cet article passe en revue les facteurs qui influencent le choix des patients en matière de prestataires de services de soins de santé ambulatoires en Jordanie. Les facteurs tels que les aspects démographiques et socioéconomiques, la situation au regard de l'assurance maladie, la qualité des soins, la taille du ménage et le coût des soins ont été étudiés grâce à l'application d'un modèle logit multinomial à un échantillon de 1 031 malades ambulatoires ayant participé à l'enquête sur l'utilisation des soins de santé et les dépenses afférentes réalisée en Jordanie en 2000. Les caractéristiques socioéconomiques et démographiques des patients avaient une incidence sur le choix des prestataires. La situation au regard de l'assurance maladie ne déterminait pas de façon statistiquement significative le choix des établissements dépendant du ministère de la Santé par rapport à d'autres prestataires. Les patients qui avaient recours au secteur public étaient sensibilisés aux prix, et cet aspect sera à prendre en compte si l'on veut améliorer l'accès aux services de soins de santé en Jordanie.

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Introduction

The health system in Jordan is a blend of several fragmented private and public programmes. The public sector has 2 major programmes that finance and deliver health care: the Ministry of Health (MOH) and the Royal Medical Services (RMS). Additionally, there are smaller public programmes such as university-based health schemes. There are also several nongovernmental organizations and donor owned and operated facilities, the largest being the United Nations Relief and Works Agency (UNRWA), which provides care to Palestinian refugees. There is a large and vibrant private provider market in Jordan.

According to the *Jordan healthcare utilization and expenditure survey, 2000*, roughly 60% of the population had at least one form of health insurance [*1*]. The MOH, through the Civil Insurance Programme, insured 20% of the population, including civil servants and their dependents; the RMS insured around 25%; UNRWA insured around 7.5%; and the private sector around 7.5%, leaving 40% of the population uninsured.

The main priority goals of the current government in Jordan emphasize the political will to reach universal health insurance coverage, reduce health inequality and inequity and improve the quality of health care services. To achieve such goals there is a need to develop and implement appropriate policies that will enable effective and equitable access to services for all Jordanians, including the uninsured. Understanding socioeconomic factors underlying the choice of health care provider by health care service users is critical to informing this process.

Little research has been done analysing factors affecting consumer choice of provider in low- and middle-income countries, and we believe that this study will contribute to the knowledge base. In Egypt the MOH/government and other public facilities account for only 36% of outpatient visits in comparison to 56% for private providers. On the other hand, nearly 85% of all inpatient visits occur in either MOH/government or public facilities, while private facilities account for only 11% [*2–4*]. In Lebanon, 9.4% of outpatient visits occur in public facilities, 12.2% in nongovernmental organizations and 78.4% at private facilities [*5*].

A study on choice of health care provider in Cameroon [*6*] illustrated that quality of care, insurance coverage, price and income were important determinants in choosing a health care provider. As quality of care increased in government health centres, the probability that an individual would choose a public facility also increased. Those with higher incomes tended to choose private health providers and those with larger families tended to choose government health units.

Additionally, insurance was a major factor in choosing a health care provider [*7,8*]; in a study conducted to determine patient choice of medical provider in rural China, insurance coverage significantly increased an individual's probability of seeking formal treatment, and, consistent with economic theory, price was important in determining the patient's medical care-seeking behaviour. The study demonstrated that, when making choices regarding which healthcare provider to visit, individuals trade off price and quality, choosing the provider that gives them the highest utility.

In Vietnam, it is estimated that the private sector provides 60% of all outpatient services [*9*]. Income, age, and number of sick individuals within the household were factors that influence the choice of a health care provider. Additionally, evidence suggested that severity of the illness is an im-

portant factor in choosing a health provider: those with severe illnesses tended to use private less than public health services.

This study investigates factors such as demographic and socioeconomic factors, insurance status, quality of care, household size, and cost of health care, and their impact on patient's choices of health care provider. We hope to provide a better understanding of the role, magnitude and contribution of both the public and the private sectors, and highlight the main factors determining choice of provider. These results can help policy makers to understand patient health-seeking behaviour, and thus provide important information for designing future health policies.

The hypothesis is that the poorest, illiterate, unemployed, residents of rural areas and publicly insured individuals are more likely to obtain care at MOH facilities than in the private sector.

Methods

Data

Data from the *Jordan household utilization and expenditure survey, 2000* were used for this analysis [*1*]. The survey was nationally representative covering about 8300 households and more than 49 000 individuals. The survey used a recall period of 2 weeks for outpatient care. In other words individuals were asked whether, conditional on being ill, they had used a health care provider in the past 2 weeks. In all, 1031 individuals had made an outpatient visit in the previous 2 weeks and all these individuals were used in the analysis. It is important to keep in mind that we were not trying to analyse the "seek or not-seek" decision but rather, once a decision to seek care had been made, to understand what factors affected choice of provider.

Model

We decided to use a multinomial logit model to analyse choice of health provider. The model has the following specification:

$$\ln\left\{\frac{P(usej)}{P(usep)}\right\} = X\beta_j$$

Where: j represents the 3 choices of health services providers MOH RMS or private sector, usep is the base group who selected private providers, X is a vector of explanatory variables and β_j is a vector of coefficients when choosing provider j.

The multinomial logit used for this analysis is the standard method for estimating unordered, multi-category, dependent variables. Multinomial probit and gompit are logically possible but impractical. For example, multinomial probit involves probability expressions that are multiple integrals of the multivariate normal density. While accurate and simple approximations are available for the integral of the univariate density, comparable approximations are feasible for the multivariate integrals only up to about the fourth order [*10*].

Dependent variable

The dependent variable "health care provider selected by the health care user" is used to define various health providers. The 15 variables reporting different levels of service and different type of provider were aggregated into 3 categories: MOH, RMS and the private sector.

Facilities owned by the MOH include primary health care centres, comprehensive health care centres, maternal and child centres, MOH hospitals and Jordan University Hospital are all listed as 1 variable, MOH. The sample indicated that Jordan University Hospital was the choice of a limited number of patients; this number was not significant when the hospital was analysed as a sepa-

rate entity. A decision was made to integrate these numbers under the MOH facilities since this was the classification it was given in the survey instrument

RMS clinics and hospitals are listed as a single variable. UNRWA, nongovernmental organization clinics and hospitals along with private clinics, laboratories, pharmacies and hospitals are also listed as a single variable: the private sector.

Independent variables

Table 1 describes the variables and their summary statistics.

Sex was measured as a dummy variable.

Geographic location was measured as a multi-dummy variable. Amman was chosen as the base.

Age was measured in complete years and treated as a continuous variable.

Education was measured in completed years of education, and treated as a continuous variable.

Employment was proxied by employment status, which includes permanent, contract, daily and others categories. Employment was measured as a dummy variable. About 35% of the respondents were under 15 years of age, which accounts for the missing values for employment status. An adjustment was made whereby all children below the age of 15 years were considered unemployed.

Marital status was measured as multi-dummy variables with never married as the base. The missing values (around 35%) were assumed to be unmarried individuals, since the sample included children, and they were integrated with never married. Divorced, separated and widowed individuals were aggregated into 1 variable.

Wealth index was used as a proxy for *household income*; 5 variables were created with the third quintile (middle income group) used as the base group (the omitted variable).

Household size was measured by total members included in the household, and treated as a continuous variable.

Out-of-pocket expenditure was measured through 4 variables: total direct medical out-of-pocket expenditure for doctor fees, medication, X-rays and laboratory tests, and other medical expenditure; total cost of transportation; total medical expenditure specifically for chronic disease; and out-of-pocket expenses for health provision (all treated as continuous variables). Finally a dummy variable was developed which covered paying any out-of-pocket amount for health provision.

Insurance status was obtained through a question asking if the individual was insured or not. A dummy variable was created where insured = 1 and other = 0.

Quality variables included questions related to waiting time, privacy of the medical examination, cleanliness of the health facility, staff treatment and sufficient treatment time.

Health status was measured using 2 variables; the first related to chronic diseases, and the second related to consumption of medication on a regular basis.

For key independent variables, χ^2 was estimated to test if the value of those variables differed significantly from zero. Other relevant explanatory variables, such as provider characteristics and severity of the diseases, were not available and consequently were not included in this analysis. Therefore, these results should be viewed as a primary attempt to explain factors influencing choice of provider. Further analysis will be needed including providers' characteristics and severity of illness to properly understand factors influencing individual choice of provider.

Table1 **Description of selected variables and distribution of study sample**

Independent variable	Description	%
Sex	1 if female, 0 otherwise	54
Location		
Amman	Omitted group	27
Northern governorates	1 if yes, 0 otherwise	28
Southern governorates	1 if yes, 0 otherwise	26
Central governorates	1 if yes, 0 otherwise	19
Age (mean 22 years)	Continuous	
Education (mean 5 years)	Continuous	
Employment	1 if temporarily employed or unemployed, 0 otherwise	93
Marital status		
Never married	Omitted group	58
Married	1 if married, 0 otherwise	36
Widowed	1 if widowed or divorced, 0 otherwise	6
Income		
Middle class	Omitted group	22
Richest	1 if richest quintile, 0 otherwise	23
Rich	1 if rich quintile, 0 otherwise	19
Poor	1 if poor quintile, 0 otherwise	19
Poorest	1 if poorest quintile, 0 otherwise	17
Insurance	1 if insured, 0 otherwise	64[a]
Out-of-pocket		
Total (mean JD5.8[b])	Continuous	
Transportation (mean JD3.9[b])	Continuous	
Total chronic (mean JD1.4[b])	Continuous	
Waiting time (mean 50 min)	Continuous	
Family size (mean 6)	Continuous	
Examination	1 if in a private room, 0 otherwise	83
Cleanliness	1 if good, 0 otherwise	76
Staff treatment	1 if good, 0 otherwise	76
Treatment time	1 if sufficient time, 0 otherwise	70
Chronic disease	1 if chronic condition, 0 otherwise	11
Regular medication	1 if taking, 0 otherwise	17

Dependent variable = health care provider (private sector = 0; Ministry of Health = 1; Royal Medical Services = 2).
[a]*Includes multiple insurance.*
[b]*Jordanian dinars.*
Source: Jordan healthcare utilization and expenditure survey, 2000 [1].

Results

Descriptive analysis

During a 2-week period, 20% of the sample reported some kind of illness among whom 63% sought treatment through health care providers; 54% were women, 28% were from the Northern Governorates, 14% were employed and 64% have one kind of health insurance or another. Mean age was 22 [standard deviation (SD) 20] years and a range of 88 years, nearly 51% were 18 years or younger. On average they had 5 years of education (SD 5.5), range 21 years.

Among those who reported illness and sought treatment, 41% used MOH centres; 9% used MOH hospitals; 0.4% used JUH facilities, 7% used RMS clinics and hospitals, 3.6% used nongovernmental organization facilities, 27% used private clinics, 2% used private hospitals and 11% used private facilities such as pharmacies and laboratories.

Table 2 **Distribution by provider type**

Variable	MOH	RMS	Private sector
Total	51.4	6.5	42.1
Insured	77.0	94.0	56.0
Uninsured	23.0	6.0	44.0
Income quintile			
Richest	18.4	6.1	75.4
Rich	49.2	7.0	43.7
Middle	57.6	4.9	37.5
Poor	60.2	8.7	31.1
Poorest	65.2	6.0	28.8
Residence			
Amman	15.7	10.4	41.5
Northern governorates	36.4	25.4	18.9
Southern governorates	29.1	47.8	19.8
Central governorates	18.9	16.4	19.8
Health status[a]			
Chronic disease	44.7	14.1	41.2
Regular medication	44.8	14.4	40.8
Employment			
Economically active	14.9	22.4	20.5
Economically inactive	85.1	77.6	79.5
Age cohort			
< 18	56.2	34.3	45.4
18+	43.8	65.7	54.6

MOH = Ministry of Health.
RMS = Royal Medical Services.
[a]*Choice of health provider by patients with chronic disease.*
Source: Jordan healthcare utilization and expenditure survey, 2000 [1].

As illustrated in Table 2, 75.4% of those in the highest income group used private providers compared with 28.2% of the lowest income group, while 65.2% of the lowest income group used MOH facilities compared to 18.4% of the richest group.

In addition, the joint impact of income and residence showed a statistically significant difference (significantly different from zero at $P < 0.001$) comparing residents of Amman, from different income groups, and residents of other governorates: 41% of the poorest income group in Amman use private facilities compared to 54% who used MOH facilities. In the other governorates, 66% of the poorest income group used MOH facilities compared to 20% who used private facilities.

Regression analysis

The results of the multinomial logit estimations are presented in Table 3. Using Nagelkerke R-squared, the overall strength of association prediction for this model across the various choices was 57%. The general model shows that demographic factors (such as place of residence), insurance status, socioeconomic factors (such as being in the poorest income group and marital status), cost of treatment, quality of care, and health status [using regular medication (P= 0.034) as a measure] were statistically significant and influenced the patients' choice of health provider.

Socioeconomic and demographic factors such as age, sex, education, income and marital status varied according to type of provider. Female sex was significantly negatively associated with choosing RMS compared to the private sector. The odds of a female selecting RMS compared to the private sector was 0.45 times (about 45%) that for a male.

Residents of the Southern governorates were 2.23 times more likely to choose MOH

and 5.35 times more likely to choose RMS over private facilities compared to residents of Amman.

Controlling for other variables, the poorest income group was 0.34 times as likely to choose MOH facilities over private facilities compared to the middle income group, while the rich income group was 2.28 times more likely to use RMS facilities over private facilities compared to the middle income group.

Marital status was statistically significant only for married individuals seeking treatment at RMS. The odds of a married individual selecting RMS rather than a private provider were 3.62 times greater than the odds of a never married individual. In contrast to prior expectations, education, age and family size had no significant influence on provider choice.

Controlling for other variables in the equation, increasing family size by 1 SD

Table 3 **Factors associated with choice of health service provider**

Variable	MOH coefficient	OR	RMS coefficient	OR
Female	–0.168	0.845	–0.793*	0.453
Age	0.018	1.018	–0.014	0.986
Northern governorates	0.688**	1.989	0.678	1.970
Southern governorates	0.804**	2.235	1.676**	5.346
Central governorates	0.399	1.490	0.542	1.719
Insurance	0.003	1.003	1.269*	3.556
Richest	0.349	1.418	0.478	1.613
Rich	0.268	1.308	0.823	2.278
Poor	–0.003	0.997	0.419	1.520
Poorest	–1.085**	0.338	0.617	1.853
Married	–0.096	0.908	1.286*	3.617
Divorced	–0.853	0.426	1.278	3.590
Employment	–0.155	0.856	–0.225	0.798
Family size	0.085*	1.089	0.055	1.057
Years of education	–0.035	0.966	–0.049	0.953
Out-of-pocket expenditure	–0.211	0.810	–1.669**	0.188
Private examination	1.695**	5.447	0.843	2.324
Cleanliness of facility	0.174	1.190	1.656**	5.240
Good staff treatment	0.336	1.399	–0.710	0.492
Sufficient treatment time	–0.342	0.710	0.835	2.304
Chronic disease	–0.084	0.919	0.514	1.672
Regular medication	0.659*	1.933	1.502**	4.491
Total out-of-pocket	–0.377**	0.686	–0.462**	0.630
Transportation cost	–0.028	0.972	–0.233**	0.792
waiting time	–0.049	0.952	0.456*	1.577
Out-of-pocket for chronic diseases	0.002	1.002	0.010	1.010

The comparison group is the private sector.
MOH = Ministry of Health; RMS = Royal Medical Services.
OR = odds ratio.
**P ≤ 0.05; **P ≤ 0.01.*
-2 log likelihood = 1161.607.

increased the probability of choosing MOH facilities over a private provider from 44.0% to 50.0%, and the probability of choosing RMS from 3.0% to 3.4%. Moreover, controlling for other variables, increasing the years of education by 1 SD decreased the probability of choosing MOH facilities over the private sector from 44% to 40%. Furthermore, an increase in age by 1 SD increased the probability of using MOH over the private sector from 44% to 53%, controlling for other variables.

Insurance status was statistically significant in choosing RMS facilities over private providers; the odds of an insured individual selecting RMS rather than a private provider were 3.6 times greater than the odds of an uninsured individual.

As expected, *out-of-pocket expenses* (proxy for cost of treatment) was a major determinant of choice of health care provider. An increase in out-of-pocket expenditure was negatively associated with choosing MOH and RMS facilities compared to private facilities.

The results regarding *health status and chronic disease* variables suggest that, although the presence of the health condition itself and the out-of-pocket payment for medication were not statistically significant, the need for regular medication contributed significantly to explaining the variation in the pattern of utilization. Individuals with a chronic disease history in the previous 6 months who took regular medication were twice as likely to visit MOH facilities and 4.5 more likely to visit RMS facilities than private providers.

Quality variables suggest that *quality of care* in the form of private examination, cleanliness of the facility, sufficient treatment time, good staff treatment, and waiting time had an impact on patient choice of health provider.

Discussion

The model demonstrates that, after controlling for sex, employment, age, and marital status, geographic location was an important determinant of an individual's choice of health care provider. Location of residence played a significant role in choosing public providers versus private providers. Residents in the regions were more likely to use public providers compared to residents of Amman. Possible explanations include a stronger presence and greater variety of private providers in Amman and the fact that the highest proportion of uninsured is clustered in Amman (38%).

In contrast to expectations, and controlling for other variables, insurance was not statistically significant in choosing MOH facilities over the private sector; unlike the RMS facilities where insurance increased the probability of using RMS. Additionally, the role played by income in determining the choice of health provider, once again, contradicted our expectations. These results are at variance with other research conducted in this field, which indicates that the higher the income of the household the higher the probability of choosing a private health provider [*6*], and should be interpreted with care. However, it should be noted that there is a regulation obligating the MOH to provide highly subsidized health care services to all Jordanians regardless of their insurance status. On the other hand while it is compulsory for those with RMS insurance to use RMS facilities, the RMS charges fees for others who use their facilities.

Tembon suggested that the presence of a close relative in the area where the health care provider is situated and the familiarity of the provider or workers in the facility might influence the choice of provider [*6*]; these factors may be also applied to Jordan.

The analysis illustrates the importance of the socioeconomic factors covered in this study, but it does not provide any information related to the availability of the private sector in the regions compared to Amman, or the quality of services provided by different health providers. Furthermore, the utilization pattern cannot only be explained by the insurance effect since 56% of those utilizing the private sector had one kind of insurance or another, and only 35% of those who used private facilities had private insurance. Our findings indicate that private providers play an important role in providing outpatient health services, not only to high-income groups, but also to lower income groups.

Conclusions and policy implications

We can conclude that the private sector plays a significant role in providing health services in Jordan, especially in Amman. The bivariate analysis as well as the regression analysis showed that, compared to other governorates, the probability of using the private sector by the poorest income group in Amman was greater than the probability of using MOH providers. One possibility is that the private sector in Amman is responding to the demand from the poor by price discrimination across income groups. Additionally, this may be an indicator of inequities in financing health care services within the health system in Jordan between different income groups as well as between different regions and the capital Amman.

According to our findings; if the MOH is planning to expand its health insurance then it needs to consider how best to include the poorest income group in Amman. Although the results indicate that as quality increases the choice probability and demand for public health services will increase significantly; they also suggest that patients utilizing the public sector are cost-sensitive. Policymakers need to keep this in mind when developing strategies and polices aimed at increasing access to health services and reducing health inequities in Jordan. The results suggest a great difference in health expenditure between the poorest income group in Amman, who are more likely to seek healthcare from the private sector, and the poorest income group in the regions, who are more likely to use MOH facilities.

This study provides basic understanding of patient choice of healthcare provider, but further in-depth studies are recommended to determine how the MOH will finance expansion, and the effect of this on prices in both the private and public sectors.

Limitations

The aggregated variables were carefully chosen. However, they may hide some differences that might appear in the disaggregated data.

This study presents the effect of different socioeconomic factors, but it does not provide any information related to the availability of the private sector in the different regions compared to Amman. Moreover, we did not include other important explanatory variables such as provider characteristics and severity of the disease. Additionally, factors such as the presence of a close relative in the area where the health care provider is situated and the familiarity of the provider or workers in the health facility were not available; therefore the impact and influence of such factors were not captured.

This study provides basic understanding of patient choice of healthcare provider. Further analysis is needed to understand other important factors influencing individual choice of provider.

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Tobacco education in medical schools: survey among primary care physicians in Bahrain

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التثقيف حول التبغ في كليات الطب: مسح بين أطباء الرعاية الأولية في البحرين

ابتهال فاضل الريفي

الخلاصة: قيّمت الباحثة في هذه الدراسة الشاملة للقطاعات مدى توافر التثقيف حول التبغ والتدريب على مهارات التدخّل لدى أطباء الرعاية الأولية في البحرين. فمن بين 217 من أطباء الأُسْرَة في البحرين، أجاب 120 طبيباً (55٪) على الاستبيان الذي يدار ذاتياً. وكان 24٪ منهم من المدخنين حالياً فيما كان 10٪ من المدخنين سابقاً. وأبلغ معظم هؤلاء الأطباء عن قصور التثقيف في كليات الطب حول تعاطي التبغ والتدخُّلات لمكافحته؛ وأن موضوع الأمراض المتعلّقة بالتدخين وسيكولوجية تعاطي التبغ ومعالجة الاعتماد عليه لم يتم تغطيتها التغطية الكافية في الكليات الطبية. كما أن التدريب على الإقلاع عن التدخين كان مهملاً بشكل خاص، فلم يتلقّ إلا 4٪ من الأطباء فقط التدريب في مجال تدخلات الإقلاع عن التدخين.

ABSTRACT This cross-sectional study assessed the extent of tobacco education and intervention skills training among primary care physicians in Bahrain. Out of 217 family physicians in the country, 120 (55%) answered a self-administered questionnaire. A total of 24% were current smokers and 10% were ex-smokers. Inadequate education at medical school about tobacco use and interventions was reported by the majority of physicians. The subject of smoking-related diseases, psychology of tobacco use and management of tobacco dependence were inadequately covered in medical schools. Training in smoking cessation was particularly neglected, with only 4% of physicians receiving training about tobacco cessation interventions.

Information sur le tabac dans les écoles de médecine : enquête auprès des médecins de soins primaires à Bahreïn

RÉSUMÉ Cette étude transversale a évalué l'importance de l'information sur le tabac et de l'acquisition de compétences en matière d'interventions chez les médecins de soins primaires de Bahreïn. Sur 217 médecins de famille dans le pays, 120 (55 %) ont répondu à un questionnaire auto-administré. Au total, 24 % étaient fumeurs au moment de l'étude et 10 % étaient d'anciens fumeurs. La plupart de ces médecins ont déclaré que l'enseignement dispensé dans les écoles de médecine à propos de la consommation de tabac et des interventions associées était inadapté. Les maladies liées au tabagisme, la psychologie du fumeur et la prise en charge de la dépendance tabagique n'étaient pas suffisamment abordées dans ces écoles. La formation en matière de sevrage tabagique était particulièrement négligée, seuls 4 % des médecins ayant appris à effectuer des interventions dans ce domaine.

