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Eastern Mediterranean Health Journal

المجلة الصحية لشرق المتوسط

La Revue de Santé de la Méditerranée orientale

The Eastern Mediterranean Region is facing extraordinary social and health challenges, aggravated by high morbidity and mortality burden (communicable and noncommunicable diseases and injuries), consequences of emergencies (including current COVID-19 pandemic), conflicts and massive migrant population movements. Research for health is essential for generating necessary evidence, which contributes to sustainable development, economic growth and sound health policy-making in the Region.

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المجلة الصحية لشرق المتوسط

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

La Revue de Santé de la Méditerranée Orientale

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Editorial

Research articles

WHO events addressing public health priorities

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Research on health priorities: a regional agenda and its implementation in Jordan and Pakistan

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The Eastern Mediterranean Region (EMR) is facing extraordinary social and health challenges, aggravated by epidemiologic variations, high morbidity and mortality burden (communicable, noncommunicable, injuries), consequences of emergencies (including current COVID-19 pandemic), conflicts and massive migrant population movements (*1,2*). Research for health is essential for generating necessary evidence, which contributes to sustainable development, economic growth and sound health policy-making. Moreover, research for health that addresses national public health priorities is essential for developing required evidence for explanations that contribute towards health improvement and can assist in best utilization of available resources towards issues that maximize the research impact on population health (*3–7*).

There are many experiences in EMR countries in conduct of health research priority setting at different levels, using a variety of approaches (*8–11*). Noting the importance of the issue, WHO published a guide for research priority-setting in 2020 (*12*). While the guide was focused on enabling WHO staff for such exercises, it includes methods that are of use to the Member States in health research prioritization. In this guidance, the acronym PIPE, which stands for Plan, Implement, Publish and Evaluate, describes the four phases of research priority setting process. The steps are intended to ensure prioritization exercise is well planned to respond to the specific national / local context needs, implemented according to the plan and timetable, and its outcomes are published and widely disseminated among key stakeholders. It also includes processes for monitoring and evaluation to track the implementation on agreed priorities and measure the impact of research prioritization exercises (*12*).

To enable such activities in countries of the Region, the guide was translated to regional languages (Arabic, French, Farsi and Urdu) and shared with the countries. In addition, pilot national exercises were planned/ implemented in two countries in the EMR – Jordan and Pakistan – in response to national interests in February and March 2021. The objectives were to sensitize participants on the WHO guidance document (*12*); facilitate dialogue among major stakeholders on national public health research priorities for improving population health; align funding for promotion of public health research; develop a mechanism for monitoring during the implementation phase and ensure that research priority setting is carried out on regular basis. While the Jordan exercise was based on the "Nominal Group Technique" (NGT) (*13*) for scoring / ranking research statements, the Pakistan one was based on the "Child Health and Nutrition Research Initiative (CHNRI)" (*14*) technique. The expected outcomes for both exercises were to develop a list of public health research priorities for the next 3–5 years; design a mechanism for carrying out public health research priority exercise on periodic basis; and align funding for the priority public health research areas.

For Jordan, the priority setting exercise was linked with Ministry of Health Strategic Plan (2018–2022) (*15*) and Jordan National Action Plan for Health Security (2018–2022) (*16*) with participation of 40 relevant research stakeholders / research experts and in close collaboration with WCO/Jordan and Ministry of Health, while the WHO Eastern Mediterranean Regional Office team from Science, Information and Dissemination department (EMRO/SID) provided technical support using the WHO guidance document (*12*). The exercise was aimed at development of a short list of research statements for 3 main research areas, i.e. (1) health systems and Universal Health Coverage (UHC); (2) health services, digital health and migration health, and (3) COVID-19 response, including public health surveillance. For Pakistan, the prioritization exercise was linked to the 12th National Five-Year Plan (2018–2023) (*17*) and WHO's Country Cooperation Strategy 2020–2025 (*18*), to ensure better health of population through enhanced access to universal health coverage and protection from health emergencies. It was conducted with the involvement of 50 relevant stakeholders that included Ministry of National Health Services, and Regulation and Coordination (MoNHSRC), academic and research institutions from public and private sectors, WHO, and other development partners in the health sector. The priority setting exercise aimed at identifying public health research priorities in 5 thematic areas, i.e. (1) communicable diseases; (2)

noncommunicable diseases; (3) reproductive, maternal, neonatal, child and adolescent health; (4) health services and systems; and (5) mental health.

Both research priority setting exercises involved development of a long list of research statements as potential national priorities, which were then subjected to participants deliberation, small groups discussions and consensus development to identify the national research priorities. These activities resulted in identifying 30 (in case of Jordan) and 50 (in case of Pakistan) research topics as priorities for health research in these two countries. Future actions are now focused on publishing, and disseminating the research priorities to different stakeholders at national and provincial level, identifying resources to enhance uptake of the research priorities by academic institutions and other partners, and monitoring and evaluation of their impact on research and responding to national needs.