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Introduction

Tobacco use kills millions of people each year. World Health Organization (WHO) epidemiologists predict that unless there is a dramatic change in present trends, tobacco will be killing 8.4 million people a year by the late 2020s [*1*].

Physicians have an important role to play in tobacco control activities as they have both access to and influence over the population of smokers. They can initiate and monitor cessation treatment with smokers [*2*]. Most studies have shown that even very brief advice from doctors yields 1-year quit rates of 5%–10% [*3,4*] and that interventions that include follow-up sessions produce abstinence rates of 20%–36% [*4–6*]. Recording tobacco history use for each patient, particularly patients with chronic diseases, is important.

However, a recent British study reported that less than one-third of smokers could recall being given advice to quit by their general practitioner [*7*]. In Australia just over 50% of smokers had been given such advice, and general practitioners could identify only 62% of their patients who smoked [*8,9*]. WHO has focused on the role of health professionals in the tobacco control process. The theme for World No Tobacco day in 2005 was the role of health professionals in tobacco control.

In Bahrain, the prevalence of smoking was reported to be 29.5% among males aged 19 years and over and 18.6% among females of the same age group [*10*]. A study of smoking prevalence among population subgroups showed that 22.1% of primary care physicians and 1.9% of female physicians in Bahrain were smoking on a regular basis, while 34.6% of male dentists and 11.5% of female dentists were smokers [*11*]. There is also evidence of a rising prevalence of smoking among youth in Bahrain. The Global Youth Tobacco Survey reported a smoking rate of 33.5% among males and 11.9% among females aged 13–15 years [*12*].

Part of the Bahraini Ministry of Health (MOH) response to the public health problem of tobacco focuses on the role of health professionals in tobacco control. Therefore it is important at this stage to identify physicians' need for training and education in the area of tobacco prevention and management of nicotine addiction in patients. The main objectives of the present study were to look at the extent of tobacco education and training received in medical schools by primary care physicians in Bahrain and to establish whether the physicians felt well-equipped to deliver smoking cessation interventions in their clinical practice.

Methods

There are 22 primary health centres in Bahrain with a total of 217 primary care physicians. The data for the survey were collected during a workshop for primary care physicians organized by the Ministry of Health in early 2005. The workshop aimed at capacity-building and maximizing the involvement of primary health professionals in tobacco control activities. The participants were all primary care physicians representing the professionals at each health centre. All physicians at the workshop (n = 120) participated in the study.

The survey used a self-completion questionnaire with the following items:

- Demographic data (age, sex, nationality, medical school attended and smoking status).
- Tobacco training and education received in medical school, including: knowledge of the adverse health effects of tobacco use and passive smoking; knowledge about the nature of tobacco use; aware-

ness of nicotine replacement products; smoking cessation training; and knowledge about the available pharmacotherapy, behavioural therapy and other evidence-based interventions.

- Beliefs and perceptions about the physician's role in tobacco control.

All questions were completed anonymously. The completed questionnaires were collected by the author.

Descriptive statistics and data management were generated using *Epi-Info*, version 6. Forms with missing responses to a few questions numbered less than 3, and these were included in the study.

Results

The majority of participating physicians (88%) were Bahraini nationals. There were 36% male and 64% female physicians. The mean age was 36.5 years. Only 23% had completed their medical training in Bahrain (at the Arabian Gulf University); the majority (77%) had been trained outside Bahrain at various medical universities (in Egypt, Saudi Arabia, India and others) (Table 1).

Table 1 **Charactersitics of the study physicians (n = 120)**

Characteristic	No.	%
Sex		
Male	43	36
Female	77	64
Medical school attended		
Bahraini	28	23
Overseas	92	77
Nationality		
Bahraini	106	88
Non-Bahraini	14	12
Age (years)		
< 30	13	11
30–39	48	40
40–49	42	35
50–59	14	12
60+	3	3
Smoking status		
Smoker	29	24
Cigarettes only	22	18
Waterpipe	3	3
Both	4	3
Non-smoker	91	76
Ex-smoker	12	10
Never smoker	79	66

Nearly one-quarter (24%) of the physicians reported being smokers, 10% were ex-smokers and 66% were never smokers (Table 1). Of the current smokers, 3% regularly smoked tobacco in waterpipes (*shisha*).

Tobacco education at medical school

The responses to questions about tobacco education and knowledge of harmful effects of tobacco use received during medical school training are shown on Table 2.

The majority of the physicians (87%) reported that their course had covered in detail the effects of tobacco use on both the respiratory and cardiovascular systems. However, only 38% said that it had covered the effect of tobacco use on the genitourinary system, including cancer of the bladder, 14% the reproduction system, and 12% the effect on skin and connective tissues (Table 2).

Only 13% of the physicians reported that they had covered the subject of tobacco dependence at medical school; even fewer physicians had been taught about the psychology of smoking (e.g. reasons why people tend to smoke) and about the difficulty people have in stopping smoking (8% and 4% respectively) (Table 2).

The physicians were asked about their perceptions regarding tobacco use; 12% of

Table 2 **Distribution of physicians regarding education on tobacco control issues and smoking cessation interventions at medical school (*n* = 120)**

Item	No.	%
Received training on smoking-related diseases of:		
Respiratory system	104	87
Digestive system	98	82
Cardiovascular system	110	92
Nervous system	38	32
Genitourinary & reproductive system	63	52
Skin and connective tissues	14	12
Received training on psychology of smoking		
Yes	10	8
No	110	92
Received training on difficulty in stopping smoking		
Yes	5	4
No	115	96
Received training on smoking cessation interventions		
Yes	18	15
No	102	85
Familiar with behavioural therapy for smoking cessation		
Yes	12	10
No	108	90
Familiar with NRT for smoking cessation		
Yes	108	91
No	12	9
Familiar with non-nicotine medications (bupropion) for smoking cessation		
Yes	16	13
No	104	87

NRT = nicotine replacement therapy.

Table 3 **Physicians' beliefs, attitudes and practices toward tobacco use and on responsibility for management of tobacco dependence (*n* = 120)**

Item	No.	%
Believe that smoking is:		
An addiction	14	12
A habit	12	10
Both	94	78
Believe that is it important to record personal tobacco use		
Yes	62	52
No	58	48
Practise recording full history of patients' tobacco use		
Yes	5	4
No	115	96
Believe the health professional responsible for management of tobacco dependence is:		
Physician	46	38
Nurse	24	20
Psychologist	94	78
Pharmacist	58	48
Social worker	26	22
Believe that smoking cessation therapy should be subsidized	116	97

the physicians perceived tobacco use as an addiction with its corresponding withdrawal symptoms, while 10% saw it as a habit; 78% believed that tobacco use is both a form of addiction and also a behavioural habit (Table 3).

Recording patients' tobacco use

The majority of physicians (88%) reported having brief training about the need to record the tobacco history of patients. However, while 52% of physicians believed that eliciting tobacco history was important, a mismatch existed between perceived importance and their current practice. Almost none of the physicians (4%) actually recorded patients' tobacco use (Table 3). Lack of time, heavy workload and lack of motivation were the main obstacles stated by the majority of respondents.

Training on smoking cessation interventions

Almost all the physicians (85%) said they had received no formal training on smoking cessation interventions at medical school (Table 2). No differences were noted between physicians trained locally and overseas with regard to smoking cessation training.

While 91% of physicians were familiar with nicotine replacement therapy (e.g. chewing gum and skin patches), they stated that their knowledge was gained in practice and not at medical school training. Only 13% of physicians knew about bupropion tablets as non-nicotine medication and its role in the management of tobacco dependence and 10% had heard about the role of other non-pharmacological therapy (e.g. motivational and behavioural therapy, acupuncture, etc.) (Table 2).

The physicians' opinion about the role of physicians versus other health professionals in the management of smokers is shown in Table 3. The majority (78%) believed that psychologists were the health professionals responsible for management of tobacco dependence. Half of the physicians (48%) thought that pharmacists were responsible and only 36% believed in the role of physicians in the management of tobacco use. Almost all physicians (97%) considered funding for the smoking cessation medication as essential for the success for smoking cessation programmes.

More than 90% of respondents indicated that additional information or training on behavioural techniques for quitting smoking would be "extremely" or "somewhat" helpful.

Discussion

There is clear evidence that doctors and primary care physicians play an important role in assisting patients with smoking cessation [*13–16*]. However, adequate education and training is essential.

The present study revealed that 24% of primary care physicians were smokers. Similar rates among primary care physicians in Bahrain were reported previously (26.6% and 23.8%) [*17,18*]. While the smoking rate among the general adult male population in Bahrain is higher (29.5%) [*10*], the rate of smoking among male physicians is of concern and may undermine their credibility in the management of smokers and minimize their role in tobacco control programmes.

The results of this study reflect deficiencies in physicians' knowledge about tobacco harm. Only 14% and 12% of physicians respectively were taught about the harmful effects of tobacco on the reproductive system and connective tissues. The international study conducted by the International Union Against Tuberculosis and Lung Diseases found major deficits in knowledge among medical students with regard to the diseases less commonly associated with tobacco, as well as skills related to tobacco dependence counselling [*13*].

Education gaps were noted again in areas related to tobacco use and dependence. Only 12% of physicians were taught about the psychology of nicotine addiction. Similarly there were deficiencies in physician's education about why people smoke and the difficulty in quitting smoking. These deficits may be associated with general shortcomings in tobacco education strategies and the tobacco education curriculum at universities.

Despite the fact that recording patients' tobacco use and history are important, particularly for patients with chronic disease, our study showed that the majority of physicians were not trained to take a tobacco history. While 52% of physicians believed in the significance of tobacco history, 96% did not comply with this and explained their

inadequate performance as due to heavy workload at primary care centres and lack of motivation.

For management of tobacco use and dependence, the majority of physicians had no formal training. Furthermore, physician's knowledge about the measures available for smoking cessation was inadequate. While 91% of the physicians knew about nicotine replacement therapy, only 13% were aware of non-nicotine medication (bupropion), and only 10% knew about the role of other measures (e.g. counselling, acupuncture) in tobacco cessation. These findings reflect missed opportunities for physicians to provide effective smoking cessation counselling and tobacco control interventions.

The results of this study are consistent with the findings of other researchers who investigated tobacco education in medical school curricula. A global survey of medical schools showed that only 11% had a specific module on tobacco education and 12% of schools did not cover the topic of tobacco in the medical curriculum; this was as high as one-quarter in medical schools in Africa and Asia [*13,19*].

Based on the current tobacco control strategy in Bahrain that attempts to lower tobacco use and maximize the tobacco quit rate, there is a need to review and improve tobacco education and tobacco intervention skills in the curriculum of medical students as well as other health professionals. Most respondents thought that additional information or training on behavioural techniques for quitting smoking would be helpful.

To sum up, the prevalence of smoking is high among primary care physicians in Bahrain (24%). The majority of physicians had not been trained about eliciting tobacco use history, and only 4% actually took a tobacco use history from patients. Major training deficiencies in medical schools about smoking cessation interventions were noted.

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World No Tobacco Day 2009. Show the truth: Picture warnings save lives.

Effective health warnings, especially those that include pictures, have been proven to motivate users to quit and to reduce the appeal of tobacco for those who are not yet addicted. Despite this fact, 9 out of 10 people live in countries that do not require warnings with pictures on tobacco packages.

However, more and more countries are fighting back by requiring that tobacco packages graphically show the dangers of tobacco, as called for in the World Health Organization Framework Convention on Tobacco Control. They use the MPOWER technical assistance package developed by WHO to help meet their commitments under this international treaty.

Do smokers benefit from dental hygiene oral prophylaxis? A Nigerian pilot study

S.O. Nwhator[1] and O. Olagundoye[1]

هل يستفيد المدخِّنون من الوقاية الفموية لصحة الأسنان: دراسة تجريبية من نيجيريا

سليمان أولوسيغون نوهاتور، ولاغوندويي ولوفيمي

الخلاصة: يُعَدُّ التدخين من عوامل الاختطار الرئيسية للإصابة بالتهاب دواعم الأسنان التي يمكن توقِّيها، ويقيِّم الباحثون الحالات والشواهد التي أجريت في نيجيريا تأثير الوقاية الفموية السنية على صحة الفم وعلى مَناسب الإصابة بالتهاب دواعم الأسنان لدى 13 من المدخنين الأصحاء و8 من غير المدخنين. وقد أجري لجميع المشاركين في الدراسة تقليح لكامل الفم وتسوية للجذور مع صقل الأسنان، وتلقوا عرضاً توضيحياً للتقنيات الصحية لاستخدام فرشاة الأسنان وزود كل منهم بفرشاة ومعجون للأسنان. وبعد انقضاء 6 شهور أوضح قياس نسب بقايا الطعام ومنسب القلح ومنسب صحة الفم ومنسب دواعم السن في المجتمع لمدى الحاجة للمعالجة في الدرجة صفر، أوضح عدم وجود أي تحسُّن لدى المدخنين، وكان هناك تحسُّن بنسبة 50٪ في جميع المناسب بين غير المدخنين. وهكذا اتَّضح من هذه الدراسة أن المدخنين لا يستفيدون من الوقاية الفموية السِنيَّة.

ABSTRACT Smoking is a major, preventable risk factor for periodontitis. This pilot study in Nigeria evaluated the effect of dental oral prophylaxis on oral hygiene and periodontal indices among 13 systemically healthy smokers and 8 non-smokers. All participants received full-mouth scaling and root planing, tooth polishing, demonstration of correct brushing technique and a new toothbrush and toothpaste. After 6 months, debris index, calculus index, oral hygiene index and community periodontal index of treatment needs status code 0 scores showed no improvement in smokers. There was a 50% improvement of all indices among non-smokers. Smokers showed no benefit from dental oral prophylaxis in this study.

Les fumeurs tirent-ils un bénéfice de la prophylaxie visant à améliorer l'hygiène bucco-dentaire ? une étude pilote au Nigéria

RÉSUMÉ Le tabagisme est un facteur de risque important de la parodontite qui peut être évité. Cette étude pilote au Nigéria a évalué les effets de la prophylaxie bucco-dentaire sur l'hygiène buccale et les indices parodontaux de 13 fumeurs en bonne santé générale et 8 non-fumeurs. Tous les participants ont été soumis à un détartrage-surfaçage radiculaire complet et à un polissage des dents, ils ont assisté à une démonstration des bonnes techniques de brossage, et une nouvelle brosse à dents et du dentifrice leur ont été remis. Six mois plus tard, le code 0 obtenu pour l'état des sujets au regard de l'indice de débris, de l'indice de tartre, de l'indice d'hygiène buccale et de l'indice communautaire des besoins en soins parodontaux a montré qu'il n'y avait eu aucune amélioration chez les fumeurs. On a constaté une amélioration de 50 % de tous les indices chez les non-fumeurs. Cette étude a montré que les fumeurs ne tiraient pas de bénéfice de la prophylaxie bucco-dentaire.

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Introduction

In addition to the well-known adverse health effects of tobacco use such as cardiovascular disease, pulmonary disease and various carcinomas [*1–4*], there are serious orodental health effects, including dental aesthetic effects in the form of tooth stains and halitosis [*5*], alteration of the mucous membrane barrier, leukoplakia (smoker's keratosis), nicotina palati, submucous fibrosis, vitiligo (leukoderma), hairy tongue, precancerous transformations of the oral mucosa [*5*] as well as severe periodontitis [*6*]. Tomar and Asma in the NHANES III [Third National Health and Nutrition Examination Survey] in the United States of America found that smokers suffered more severe periodontitis than non-smokers [*7*]. Baab and Oberg reported irreversible microvascular changes in the gingiva in dogs [*8*]. Dietrich et al. in a recent German study reported that "smoking exerts a strong, chronic, and dose-dependent suppressive effect on gingival bleeding on probing" [*9*]. Barbour et al. observed that smokers exhibited increased numbers of peripheral blood mononuclear phagocytes, but these phagocytes were functionally compromised [*10*], while Zambon et al. concluded that cigarette smoking favours subgingival infection with periodontopathic organisms [*11*].

Dental studies have reported that smokers have a greater amount of plaque and calculus deposits than their non-smoking counterparts of comparable age [*12–14*], although some other studies found no such differences [*15*]. Reasons suggested for the differences include smokers' general attitude of neglect [*16*], ineffective toothbrushing [*17*] and greater mineralization potential of plaque fluid in smokers [*18*].

This pilot study in Nigeria evaluated whether a session of dental hygiene oral prophylaxis and training had an effect on oral hygiene and periodontal indices among smokers and non-smokers.

Methods

Study design and sample

A cross-sectional field survey was carried out among factory workers in Lagos state, Nigeria. The participants treated in the current study were all seen in a dental hospital in Lagos in the year 2004. They were 21 systemically healthy adult volunteers (13 non-smokers and 8 smokers), selected by convenience sampling; 76% were under 45 years of age. In a dental examination, oral hygiene and periodontal status scores were recorded for all participants before they received a dental hygiene oral prophylaxis. Six months after the intervention the scores were evaluated again.

Research instruments/periodontal examination

A single dentist carried out all examinations and scorings and performed all treatments and surgery required by the participants.

Oral hygiene

Debris index scores (DIS) and calculus index scores (CIS) were recorded for both smoker and non-smoker groups. DIS and CIS are 2 components of the oral hygiene index score (OHIS), a composite index [*19*]. It measures level of debris and calculus accumulation on the clinical (visible) crown of the tooth. In line with this index, participants were scored as follows: 0 = debris, plaque and calculus-free surface, 1 = deposits covering up to one-third of clinical tooth crown, 2 = deposits covering two-thirds of crown and 3 = deposits covering beyond two-thirds of tooth crown surfaces. The DIS and CIS were obtained for each patient and the OHIS calculated as: OHIS = DIS + CIS/6.

Periodontal status

The study also evaluated the status codes of the community periodontal index of treatment needs (CPITN) for each patient. The CPITN is an internationally recognized index developed by Ainamo et al. and adopted for use by the World Health Organization [*20*]. It is useful in the rapid examination of the periodontal status and treatment needs of a given population. It comprises 5 status codes (0–4), and their corresponding 5 treatment need codes (0–IV). The status codes are: 0 = no sign of disease (healthy periodontium); 1 = gingival bleeding on gentle probing; 2 = supra/subgingival calculus present; 3 = shallow pathological pockets (4–5 mm); 4 = deep pathological pockets (> 6 mm).

The mouth was divided into sextants. The individual's CPITN maximum score was the worst score in the sextants. Only status codes 0 and 2 were used in the current study because the time-scale of the pilot study was too short to detect any changes in pocket depth [*21*].

Intervention

Smoking status was recorded for all participants. Smoking was defined as currently smoking 1+ cigarettes per day. The sample were predominantly mild smokers; 60% had smoked for less than 10 years and over 60% smoked only 1–4 cigarettes daily.

After the pre-evaluation recordings of the OHIS and CPITN scores, all participants received a session of dental hygiene prophylaxis. Each participant was given full-mouth scaling and root planing (if indicated), meticulous tooth polishing, individualized practical demonstration of correct brushing technique, a new toothbrush and toothpaste of the same brand, and instructions on twice daily brushing. All the treatments, demonstrations and instructions were given by a single examiner. No smoking cessation counselling was given until the end of the 6-month evaluation period.

Six months after the intervention the OHIS and CPITN scores were evaluated again by the same examiner. Recordings of pre- and post-evaluation recordings were made on different sheets to blind the examiner to both the smoking status and the pre-evaluation recordings of the participants.

Data analysis

Data entry and analysis were done using *Epi-info*, version 6, using simple intra-group analysis. Chi-squared statistics were used to determine statistical significance at $P < 0.05$.

Results

Table 1 shows the OHIS and CPITN scores and percentage improvement/deterioration before and after the intervention. Smokers showed no change in mean total OHIS score (8.0) (scores for DIS and CIS were 4.0 re-

Table 1 **Oral hygiene index score (OHIS) and community periodontal index of treatment needs (CPITN) status of smokers and non-smokers before and after intervention**

Smoking status	OHIS (mean score)		CPITN status (no. of sextants)			
			Code 0 (healthy)		Code 2 (calculus)	
	Before/after	% change	Before/after	% change	Before/after	% change
Smokers (n = 13)	8.0/8.0	0.0	29/29	0.0	14/15	–7.1
Non-smokers (n = 8)	15.6/7.8	+50.0	33/56	+69.7	41/19	–53.7
	χ^2 = 11.0, df = 1, P < 0.001		χ^2 = 2.4, df = 1, P = 0.121		χ^2 = 3.33, df = 1, P = 0.067	

spectively) at baseline and post-evaluation (8.0). The mean OHIS score of non-smokers, however, improved from 15.6 to 7.8 ($\chi^2 = 11.0$, df = 1, $P < 0.001$) (scores for DIS and CIS were 7.8 and 3.9 respectively).

Smokers had a total of 29 sextants with CPITN status code 0 (healthy sextants) at baseline and same figure at post-evaluation, while the number of healthy sextants in non-smokers improved from 33 before to 56 after ($\chi^2 = 2.4$, df = 1, $P = 0.121$). Smokers had 14 sextants with CPITN status code 2 (calculus) at baseline and 15 sextants at the 6-month post evaluation recordings, while non-smokers improved their dental status from 41 code 2 sextants before to only 19 sextants after intervention ($\chi^2 = 3.33$, df = 1, $P = 0.067$).

Discussion

Even though the detrimental effects of smoking on periodontal health are well documented [*22–26*], not much has been reported about smokers and non-smokers whose oral hygiene and periodontal status are standardized at baseline. Findings from the current study show the ineffectiveness of proprietary smokers' toothbrushes and dentifrices. These products might at best palliate smokers' aesthetic concerns, but do not address their more deep-seated periodontal problems. Our findings suggest that the periodontal effects of smoking are neither plaque-related nor locally controlled, but in fact are systemically-mediated. This corroborates several previous studies [*23–26*].

Statistical analysis of the data revealed a highly significant difference between the pre- and post-evaluation measurements of oral hygiene between smokers and non-smokers. Comparisons of differences in CPITN scores did not attain statistical significance. This is not surprising because the CPITN is not as sensitive an index as the OHIS [*27,28*].

The 50% improvement in oral hygiene among non-smokers compared with no improvement among smokers is not only of concern, considering the short evaluation period, but also strongly suggestive that smokers benefit little or nothing from oral hygiene prophylaxis. Moreover, a nearly 70% increase in the number of healthy sextants among non-smokers compared with no improvement in smokers, as well as a 54% decrease in the sextants with calculus among smokers as against a 7% increase among non-smokers seems to confirm this observation. The huge difference in the number of sextants with CPITN status code 2 between the 2 groups is explained by the greater mineralization potential of plaque fluid, which in turn can be explained by 2 phenomena in smokers: the greater salivary concentration of calcium and phosphate ions and the increased salivary pH [*18*].

Natto et al. in a study of tobacco smoking and periodontal health in a Saudi Arabian population found a statistically significant association between smoking and probing depth [*29*]. The current study did not assess differences in probing since the 6-month observation period was too short to note any significant differences in pocket depth. Our study used simple, universally acceptable indices. Emphasis has been rightly placed on measuring pocket formation since it is a reproducible linear indicator of chronic periodontitis [*30*]. However, advanced imaging techniques such as subtraction radiography [*31*] and computer-assisted densitometric image analysis [*32*] are not readily available in developing countries such as Nigeria. In addition, it takes an average of 5 years to lose 1 mm of alveolar bone height [*21*], thus making it impracticable to use it as index in a short-term pilot study such as this.

Despite these limitations and the limitations of the small sample size and the relatively short evaluation period of this pilot study, we feel that the findings should be viewed seriously considering the large differences recorded between smokers and non-smokers as well as the fact that the smokers included in this study were mostly light (mild) smokers, in line with criteria set by Schwartz-Arad et al. [*33*], and modified by Nwhator [*13*]. Considering previous reports on the dose–response effect of smoking on the periodontium [*9,34,35*], the differences between smokers and non-smokers as observed in our study could be described as profound and could be even worse in heavy smokers.

These results are even more important when we consider that within the last decade attention has shifted to the mouth as a likely route of penetration of aggravating factors which complicate already existing systemic diseases. This shift in attention is based on intriguing findings from studies carried out especially within the last decade, such as normative ageing [*36*] and a study which found that traditional risk factors do not explain a large number of patients with coronary arteriosclerosis [*37*].

Other studies in this regard include those of Mattila et al. [*38*] who found an independent association between poor periodontal health and myocardial infarction, Syrjanen et al. [*39*] found that 25% of stroke patients as against 2.5% of controls had poor periodontal health and Offenbacher et al. [*40*] who reported that known risk factors do not account for 25% of cases of preterm low-birth-weight babies, while Hyman and Reid [*41*] noted that their results "suggest that cigarette smoking may be a cofactor in the relationship between periodontal disease and chronic obstructive pulmonary disease."

Conclusions

The findings from the current study support the widely reported observation that the effects of smoking on the periodontal support apparatus are not plaque-related but systemically-mediated. If the differences are so marked in mild smokers, then the situation would more serious in heavy smokers. We conclude that dental hygiene oral prophylaxis is of little or no benefit to smokers.

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Correlates of ever-smoking habit among adolescents in Tabuk, Saudi Arabia

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التـرابطات في العادات لدى المراهقين ممن سبق لهم أن دخّنوا في تبوك، المملكة العربية السعودية

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الخلاصـة: أجرى الباحثون دراسة للترابطات عبر القطاعات مستخدمين استبياناً حول المراهقين الذين سبق لهم أن دخّنوا في المدارس الحكومية في تبوك في المملكة العربية السعودية. وبلغ عدد التلاميذ 1505، وكانت أعمارهم تتـراوح بين 12 و19 عاماً، وتبين أن 657 منهم (43.7٪) سبق لهم التدخين، أي أنهم حاولوا تدخين السجاير، ولو نفخة واحدة أو نفختين، وقد كان 65٪ من هؤلاء من الذكور و23.1٪ من الإناث. وباستخدام التحوُّف اللوجستي تبين أن المنبئات ذات الاعتداد الإحصائي لمن سبق له التدخين؛ أن يكون ذكراً، والاعتقاد أن التدخين يساعد الناس على الشعور بالراحة في الأوضاع الاجتماعية المختلفة، ووجود شيء ذي قيمة في شعارات الحض على التدخين، والحصول على مصروف جيب قدره عشرون ريالاً أو أكثر يومياً، والأداء السيئ في المدرسة، ووجود أصدقاء أو آباء مدخنين.

ABSTRACT A cross-sectional questionnaire study of the correlates of ever-smoking among adolescents was made in Tabuk government schools in Saudi Arabia. Of 1505 students aged 12–19 years, 657 (43.7%) were ever-smokers (i.e. ever tried cigarette smoking, even 1 or 2 puffs); 65.0% of males and 23.1% of females. In logistic regression analysis significant predictors for ever-smoking were: male sex, belief that smoking helps people feel comfortable in social situations, owning something with a cigarette logo, having pocket money ≥ 20 riyals/day, poor school performance and having friends or parents who smoked.

Corrélats de l'expérience du tabagisme chez les adolescents de Tabouk (Arabie saoudite)

RÉSUMÉ Une étude transversale par questionnaire sur les corrélats de l'expérience du tabagisme chez les adolescents a été réalisée dans les écoles publiques de Tabouk (Arabie saoudite). Sur 1 505 élèves âgés de 12 à 19 ans, 657 (43,7 %) avaient déjà fumé (ne serait-ce qu'une fois, même une ou deux bouffées) ; 65,0 % des garçons et 23,1 % des filles. Dans l'analyse de régression logistique, les facteurs prédictifs significatifs de l'expérience du tabagisme étaient l'appartenance au sexe masculin, la croyance que le tabagisme aide à se sentir plus à l'aide en société, la possession d'un objet comportant un logo de cigarette, le fait de recevoir au moins 20 riyals d'argent de poche par jour, les mauvais résultats scolaires et le fait d'avoir des amis ou des parents fumeurs.

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Introduction

Tobacco use is a grave threat to health around the world; it has been linked to many diseases and health problems. Over 4 million people die prematurely from tobacco-related diseases each year, and by the year 2030 the annual mortality is projected to rise to 10 million [*1,2*]. The financial burden associated with smoking-related illness is overwhelming, including the cost of treatment and the loss of productivity from morbidity and premature death.

Teenage smoking has become a major health problem throughout the world. While the serious complications of smoking usually occur later in adult life, even at young ages there are numerous adverse health conditions, including reduction in the rate of lung growth and in the level of maximum lung function, increase in the number and severity of respiratory illnesses and unfavourable effects on blood lipid levels. There is also evidence that 4 out of every 5 persons who use tobacco begin smoking before they reach adulthood and that an earlier start to smoking makes it more difficult to break nicotine dependence [*3*]. Hence it is of paramount importance that tobacco prevention activities should focus on school-age children and adolescents to reduce future smoking-related illness and associated costs.

Previous studies on smoking habits have been conducted in Saudi Arabia in the capital city Riyadh [*4–8*] but to the best of our knowledge none have conducted in the Tabuk area. The aim of this study was to describe the prevalence of ever-smoking and to analyse the relationship between variables related to tobacco use, including the sociodemographic and educational characteristics of students, knowledge, attitudes and social influences, in an attempt to identify the correlates of ever-smoking among adolescents in Tabuk.

We focused on ever-smokers because it is vital to identify factors associated with initiation and uptake of the habit. Such information is a prerequisite for designing, implementing, monitoring and finally evaluating a comprehensive tobacco prevention programme to reduce ever-smokers among adolescents in Tabuk. Other communications will deal with attempts to quit and their outcomes among ever-smokers as a prerequisite for designing a smoking cessation programme as part of a comprehensive tobacco prevention and control programme in Tabuk that could be extended to other regions.

Methods

This was a cross-sectional school-based study in Tabuk government schools at grades 7–12 (intermediate and secondary schools), corresponding to ages 12–19 years. This was preferred to a household survey because it is logistically easier and cheaper and gives more freedom for students, particularly females, to express their habits and views away from family pressure.

A 2-stage stratified cluster sampling method was used. All public schools with any classes of grades 7–12 in Tabuk city were placed in 2 categories according to school level (intermediate or secondary). Then each category was stratified into 2 categories according to sex. In the first stage, 16 schools were randomly selected comprising 8 intermediate schools (4 for boys and 4 for girls) and 8 secondary schools (4 for boys and 4 for girls). Then 1 class was randomly selected from each grade (3 classes per school). This yielded 48 classes with 1566 students, all of whom were included in the study. The average class size for the whole group was around 32–33 students and there were no obvious differences between males and females in this respect.

The study tool was a pilot-tested, anonymous, self-administered questionnaire consisting of 56 questions, with core items selected from the Global Youth Tobacco Survey items (Arabic version) [*9*]. Background characteristics were collected, such as age, sex, school grade, type of school, school performance (student performance in the last final year examination) and amount of pocket money. The smoking questions were grouped into categories relating to tobacco use, prevalence of tobacco use, knowledge and attitude toward smoking, exposure to environmental tobacco smoke, attitude toward cessation of smoking, exposure to tobacco-related advertisements in the media, minor's access to tobacco and education on tobacco and smoking in school. The definition of an ever-smoker was any student who had ever tried cigarette smoking, even 1 or 2 puffs.

Questionnaires were distributed during the mid-morning classes to include students arriving late but to avoid lunchtime. The collection of data was conducted under the supervision of trained health-care workers in school and in the absence of any schoolteacher or any other school personnel. Students were assured about the confidentiality of responses (written and verbal) and that the data would be used only for the stated research purposes.

The heath workers were responsible for the delivery and collection of questionnaires and for reporting on the number of students not attending class on the date of the survey or refusing to participate. Completed questionnaires were collected and checked manually for completeness and then entered into a personal computer and analysed using *SPSS*, version 11.5.

Descriptive statistics for sociodemographic and other background variables was done, and univariate analysis using chi-squared tests was performed to identify significant correlates of ever-smoking. Logistic regression was used to detect significant factors predicting initiation of smoking.

Results

A total of 1566 questionnaires were distributed; 1505 were completed and returned, giving a response rate of 96.1% with no significant differences between males and females (738 males and 767 females). The mean age of the total sample was 15.6 years [standard deviation (SD) 1.7] years: 15.7 (SD 1.7) years for males and 15.5 (SD 1.7) years for females. There were no significant differences in age according to grade between males and females.

Of the 1505 students who returned completed questionnaires, 657 (43.7%) were ever-smokers. Ever-smoking was mostly a male habit: 65.0% of all males were ever-smokers compared with 23.1% of females. More than 50% of ever-smokers initiated the habit at age 10–13 years.

Table 1 shows ever-smoking according to selected sociodemographic and educational characteristics of the students. Smoking was significantly associated with male sex, older age, senior classes, having more daily pocket money and poor school performance. Ever-smoking was also significantly associated with students who had smoking parents and friends and who were more exposed to smoking at home and in public places (Table 2). Ever smoking was more frequent among students who read or watched pro-smoking messages and was significantly less among students who read or watched antismoking messages (Table 3). It was also significantly associated with positive attitudes towards smoking, such as "helps attract the opposite sex" and "helps modify body weight", "helps one feel comfortable in social gatherings" and "helps

Table 1 **Frequency of ever-smoking according to students' characteristics**

Variable	Total (n = 1505)	Ever-smokers (n = 657)	*P*-value
Sex	%	%	
Male	49.0	65.0	0.001
Female	51.0	23.1	
School grade			
7th	19.2	29.8	0.001
8th	16.3	48.0	
9th	15.9	45.6	
10th	19.0	52.1	
11th	16.1	46.7	
12th	13.5	40.4	
Age (years)			
12/13	13.2	21.6	0.001
14	15.7	41.9	
15	20.2	45.7	
16	14.2	43.9	
17	20.5	48.1	
18+	16.2	54.9	
Pocket money[a]			
< 10	86.1	41.4	0.001
≥ 10 < 20	12.1	59.1	
≥ 20	1.8	63.6	
School performance			
Poor	7.3	72.0	0.001
Good	59.8	46.8	
Excellent	32.9	35.9	
Type of school			
Intermediate	51.4	40.4	0.010
Secondary	48.6	47.1	
Owns object(s) with smoking logo			
Yes	9.0	75.0	0.001
No	91.0	40.5	

[a]*Saudi riyals/day*

increase one's number of friends" among other positive attributes (Table 4).

In order to study which factors were significant correlates and possible predictors for initiating smoking (ever-smoking), stepwise multiple logistic regression was performed (Table 5). Significant predictors for ever-smoking were: male sex [odds ratio (OR) = 4.71], student's belief that smoking helps people feel comfortable in social situations (OR = 1.70), owning something with a cigarette logo (OR = 2.75), having ≥ 20 riyals/day pocket money (OR = 1.25) and poor school performance (OR = 2.28).

Table 2 **Frequency of ever-smoking according to students' smoking contacts**

Variable	Total (n = 1505)	Ever-smokers (n = 657)	*P*-value
	%	%	
Parents are smokers			0.001
Neither	66.8	38.9	
Both	1.6	66.7	
Father only	29.8	52.9	
Mother only	0.5	62.5	
Don't know	1.3	40.0	
Friends are smokers			
None	57.9	25.1	0.000
Some	30.2	66.3	
Most	9.1	74.3	
All	2.8	83.3	
Contact with smokers at home last week (days)			
0	52.9	39.0	0.001
1–2	16.9	52.6	
3–4	8.4	65.9	
5–6	4.0	58.3	
7	17.9	59.7	
Contact with smokers in public places last week (days)			
0	49.7	27.4	0.001
1–2	18.8	52.1	
3–4	11.3	61.2	
5–6	5.9	71.9	
7	14.3	63.7	

Table 3 **Frequency of ever-smoking according to students' practices**

Variable	Total (*n* = 1505) %	Ever-smokers (*n* = 657) %	*P*-value
Discussed harmful effects of smoking at home			
Yes	66.3	45.3	0.070
No	33.7	40.4	
Taught harmful effects of smoking at school			
Yes	22.5	49.3	0.021
No	73.2	43.0	
Not sure	4.3	47.6	
Reads/watches anti-smoking advertisements			
A lot	22.1	36.6	0.004
A few	32.6	43.0	
None	45.2	47.6	
Reads/watches pro-smoking advertisements			
A lot	23.1	51.6	0.001
A few	37.5	54.4	
None	39.5	37.3	

Students who had friends and parents who smoked were also more likely to be ever-smokers.

Discussion

Although most of the adverse effects of smoking appear in adult life, the initiation of smoking usually starts early in adolescence. Once smoking has begun, cessation is difficult. Hence surveying smoking habits and identifying the correlates and possible predictors of ever-smoking is a prerequisite for any effective smoking prevention programme.

Our findings show that about half of the students in Tabuk had ever-smoked, predominantly males, and the majority initiated the habit at or before 13 years of age. These findings are in accordance with the findings of studies conducted in other parts of Saudi Arabia [*4–8*], and worldwide in other countries of the Persian Gulf, Middle East, Africa, Europe, Asia and Latin America [*10–15*]. Adolescents who begin smoking at a younger age are more likely to become regular smokers and less likely to quit smoking [*16*]. This is a cause for concern in the Tabuk area, as in other areas of Saudi Arabia, and needs urgent intervention.

Our data in Tabuk showed a significant association of ever-smoking in students with parents, peers and friends who smoke, which is in accordance with previous studies in Saudi Arabia [*4–8*]. One of the most consistent findings in the literature is that of the social influence of peers on adolescent smoking. Modelling, direct pressure and normative beliefs have been suggested as mechanisms of influence and investigated along with the potential importance of levels of social interactions [*17*]. Of particular interest is research suggesting that ever-smoking is best modelled as a prevalence-driven behaviour depending upon the degree to which an adolescent comes into contact with others displaying the behaviour [*18*]. Our study and other studies in Saudi Arabia and in many other countries in the region showed that parents who smoke tend to have ever-smoking children [*4–8,11,19*]. Family members, particularly parents and siblings, exert their influence through providing access, communicating information, modelling and demonstrating how to use cigarettes as well as conveying attitudes and social norms favourable to smoking.

For males in Tabuk, pocket money was significantly correlated with ever-smoking. The personal income of adolescents has

Table 4 **Frequency of ever-smoking according to attitudes and beliefs of students**

Believe that smoking:	Total (n = 1505) %	Ever-smokers (n = 657) %	*P*-value
Is harmful to smokers' health			
Definitely no	3.8	52.6	0.001
Probably no	3.1	71.7	
Probably yes	10.2	66.0	
Definitely yes	83.0	39.5	
Is harmful to non-smokers' health			
Definitely no	6.3	37.9	0.007
Probably no	6.8	53.4	
Probably yes	21.1	49.7	
Definitely yes	65.7	41.3	
Helps attract the opposite sex			
More	18.6	54.6	0.001
Less	55.8	39.2	
No difference	25.6	45.5	
Helps modify body weight			
Gain weight	4.7	47.1	0.694
Lose weight	62.2	44.0	
No difference	33.1	42.4	
Helps one feel comfortable in social gatherings			
More	13.5	69.0	0.001
Less	21.1	39.6	
No difference	18.4	43.3	
Don't know	46.9	38.4	
Helps increase one's number of friends			
More	33.5	49.6	0.001
Less	33.5	34.5	
No difference	33.0	47.0	
Should be banned			
Yes	76.4	40.0	0.001
No	23.6	55.5	

been associated with adolescent smoking; young people with more spending money have higher levels of ever-smoking, presumably because money is needed for the purchase of cigarettes [*20,21*]. Adequate income may supersede other protective factors and young people who are working and have their own personal income show higher cigarette use [*22*].

Ever-smoking was significantly more prevalent in students with poorer school performance. Smoking status has been found in many studies to be consistently related to academic success and this may show that beliefs about smoking and attitudes to academic performance are inter-connected [*23–25*].

In this study ever-smoking was associated with students who possessed objects with smoking logos, who believed that smoking made one feels more comfortable in social events and who watched or read smoking promotion advertisements. The opposite was also true; students who thought that smoking was hazardous to smokers and their contacts and who watched or read anti-smoking messages were less likely to be smokers. This is not surprising since more positive attitudes toward smoking and smokers tended to be related to an increased likelihood of smoking and vice versa.

Discussing the harmful effects of smoking at school or at home was not significantly associated with ever-smoking. This needs further examination to assess what information and how discussion of harmful effects are presented. Good knowledge *per se* may not be a deterrent to ever-smoking, as witnessed by the fact that many health professionals are smokers.

Weight considerations were not a significant correlate of ever-smoking in our study. There is evidence from international

studies that youth, especially girls, use smoking for weight control. These studies have established a positive association between weight concerns and cigarette smoking among female, but not among male, adolescents [*16,26,27*]. However, the temporal relation between weight concerns and smoking behaviour has not been clearly established, and this has to be confirmed by proper prospective studies.

We believe that the data generated in this study will help in assessing the magnitude and the contributing factors of the problem among students. Although it is often assumed that research findings will inevitably be translated into intervention programmes, the data may instead remain within the academic community and fail to be disseminated to experts in programme and policy development. It is essential that experts work together to ensure that the information is translated into programmes, the programmes are implemented and evaluated and the results are disseminated widely. We are determined to make that a reality. Emphasis will centre on the significant determinants identified in this study.

This was essentially a collaborative multidisciplinary effort involving schools, families, health providers, social and religious leaders and organizations, media and Internet. Intervention programmes should include measures to convince non-smokers to continue as such and to help smokers to quit and continue as successful quitters. The programme should be appealing and acceptable to adolescents to meet their individual needs, and be flexible. We have started such programmes in schools in the Tabuk area which focused on the hazards of smoking including health, social, economic, educational and above all religious implications. We plan to communicate the results to health care and education authorities, the media, social and sports youth clubs and organizations with an active role in combating adolescents' smoking. Health providers in particular need to be actively involved, and should enquire about tobacco use by clients

Table 5 **Stepwise multiple logistic regression of significant predictors of ever-smoking**

Predictor	Adjusted OR	95% CI
Sex		
Female	1	
Male	4.71	3.49–6.36
School performance		
Excellent	1	
Good	1.70	0.99–2.92
Poor	2.28	1.30–4.01
Pocket money[a]		
< 10	1	
≥ 10 < 20	0.61	0.40–0.91
≥ 20	1.25	0.48–3.24
Parents are smokers		
Both	1	
None	0.37	0.13–1.10
Father only	0.47	0.35–0.64
Mother only	0.40	0.07–2.44
Friends are smokers		
All	1	
Most	0.36	0.26–0.48
Some	0.29	0.18–0.48
None	0.30	0.11–0.80
Smoking helps one feel comfortable in social gatherings		
Don't believe	1	
Believe	1.70	1.05–2.75
No difference	1.83	1.19–2.81
Smoking is harmful to non-smokers' health		
Don't believe	1	
Believe	0.64	0.43–0.97
Owns object(s) with smoking logo		
No	1	
Yes	2.75	1.64–4.61

OR = odds ratio; CI = confidence interval.
[a]*Saudi riyals/day*

and convince smokers to quit and provide necessary help to achieve that.

There were some limitations to the study. Every possible effort was made to ensure privacy and confidentiality, but problems of underreporting or misreporting, intentionally or non-intentionally, cannot be definitely ruled out. We were not able to validate smoking status by any other means than this self-reporting methodology. We hope, however, that the results reflect the real situation to a large extent as such studies are generally considered acceptable and valid for surveying smoking habits [*28,29*].

Future studies might include other variables, such as the role of religious beliefs and Internet use on initiation of ever-smoking, continuation and cessation of smoking among students. Religion was a very powerful factor for not smoking and for quitting or attempting quitting smoking in all previous studies in Saudi Arabia [*4–8*]. The Internet is fast becoming a new battleground between tobacco control advocates and pro-tobacco forces, and this new medium will certainly have a greater impact on tobacco use in the future. The Internet can encourage youth smoking by providing access to tobacco products and offering content that glamorizes smoking lifestyle and culture in websites and chat rooms. In contrast, smoking among youth is discouraged by online grassroots advocacy and counter-marketing websites [*30*].

Future studies should be longitudinal in nature to establish cause-and-effect associations and decrease bias and confounding effects.

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World report on child injury prevention

Every day more than 2000 children and teenagers die from an injury which could have been prevented. This joint WHO/UNICEF report is a plea to keep kids safe by promoting evidence-based injury prevention interventions and sustained investment by all sectors. The report presents the current knowledge on the 5 most important causes of unintentional injury: road traffic injuries, drowning, burns, falls and poisoning—and makes 7 recommendations for action.

Child-friendly version

UNICEF and WHO have produced a child-friendly version of the report, which aims to inform children aged 7–11 years about various types of injuries and how these may be prevented, using a mixture of facts, puzzles, games and other visual material. This document is available in 5 languages, including English, French and Spanish.

Both versions are freely downloadable and can be accessed from: http://www.who.int/violence_injury_prevention/child/injury/world_report/en/index.html

National survey of the oral health of 12- and 15-year-old schoolchildren in the United Arab Emirates

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المسح الوطني لصحة الفم لأطفال المدارس بأعمار 12 و15 عاماً في الإمارات العربية المتحدة

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الخلاصة: يصف الباحثون في هذه الورقة المسح الوطني الأول لصحة الفم في الإمارات العربية المتحدة، مستخدمين معايير منظمة الصحة العالمية، وقد سجلوا تسوس الأسنان والتسمم بالفلوريد لدى 2651 من أطفال المدارس بأعمار 12–15 عاماً، ومرض دواعم السن لمن هم في سن 15 عاماً. وقد بلغ معدّل انتشار تسوس الأسنان الدائمة لمن هم في عمر 12 عاماً 54٪، أما وسطي عدد الأسنان الدائمة المصابة بالتسوس أو المقلوعة أو المحشوة فبلغ 1.6 لكل طفل. وبلغ معدّل انتشار التسوس بين من هم في عمر 15 عاماً 65٪ ووسطي عدد الأسنان الدائمة المصابة بالتسوس أو المقلوعة أو المحشوة 2.5 لكل طفل. وفي مجمل الإمارات العربية المتحدة فإن 70٪ من أطفال المدارس بعمر 12 عاماً ليس لديهم تسمم بالفلوريد في الأسنان و37٪ ممن هم في عمر 15 عاماً لديهم نسج دواعم الأسنان تتمتع بالصحة.