Moving forward, WHO plans to extend such exercises to other Member States in the EMR in order to ensure that resources are well utilized and evidence is generated for high-priority health problems in communities to support health policy-making and sustainable development. To ensure success for such exercises, monitoring and evaluation indicators of achievement are designed to include satisfaction of stakeholders with the priority setting processes; alertness of stakeholders with the priorities and their citation in published reports; change in volume of research funding (compared to baseline during planning); and change in the nature of research conducted at local, provincial and national levels, including novel interventions.

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Evaluation of smoking status: comparison of self-reports with exhaled carbon monoxide analysis in university students in the Islamic Republic of Iran

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Abstract

Background: Smoking is considered the leading risk factor for many chronic diseases and deaths worldwide. Thus, it is important to determine the number of smokers before implementing tobacco control initiatives. Due to stigma and deterrent measures, it is impossible to access smokers through a self-report questionnaire.

Aims: To compare exhaled carbon monoxide levels with self-reports among university students in the Islamic Republic of Iran.

Methods: This cross-sectional study included a convenience sample of 60 university students recruited in 2016 in Tehran. There were 30 women and 30 men with an average age of 23.1 (±15.6) years. They were interviewed using an adaptation of the International Union Against Tuberculosis and Lung Diseases questionnaire and further assessed by breath analysis. Smoking status was compared and then correlated with the resultant carbon monoxide levels at a cutoff of 6 ppm.

Results: Mean cigarette consumption was 4.7 (±1.8) each day and smoking status was reported as 19 (31.7%) current smokers and 41 (68.3%) nonsmokers of tobacco. Significant correlations were obtained between the exhaled carbon monoxide levels of the smoker and nonsmoker groups ($P < 0.05$). Irrespective of the measures of smoking status, the frequency of detecting smokers was comparable to that of detecting nonsmokers ($P = 0.756$).

Conclusions: Similar to self-reports, the exhaled carbon monoxide measurement successfully distinguished smokers from nonsmokers. This allows healthcare providers and policy-makers to examine the effectiveness of tobacco cessation and prevention programmes.

Keywords: exhaled carbon monoxide, tobacco use, self-report, university students, Islamic Republic of Iran

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Introduction

Smoking is the most prevalent, high-cost, and fatal form of drug dependence. Each year, > 8 million of the estimated global 1.1 billion tobacco smokers die due to the use of nicotine-containing products (*1*). Mathers and Loncar (*2*) have reported that tobacco-related deaths will reach 8.3 million in 2030. Tobacco consumption accounts for 80–90% of lung cancers (*3*) and leads to an increase in cancers of the larynx, mouth, oesophagus, pancreas, kidney, bladder, and uterine cervix (*4*). In addition to cardiovascular and respiratory diseases, it can cause fetal abnormalities (*1*). Deaths caused by tobacco use are more than those linked to alcohol consumption, AIDS, vehicle accidents, substance abuse, crime and suicide combined (*5*). Tobacco use has grown in low- and middle-income countries, and ~80% of smokers live in these regions (*6*). The tobacco use epidemic has shifted to the developing world. Given the young population density, the Islamic Republic of Iran demands special attention (*7*); in other words, the high number of adolescents in the country makes it into an ideal market for the tobacco trade.

Determining smoking status is important in starting cessation interventions as well as monitoring progress (*8*). In epidemiological studies, validation and confirmation of cigarette smoking and nonsmoking are essential. The advent of electronic health records has facilitated obtaining updates on smoking status. However, this may not occur in reality due to the absence of approved terminology and granularity for data collection, changes in cultural attitudes toward tobacco use, and probable instability of smoking behavior (*9,10*). Tobacco exposure can be assessed by self-reports, which seem convenient, especially for extensive studies (*11*). Although self-reported smoking status is widely applied for assessing the prevalence of smoking, it underestimates the actual exposure (*12*), owing to the lack of social acceptance of smoking (*13*).

As an alternative, many studies have used measurement of carbon monoxide (CO) in exhaled breath as a quick and noninvasive technique to verify smoking status (*14*). CO is a product of tobacco combustion (*15*), and exhaled CO is considered a specific biomarker of recent

smoking, with a half-life of 2–6 hours (*16*). Accordingly, the present study compared the self-reported cigarette smoking status with the results of exhaled CO testing in university students. This is believed to be the first study in the Islamic Republic of Iran to investigate the correlation between exhaled CO and self-reports of smoking.

Methods

Study design and participants

This was a cross-sectional study conducted within a university setting. In November 2016, we used a nonrandom convenience sampling technique to select 60 students who read the study communiqués issued by the Department of Public Relations in the School of Advanced Technologies in Medicine in Tehran, Islamic Republic of Iran. The recruitment was performed in person by research team members based on the following inclusion criteria: age 18–30 years and higher education to at least diploma level. There was an equal sex ratio, with 30 women and 30 men, with an average age of 23.09 [standard deviation (SD) 15.64] years. The exclusion criteria included pulmonary diseases, cognitive disorders, nicotine replacement therapy, renal failure requiring dialysis, and facial deformities that would cause problems in the use of spirometry or determination of the exhaled CO level (*17*).