ABSTRACT This paper describes the first national survey of oral health in the United Arab Emirates (UAE). Using WHO criteria, dental caries and fluorosis were recorded in 2651 schoolchildren aged 12 and 15 years, and periodontal disease in those aged 15 years. The prevalence of dental caries in the permanent teeth of 12-year-olds was 54%; the mean DMFT (number of decayed, missing or filled permanent teeth) per child was 1.6. The prevalence of dental caries in 15-year-olds was 65% and the mean DMFT was 2.5. For the UAE as a whole, 70% of 12-year-old schoolchildren had no dental fluorosis and 37% of 15-year-olds had healthy periodontal tissues.

Étude nationale sur la santé bucco-dentaire des enfants de 12 et 15 ans scolarisés aux Émirats arabes unis

RÉSUMÉ Cet article est consacré à la première enquête nationale sur la santé bucco-dentaire aux Émirats arabes unis (ÉAU). En se basant sur les critères de l'OMS, on a enregistré les caries dentaires et la fluorose chez 2 651 enfants scolarisés âgés de 12 et 15 ans, et les parodonpathies chez ceux âgés de 15 ans. La prévalence des caries sur les dents définitives chez les enfants âgés de 12 ans était de 54 % ; l'indice CAO (nombre de dents définitives cariées, absentes ou obturées) moyen par enfant était de 1,57. La prévalence des caries dentaires chez les adolescents âgés de 15 ans était de 65 % et l'indice CAO moyen de 2,47. Dans l'ensemble des ÉAU, 70 % des écoliers de 12 ans ne présentaient pas de fluorose dentaire et 37 % de ceux âgés de 15 ans avaient des tissus parodontaux sains.

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Introduction

The United Arab Emirates (UAE) is a young nation, created by the federation of 7 Emirates just over 30 years ago. Development has been rapid, with corresponding changes in the wealth and lifestyle of the diverse population. Previous dental surveys have usually been confined to a single Emirate [unpublished reports: 1991, K. Cowles, E. Beltran; 1993, D. Barmes; 1994, H. Tala], and subjects were often chosen by convenience rather than by random sampling, although these surveys were sufficient to indicate an increasing problem of dental decay in young schoolchildren in the Emirates. Therefore, it was important that this survey included a sample of schoolchildren from all 7 Emirates and all 9 medical districts within these Emirates.

It is hoped that this report will be valuable in several ways. First, it should assist those responsible for planning health and oral health services in the UAE by providing a picture of the severity and distribution of oral disease in children. Secondly, it will provide a baseline against which trends in the oral health of children in the UAE can be recorded. These trends will indicate the degree of success of oral health care strategies and will assist in the planning of new strategies. Thirdly, it will provide dental practitioners with a profile of the state of children's teeth in the UAE to assist in the evaluation of their patients and, fourthly, the findings will contribute to the world database of oral health and disease, maintained by the World Health Organization (WHO): the Global Oral Data Bank.

The aims of this survey were to provide information on the oral health of schoolchildren to assist in the planning of preventive and treatment oral care services in the UAE; to provide baseline information on the oral health of schoolchildren in the UAE in order to determine future trends in oral disease; to determine the variation in oral disease in schoolchildren in different medical districts in the UAE; and to compare the oral health of schoolchildren in the UAE with the oral health of similarly aged schoolchildren in some other countries.

Methods

Study design

A total of 2651 schoolchildren were examined: 1323 aged 12 years and 1328 aged 15 years. Dental caries and fluorosis was recorded in both age groups, 12 and 15 years, and periodontal disease only in those aged 15 years. Descriptive statistics were derived for standard oral health indices, by age, sex and district and for UAE nationals and non-nationals. A recording clerk assisted each examiner and the role of organization clerk was given to the school nurse to ensure a constant flow of children. The examiner was asked to review each day's recording forms for completeness and clarity of recording. During the course of the survey, the school nurse was requested to arrange for the re-examination of 10% of children, to assess examiner reproducibility.

Sampling

Schoolchildren aged 12 and 15 years in all 9 medical districts were included. Sampling was in 2 stages. First, all state and private schools in each medical district were listed; the small number of "community schools" (e.g. American and Canadian schools) were excluded. Secondly, within each selected school, children were chosen with a frequency depending on the size of the school, giving each child in a district an equal probability of being selected. After calculating the sampling interval within each school, dates of birth were checked to

ensure eligibility and the first name from the school register list was selected using random number tables. It was decided not to replace schoolchildren who, for a variety of reasons, were not examined.

The sample size was determined in the following way. Guidelines for conducting oral health surveys published by the WHO suggest that the number of subjects in each unit of analysis (cell size) should be at least 50 [*1*]. The intention was to present descriptive statistics for boys and girls separately in each of the 9 medical districts within the UAE. It was, therefore, decided to sample about 150 schoolchildren in each medical district to allow for some non-participation. Thus, about 1350 schoolchildren for each of the age groups would be sampled. The size of the population within each of the 9 medical districts differs considerably so the proportion of eligible schoolchildren who were to be sampled varied between medical districts. This meant that in order to obtain descriptive statistics for the whole of the country, mean scores for each medical district had to be weighted appropriately.

Permission and consent

The survey proposal was approved by the Ministries of Health and Education. Approval was then obtained from the appropriate authorities in each medical district, and lists of schools and the numbers of schoolchildren in the relevant age groups were compiled. After selection of individual children, verbal consent was sought from the parents for the child's examination. Only schoolchildren whose parents consented were examined.

Standardization of examiners

The 9 examiners examined schoolchildren in their own medical districts in order to reduce differences in examination standards between examiners and to adhere to WHO guidelines. Two 1-week training sessions were conducted before the examination of subjects started. Schoolchildren aged 12 and 15 years were examined by all examiners and the findings were compared and discussed. During the main survey, each examiner re-examined a 10% sample of schoolchildren in order to assess examiner reproducibility [*2*]. As far as possible, the organizing clerk concealed the identity of these re-examined subjects from the examiner.

Examination of subjects and logistic support

Each examining team was responsible for the arrangements to examine the selected subjects within their medical districts. Whenever possible, a medical or dental room or similar alternative was used. The children were examined in a supine position on a flat table. The examiner was seated and the recorder was seated close to the examiner to ensure accurate recording. All examinations were carried out under natural and artificial room light, but without a spotlight. No special tooth-cleaning was done before examination; teeth were dried with cotton gauze before examination if needed. Compressed air was not used. No drying was carried out before the recording of dental fluorosis. The order of examination was: presence of teeth and caries status, dental fluorosis, periodontal disease. If the reason for a tooth being missing was not clear to the examiner, the subject was questioned to aid the decision. The examination recording form was a modification of the WHO form [*1*]. Identification numbers were allocated to subjects and examiners.

Examination criteria

Each tooth was examined in turn. A tooth was deemed to be present if any part of the crown was visible. "Decay" was re-

corded at one level of severity only—the cavitation stage (detectable softened floor, undermined enamel or softened wall)—and sticky fissures or precavitation lesions were recorded as sound. The examination was principally visual. The explorer was used for removal of plaque and debris, and as a diagnostic aid for approximal and fissure sites. "Excluded tooth" was used when the tooth could not be examined. "Sealed tooth" was recorded as such. For missing permanent teeth, a tooth was recorded as "missing" unless it appeared to be unerupted or an incisor tooth that was missing due to trauma or a permanent premolar tooth that had been extracted for orthodontic reasons; the child could be questioned about these.

Dental fluorosis

Dean's criteria [*3*], as described in the WHO guidelines [*1*], were used to record dental fluorosis in the permanent teeth of both the 12- and 15-year-olds: 0 = normal, 1 = questionable, 2 = very mild, 3 = mild, 4 = moderate, 5 = severe. All teeth were examined and the mouth score was the score given to the most severely affected tooth.

Periodontal disease

The Community Periodontal Index of Treatment Needs (CPITN) described by WHO [*1*] was used to record gingival bleeding and dental calculus in the 15-year-olds. The mouth was divided into sextants (teeth 18–14, 13–23, 24–28, 38–34, 33–43, 44–48). The following index teeth were examined: 16, 11, 26, 36, 31 and 46.

If any of these teeth were absent, other teeth in the sextant were examined and the highest score in that sextant was recorded. A WHO periodontal probe with 0.5 mm diameter tip was used to examine all of the gingival margins of each tooth. There should be a minimum of 2 teeth present in the sextant which are not indicated for extraction; if this was not the case, the sextant was not recorded. The codes were: 0 = healthy, 1 = bleeding on probing, 2 = presence of supra- and/or sub-gingival calculus.

Data handling and analysis

The following derived variables were calculated for each subject:

- number of decayed teeth (DT), missing teeth (MT), filled teeth (FT) and decayed, missing, filled teeth (DMFT);
- highest dental fluorosis score for any tooth in the mouth;
- highest CPITN score for any sextant in the mouth.

For each group of schoolchildren, the following descriptive statistics were calculated:

- percent prevalence of health/disease;
- mean number of teeth affected by dental caries per mouth (as a measure of caries severity).

Examiner reproducibility was expressed as the reliability coefficient for the DMFT (12- and 15-year-olds) index [*2*], calculated for each examiner. The values for the 9 examiners were averaged to produce an estimate of reliability for the examination of all schoolchildren.

Results

There was a high response rate (96.7% of those sampled), so the total number of schoolchildren examined in the survey was 2651. This represented 5% of 12-year-olds and 5% of 15-year-olds attending schools in the UAE. More girls were examined in both age groups (Table 1). The proportion of those examined who were non-UAE nationals increased with age, reaching about one-third in 15-year-olds. The proportion

Table 1 **Frequency of boys and girls examined in each of the 9 medical districts for the 2 age groups**

Medical district	12 years				15 years			
	Boys		Girls		Boys		Girls	
	No.	%	No.	%	No.	%	No.	%
Abu Dhabi	74	50	75	50	75	50	75	50
Al Ain	73	46	87	54	71	42	78	52
Western Region	50	40	74	60	49	37	82	63
Dubai	95	63	56	37	44	29	108	71
Sharjah	60	40	90	60	85	51	83	49
Ajman	16	11	134	89	49	33	101	67
Um Al Quwain	53	35	97	65	53	34	104	66
Ras Al Khaimah	20	15	118	85	42	30	97	70
Fujairah	71	47	80	57	54	41	78	59
Total	512	39	811	61	522	39	806	61

of 12- and 15-year-old children examined was 71% and 65% for UAE nationals and 29% and 35% for non-UAE nationals respectively. The most common countries of origin of the non-UAE nationals were Egypt, Palestine, Syria and Jordan.

Dental caries in 12-year-olds

The prevalence and severity of caries experience in 12-year-old schoolchildren is given in Table 2. The proportion of 12-year-olds who had caries in their permanent dentition was 54% overall, varying between 43% in Sharjah and Umm Al Quwain and 89% in Western Region (Table 2). The DMFT distribution by tooth of these schoolchildren is given in Figure 1.

A very high proportion (32%) of 12-year-olds in Western Region had more than 4 teeth with decay. On the other hand, in 4 medical districts (Ajman, Dubai, Sharjah and Um Al Quwain) 3% or less of school-

Table 2 **Caries experience of 12-year-old children and the mean decayed, missing, filled teeth index (DMFT) for boys and girls in each of the 9 medical districts**

Medical district	% of children			Mean DMFT	
	Caries-free	Moderate caries	High caries		
	DMFT 0	DMFT 1–4	DMFT > 4	Boys	Girls
Abu Dhabi	40	50	10	1.8	2.1
Al Ain	34	57	9	2.0	1.9
Western Region	11	58	31	3.0	4.2
Dubai	52	46	2	1.2	0.7
Sharjah	57	39	3	0.9	0.9
Ajman	53	45	1	1.5	1.0
Um Al Quwain	57	40	3	1.1	0.9
Ras Al Khaimah	50	42	8	1.7	1.3
Fujairah	34	60	5	1.4	2.1

children had more than 4 teeth with decay (Table 2).

For the whole of the UAE, 8% of these schoolchildren had had teeth extracted because of dental caries and 18% had had teeth filled. The highest number of extractions was in Fujairah and of fillings was in Abu Dhabi. For the whole of the UAE, the mean DMFT for 12-year-olds was 1.6. The filled component was 0.5 FT and the extracted component was 0.1 MT.

The high rate of caries in Western Region in 12-year-olds was accompanied by a low number of teeth filled or extracted.

There was little difference between the sexes in mean DMFT and in the components (DT, MT and FT) of this index of caries (Table 2). Caries experience was higher in the girls in Western Region (mean 4.2 DMFT) and lowest in girls in Dubai (0.7 DMFT). There was also little difference in mean DMFT between UAE nationals (1.6 DMFT) and non-UAE nationals (1.4 DMFT): the filled (FT) and the extracted (MT) components were also similar. The prevalence of 1 or more sealed teeth in 12-year-olds in the UAE was 0.1%.

Dental caries in 15-year-olds

The prevalence and severity of dental caries in 15-year-olds is given in Table 3. By the age of 15 years, 65% had experienced dental decay in the UAE overall. This varied from 51% in Sharjah to 89% in Western Region. The DMF distribution by tooth of these children is given in Figure 2.

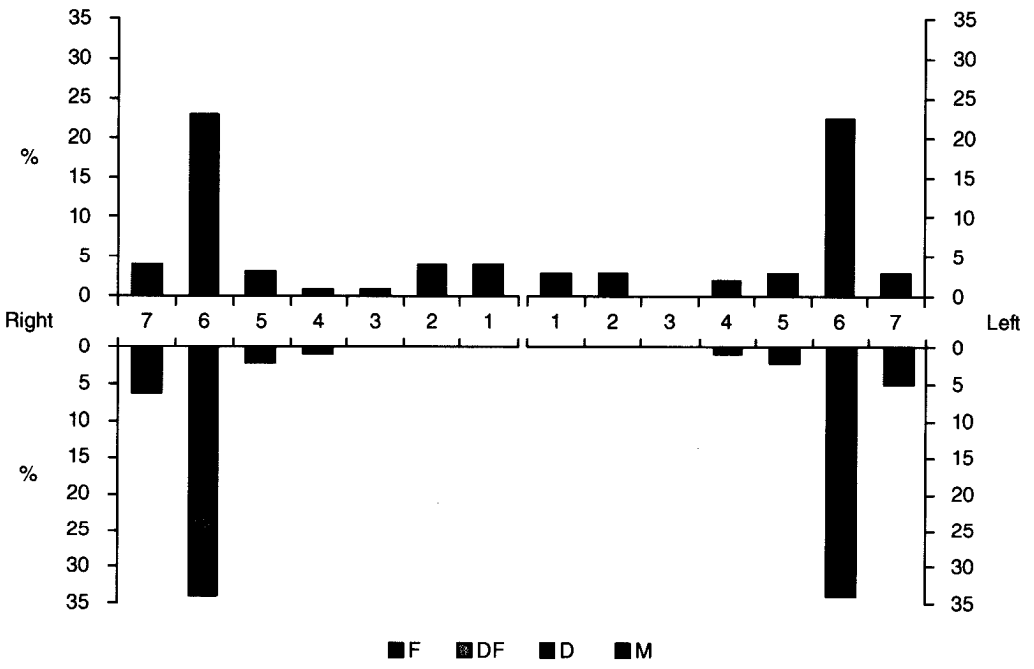


Figure 1 **DMF distribution by tooth for 12-year-old children (F = filled, DF = decayed and filled, D = decayed, M = missing teeth). Note: Unerupted teeth and teeth extracted for reasons other than dental caries have been excluded from the calculation of percentage. Sealed teeth were included in the count of sound teeth.**

Table 3 **Caries experience of 15-year-old children and the mean decayed, missing, filled teeth index (DMFT) for boys and girls in each of the 9 medical districts**

Medical district	% of children			Mean DMFT	
	Caries-free DMFT 0	Moderate caries DMFT 1–4	High caries DMFT > 4	Boys	Girls
Abu Dhabi	30	51	18	2.3	2.8
Al Ain	11	56	33	3.4	4.3
Western Region	10	29	60	5.2	6.0
Dubai	35	51	13	1.8	2.0
Sharjah	48	42	9	1.1	2.1
Ajman	46	43	11	1.7	1.7
Um Al Quwain	47	42	11	1.4	1.6
Ras Al Khaimah	41	40	19	2.1	2.4
Fujairah	21	50	28	3.2	3.2

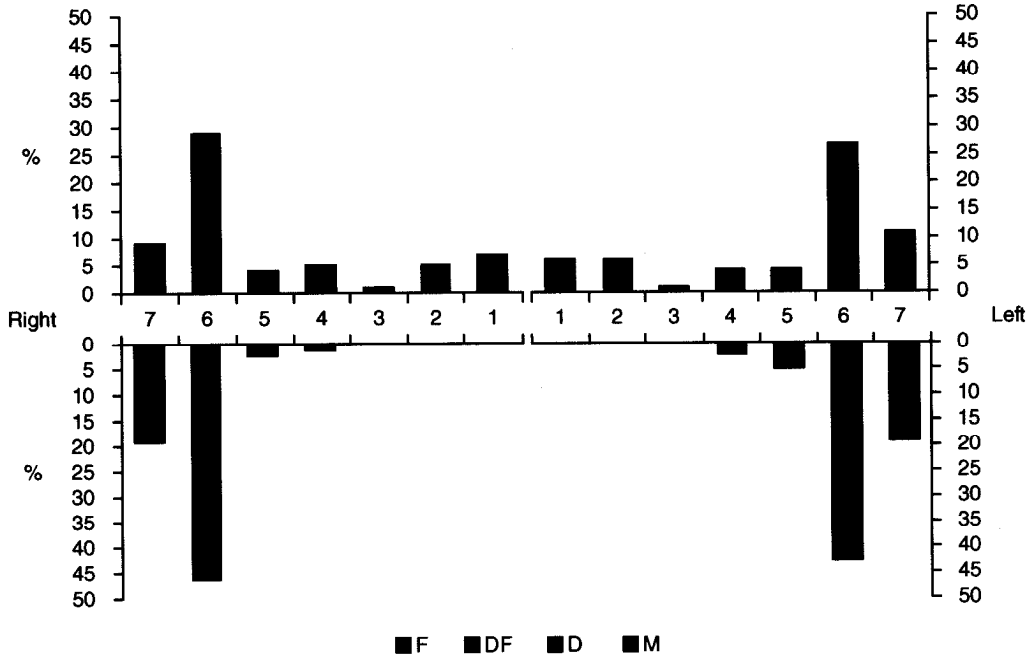


Figure 2 **DMF distribution by tooth for 15-year-old children (F = filled, DF = decayed and filled, D = decayed, M = missing teeth). Note: Unerupted teeth and teeth extracted for reasons other than dental caries have been excluded from the calculation of percentage. Sealed teeth were included in the count of sound teeth.**

In Western Region, a high percentage of schoolchildren (60%) had decay in > 4 teeth; this was only 9% in Sharjah. Almost 1 in 8 schoolchildren had experienced extraction of ≥ 1 teeth for dental caries and about a quarter had had teeth filled. The 15-year-olds in Abu Dhabi were the most likely to have had teeth filled.

Mean DMFT 2.5 overall was recorded for 15-year-olds. The highest mean value (5.7 DMFT) was in Western Region and the lowest in Sharjah and Um Al Quwain (1.5 DMFT). In Western Region, 15-year-olds had mean 5.0 DT and 0.4 FT, while those in Abu Dhabi had mean 0.9 DT and 1.5 FT.

There was a slight tendency for girls to have higher DMFT scores; this was observed in 6 of the 9 medical districts (Table 3). The provision of treatment (FT), though, was similar in boys and girls.

UAE nationals tended to have higher DMFT values than non-UAE nationals; again, this was recorded in 6 out of 9 medical districts. Provision of care (in terms of FT) was approximately equal in UAE nationals and non-nationals.

Examiner reproducibility

Examiner reproducibility was measured by the reliability coefficient [*2*] calculated for 7 of the 9 examiners from re-examination of 10% of the schoolchildren. In 2 districts, the examiner did not re-examine any child. The data obtained by the 7 examiners had high reliability (reliability coefficient = 0.97 for 12 years and 0.93 for 15 years).

Dental fluorosis

The prevalence of dental fluorosis is presented in Table 4 for 12-year-olds and in Table 5 for 15-year-olds. Data were not recorded for 12-year-olds in Al-Ain district and the average for the UAE needs to be interpreted with this in mind. For the UAE as a whole, 70% of 12-year-old schoolchildren had no teeth with dental fluorosis (grades 0 and 1); this varied from 39% in Dubai to 99% in Abu Dhabi medical district. None of the schoolchildren had teeth with severe fluorosis (grade 5) and overall, 0.8% had 1 or more teeth graded moderate fluorosis (grade 4). Very mild fluorosis (grade 2) was common, with 20% of 12-year-olds having 1 or more teeth with this grade. Severity of dental fluorosis was highest in Dubai and lowest in Abu Dhabi.

There were some differences between the sexes in the prevalence and severity of dental fluorosis, with mild and moderate fluorosis tending to be more prevalent in

Table 4 **Dental fluorosis (Dean's grading [6]) of 12-year-old children in 8 medical districts**

Medical district	% of children with dental fluorosis:				
	Healthy Grade 0	Questionable Grade 1	Very mild Grade 2	Mild Grade 3	Moderate Grade 4
Abu Dhabi	94	5	1	0	0
Western Region	55	32	10	3	1
Dubai	8	31	38	21	2
Sharjah	8	53	30	7	3
Ajman	17	34	31	15	2
Um Al Quwain	43	33	22	3	0
Ras Al Khaimah	21	29	43	7	0
Fujairah	58	29	9	4	0

Data not recorded in Al Ain district.

boys than in girls. There was no consistent difference between UAE nationals and non-nationals in the prevalence and severity of dental fluorosis.

About 2% of 15-year-olds had moderate fluorosis. The percentage of mild and moderate fluorosis was highest in Dubai (23%) (similar to that for 12-year-olds). The percentage of mild and moderate dental fluorosis was next highest in Sharjah and Ras Al Khaimah (both 16%). Little difference between boys and girls was recorded (Table 5), except in Ajman where the prevalence of mild and moderate fluorosis was higher in girls than in boys.

Periodontal disease

The periodontal disease status, as measured by the CPITN, of 15-year-old schoolchildren is given in Table 6. The CPITN was not measured in Al-Ain medical district and the average score for the UAE needs to be interpreted with this in mind. Overall in the UAE, 37% of children had healthy periodontal tissues, 15% had 1 or more sextants which bled on probing but had no calculus, and 39% had 1 or more sextants with calculus. Pocketing was not examined for this survey.

The percentage of schoolchildren with healthy periodontal tissues was lowest in Fujairah medical district and highest in Ajman. There was little difference in CPITN percentages between the sexes (Table 6) or between UAE nationals and non-nationals.

Discussion

This was the first national survey of oral health in the UAE. It was decided to survey schoolchildren and not adults as oral disease begins in childhood and preventive programmes are often planned and implemented at this time; sampling of children is easier than for adults; and more international comparisons can be made for children than for adults. Future national surveys are likely to include adults. Our survey included 12- and 15-years-olds because 12 years is the most common age for oral health surveys according to WHO recommendations [*1*] and by the age of 15 years the majority of the permanent dentition has been present in the mouth for 2 to 3 years and the children are likely to be still in school.

Mean data presented for the UAE as a whole took account of differences in district

Table 5 **Dental fluorosis (Dean's grading [6]) of 15-year-old boys and girls in 9 medical districts**

Medical district	% of children with dental fluorosis:								
	Healthy/questionable Grade 0 or 1			Very mild Grade 2			Mild/moderate Grade 3 or 4		
	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both
Abu Dhabi	97	100	99	3	0	1	0	0	0
Al Ain	72	80	76	14	14	14	15	6	10
Western Region	75	66	68	10	18	15	15	16	17
Dubai	64	49	53	9	30	24	27	21	23
Sharjah	48	48	47	35	38	36	18	15	17
Ajman	88	66	72	10	17	15	2	17	13
Um Al Quwain	66	75	73	32	17	22	2	8	5
Ras Al Khaimah	50	49	50	36	35	35	14	17	15
Fujairah	96	86	90	2	10	7	2	4	3

Table 6 **Periodontal status of 15-year-old boys and girls as measured by the Community Periodontal Index of Treatment Needs (CPITN) in 8 medical districts**

Medical district	% of children with periodontal status:								
	Healthy			Bleeding			Calculus		
	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both
Abu Dhabi	44	60	52	35	20	28	21	20	21
Al Ain	42	55	49	4	1	3	54	44	48
Dubai	52	56	55	18	7	10	30	37	35
Sharjah	21	37	29	28	35	32	51	28	39
Ajman	57	59	59	14	17	16	29	24	25
Um Al Quwain	47	32	37	25	22	23	28	46	40
Ras Al Khaimah	31	26	27	5	10	9	64	64	64
Fujairah	19	13	15	6	8	7	76	79	78

CPITN not recorded in Western Region district.
Due to rounding, percentages do not total 100.

size. This is a common procedure as it limits the number of schools visited to an acceptable level. It should be noted, however, that in some medical districts, the random selection of schools resulted in an imbalance of boys and girls, and stratification of schools by sex may be desirable in the future. In practice, in this survey, there was little difference in oral disease between boys and girls. The very low rate of non-participation (non-consent or absence from school) is a welcome feature of this survey.

Some other diseases or defects were excluded (e.g. oral cleanliness, malocclusion, dental trauma and dental enamel defects other than fluorosis) in this survey as they are of lesser importance or are difficult to record, and limiting the burden on inexperienced examiners was considered important.

There are very few dentists trained in epidemiology in the UAE. For practical reasons, it was decided to have 1 examiner from each of the 9 medical districts. It was very important that these examiners conformed to a single standard and that this standard conformed to that of the WHO. The 7 examiners who undertook re-examination of subjects demonstrated a high level of reliability of data. In future surveys, verifying diagnostic standards between examiners would be desirable: the establishment of an oral epidemiology training unit would help considerably. This might avoid the non-recording of dental fluorosis which occurred in 1 district in this survey.

The mean DMFT for 12- and 15-year-old schoolchildren in the UAE was 1.6 and 2.5. Comparing similar surveys in other countries such as China showed a mean DMFT of 1.0 and 1.4 for the same age groups [*4*]. In India the mean DMFT for 12-year-old schoolchildren was 0.5 [*5*], whereas it was 4.6 for the same age group in Vietnam [*6*]. In a survey conducted in Lebanon, mean DMFT for 12- and 15-year-olds were 5.0 and 7.7 respectively [*7*], and in Nigeria mean DMFT for the same groups was 0.7 and 1.3 [*8*].

There is an extensive databank held by WHO on the caries experience of 12-year-olds. Comparing mean DMFT from countries geographically close to the UAE and selected other countries, the 1.6 DMFT for the UAE is similar to those recorded in neighbouring countries (Oman 1.5, Saudi Arabia 1.7 and Bahrain 1.4). It is, though, higher than values currently recorded in northern Europe.

The 15-year-olds in the UAE had mean 2.5 DMFT in this survey. Values for the same age in sme neighbouring countries were 2.5 DMFT in Bahrain, 2.8 DMFT in Jordan, 3.2 DMFT in Oman, 3.6 DMFT in Kuwait and 3.8 DMFT in Saudi Arabia [*9*].

If the "questionable" grade of dental fluorosis is included within the "healthy" grade, the prevalence of dental fluorosis was 32% in 12-year-olds and 30% in 15-year-olds in this survey. In the only previous study in the UAE, a small study of 59 children, 18% of 15-year-olds had dental fluorosis [unpublished report, 1991, K. Cowles].

There have been no previous surveys of periodontal disease in the UAE. However, the WHO maintains a databank of CPITN values, and information on 15–19-year-olds from countries geographically close to the UAE and selected other countries. The percentage of 15-year-olds with healthy periodontal tissues (41%) was higher than in other countries in the region; the percentage of 15-year-olds with bleeding (16%) or calculus (43%) was also better (lower) than in many other countries. Periodontal pockets were not examined for in our survey as low prevalence could be expected at the age of 15 years and "false pocketing" occurs (due to partial tooth eruption) in adolescence. This decision should be reconsidered when planning the next survey.

Overall, the rates of caries in the permanent dentition, dental fluorosis and periodontal disease were similar to many other countries. However, these levels indicate considerable oral morbidity, which demands attention for untreated dental caries.

Although the fluoride concentration in drinking water in the Emirates is generally low, much caries prevention is fluoride-based and recording the prevalence and severity of dental fluorosis seemed to be a wise precaution. Planning future surveys should consider the inclusion of adults.

Conclusions

Regarding the implications for the Ministry of Health, in spite of remarkable progress in the provision of dental health services in the UAE, dental caries remains a public health problem in young children. The low prevalence of periodontal disease and dental fluorosis in schoolchildren aged 12 and 15 years should not be considered an indication of good oral health in these children: a low prevalence of periodontal diseases is expected at this age.

Coordinated epidemiological studies should be carried out every 5 years. Resources such as well-trained staff and an adequate budget should be available to secure the success of such investigations.

School-based preventive programmes should be encouraged and supported, and any national preventive strategy to control dental caries should take into account the trends in dental caries. Local legislation in each Emirate can play a major role in reducing the risk of dental diseases.

Acknowledgements

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Oral health facts

- The most common oral diseases are dental cavities and periodontal (gum) disease.
- 60%–90% of schoolchildren worldwide have dental cavities.
- Severe periodontal (gum) disease, which may result in tooth loss, is found in 5%–20% of middle-aged adults; the rate varies across geographical regions.
- Incidence of oral cancer ranges from one to 10 cases per 100 000 population in most countries.
- Birth defects such as cleft lip and palate occur in around one per 500–700 of all births; the birth prevalence rate varies substantially across ethnic groups and geographical areas.

Source: WHO Fact sheet, No. 318
February 2007

Pattern of acute poisoning in Al-Qassim region: a surveillance report from Saudi Arabia, 1999–2003

M. Moazzam,[1] A.M. Al-Saigul,[2] M. Naguib[3] and M.A. Al Alfi[2]

نمط التسمُّم الحاد في منطقة القصيم: تقرير ترصدي من المملكة العربية السعودية 1999 – 2003

محمد معظم، عبدالله بن محمد الصيقل، محمد نجيب، محمد العراقي الألفي

الخلاصة: استعرض الباحثون جميع الحالات المسجَّلة على أنها تسمُّم كيميائي حاد أبلغ عنها في قسم الطب الوقائي في منطقة القصيم في المملكة العربية السعودية في الفترة 1999 – 2003. وقد لاحظ الباحثون ازدياد عدد الحالات من 66 إلى 114 خلال فترة الدراسة. وكان متوسط عمر المرضى 17.7 سنة، ولكن 39٪ من المرضى كانوا من الأطفال الذين تبلغ أعمارهم إما 5 سنوات أو أقل، وكان أكثر المواد الكيميائية المسببة للتسمُّم مبيدات الهوام، غير أن هناك إبلاغ متكرر عن التسمُّم بالباراسيتامول وغيره من المسكنات. وكان أكثر طرق تناول السم هو الفم، والعَرَض الأكثر شيوعاً هو الإقياء. وقد سُجِّلَتْ 9 وفيات كان 4 منها ناجمة عن التسمم بمبيدات الهوام. واستنتج الباحثون أن التسمم الحاد بالمواد الكيميائية يزداد، ليصبح من القضايا الصحية الرئيسية في منطقة القصيم، وذلك يتماشى مع الاتجاه العالمي.

ABSTRACT We reviewed all registered cases of acute chemical poisoning reporting to the preventive medicine department in the Qassim Region of Saudi Arabia from 1999 to 2003. The number of cases increased from 66 to 114 during the study period. Mean age of patients was 17.7 years, and over 39% were children aged ≤ 5 years. Pesticides were the most common chemical involved; paracetamol and other analgesics were also frequently reported. The oral route was the most frequent, while vomiting was the commonest symptom. Nine deaths were recorded, of which 4 were due to pesticide poisoning. In line with the global trend, acute chemical poisoning is growing as a major health issue in the Qassim Region.

Évolution des intoxications aiguës dans la région d'Al-Qassim : rapport de surveillance en Arabie Saoudite, 1999–2003

RÉSUMÉ Nous avons passé en revue tous les cas d'intoxication chimique aiguë enregistrés et déclarés au service de médecine préventive de la région d'Al-Qassim (Arabie saoudite) de 1999 à 2003. Le nombre de cas est passé de 66 à 114 pendant la période d'étude. L'âge moyen des patients était de 17,7 ans et plus de 39 % étaient âgés de 5 ans ou moins. Les pesticides étaient les produits chimiques les plus souvent en cause ; le paracétamol et les autres analgésiques étaient eux aussi souvent signalés. La voie orale était la plus fréquente et le vomissement était le symptôme le plus courant. Neuf décès ont été enregistrés, dont quatre étaient dus à une intoxication par les pesticides. Conformément à la tendance mondiale, l'intoxication chimique aiguë est un problème sanitaire grandissant dans la région de Qassim.

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Introduction

Acute chemical poisoning is a major public health concern. The World Health Organization estimates that total number of acute unintentional poisonings throughout the world ranges from 3.5–5.0 million cases annually, of which 3 million are severe poisonings resulting in 20 000 deaths annually, while the estimated annual intentional poisonings number 2 million resulting in 200 000 suicides [*1,2*].

Exposure to chemicals can be accidental or iatrogenic in young children, whereas it is usually deliberate among adults [*3*]. The increased tendency to use over-the-counter drugs has resulted in a significant rise in the numbers of patients admitted to hospital suffering from overdose [*4*].

Acute chemical poisoning being a major public health issue formed the rationale for undertaking this study to estimate the acute chemical poisoning situation in Qassim, Saudi Arabia in relation to national and international experience.

The specific objectives of the study were to describe the magnitude and characteristics of chemical poisoning in the Qassim region and to formulate recommendations to: a) improve chemical poisoning surveillance in the region and b) suggest interventional programs to minimize chemical poisoning.

Methods

This was a retrospective study of all registered cases of acute chemical poisoning at Preventive Medicine Department, Qassim Region, Saudi Arabia for the period April 1999–February 2003.

The total population of the region during the year 2000 was close to a million (979 858) [*5*]. The population for other years was adjusted using a growth rate of 2.9% [*6*]. Surveillance data in Qassim Region, Saudi Arabia was reviewed by the authors during the period from April 2004–September 2004. The cases were reported by hospitals and related health facilities under the administrative control and standardized forms of the Ministry of Health. Cases were defined as any person at any age with symptoms after history of exposure to chemical material or medicines in excess of their therapeutic limits. Data for patients, illnesses, and chemical material characteristics were analysed using *Epi-Info*, version 6.04.

Results

During the period April 1999–February 2003, the total reported number of cases of acute chemical poisoning in Qassim region was 404. Table 1 shows the annual rise in cases since the year 2000 from 66 to 114 cases, with an estimated annual incidence of 10.7 cases per 100 000 population in the year 2003.

The total population of Qassim region in 2000 was recorded as 979 858. Buraidah is the main city in the region with about one-third of the population residing there. More than half the reported cases, 235 (58.2%), were from Buraidah district. Most cases (116, 28.7%) were reported from Buraidah Central Hospital followed by the Maternity

Table 1 **Yearly distribution and incidence of poisoning in Qassim region, 1999–2003 (*n* = 404)**

Year	No. of cases	Annual incidence[a]
1999	66	6.9
2000	48	4.9
2001	76	7.5
2002	100	9.6
2003	114	10.7

[a]*Cases/100 000 population.*

and Children's Hospital Buraidah, which reported 113 (28.0%) cases.

Table 2 shows patient characteristics. Most cases were Saudi Arabians (310, 76.7%) and just over half were males (229, 56.7%). Mean ages was 17.7 years (range 0.5–86 years); 39% were ≤ 5 years of age. Vomiting was the most common presenting symptom (203, 50.2%). The mean time of appearance of symptoms after ingestion was 2.3 hours, range 0.5–18 hours; in 236 (58.4%) cases, however, symptoms appeared within 1 hour.

Nine patients died, giving a mortality rate of 2.2%; all other 395 reported cases (97.8%) recovered with no reported sequelae.

Chemicals were responsible for 234 (57.9%) cases (Table 3), whereas 170 (42.1%) cases were due to use of medicines outside therapeutic limits and advice. Pesticides were involved in 100 (24.7%) cases and were the main chemical agent causing death. The most common recorded route was ingestion; 315 (78.0%), whereas liquid and solid forms were the most common physical forms reported 176 (43.6%) and 150 cases (37.1%) respectively.

All cases in children ≤ 5 years (159) were accidental poisoning (Table 4). In total, 247 (61.1 %) were accidental. Intentional poisoning was reported in 109 cases (27.0%), with a male to female ratio of 2:3. Occupational poisoning occurred in 28 cases (6.9%).

Table 2 **Patient characteristics for cases of acute chemical poisoning in Qassim region, 1999–2003 (*n* = 404)**

Variable	No.	%
Age group (years)		
0–15	189	47
> 15	215	55
Males	229	57
Saudi Arabians	310	77
Common symptoms		
Vomiting	203	50
Dizziness	129	32
Difficulty breathing	88	21
Irritability	73	18
Constricted pupils	70	17
Unconscious	68	16
Headache	62	15
Mortality	9	2.2

Table 3 **Acute poisoning, characteristics of materials, Qassim region, 1999–2003 (*n* = 404)**

Variable	No.	%
Chemical	234	57.9
Pesticide[a]	100	24.7
Kerosene oil	29	7.2
Household bleach	23	5.7
Carbon monoxide	22	5.4
Acid	11	2.7
Thinner/diesel oil	11	2.7
Other	37	9.4
Medications	170	42.1
Paracetamol & other analgesics	41	10.1
CNS-acting[b]	41	10.1
Antihistamines	18	4.6
Multiple drugs	16	4.0
Oral contraceptive pills	7	1.7
Other	47	11.6
Physical form		
Liquid	176	43.6
Solid	150	37.1
Gas	38	9.4
Other[c]	40	9.9
Route of administration		
Oral	315	78.0
Respiratory	47	11.6
Dermal	21	5.2
Other	6	1.4

[a]*Organophosphates + others: organousphorous pesticides form the main proportion (22%).*
[b]*CNS = central nervous system: benzodiazepine, antipsychotics, antidepressants, alcohol, etc.*
[c]*Powders, creams and "not recorded".*

Table 4 **Acute chemical poisoning, distribution according to age and circumstances, Qassim region, 1999–2003 (*n* = 404)**

Age (years)	Accidental		Intentional		Occupational		Unknown	
	No.	%	No.	%	No.	%	No.	%
≤ 5	159	39.5	0	0.0	0	0.0	0	0.0
6–15	26	6.4	4	1.0	0	0.0	0	0.0
16–25	24	5.9	55	13.6	5	1.2	10	2.4
26–35	20	4.9	33	8.2	17	4.3	4	1.0
36–45	8	2.0	13	3.2	5	1.2	4	1.0
> 45	10	2.5	4	1.0	1	0.2	2	0.5
Total	247	61.2	109	27.0	28	6.9	20	4.9

Discussion

The surveillance data had a few known shortcomings: the present surveillance system (including reporting of acute poisoning) started in 1995 (replacing the previous system) and under-consultation by patients or their proxy and under-reporting by health institutes are the main reasons for weak chemical poisoning surveillance. However, much can be learnt from the simple results obtained. The number of reported cases and the estimated incidence (10.7/100 000 population) indicate there is a problem that deserves continuous assessment and interpretation. Gradual strengthening and capacity-building of the information system for chemical poisoning is desirable. Given that this system is quite new, and more cases are being reported every year, the real number is expected to be much higher. Most reported cases came from large cities: more than half were from the capital of the region, Buraidah, where one third of the population resides. Surveillance is expected to better in the capital as patients are more likely to consult for minor symptoms (or even without symptoms) and health institutes do comply better with the reporting. Although the Maternity and Children's Hospital is the referral pediatric hospital for Qassim Region, acute cases are usually seen and stabilized, and hence reported, before being referred for advanced care at this hospital.This may support the notion of under-reporting from the smaller districts. Our estimated incidence is lower than that reported in a study conducted in the Eastern Province of Saudi Arabia [*7*] and in another in the north of Jordan [*8*].

The highest proportion of acute poisoning was observed among children ≤ 5 years of age, which corresponds with the findings of similar studies conducted in other areas of Saudi Arabia [*9–14*] and other countries in the region [*15–17*]. The lowest proportion of poisoning was among people aged > 50 years (3.2%), is similar to another study from Jeddah [*18*].

Accidental poisoning was commonest amongst children for obvious, though highly preventable, reasons, mainly accidental exposure to household products and drugs. Small children especially remain a significant problem for this age group as shown in many other studies [*19–21*]. Interventions need to be designed to address this aspect. On the other hand, intentional poisoning is also quite frequently witnessed. Most intentional poisoning cases were among teenagers and young adults, with females significantly outnumbering males. Drugs were commonly the mode of intentional poisoning in our study consistent with the

findings of other studies [*7–8,21–23*]. The proportion of occupational poisoning cases seen (6.9%) was slightly higher than that reported by the Ministry of Health Central Department of Preventive Medicine (4.7%) [*14*].

The commonest chemical substance cited was pesticides, in accordance with the findings of other studies [*16,19,24,25*]. Organophosphorus compounds (22%) were the most commonly involved, both in accidental and occupational poisoning.

Chemical poisoning due to use of medicines outside their therapeutic limits and advice was more frequent than in an Australian study [*26*]. Paracetamol and other analgesics were the most common drugs cited among all age groups, in accordance with the results of other studies [*8,23*] whereas drugs acting on the central nervous system were mainly used by adults in intentional poisoning, showing a distinct similarity with the results of another Saudi Arabian study [*7*].

The mean time between ingestion and appearance of symptoms was 2.3 hours and symptoms appeared within one hour in 58.4% cases, indicating the urgency of case management.

Overall mortality rate (2.2%) is slightly higher than the study (1.3%) conducted in the Islamic Republic of Iran [*27*], while the mortality rate among the age group 0–5 years (1.8%) coincides with other results from Saudi Arabia [*28*].

The oral route was the most common route of poisoning in our study in accordance with results of other studies in Saudi Arabia [*18*] and other countries [*19,20,23*]. Liquid was the most common physical form used, as found in a previous Saudi Arabian study [*18*].

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Review

Growing burden of noncommunicable diseases: the contributory role of oral diseases, Eastern Mediterranean Region perspective

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العبء المتزايد للأمراض غير السارية: الدور المسهم لأمراض الفم فيه، منظور إقليم شرق المتوسط

سيد أختر حسين بخاري، أياذ علي خان

الخلاصة: نُشرت تقارير على نطاق واسع في الأدبيات الصادرة عن البلدان المتقدِّمة حول الارتباط بين أمراض الفم والأمراض غير السارية مثل السكري والأمراض القلبية الوعائية والأمراض التنفسية المزمنة وتخلخل العظام والفشل الكلوي المزمن. ويلعب دوراً هاماً في هذا الارتباط كلٌ من شيوع عوامل الخطر هذه، والتغيرات في الوسائط الالتهابية الجهازية واستقلاب الجسم. ويستعرض الباحثان في هذه الورقة المعارف حول عبء وارتباط الأمراض الجهازية وأمراض الفم، ويوضحان قلة المعلومات والبحوث في إقليم شرق المتوسط والبلدان النامية الأخرى. ويدعو الباحثان إلى إجراء المزيد من البحوث للحصول على فهم أفضل لوضع وأهمية الارتباط بين الأمراض الجهازية وأمراض الفم وإعداد دلائل إرشادية لمكافحتها في الإقليم.

ABSTRACT Associations of oral diseases with noncommunicable diseases such as diabetes, cardiovascular diseases, chronic respiratory diseases, osteoporosis and chronic renal failure are widely reported in the literature from developed countries. Commonality of risk factors, changes in systemic inflammatory mediators and body metabolism play a role in this association. This paper reviews current knowledge on the burden and association of oral and systemic diseases, and highlights the paucity of information and research from the Eastern Mediterranean Region and other developing countries. A call is made for further research to understand the status and significance of oral–systemic disease associations and develop guidelines for their control in this Region.

Charge croissante des maladies non transmissibles : le rôle contributif des affections bucco-dentaires. Le point de vue de la Région de la Méditerranée orientale

RÉSUMÉ L'association entre les atteintes bucco-dentaires et les maladies non transmissibles telles que le diabète, les maladies cardiovasculaires, les maladies respiratoires chroniques, l'ostéoporose et l'insuffisance rénale chronique fait l'objet d'une abondante littérature dans les pays développés. Les points communs entre les facteurs de risque, les modifications au niveau systémique des médiateurs inflammatoires et le métabolisme du corps humain jouent un rôle dans cette association. Cet article examine les connaissances actuelles sur la charge des maladies bucco-dentaires et systémiques et leur association, et met en lumière le manque d'information et de recherche dans la Région de la Méditerranée orientale et les autres pays en développement. Un appel à l'intensification de la recherche est lancé, afin que l'on comprenne l'importance et la signification de l'association entre maladies bucco-dentaires et systémiques et que l'on définisse des lignes directrices permettant de lutter contre ces maladies dans la Région.

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Introduction

The world is facing an epidemic of chronic diseases, especially noncommunicable diseases (NCD). Heart disease, stroke, cancer, diabetes and chronic respiratory disease are the leading causes of death in every region of the world [*1*]. In countries of the Eastern Mediterranean Region (EMR) 47% of the Region's burden of disease is currently due to NCD, and this is expected to rise to 60% by the year 2020 [*2*]. It is predicted that by 2020 these diseases will be causing 7 out of every 10 deaths in developing countries [*3*] and 60% of all mortality will be attributable to NCD [*4*]. Future decades will see dramatic changes in the health needs of poor and developing countries. In view of the estimates of the growing burden of NCD on the lives of poor people, greater recognition of the importance of NCD is needed [*5*].

Oral diseases are included among the World Health Organization (WHO) definition of chronic diseases [*1*], and the importance of oral health is recognized as more than just healthy teeth: "the mouth is a mirror of health or disease, a sentinel or early warning system, an accessible model for the study of other tissues and organs and as a potential source of pathology affecting other systems and organs" [*6*].

Oral–systemic disease connections are not new and according to the American Dental Association as many as 200 possible associations between systemic conditions and oral manifestations can be identified in the literature [*7*]. The relationship of poor oral health—mainly due to periodontal diseases and/or tooth loss—and increased risk of cardiovascular diseases (CVD), pulmonary diseases, diabetes, pregnancy outcomes, and all-cause mortality have become a constant issue of discussion in the current scientific literature [*8*]. These chronic systemic and oral diseases share many common risk factors such as heredity, age, sex, education, sedentary lifestyle, smoking, diet and obesity [*9*]. Epidemiological and clinical studies identify a relationship between oral diseases and NCD, but the relationship has not been clearly established as a causal one. Several pathophysiological pathways of association are postulated to explain this relationship. Certain criteria for a cause–effect relationship have been suggested which provide a direction for future investigations.

The objective of this review article was to explore the literature for information on the status, association and burden of oral diseases in relation to NCD in developing countries generally and the EMR especially in order to review the body of global research evidence about possible pathways of infection. The rationale of this review was to highlight the lack of information and research about the impact of oral diseases on NCD in this Region and to stress the importance of oral health issues in medicine in relation to the risk of NCD.

Research method

Online searches were made to find literature on oral diseases, e.g. dental caries, periodontal diseases and tooth loss, and on NCD, e.g. CVD, diabetes, chronic respiratory diseases, osteoporosis and renal complications. *PubMed* and websites of peer-reviewed journals, WHO, World Heart Federation, International Diabetes Federation and other health organizations were browsed to collect the required information related to NCD and oral diseases.

Burden of oral diseases

Oral diseases are prevalent globally. Dental caries and periodontal diseases, which have historically been considered the most im-

portant global oral health burdens, vary in distribution and severity in different parts of the world [*10*]. The prevalence and severity of oral diseases is affected by age, sex, race, geographic area, socioeconomic factors, local and systemic factors and methods of oral cleansing [*11*].

Dental caries affect 60%–90% of schoolchildren and adults in EMR countries. The average decayed/missing/filled teeth (DMF) score exceeds 2.00. The problem of missing teeth is reported to be smaller in industrialized countries than in developing countries. Edentulism in those aged 65+ years is reported as 7% for Egypt, 20% for Lebanon and 31%–46% for Saudi Arabia [*12*]. While there is research on missing teeth in EMR countries, e.g. from Jordan [*13*], in general data from the Region are sparse. Periodontal disease is prevalent in all age groups; the current view is that some 5%–20% of any population suffers from severe generalized periodontitis, and moderate disease affects a majority of adults. If the minimum level of disease is defined as "one site of clinical loss of attachment of 2 mm or more", around 80% of all adults and over 90% of those aged 55–64 years are affected [*14*]. WHO data confirm that the problem of dental caries continues to increase and that the prevalence of periodontal disease remains high in developing countries [*15*].

Oral disease and diabetes

A bidirectional relationship of diabetes and periodontal diseases is reported in the literature [*16,17*], as the presence of one condition tends to promote the other and periodontal disease is graded as the 6th most common complication of diabetes mellitus [*18*]. Greater prevalence, severity, extent or progression of periodontal diseases [*19*], greater tooth loss when compared with general populations [*18,20*], higher incidence of dental caries [*21*] and poor oral health [*20*] are reported in diabetic patients. However there is insufficient evidence to determine a relationship between diabetes and higher risk for coronal or root caries [*17*].

The relationship between diabetes mellitus and periodontal disease has been explained in many ways. Oral infections serve as metabolic stressors that may exacerbate systemic disease [*21*] and bacterial products propagate an inflammatory response in the host through Toll-like receptors that induce an inflammatory cascade [*22*]. The physiological phenomena of impaired body resistance, vascular changes, altered oral microflora and abnormal collagen metabolism found in diabetes may explain the association with periodontitis [*23*].

Oral disease and cardiovascular disease

Oral infections are associated with CVD as risk factors and this association is independent of the "classic" coronary risk factors [*24*]. One review of studies and several cross-sectional, case–control and follow-up studies report a positive association of poor oral health with CVD [*12,25–29*]. These include an association of periodontitis with carotid calcification and stroke [*26*]; of tooth loss and periodontal parameters (periodontal pocket and clinical attachment loss) with cases of myocardial infarction and angina [*27*]; and of chronic periodontitis with future events of acute myocardial infarction [*28*]. But the associations of other oral health indicators, e.g. dental caries, presence of remaining teeth, dental plaque and dentures, with CHD deaths are not significant [*29*].

The association between poor oral health and CHD is explained by changes in inflammatory and haemostatic factors [*30*]. Key inflammatory mediators [C-

reactive protein (CRP), serum amyloid A, ceruloplasmin, alpha(1)-acid-glycoprotein and alpha(1)-antichymotrypsin] increased 3-fold in patients with both CVD and periodontal disease [*31*]; CRP increases independently in patients with periodontitis [*32*] and coronary calcification [*33*] and is associated with increased risk for future development of atherosclerosis in periodontitis patients [*34*]. White blood cell counts increased with the severity of periodontitis in both smoking and nonsmoking groups of patients [*35*]. Concentrations of pro-inflammatory markers (interleukin-1β, tumour necrosis factor-α, interleukin-2, interferon cytokine-y) were on average significantly higher in serum samples and gingival tissue biopsies from periodontitis patients than healthy controls [*36*]. Lipid profiles also showed that total cholesterol/high-density lipoprotein cholesterol ratio was higher in patients with periodontitis and CVD [*37*].

Intervention studies have shown an influence of periodontal treatment in CVD patients by bringing changes in serum inflammatory and haemostatic markers, suggesting that prevention and control of periodontal diseases may play a role in the initiation and/or progression of CVD [*34,38–40*]. CRP levels were modified by periodontal treatment [*41*].

Oral disease and chronic respiratory disease

Recent studies provide evidence that oral infections may influence the initiation and progression of lung disease, but the link remains controversial [*42,43*]. Joshipura has reported a high prevalence of dental plaque colonization of potential pathogens for bacterial pneumonia, an association of anaerobic pulmonary infection with periodontitis, an association of poor oral hygiene with chronic respiratory disease, an association of alveolar bone loss at baseline with subsequent pulmonary disease and systemic activation of cytokines in periodontal disease [*8*]. Meta-analysis of 5 intervention studies on the relationship of oral hygiene and pneumonia showed that improvement in oral hygiene reduced incidence of nosocomial pneumonia by on average 40% [*44*].

Oral disease and osteoporosis

The literature provides increasing evidence that osteoporosis is associated with periodontitis and tooth loss [*45*], but the results are inconsistent. Reviews of studies demonstrate a significant association between bone mass density of the mandible and peripheral skeleton, and a correlation between decreased mandibular bone mass and tooth loss [*46,47*], but this is not definitely proven. Bollen et al. reported an association of osteoporotic fractures with the number of teeth and with age [*48*]. Klemetti suggested that individuals with high mineral values in the skeleton seem to retain their teeth with deep periodontal pockets more easily than those with osteoporosis [*49*]. A case–control study found no statistically significant differences between osteoporotic patients for cortical width, panoramic mandibular index, alveolar crest resorption degree, fractal dimension and the number of mandibular teeth, but there was a difference for cortical index [*47*].

Studies report that there is an association between edentulousness, periodontal disease and longitudinal changes in mandibular bone mass density [*50*]; that the present number of teeth are highly related to thoracic spine fracture and with latent osteoporosis [*51*]; and that a decrease in mandibular bone mass positively correlates with tooth loss in females, but not in males [*52*].

Oral diseases and chronic renal failure

Data on the epidemiology of chronic renal failure (CRF) are available for many European countries, but limited for other countries. Oral soft and hard tissues are significantly affected as result of CRF. Children with CRF have significantly fewer dental caries than healthy children due to the inhibitory effect of increased salivary urea levels, and an early effect of enamel hypoplasia is due to a defect of enamel development and mineralization [*16,53*]. As reported in many epidemiological and case–control studies CRF is associated with several oral manifestations, e.g. with oral infections, dental anomalies of delayed eruption and enamel hypoplasia in children and gingival enlargement in adults [*16,54*] and with poor oral hygiene and significantly higher plaque and calculus indices [*55*]. An increased risk of periodontitis has been reported in 80.6% of haemodialysis cases [*56*], and premature tooth loss and localized suppurative osteomyelitis secondary to periodontitis in individuals receiving haemodialysis. CRF has also been associated with symptoms of xerostomia and reduced salivary flow [*57,58*]; oral uraemic malodour/bad taste [*59*]; and petechia and/or ecchymosis and increased tongue coating and mucosal lesions such as uraemic stomatitis [*60*].

Possible pathways of association between oral disease and NCD

Many pathways of association of oral infections and NCD have been postulated, e.g:

- Oral infections might contribute to the pathogenesis of CHD by the effects of endotoxins on the circulation; the role of heat-shock proteins; infection-induced perturbations in lipid profiles; and the formation of acute-phase reactants [*61*].
- Aspiration of saliva contaminated with oral bacteria, endotoxins, lipopolysaccharides and enzymes promotes inflammation and infection of the lower respiratory tract and may develop to chronic obstructive pulmonary disease [*62*].
- Osteoporosis affects alveolar bone density that contributes towards a progression of periodontitis [*63*] that results in a weakening of the tooth socket and eventual loss of teeth [*64*].
- In diabetes the association with oral disease includes microvascular changes; changes in the components of the gingival crevicular fluid; changes in collagen metabolism; an altered host response; alteration in subgingival flora; genetic predisposition; and monoenzymatic glycation [*65*].
- In renal failure, oral infections correlate with markers of malnutrition and inflammation [*66*]; immunosuppression with cyclosporine A; reduced immunodeficiency [*53*]; and use of antihypertensive calcium-blocking agents [*56*].

Discussion

A great volume of research is available in the literature about the association of oral disease with NCD such as diabetes or CVD. The global health challenge posed by the escalating burden of NCD in the developing world is well documented in various reports and publications [*67*]. Chronic diseases are a larger problem in low-income settings. Data on the global burden of NCD reveals a clear dominance of CVD, and research on chronic diseases in resource-poor nations remains embryonic [*68*]. A permanent threat of systemic toxicity and injury may be anticipated

through bacterial endotoxins from oral origin entering the bloodstream, especially in patients with severe periodontal disease [*69*]. The emerging concept of "periodontal medicine" highlights the importance of research into periodontal–systemic relationships as a major source of potential contributory risk factors for systemic diseases [*70*]. Research on oral diseases is neglected and has a small share in the medical research work of developing countries. A stark illustration of the divide between the developed and developing world is provided by expenditure on global health research. Of the US$ 70 billion spent annually, only 10% is allocated to poor countries that bear 90% of the world's disease burden: the so-called "10–90 gap" [*71*].

Poor literacy rates and lack of awareness of disease symptoms in the population of developing nations results in worse disease outcomes [*72*]. People of South Asian descent have one of the highest risks of CVD in the world. Thus it is likely that escalation of the global CVD epidemic will be most marked in Pakistan and India [*73*], and available data from the EMR shows that both men and women are at high risk [*3*]. Urbanization and industrialization bring changes in lifestyle that can affect oral and general health. Although oral health problems appear not to be life-threatening and have a low burden on daily life, when it comes to quality of life, oral and dental conditions are characterized in terms of "impairment, disability and handicap" [*12*]. Like other NCDs, oral diseases such as periodontal diseases, dental caries and tooth loss are preventable and controllable through healthy behaviours and lifestyle changes. Prevention is the most effective way of combating CVD and other chronic diseases [*73*].

Abundant information about these challenging diseases and guidelines for prevention and control are available for developed countries, while there is poor representation of research and literature from developing countries that have the greatest disease burden [*71*]. The volume of research and production of scientific knowledge in developing countries is negligible. Dental scientific literature productivity in EMR countries is estimated to be 2.46% of the total scientific literature [*74*].

Conclusion

The literature provides evidence for an association with and contributory role of oral diseases to NCD, working through systemic pathophysiological phenomena. Understanding the association of tooth loss, periodontal disease and other oral health parameters with NCD remains uncertain until prospective controlled studies are conducted. The studies available are largely from developed countries and few report any research on oral–systemic disease relationships from the EMR. The wide gap of representation of health issues between developed and developing countries needs to be addressed. This calls for attention from the WHO, World Bank and other international research organizations to address the issue in developing countries where NCD are becoming more of a challenge. There is a need to include oral diseases in WHO's STEPwise approach of disease surveillance while doing research on the prevention and control of NCD in countries at high risk of NCD and where relevant data on oral diseases is scarce [*75*]. It is important to establish a system of global surveillance of diseases based on the principles of equality of all people and health improvement as a common goal of humanity [*76*].

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Report

Community-based diabetes programme: the micro-clinic project

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برنامج السكري المجتمعي المرتكز: مشروع العيادة المكروية

دانيال زغبي

الخلاصة: لقد أدى ازدياد التحضُّر في إقليم شرق المتوسط إلى ارتفاع ملحوظ في معدَّل انتشار السكري. وأصبح تقديم الرعاية للسكريين يمثِّل تحدياً كبيراً تحت ظروف التوطن للقلاقل والعنف والفقر. ويرسخ نموذج العيادة المكروية مجالاً عمومياً للتفاعل بين المجتمع العام والمجتمع المحلي، وينخرط فيه الأسر والأصدقاء والجيران بمجموعهم في التثقيف وتقديم المعالجة والدعم الجماعي والحصول على نصيب مما هو متاح من التكنولوجيا الملائمة، إلى جانب نشر السلوكيات الإيجابية، حيث يشعر المساهمون في مشروع العيادة المكروية بأنهم متمكنون من رعاية أنفسهم ورعاية غيرهم. كما يقدم هذا النموذج آفاقاً رحبة لأسلوب تقديم للرعاية الصحية مضمون الاستمرار على الصعيد السياسي والاجتماعي والاقتصادي.

ABSTRACT Increased urbanization in the Eastern Mediterranean Region has led to a significant rise in the prevalence of diabetes. Caring for diabetes under conditions of endemic uncertainty, violence and poverty is a great challenge. The micro-clinic model establishes a public domain of social and community interaction whereby friends, families and neighbours can collectively engage in education, treatment and group support, obtain shared access to appropriate technology and spread positive behaviours. Participants who are active in micro-clinics feel empowered to care for themselves and others. The micro-clinic model offers the prospect of an economically, socially and politically sustainable approach to health care.

Programme de lutte contre le diabète à l'échelon local : le projet de microclinique

RÉSUMÉ L'urbanisation croissante dans la Région de la Méditerranée orientale a entraîné une augmentation significative de la prévalence du diabète. La prise en charge de cette maladie dans des conditions d'incertitude, de violence et de pauvreté endémiques est extrêmement difficile. Le modèle de la microclinique permet d'instaurer un espace public d'échanges sociaux et communautaires au sein duquel les amis, la famille et les voisins peuvent participer tous ensemble à l'éducation, au traitement et aux séances de groupe, accéder avec d'autres à la technologie appropriée et encourager les comportements sains. Les participants qui s'investissent dans des microcliniques se sentent qualifiés pour prendre soin d'eux-mêmes et des autres. Le modèle de la microclinique offre la perspective d'une démarche durable du point de vue économique, social et politique en matière de soins de santé.

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Introduction

Chronic diseases are a leading cause of death and disability in the world today. Noncommunicable conditions, including obesity and diabetes, account for 59% of the 57 million deaths annually. Around 177 million people are affected by diabetes, two-thirds of whom live in the developing world [*1,2*]. The growing prevalence of diabetes and obesity threatens to undermine struggling economies [*3*].

Although there is a strong economic and humanitarian argument to be made for the prevention and management of chronic diseases, poverty alleviation programmes such as the Millennium Development Goals have failed to list chronic diseases as a major priority. Thus, they are being ignored and underfunded [*4*].

Burden of chronic disease in Palestine

Increased urbanization, socioeconomic development and behavioural changes in the Eastern Mediterranean Region have led to a rise in chronic diseases such as diabetes. These trends have serious implications for the future growth of chronic noncommunicable diseases, and constitute a major public health problem [*5,6*]. In the context of endemic uncertainty, poverty, persistent violence and restricted movement, the burden of diabetes in the Occupied Palestinian Territory is great. A 2001 study found impaired glucose tolerance in 5.9% of an urban survey population (492 men and women) and diabetes in 12.0% of the same population [*7*].

There is evidence that preventive measures in high-risk individuals, including proper self-management of diabetes, can reduce its prevalence and complications. The American Diabetes Association suggests that self-monitoring of blood glucose is an important part of diabetes management that allows individuals to evaluate their response to therapy and to achieve desirable blood glucose levels. Self-monitoring of blood glucose enables diabetic individuals to interpret data and to adjust medication and behaviour accordingly [*8*]. A healthy diet and appropriate physical activity are other important components of effective therapy as they can contribute to improved blood glucose control, prevent diabetes mellitus in high-risk individuals and improve overall bodily health [*8*].

Because individuals are connected to other individuals, their health is also connected to the health of those around them. Both negative and positive behaviours have the potential to be spread via social networks [*9*]. While medication can also be an important part of therapy, in places such as the Occupied Palestinian Territory, there are often severe shortages of medication due to closures, curfews, violence and economic hardship. General health and lifestyle information is provided hastily and superficially, if at all [*10*]. The prevention and management of diabetes in underserved regions requires effective social solidarity programmes that compliment existing services and bring together all available technical and human resources to solve significant public health problems.

The diabetes micro-clinic study

The existing Palestinian health care system continues to be undermined by geo-politics and pervasive conditions of uncertainty. In the D'heisheh refugee camp, for instance, it has been reported that a United Nations employed doctor sees about 170 patients a day [*11*]. With economic restrictions imposed

in 2006, the World Health Organization warned of a growing financial and humanitarian crisis, which has resulted in high rates of unemployment, restricted access to services, unpaid health workers and severe shortages of medicines [*12*].

In 2005, a pilot micro-clinic project was established in the Bethlehem area and the D'heisheh refugee camp. Working with volunteer doctors, nurses and students, we created 50 diabetes "micro-clinics" composed of small groups of patients meeting in designated houses or business premises for the purpose of diabetes education, screening, treatment, monitoring and social solidarity [*11*]. Micro-clinics bring together human, technological and information resources within a given community to address a significant public health problem. They facilitate shared access to general education, specialist services and technologies such as personal blood glucose monitoring devices. Using lectures, workshops and group activities, the diabetes micro-clinics are vehicles of self-empowerment that encourage informed interaction with health care professionals. The micro-clinics create an infrastructure that is owned and operated by the participants. Ultimately, micro-clinics are the people.

The micro-clinic model establishes a public domain of community interaction whereby people who know each other as family, friends and neighbours can collectively access education, treatment and psychosocial support. The idea emerged from ethnographic observations showing that many Palestinians are not properly educated about diabetes. Family members and close friends heavily influence the perception of serious health problems. Moreover, people do not have the resources or information to purchase important technologies such as personal glucose monitoring systems, widely used in the United States and Europe [*11*]. Therefore, each micro-clinic (a group of approximately 3 to 6 individuals) voluntarily completes an educational programme, participates in structured and unstructured group activities, and shares the cost of maintaining a glucose meter. These machines are important as they allow for more intensive blood glucose control that is cost-effective and can significantly reduce diabetes-related complications [*13*]. The machines, educational materials, and social activities create an interesting focal point for groups as they positively engage in improving the health and well-being of the community.

The micro-clinic project was implemented in 4 steps:

Step 1: Assessment and planning efforts were undertaken to identify existing resources, social networks and local volunteer leadership. This stage included planning and training sessions with volunteer doctors, nurses and students from the Bethlehem area and from the D'heisheh refugee camp.

Step 2: Although the Ministry of Health did not have any official involvement with this project, volunteer nurses, doctors and university faculty members from the Bethlehem area provided large educational lectures open to the community. These volunteers distributed supplemental educational booklets obtained from the United Nations Relief Works Agency (UNRWA). The lecture topics included the causes of diabetes, complications, prevention, management, diet and exercise [*11*]. These lectures were facilitated using local community centres, health committees and academic staff.

Step 3: The large lecture groups were then divided into smaller groups of about 20 individuals. Each person was able to ask personal questions and was tested by a

doctor or registered nurse using a personal glucose monitoring system (MediSense Precision QID systems were used because they do not require batteries and are locally available). Those who registered high readings or previously knew that they had diabetes moved on to the next step. These individuals were also referred to local doctors and nurses from the UNRWA, private clinics and Ministry of Health doctors or nurses when possible. In the Bethlehem area, existing services are either limited or expensive, and therefore many diabetic patients were not able to obtain regular access to such facilities.

Step 4: Individuals who registered high readings, and who were evaluated by health care professionals, were divided into "micro-clinics"—organically formed, self-selected groups of close friends, family and neighbours. Each micro-clinic was given a glucose monitor to share. During this phase, members of the micro-clinics were trained by a doctor or registered nurse in the use of the glucose monitors. This training included following relevant guidelines concerning the proper sterilization and waste disposal procedures for insulin needles, lancets and other sources of contamination [*14*].

As support groups, the micro-clinics are led by a volunteer leader—usually a family member—responsible for assisting in documenting readings, administering tests and promoting education and behavioural change. These micro-clinic groups participate in social activities together and receive ongoing education and follow-up visits from a registered nurse who serves as a local micro-clinic coordinator for approximately 1 year. The micro-clinic coordinator checks to make sure that the machines are working, being utilized properly and sterilization and waste disposal procedures are being adhered to. The coordinator also discusses behavioural changes, monitoring results and overall progress in the management of diabetes. This process helps diabetes patients interact with health care professionals in a more informed and empowered way. Working with local entrepreneurs, a cooperative system of purchasing replacement supplies was established to secure discounted prices for micro-clinic members.

Evaluation

Continuous evaluation takes place of what is and is not working at the local level. Several important observations were made during ethnographic fieldwork, focus groups and through individual discussions with 25 micro-clinic representatives.

Micro-clinics facilitate community awareness and outreach

The micro-clinics not only serve participants, but also impact on their immediate communities. Friends and neighbours mingle with micro-clinic participants and often ask about the programme and glucose meters. Some have subsequently asked to be screened for diabetes. As outreach centres, the micro-clinics are also functioning in emergencies. One undiagnosed woman who was feeling ill was rushed to the local doctor after her daughter, a micro-clinic participant, tested her and found an extremely high glucose level.

Micro-clinics involve friends and family

In most micro-clinics, both participants and volunteers (a son, daughter, grandson, etc.) were shown how to use the machines. These youth volunteers, family members, and caregivers act as "staff" leaders of the micro-clinics and are vital to their effectiveness. The micro-clinics work from within the space of the home, encouraging prevention and management of a disease which is

so greatly affected by domestic behaviour patterns.

Micro-clinics can be important in remote locations

Glucose monitors were also distributed to registered nurses, who were not previously equipped with basic medical technologies. They have used these resources for micro-clinic groups of patients in remote locations, enhancing their mobility and geographical health care capacity.

Micro-clinics can be used as emergency support systems

The micro-clinic model offers an emergency support system which can be implemented in various contexts including conflicts and natural disasters. For instance, during curfews in Bethlehem when it is prohibited to enter the streets, family, friends and neighbours can come together in the micro-clinic house and share food, medicine and services.

This testing and health awareness is of even greater importance during emergencies, given prolonged high stress levels and lack of supplies.

Micro-clinics spread positive behaviours and provide psychological support

People "feel secure" and empowered in their micro-clinics, and share resources such as test strips when they run out. The micro-clinics also encourage behavioural changes, as participants take medicine and exercise in response to elevated glucose levels detected on the monitors.

Micro-clinics empower participants to take responsibility for their own health

Because the micro-clinic participants are encouraged and prepared to take a more central role in the prevention and management of diabetes and its complications, they are able to interact with health care professionals in a participatory manner.

The micro-clinic model offers the potential of scalability as well as social, economic and political sustainability, especially in conflict-ravaged and impoverished areas. It creates a social network that can be used to spread positive behaviours throughout a community. Most importantly, the micro-clinic model advances the notion that health care cannot simply be provided from the top down—it must also be provided from the bottom up.

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More details of the Global Micro-Clinic Project are available at at: http://www.gmcp.org.

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Short communication

Paediatric gastrointestinal endoscopy: experience in a Sudanese university hospital

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التنظير الهضمي عند الأطفال: خبرة مستشفى جامعي في السودان

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الخلاصة: استقصى الباحثون دواعي ونتائج التنظير الهضمي لجميع الأطفال دون عمر 16 سنة، ممَّن حولوا إلى وحدة التنظير في مستشفى سوبا الجامعي في الخرطوم خلال الفترة بين كانون الثاني/ يناير 2004 وكانون الثاني/ يناير 2006. وقد شملت الدراسة 113 طفلاً، أجري لـ 73٪ منهم تنظيراً هضمياً علوياً ولـ 27٪ تنظيراً هضمياً سفلياً (15٪ تنظير القولون و12٪ تنظير السيني بالمنظار المرئي). وكانت دواعي التنظير الهضمي العلوي إقياء الدم في 24٪ وارتفاع الضغط البابي في 21٪ والألم البطني في 16٪ والإقياء في 15٪. وكان التشخيص يشمل دوالي المرئ في 16٪ والتهاب المعدة في 7٪ والفتق الحجابي في 6٪. أما دواعي التنظير الهضمي السفلي فشملت النزف من المستقيم في 87٪ من الحالات والإسهالات في 19٪ منها وفقر الدم في 10٪ .

ABSTRACT We investigated the indications for and findings of gastrointestinal (GI) endoscopy in all children ≤ 16 years old referred for the procedure to the endoscopy unit at Soba University Hospital, Khartoum from January 2004 to January 2006. Thus 113 children were enrolled; 73% underwent upper GI endoscopy, 27% lower GI endoscopy (15% colonoscopy, 12% flexible sigmoidoscopy). Indications for upper GI endoscopy included haematemesis (24%), portal hypertension (21%), abdominal pain (16%) and vomiting (15%). Diagnoses included oesophageal varices (16%), gastritis (7%) and hiatus hernia (6%). Indications for lower GI endoscopy included rectal bleeding (87%), diarrhoea (19%) and anaemia (10%).

Endoscopie gastro-intestinale en pédiatrie : l'expérience d'un hôpital universitaire soudanais

RÉSUMÉ Nous avons étudié les indications et les résultats de l'endoscopie gastro-intestinale chez tous les enfants de 16 ans ou moins orientés pour cet examen vers le service d'endoscopie de l'hôpital universitaire Soba de Khartoum, entre janvier 2004 et janvier 2006. Au total, 113 enfants ont été recrutés ; 73 % ont subi une endoscopie digestive haute et 27 % une endoscopie digestive basse (15 % une coloscopie et 12 % une rectosigmoïdoscopie flexible). Les indications de l'endoscopie digestive haute étaient l'hématémèse (24 %), l'hypertension portale (21 %), les douleurs abdominales (16 %) et les vomissements (15 %). Parmi les diagnostics figuraient les varices œsophagiennes (16 %), la gastrite (7 %) et la hernie hiatale (6 %). Les indications de l'endoscopie digestive basse étaient les saignements rectaux (87 %), la diarrhée (19 %) et l'anémie (10 %).

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Introduction

Since the advent of flexible gastrointestinal (GI) endoscopy in the 1970s and the subsequent development of smaller instruments in the 1990s, diagnostic and therapeutic paediatric endoscopic procedures are now standard care [*1*].

Gastrointestinal endoscopy is now a recognized major diagnostic tool in children. Knowledge of the pattern of gastrointestinal disorders detected by endoscopy is lacking in Sudan. In addition, there are very few studies on paediatric GI endoscopy in African children. One study from Uganda on upper GI endoscopy in adolescents with an age range of 11–18 years (mean age 16 years) concluded that upper GI endoscopy was a useful diagnostic tool in children and that gastritis and duodenal ulcer must be included in the differential diagnosis of upper GI pathology in symptomatic children [*2*]

This study was conducted to determine the indications, diagnoses and safety of upper and lower GI endoscopy in Sudanese children.

Methods

We conducted a prospective, descriptive, hospital-based study in a single endoscopy centre at Soba University Hospital in Khartoum, Sudan from January 2004 to January 2006. Soba University Hospital is a tertiary referral hospital in Khartoum, and its endoscopy unit is one of only 2 units in the country providing both diagnostic and therapeutic upper and lower GI endoscopy and endoscopic retrograde cholangiopancreatography services to both adult and paediatric population from all over the country.

All children ≤ 16 years old referred for diagnostic or therapeutic upper or lower GI endoscopy were enrolled in the study after a brief interview with both parents and the child to explain the procedure and complete a questionnaire with basic demographic data Indications for the procedure and endoscopic findings were recorded.

Children having upper GI endoscopy were requested to fast overnight and the procedure was performed the following morning. Children having lower GI endoscopy were required to take clear fluids one day before the procedure and they were also required to take 2 sachets each containing 59 g polyethylene glycol, an iso-osmotic bowel cleansing agent. Each sachet was dissolved in 1 L of water before being drunk by the child over 24 hours.

There are no dedicated paediatric GI endoscopists in Sudan and the procedure was performed by fully trained adult GI endoscopists. Olympus GIF XQ 240 video gastroscope and Olympus Q 240 CL video colonoscope (*Olympus* Inc., Tokyo, Japan) were used to perform the procedures. All procedures were done on an outpatient basis except when general anaesthesia was required. At least 2 endoscopy nurses were present in the endoscopy room to assist with the procedure. This was usually performed after insertion of a reliable venous access, with monitoring of vital signs and oxygen saturation. Sedation was either in the form of local lignocaine spray 2%, or conscious sedation with intravenous diazepam in a dose of 0.3 mg/kg body weight. For children undergoing colonoscopy for removal of colonic polyps, the procedure was always performed under general anaesthesia after obtaining consent from the parents.

The study was approved by the ethical committee at Soba University Hospital and children were only enrolled in the study after obtaining the informed consent of the parents.

Results

A total of 113 children ≤ 16 years presented for endoscopy over the study period and were included in the study. Of these 82 (73%) attended for upper GI endoscopy, which constituted 2.5% of all patients attending for diagnostic/therapeutic upper GI endoscopy during the study period. Mean age of the children was 10 (standard deviation 4.39) years, range 14 months to 16 years; 76% of the children were aged 6–16 years. A total of 54% were male. Conscious intravenous sedation was used in 99% of cases and local lignocaine spray in 1%.

The commonest indications for upper GI endoscopy were haematemesis, 24% of cases, portal hypertension, 21%, abdominal pain, 16% and vomiting, 15%, (Table 1).

Endoscopic diagnoses included normal endoscopy, 49% of cases, oesophageal varices, 16%, gastritis/gastric erosions, 7%, hiatus hernia, 6%, duodenal ulceration, 5% and other, 15% (Table 2).

A biopsy or a therapeutic procedure was performed in 39% of children undergoing upper GI endoscopy: small bowel biopsy in 21%, oesophageal dilatation in 8.5%, endoscopic variceal sclerotherapy in 8.5% and foreign body retrieval in 1%.

Table 1 **Indications for children attending for upper gastrointestinal endoscopy (*n* = 82)**

Indication[a]	No.	%
Haematemesis	20	24
Portal hypertension	17	21
Abdominal pain	13	16
Vomiting	12	15
Small bowel biopsy	7	9
Anaemia	5	6
Dysphagia	5	6
Foreign body	2	2
Other[b]	15	18

[a]Some children had more than one indication.
[b]Other indications included diarrhoea, heartburn, ascites and splenomegaly.

Table 2 **Findings in the children undergoing upper gastrointestinal endoscopy (*n* = 82)**

Finding[a]	No.	%
Normal	40	49
Oesophageal varices	13	16
Gastritis/gastric erosions	6	7
Hiatus hernia	5	6
Duodenal ulcer	4	5
Peptic oesophageal stricture	4	5
Corrosive oesophageal stricture	2	2
Other[b]	12	15

[a]Some children had more than one finding.
[b]Other findings included abnormal gastric mucosa, oesophagitis, achalasia, gastric varices.

A total of 31 (27%) children attended for lower GI endoscopy (15% underwent colonoscopy and 12% flexible sigmoidoscopy). This represented 3.6% of all patients attending for diagnostic/therapeutic lower GI endoscopy during the study period. Mean age was 8 (standard deviation 4.04; range 2–16) years; 68% were between the ages of 6 and 16 years and 48% were males.

The procedure was done under conscious intravenous sedation in 74% of cases and under general anaesthesia in 26%; these were usually children undergoing a colonoscopy for removal of colonic polyps. Caecal intubation was achieved in all children undergoing a colonoscopy.

Indications for lower GI endoscopy included rectal bleeding in 87% of cases, diarrhoea in 19%, anaemia in 10%, abdominal mass in 3% and other in 9% of cases (Table 3). Diagnoses included colonic polyps in 45% (half of them were multiple), inflammatory bowel disease in 19%, normal endoscopy in 16% (Table 4). A biopsy or a therapeutic procedure was performed in 81% of cases; 42% had a colonic biopsy and 39% had a polypectomy. No complications were reported in this study.

Discussion

The majority of children underwent upper GI endoscopy, the most frequent procedure performed in children, with a male:female ratio of 1.2:1. This differs from studies in Saudi Arabia [*3*] where the ratio was 0.7:1. The majority of procedures (99%) were done under conscious sedation unlike the experience in Brazil [*4*] where 80% were done under general anaesthesia or Jordan [*5*] where no sedation was used in those under 12 years of age. The greatest proportion of children undergoing upper GI endoscopy presented with haematemesis (24%), compared to only 6% in Jordan [*5*]. In addition 21% of the children had portal hypertension secondary to hepatosplenic schistosomiasis, which is endemic in central Sudan [*6*]. This is also reflected in the number of those found to have oesophageal varices (16%) and in the number of those needing endoscopic oesophageal sclerotherapy (8.5%). Only 9% of the children were referred for small bowel biopsy, a figure much lower than that in Jordan (46%) [*5*] and Saudi Arabia (29%) [*3*], reflecting perhaps that endoscopy is under-used in the diagnosis of malabsorption in Sudanese children.

In 49% of the children undergoing upper GI endoscopy the findings were normal, which is similar to studies in the United States of America (USA) (44%) [*7*], Brazil (42%) [*4*] and Jordan (38%) [*5*]. Gastritis was found in 7% of cases, much lower than figures reported from Saudi Arabia [*3*] (32%), and duodenal ulceration was found in 5% of the study group, similar to reports from Brazil (4%) [*4*] and Jordan (5.5%) [*5*]. Unfortunately testing for *Helicobacter pylori* infection is not routinely performed in Sudan and thus we could not define its role in the children with gastritis or duodenal ulceration in our sample. Endoscopy was indicated following foreign body ingestion in 2% of the children, this is similar to studies from the USA [*7*]. No complications were reported in our study, unlike the experience in Jordan, where respiratory depression was reported in some children [*5*], explaining perhaps their policy of not using intravenous sedation in children under 12 years.

Lower GI endoscopy constituted 3.6% of all lower GI procedures performed in the unit during the period of the study, slightly more than reported from Kuwait (2.9%) [*8*]. Rectal bleeding was the commonest indication for lower GI endoscopy (87%), a figure higher than that reported from Kuwait (60%) [*8*] and the USA (31%) [*7*]. This may explain the high yield of lower GI endoscopy in this study (84%) compared

Table 3 **Indications in children undergoing lower gastrointestinal endoscopy, (*n* = 31)**

Indication[a]	No.	% of patients
Rectal bleeding	27	87
Diarrhoea	6	19
Anaemia	3	10
Abdominal mass	1	3
Other[b]	3	10

[a]*Some children had more than one indication.*
[b]*Other indications included chronic constipation and abdominal pain.*

Table 4 **Findings in children undergoing lower gastrointestinal endoscopy (*n* = 31**

Finding[a]	No.	% of patients)
Polyps	14	45
Inflammatory bowel disease	6	19
Normal	5	16
Rectal ulcer	1	3
Tumour	1	3
Other[b]	4	14

[a]*Some children had more than one finding.*
[b]*Other findings included telangiectasia and abnormal colonic mucosa.*

to the USA (59%) [7] and Kuwait (58%) [8]. The commonest diagnosis was colonic polyps in 45% of cases, in agreement with the high number of those presenting with rectal bleeding. This is higher than reported from Kuwait [8] and the USA [7] (polyps found in 26% and 11% of cases respectively). Inflammatory bowel disease was diagnosed in 19% and rectal ulcer in 3% of the children in our study, which is similar to Kuwaiti children [8] with figures of 22% and 4.4% respectively. One 14-year-old girl had colorectal cancer; she had no associated colonic polyps or family history of colorectal cancer. No cases of colorectal cancer were reported from Kuwait [8] and the USA [7]. No complications were reported in our study, while complications such as bleeding and perforation have been reported in other studies on children [9,10].

Conclusion

This is one of the few studies on paediatric GI endoscopy in our region. It provides useful data on the frequency of, indications for and findings from this procedure in a sample of Sudanese children.

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Short communication

Prevalence of cigarette smoking in the Rafsanjan urban population

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معدَّلات انتشار تدخين السجاير بين سكان الحضر في رفسنجان

إسماعيلي نديمي علي، أحمدي جعفر

الخلاصة: تعرَّف الباحثون في هذه الدراسة على معدَّل انتشار التدخين بين الريفيين في رفسنجان في جمهورية إيران الإسلامية، من خلال عينة مجتمعية عشوائية تألَّفت من 491 من البالغين (247 من الذكور 244 من الإناث) ممن تزيد أعمارهم عن 20 عاماً. وقد بلغ المعدَّل الإجمالي الحالي لتدخين سيجارة أو أكثر يومياً 24.2٪، بواقع 38.5٪ لدى الذكور و9.8٪ لدى الإناث. كما بلغ العدد الوسطي للسجاير المستهلكة يومياً عند الجميع 12.1 بانحراف معياري قدره 8.6، ولكنه كان 13.6 عند الذكور بانحراف معياري قدره 8.9 وكان 6.5 عند الإناث بانحراف معياري قدره 4.5. ويزداد معدَّل انتشار التدخين والعدد الوسطي للسجائر التي يتم تدخينها كل يوم بشكل يُعْتَدُّ به إحصائياً في مجموعات الأعمار المتقدِّمة.

ABSTRACT This study determined the smoking rate in the urban population of Rafsanjan, Islamic Republic of Iran, in a random community sample of 491 adults (247 males and 244 females) aged > 20 years. The overall prevalence of current smoking (1+ cigarettes per day) was 24.2%; 38.5% in males and 9.8% in females. The mean number of cigarettes consumed per day was 12.1 [standard deviation (SD 8.6)]; 13.6 (SD 8.9) in men and 6.5 (SD 4.5) in women. The prevalence and mean number of cigarettes smoked per day increased significantly in older age groups.

Prévalence de la consommation de cigarettes dans la population urbaine de Rafsanjan

RÉSUMÉ Cette étude a déterminé le taux de tabagisme dans la population urbaine de Rafsanjan (République islamique d'Iran), sur la base d'un échantillon aléatoire de la population composé de 491 adultes (247 hommes et 244 femmes) âgés de plus de 20 ans. La prévalence globale de tabagisme au moment de l'étude (1 cigarette au moins par jour) était de 24,2 % ; 38,5 % chez les hommes et 9,8 % chez les femmes. Le nombre moyen de cigarettes consommées par jour était de 12,1 [écart type (E.T. 8,6)], 13,6 (E.T. 8,9) chez les hommes et 6,5 (E.T. 4,5) chez les femmes. La prévalence et le nombre moyen de cigarettes fumées par jour augmentaient significativement dans les groupes plus âgés.

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Introduction

Cigarette smoking is the leading preventable cause of death and morbidity worldwide [*1*]. In the United States of America (USA), as elsewhere in the developed world, the estimated rate of smoking in men has been falling: from 55% in 1955 to about 25% in 2001 [*2,3*]. In developing countries, however, the rate of smoking continues to rise [*4*]. More alarming is the evidence that smoking rates are increasing among children and women and, unless effective comprehensive and sustained initiatives are implemented to reduce smoking, the prevalence of smoking in women in developed and developing countries has been predicted to rise to 20% by 2025 [*5*].

Smoking rates vary across the Asian parts of the Eastern Mediterranean Region. For example, in Oman the overall prevalence of smoking in 2000 was 7% (13.4% in men and 0.5% in women) [*6*], while a survey in 2002 recorded the overall prevalence of current smoking in adult males in Karachi, Pakistan as 34% [*7*]. Some data are available about the prevalence of smoking in the Islamic Republic of Iran. In the Tehran Lipid and Glucose Study, for example, the global smoking rate in the urban population was 10.6% (22% in men and 2.1% in women) [*8*]. In Shiraz the prevalence of smoking was reported as 26% in men and 3.6% in women [*9*]. Because this type of research has not been done in the Rafsanjan area the present study was designed to describe the prevalence of smoking in the urban population of this south-east area of the Islamic Republic of Iran.

Methods

This cross-sectional community study in 2004 was performed on 491 participants over 20 years old in Rafsanjan (247 men and 244 women). The population of the urban area of Rafsanjan was about 112 000. The expected prevalence of smoking according to a pilot study was about 30%, so with desired precision 5% and with confidence interval 95% the sample size was estimated to be 322 participants. For a safety margin due to the type of sampling and design effect, a final sample of about 500 participants was enrolled.

The sample was chosen using a randomized cluster method. Clusters were defined previously by the local health organization; 28 clusters were selected, each cluster containing 58 families. Families were randomly selected from the clusters, but if there were any problems contacting a family or a member refused to participate, the next neighbours on the right side of that family were selected and if that was unsuccessful the family on the left side was selected. About 9 family members refused to participate and were replaced with another family as described above.

Participants were requested to complete a questionnaire about demographic data, the number of cigarettes smoked and the duration of cigarette smoking. Those who smoked 7+ cigarettes per week were considered current smokers. The interviews were carried out by 2 general physicians and filled questionnaires were randomly checked by the author.

For data analysis *SPSS*, version 11 was used. For nominal variables the chi-squared and Fisher exact tests and for continuous variables the independent *t*-test and 1-way ANOVA were used.

Results

The mean age of participants was 38.4 (13.1) years; 50.3% male and 49.7% female. The overall rate of smoking was 24.2% [95%

confidence interval (CI) 20.6%–28.3%]. The rate was 38.5% (32.4%–44.9%) and 9.8% (6.5%–14.5%) for men and women respectively and the sex difference in smoking prevalence was significant (relative risk = 2.46, $P = 0.001$).

The mean number of cigarettes consumed per day by smokers was 12.1 [standard deviation (SD 8.6)], greater in men 13.6 (SD 8.9) than women 6.5 (SD 4.5). The difference between the 2 sexes in the mean number of cigarettes smoked per day was significant ($P = 0.001$).

The mean duration of smoking was 14.2 (SD 9.2) years for men and 14.6 (SD 9.2) years for women. The proportion of heavy smokers (> 20 cigarettes per day) was 1.2% of the total sample and about 5% of current smokers. No woman reported being a heavy smoker. The prevalence of smoking in the sample increased with increasing age from 19.3% in the age group 20–29 years to 32.0% at ages 40–49 years before declining to 19.0% at age ≥ 60 years ($P = 0.001$) (Table 1). The mean number of cigarettes smoked rose with age from 9.6 per day in age group 20–29 years to 15.3 in the age group ≥ 60 years ($P = 0.001$).

Discussion

Cigarette smoking is an important social problem. Although the role of smoking as a risk factor in many diseases has been clearly established, the smoking rate in developing countries continues to rise. In the USA the smoking rate in 1955 was about 55% in men and 34% in women and currently this rate is about 25% and 21% respectively [*1,3*]. In China it was reported in 1995 that 63% of men and 3.8% of women were current smokers [*10*].

In the Eastern Mediterranean Region the prevalence of cigarette smoking varies among different countries. For example in a 2004 report from Kuwait, the rate of smoking was 37% among married men and 0.5% among married women [*6*]. In Saudi Arabia, the 1994 smoking rate was 40.0% for males and 8.2% for women [*7*]. In the Islamic Republic of Iran previous studies in Tehran found the smoking rate was 22% in men and 2.1% in women [*8*] and in Shiraz these values were 26% and 3.6% respectively [*9*]. Rafsanjan is an urban area of the south-east of the Islamic Republic of Iran, and the generalization of our data to other parts of the country is uncertain. However our data showed an overall self-reported smoking rate of 24.2% (38.5% in men and 9.8% in women).

This study shows that despite the increasing awareness of the health problems due to tobacco use, smoking is still common and the prevalence of smoking in women was higher than previous studies in the

Table 1 **Smoking prevalence by sex and age**

Age (years)	Total			Males			Females		
	No. sampled	No. of smokers	%	No. sampled	No. of smokers	%	No. sampled	No. of smokers	%
20–29	140	27	19.3	69	21	30.4	71	6	8.5
30–39	157	39	24.8	78	34	43.6	79	5	6.3
40–49	100	32	32.0	49	25	51.0	51	7	13.7
50–59	52	13	25.0	29	9	31.0	23	4	17.4
≥ 60	42	8	19.0	22	6	27.3	20	2	10.0
Total	491	119	24.2	247	95	38.5	244	24	9.8

Islamic Republic of Iran. The health effects of smoking for women are more serious than for men because exposure to smoking had additional hazards in pregnancy and sex-specific cancers such as cancer of the cervix [6]. Anti-tobacco strategies should be vigorously implemented to prevent the health consequences of smoking, and the motivations for smoking cessation should be taken into consideration in planning a health education strategy.

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Short communication

Rafsanjan AIDS clinic 1996–2005: problems faced and solutions found

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عيادة الإيدز في رفسنجان 1996 – 2005: المشاكل التي واجهتها وحلولها

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الخلاصة: استجابة للعدد المتزايد من المرضى الإيجابيين لفيروس العَوَز المناعي البشري في جمهورية إيران الإسلامية، فقد افتتحت وزارة الصحة والتعليم الطبي في إيران عدة عيادات متخصصة في جميع الولايات الإيرانية لتقديم المعالجة والرعاية للمرضى الإيجابيين لفيروس العوز المناعي البشري؛ وأسست عيادة الإيدز في رفسنجان في عام 1996، وقد ترافق العمل فيها بعدة صعوبات، وذلك بسبب طبيعة العدوى والوصمات المرافقة لها. ويعرض الباحثان في هذا التقرير الموجز بعض المشكلات التي واجهتها عيادتهما والحلول التي اتبعاها للتغلب عليها.

ABSTRACT In response to the growing number of the HIV-positive patients in the Islamic Republic of Iran, the Iranian Ministry of Health and Education established several special clinics in all Iranian provinces to provide treatment and care to HIV-positive patients. The Rafsanjan AIDS Clinic is one such clinic that was set up in 1996. Running such a clinic is not without difficulties, given the nature of the infection and the stigmas associated with it. In this brief report we discuss some of the problems faced at our clinic and the solutions found to overcome them.

Centre anti-sida de Rafsanjan de 1996 à 2005 : problèmes rencontrés et solutions trouvées

RÉSUMÉ Afin de faire face au nombre croissant de personnes séropositives en République islamique d'Iran, le ministère iranien de la Santé et de l'Éducation a ouvert dans toutes les provinces du pays plusieurs centres spécialisés dispensant des traitements et des soins aux personnes séropositives. L'un de ces établissements, le centre anti-sida de Rafsanjan, a ainsi été créé en 1996. La gestion de ce type de centre n'est pas sans difficultés, compte tenu de la nature de l'infection et du caractère honteux qui lui est associé. Dans cette brève communication, nous évoquons certains des problèmes rencontrés par notre centre, ainsi que les solutions trouvées pour les surmonter.

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Introduction

Human immunodeficiency virus (HIV) infection has spread all over the world and in all continents. By the end of 2007, 33.2 million people were estimated to be living with HIV, 2.5 million became newly infected and 2.1 million developed AIDS [*1*]. The majority of new cases come from sub-Saharan Africa and Asia [*1*]. HIV is increasingly spreading in Asia [*1*] and the extent of this spread is very important because more than half the world's population lives on this continent.

The Islamic Republic of Iran has a population of about 70 million. The first HIV-positive patient, who had haemophilia, was documented in 1985 [*2*]. From the first recognition of HIV infection in the country until 2005, 13 357 cases had been reported [*2*]. Of this total number, 736 cases (5%) subsequently developed AIDS. Table 1 shows the frequency distribution of HIV-positive and AIDS patients from 1985 to 2005 according to the route of transmission and age group and sex. As the table shows, the greatest proportion of the cases was in the 25–34 years age group and intravenous-drug abuse was the commonest route of transmission; 63.4% of the patients had been infected this way.

In response to the growing number of the HIV-positive patients, the Iranian Ministry of Health and Education established severed special clinics under the health care systems in all Iranian provinces. In each of these clinics, HIV-positive patients, who are usually referred from prisons, hospitals, laboratories and private clinics, are seen by a general physician. Usually,

Table 1 **Distribution of HIV-positive and AIDS patients in the Islamic Republic of Iran according to route of transmission and age group and sex (1985–2005**

Variable	Route of transmission											
	Intravenous drug use		Sexual		Blood transfusion		Mother to child		Unknown		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age (years)												
0–4	0	0.0	0	0.0	0	0.0	23	35.9	6	0.3	29	0.3
5–14	0	0.0	4	0.4	11	4.7	31	48.4	5	0.3	51	0.5
15–24	320	4.5	60	6.7	46	19.7	4	6.3	76	4.2	506	5.6
25–34	2 995	42.1	312	34.8	77	33.0	5	7.8	668	37.1	4 057	4.6
35–44	2 356	33.1	274	30.6	42	18.0	0	0.0	470	26.1	3 142	31.1
45–54	1 210	17.0	172	19.2	36	15.4	1	1.6	454	25.2	1 873	18.5
55–64	209	2.9	60	6.7	15	6.4	0	0.0	111	6.2	395	3.9
> 65	31	0.4	14	1.6	6	2.6	0	0.0	12	0.7	63	0.4
Total (known age)	7 121	100.0	896	100.0	233	100.0	64	100.0	1 802	100.0	10 116	100.0
Unknown age	1 429	16.7	89	9.0	7	2.9	2	3.0	1 714	48.7	3 241	24.2
Total	8 550		985		240		66		3 516		13 357	
Sex												
Male	8 470	99.1	592	60.1	223	92.9	34	51.5	3 308	94.1	12 627	94.5
Female	80	0.9	393	39.9	17	7.1	32	48.5	208	5.9	730	5.5
Total	8 550	100.0	985	100.0	240	100.0	66	100	3 516	100.0	13 357	100.0

other physicians, such as infectious diseases specialists, dermatologists, neurologists, psychiatrics, internists and dentists, collaborate with these clinics, as consultants. Financial and non-financial help is also offered to the patients and their relatives by the clinics and relevant nongovernmental organizations (NGOs). All the laboratory tests, drugs and hospitalization costs are covered by the clinic and are thus free of charge to the patient.

Since the care of HIV-infected individuals has an important role in the control of the AIDS epidemic, we describe here some of the problems faced by one such clinic, the Rafsanjan AIDS Clinic, and discuss the solutions found to overcome them. We hope that this communication will trigger more discussion on this important topic.

History of the Rafsanjan AIDS clinic

Rafsanjan is located in Kerman province (south-east of the Islamic Republic of Iran) and has a population of nearly 250 000. Rafsanjan AIDS Clinic was established in 1987. Up to 2005 this clinic had treated 57 HIV-positive patients. HIV infection was confirmed by Western blot [*3*]: 45 (78%) patients were diagnosed by Rafsanjan prison authorities, 8 (14%) by the Blood Transfusion Organization and 5 (8%) directly by the AIDS clinic.

Table 2 shows some characteristics of the 57 patients treated at the clinic. The mean age of the patients was 34 years and the majority (89%) were men. Of the men, 50 (98%) were intravenous-drug abusers and 1 (2%) was a haemophiliac and acquired the infection by blood transfusion. Among the women, 5 (80%) had been infected by sexual contact with their husbands; for 1 patient (20%) the route of infection was unknown. As regards marital status, 35% were single, 35% were married, 14% divorced and 11% widowed. As regards vaccination status, 61% were vaccinated against tetanus, 54% against influenza and 44% against hepatitis B at the clinic. Among the married patients who agreed to further study (13 cases), none had an infected child. In all, 36 patients were studied further and 50% of these had positive PPD (tuberculin) test and all had negative RPR (syphilis) test. Of 33 patients who were checked for hepatitis C virus antibodies and hepatitis B surface antigen, 88% were positive for hepatitis C and 19% for hepatitis B.

Table 2 **Characteristics of HIV-positive patients attending the Rafsanjan AIDS clinic (1987–2005)**

Variable	No. (*n* = 57)	%
Diagnosed by:		
Prison services	44	77
Blood transfusion services	8	14
AIDS clinic	5	9
Sex		
Male	51	89
Female	6	11
Marital status		
Married	20	35
Single	20	35
Widowed	6	11
Divorced	8	14
Unknown	3	5
Route of transmission		
Males (*n* = 51)		
Intravenous drug use	50	98
Haemophilia	1	2
Females (*n* = 6)		
Sexual (acquired from husband)	5	83
Unknown	1	17
Vaccination status		
Tetanus	35	61
Influenza	31	54
Hepatitis B	25	44

Problems faced at the Clinic and solutions found

From the beginning, one of the most important problems faced by the staff of the Clinic was changing the negative attitude of healthcare personnel and the community to HIV-positive patients. We approached this by delivering educational programmes and pamphlets as widely as possible within schools, offices, factories, health centres, etc. We also strengthened our educational efforts by a series of radio programmes.

Since most of our patients were unable to work due to their illnesses or for social and cultural reasons, another problem the clinic faced was obtaining financial support for the patients and their families. At first we tried to approach NGOs and the wealthier members of the community. In this way we were initially able to provide money for the patients, but unfortunately we gradually realized that some of the patients spent the money on opium. Therefore, we began to provide them with vouchers rather than cash, which allowed them to buy clothes, food and other goods or services.

Furthermore, because most of the patients and their families had mental health problems, such as depression, and were in need of psychiatric counselling, we referred them to an experienced psychiatrist, who now sees the patients routinely. Similarly, providing dentistry services for the patients posed another important problem. In order to solve this we bought a dentistry unit for our clinic and for the last 4 years a part-time dentist has provided the necessary services to the patients in the clinic.

Since the highest risk group of patients were the intravenous-drug abusers in prison, we have focused more on the prison and tried to improve the situation of the prisoners. For instance, the most important problem in prison has been sharing infected syringes between prisoners. At the moment we are trying to deliver disposable syringes among HIV-infected and non-infected drug abusers within the prison environment. We are also conducting a routine screening programme for HIV and hepatitis B and C within the prison and also among healthy family members of the HIV-positive patients.

However, after release a number of the prisoners never refer to the clinic again and unfortunately their addresses are not always clear, therefore, our information about them remains incomplete, even though the risk which they pose to the community is obvious.

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Case report

Brucella meningitis: first reported case in Egypt

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Introduction

Brucellosis, an infectious disease transmitted to humans principally through exposure to contaminated milk products, is endemic to the Middle East [*1*]. In Egypt, a cross-sectional study found that 11% of the population had serological evidence of infection with *Brucella* spp., while a study of acute febrile illnesses found that 3% of all bacteraemias were caused by the organism [*2,3*]. *Brucella* spp. has been reported as a cause of meningitis in many parts of the world. But, despite the frequent finding of *Brucella* bacteraemia, as far as we know the agent has not been previously reported in the medical literature as a cause of meningitis in Egypt. The current case thus represents the first report of cerebrospinal fluid (CSF) culture-positive *Brucella* meningitis in Egypt.

Case report

A 21-year-old Egyptian male was in his usual good health until approximately 2 weeks before admission when he began to complain of anorexia, weight loss, fever, vomiting and headache. Three days prior to admission he developed neck stiffness and diplopia and when the symptoms persisted, he presented to the Abbassia Fever Hospital in Cairo for evaluation.

On examination, the patient was an alert, thin male with a moderately ill appearance. His pulse was 75 beats/min, oral temperature 38 °C, blood pressure 80/120 mmHg and weight 58 kg. Other significant findings were left esotropia, bilateral papilloedema and nuchal rigidity. The remainder of the physical examination, including the neurological examination, was normal.

Peripheral white blood cell (WBC) count was 8000 cells/mL with a differential count of 80% polymorphs. Haemoglobin level was 12.2 mg/dL. After admission, computerized tomography scan of the brain (with and without contrast) was normal, and a lumbar puncture was performed. The CSF sample showed 1650 WBC/mL, 95% lymphocytes, protein 373 mg/dL and glucose 9 mg/dL (Table 1). Samples of blood and CSF were sent to the laboratory for culture. Chest radiograph showed nonspecific exaggerated bronchovascular markings. The patient was not tested for human immunodeficiency virus.

Therapy included parenteral chloramphenicol and penicillin, the Abbassia Fever Hospital standard initial antibiotic regimen for presumed bacterial meningitis [*2*]. When after 2 days the patient showed no response to therapy, isoniazid, rifampicin, streptomycin and pyrazinamide were added to the regimen to empirically treat tuberculous meningitis. On hospital day 11,

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Table 1 **Serial cerebrospinal fluid analysis of the patient with *Brucella* meningitis**

Test	Day 0 (admission)	Day 1	Day 7	Day 14	Day 35[a]
White blood cells (cells/mL)	1650	2200	1490	920	320
Polymorphonuclear cells (%)	5	0	27	0	0
Lymphocytes (%)	95	100	73	100	100
Red blood cells (cell/hpf)	80	2400	330	80	0
Protein (mg/dL)	373	367	278	242	197
Glucose (mg/dL)	9	13	13	32	37

[a] *14 days after start of anti-*Brucella *treatment.*
hpf = high-power field.

Brucella spp. was isolated from culture of the CSF sample from admission. *Brucella* tube agglutination tests performed on both serum and CSF samples collected at the time of hospital admission were negative even after high dilution to avoid the prozone phenomenon. Subsequent evaluation using an inhouse enzyme-linked immunosorbent assay (ELISA) test was positive for immunoglobulin (Ig)G and IgM antibodies in the serum, along with IgG antibodies in the CSF (Table 2). Polymerase chain reaction testing of CSF was positive for *B. melitensis*. The patient had some improvement in his clinical condition after anti-tuberculosis treatment, but once the diagnosis of *Brucella* meningitis was made, antibiotic therapy was changed to doxycycline (200 mg/day), trimethoprim/sulfmethoxazole (TMX/SMP) (2 double-strength tablets every 12 hours) and rifampicin (900 mg/day).

Within a week of initiating anti-*Brucella* therapy, the patient became afebrile, had no further vomiting and his esotropia improved. Two weeks after start of therapy for brucellosis, his CSF WBC count decreased to 320 cells/mL, protein level dropped to 197 mg/dL and glucose level rose to 37 mg/dL. All serial CSF parameters are shown in Table 1.

After 1 month of treatment, the laboratory informed the treating physician that the patient's gastric aspirate performed on admission grew acid-fast bacilli on Lowenstein–Jensen slant, identified as *Mycobacterium* spp. The patient was referred to the Chest Hospital for treatment of chest tuberculosis and was lost to follow-up. Prior to transfer to the Chest Hospital, the patient was advised to continue anti-*Brucella* treatment for 3 months.

Table 2 **Pre-treatment serum and cerebrospinal fluid (CSF) *Brucella* antibody titres by enzyme-linked immunosorbent assay and post-treatment CSF *Brucella* antibody titres**

Serial	Sample	Time after admission (days)	IgM titre (IU/L)	IgG titre (IU/L)	Treatment
1	CSF	0	1/160	> 1/5120	Penicillin–chloramphenicol
2	Serum	3	1/2560	> 1/5120	Anti-tuberculosis
3	CSF	11	1/160	> 1/5120	Anti-*Brucella*
4	CSF	17	1/160	> 1/5120	Anti-*Brucella*
5	CSF	41	1/160	> 1/5120	Anti-*Brucella*

Discussion

This is the first reported case of *Brucella* meningitis in Egypt and illustrates many of the difficulties in diagnosing chronic meningitis. The initial CSF picture was suggestive of a bacterial process (high WBC count, low glucose and high protein). However, the chronicity of the infection (having symptoms for over 2 weeks before presentation to the hospital) and the preponderance of lymphocytes in the CSF were not the typical presentation of bacterial meningitis. Thus, when no improvement was noted after 2 days of treatment with penicillin and chloramphenicol, which is not the recommended treatment regimen of most scientific sources [*4,5*], therapy was broadened to treat tuberculosis, a common cause of chronic meningitis in Egypt [*2*]. The true diagnosis was not made until the CSF culture yielded *Brucella* spp. 11 days later. The ability to culture the organism from the CSF fluid was a result of clinicians informing the laboratory of the chronic nature of the patient's meningitis, which resulted in the laboratory incubating the fluid past the normal 3-day period.

An additional confusing feature of the case was the improvement in the clinical condition of the patient after anti-tuberculosis therapy was initiated and the negative serum on admission and CSF agglutination test for *B. melitensis* which is a rare phenomenon [*6,7*], leading the practitioners to believe they were treating tuberculous meningitis. This may be because the organism was susceptible to rifampicin and streptomycin, resulting in an initial clinical improvement. Significant further improvement occurred when definitive treatment with doxycycline and TMX/SMP was begun.

Brucellosis is endemic to Mediterranean and Middle East regions [*1,3*]. In Egypt, *B. melitensis* is the most common species and is thought to be transmitted to humans through animal contact and consumption of raw dairy products [*8*]. The exact incidence of *Brucella* spp. infection in Egypt is unknown but in a study of patients admitted to fever hospitals, *Brucella* spp. was second only to typhoid as the cause of acute febrile illness requiring hospitalization [*8*]. A recent cross-sectional study in the Fayoum district of Egypt found the estimated incidence of *Brucella* infections to be 18 per 100 000 persons per year compared to 13 per 100 000 persons per year for typhoid [*9*].

Although *Brucella* infection is common in Egypt and meningitis is a known complication of this infection, we were unable to find any reports of *Brucella* meningitis occurring in the country. In fact, no form of neurobrucellosis, including meningitis, myelitis or radiculoneuritis, has been previously reported from Egypt. As mentioned above, *B. meningitis* has clinical and radiographic characteristics very similar to tuberculous meningitis, and it is difficult to diagnose in the laboratory [*10*]. Although brucellosis is common in Egypt and ELISA is reported to be a sensitive and specific tool to screen for brucellosis [*11,12*], the principal means of diagnosis in Abbassia Fever Hospital is tube agglutination (negative in our case). *Brucella* spp. can take up to 2 weeks to grow, and CSF cultures are routinely inoculated for 2–3 days. Thus the lack of reporting of cases of *Brucella* meningitis in Egypt may be because it is overshadowed by the clinical similarity with the much more common tuberculous meningitis in settings with limited diagnostic capacity.

Incumbent upon physicians diagnosing brucellosis is inclusion of the infection in the differential diagnosis. Brucellosis, among other infections, should be suspected in a patient with symptoms over 10 days, especially if associated with hepatosplenomegaly. Obtaining a history of contact with sheep, goats or cows, and/or consumption of

raw dairy products, significantly increases the likelihood that *Brucella* spp. is the etiology of the infection. Working closely with the laboratory and informing them when unusual etiologies are being considered is mandatory, as demonstrated in this case, since *Brucella* spp. can take up to 2 weeks to grow in culture [*2*] and CSF cultures are routinely only incubated for 2 or 3 days.

In areas at low risk for brucellosis, the presence of an anti-*Brucella* titre strongly suggests the organism is the cause of the infection. However, in endemic areas, while a negative titre can eliminate brucellosis from the diagnosis, a positive titre may represent a past infection and thus is not sufficient to diagnose the infection. However, a titre > 1/160 IU/L, or a rising titre against *Brucella* spp., is highly suggestive of the infection [*12*]. The finding of *Brucella*-specific antibodies in the CSF is also highly indicative of CSF infection. However, since these antibodies are sometimes present at low levels, agglutination tests often employed in the diagnosis of neurobrucellosis can be falsely negative [*13*]. In contrast, the *Brucella* ELISA test is very sensitive, but specificity may suffer due to cross-reaction with other Gram-negative bacteria [*10*]. To decrease the likelihood of false-negative results, some experts advise performing at least 2 different tests to diagnose brucellosis [*1*]. The tests commonly used in clinical practice include the serum agglutination test for screening and then a complement fixation or Coombs test to confirm the diagnosis [*10,14*].

There is little agreement regarding the optimal therapy for *Brucella* meningitis, except for the need for multiple drugs given for prolonged periods. A combination of doxycycline 200 mg/day, rifampicin 900 mg/day and TMX/SMP 2 double-strength tables/day for 4–6 months is recommended [*15*]. Streptomycin 0.75 to 1 g intramuscular per day for the initial 14 days of treatment can be used instead of TMP/SMX. Untreated, the infection is fatal but appropriate antimicrobial regimens result in a high likelihood of cure [*16*]. Although *Brucella* meningitis has a better prognosis and lower mortality than other forms of meningitis, the incidence of minor sequelae is high [*17*].

This case highlights the importance of a broad differential diagnosis of meningitis and the consideration of other etiologies when a patient is not responding as expected. In particular, we suspect the diagnosis of *Brucella* meningitis is much more common than reported based on the prevalence of brucellosis in the community. Clinical suspicion and close collaboration with the laboratory is critical to optimize the ability to diagnose unusual manifestations of infections.

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المجلة الصحية لشرق المتوسط

دلائل إرشادية للمؤلفين

١. ينبغي أن لا تكون الورقات المقدَّمة 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 قِبَل رئيس تحرير *المجلة الصحية لشرق المتوسط*، بالمكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط، ص. ب. (٧٦٠٨)، بمدينة نصر (١١٣٧١)، بالقاهرة، في مصر. ويتم تقديم خلاصات للورقات، باللغات الثلاث.

٣. ينبغي أن يكون موضوع الورقات منتمياً 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 قدَّمها قد تم قبولها من دون شرط، أو قبولها بشروط، ينبغي أن يقدِّم قرص حاسوبي (٣,٥ بوصة)، يتضمن النص، والجداول، والرسوم البيانية والتوضيحية. وبالنسبة للورقات المقدَّمة باللغتين الإنكليزية والفرنسية، يرجى، بناءً على طلب رئيس التحرير، أن يتم تقديم النص، في كلٍّ من، صيغة معالجة الكلمات (وحبَّذا 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 أوأي حروف مكتوبة .

٥. يتم مراجعة جميع الورقات المقدَّمة مراجعة دقيقة من قِبَل 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، وحبَّذا 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. ولابد أن يكونوا قد ساهموا جميعاً في تصميم البحث أو تحليل نتائجه أو كتابته، وأن يكونوا قد وافقوا، جميعاً على النسخة النهائية المقدَّمة. وقد يطلب من المؤلفين إثبات الإسهام الذي قدَّموه. ويمكن إدراج أسماء أخرى إلى عبارات الشكر التي تكون في مقدِّمة الورقة.

٧. ومن أجل تيسير ترجمة الخلاصات وأسماء المؤلفين، على المؤلفين الذين تكون لغتهم الأم تكتب بحروف عربية، ويكتبون مؤلفاتهم بالإنكليزية أو الفرنسية، أن يزودوا رئيسي التحرير بأسمائهم كاملة، مكتوبة بالحروف العربية، ثم بالحروف اللاتينية.

٨. الورقات التي تمثِّل 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، تبيّن 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 أسمائهم، 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، ومرقمة 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، وحبَّذا 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 الأذون اللازمة. وبُغْيَةَ تجنُّب أي مشكلات في طريقة تنسيق المنتج النهائي، فإنه ينبغي الاقتصار على قدر الإمكان في إدراج الجداول والرسومات. وحبَّذا لو أمكن الاقتصار على جدول واحد أو رسم واحد لكل ١٠٠٠ كلمة. علماً بأن الرسومات المتعلقة ببعض المعطيات، ينبغي أن تصاحب هذه المعطيات، وأن يتسنَّى إعادة رسمها، إذا تطلَّب 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. وتقدَّم الطلبات للحصول على المزيد من النسخ، أو على معلومات حول الأسعار، إلى رئيس التحرير.

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Article de Revue : Jones A et al. One day in Tibet. *Journal of tautology*, 1993, 13(5):23–7.

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