Determination of self-reported smoking status

A self-administered Farsi-language smoking questionnaire, adapted from the International Union Against Tuberculosis and Lung Diseases (*18*,*19*), was utilized, as in previous reports from the Islamic Republic of Iran (*20*). The questionnaire contained information on demographics (age, residency and marriage) and tobacco use (4 questions), smoking status (4 questions), and smoking frequency (4 questions). Two supplementary questions were added concerning the age at starting smoking tobacco. Six of the questions dealt with the pattern of smoking behavior, including one "yes/no" question about present cigarette smoking; 2 short answer questions about weekly frequency of cigarette smoking; 2 short answer questions about the type of cigarettes smoked; and 1 "multiple-choice question" about the time to first cigarette in the morning (ranging from < 5 minutes to > 1 hour).

Exhaled breath CO analyzer

The piCO+ Smokerlyzer (Bedfont Scientific, Maidstone, UK) was used to measure exhaled CO levels with standardized smoking thresholds recommended by the manufacturer for different age categories. The test was conducted in the school hall by a trained research assistant. There was a breath sampling D-piece and a cardboard mouthpiece attached to the device before each test. Initially, the ambient levels of CO were detected, and the machine was calibrated against the room air. The study participants were instructed to inhale and hold their breath while a 15-second countdown was started. Also, they were asked to blow into the mouthpiece as slowly and thoroughly as possible in an attempt to empty the lungs when the device alarm started. Finally, the students were given access to their test results. The breath tests were conducted in duplicate to ensure consistency. The breath analysis was repeated if the difference between the results was higher than 2 ppm. The exhaled CO levels were presented in ppm, with > 6 ppm being indicative of smoking.

Procedure

All participants were referred during November 2016 to the Health Counseling Room in the School of Advanced Technologies in Medicine for eligibility assessment by a physician and psychologist. The initial sample included 84 men and women, 60 of whom met the inclusion criteria. The other remaining 24 participants were prevented from continuing the study. Afterwards, the students were asked to participate in both interview and breath analysis. All interviewers were trained to ensure consistency and avoid bias. Those who reported any form of tobacco use in the preceding 24 hours were put in the category of smokers. The remaining students were considered nonsmokers, including those who did not smoke in the last week or who had never smoked.

Ethical considerations

At the start of the study, written informed consent was obtained from all students. They were assured that the results would be confidential and reported anonymously in an attempt to encourage accurate and thorough reporting of their smoking habits. The Research Ethics Committee of Tehran University of Medical Sciences approved the study (code: IR.TUMS.REC.1394.18.96).

Statistical analysis

Data were collected and entered into SPSS version 22 software (SPSS Inc., Chicago, IL, USA) for further analyses. The data were described by descriptive statistics, including frequency, percentage, and mean (SD). The data distribution was investigated by performing the Kolmogorov–Smirnov test. Student's independent *t* test was carried out for comparison of CO levels between the smoker and nonsmoker groups. The Pearson correlation coefficient was determined between them. The frequency of smokers according to exhaled CO measurement was compared with that by self-reports using Pearson's χ^2 test. The effect of sex on the exhaled CO levels was evaluated by the Mann–Whitney *U* test. $P < 0.05$ was defined as statistically significant.

Results

The demographic characteristics of the university students are summarized in Table 1. They had a mean cigarette consumption of 4.68 (1.79) each day, and a mean smoking initiation age of 19.43 (8.62) years.

Among the 60 students, 319 (1.67%) had smoked tobacco within the last 24 hours and were assigned to the smoker group. A total of 41 participants (68.33%) self-reported no use of tobacco products in the last week or no

Table 1 Participants' demographics and smoking characteristics

Characteristics	Self-reported status of tobacco use		Total n = 60
	Smoker n = 19 (31.67)	Nonsmoker n = 41 (68.33)	
Age, years, mean (SD)	25.68 ± 11.21	21.62 ± 19.04	23.09 ± 15.64
Male, n (%)	14 (23.33)	16 (26.67)	30 (50)
Residency, n (%)			
Individual home	8 (13.33)	25 (41.67)	33 (55.00)
Parent's home	5 (8.33)	8 (13.33)	13 (21.67)
Dormitory	6 (10.00)	8 (13.33)	14 (23.33)
Marriage, n (%)			
Divorced/widowed	1 (1.67)	1 (1.67)	2 (3.33)
Married	2 (3.33)	5 (8.33)	7 (11.67)
Single	11 (18.33)	34 (56.67)	45 (75.00)
Smoking initiation age, years, mean (SD)	17.93 ± 6.22	21.04 ± 13.51	19.43 ± 8.62
Cigarettes per day, mean (SD)	5.79 ± 3.40	4.11 ± 1.13	4.68 ± 1.79

Results presented as number (%) SD = standard deviation.

smoking at all, and they were placed in the nonsmoker group. In the smoker group, there were 14 (23.33%) men, aged 25.68 (11.21) years, and 11 (18.33%) were single. In the nonsmoker group, there were 16 (26.67%) men, aged 21.62 (19.04) years, and 34 (56.67%) were single. The smoker group tended to start smoking at a younger age compared with the nonsmokers [17.93 (6.22) vs 21.04 (13.51) years and reported smoking a higher number of cigarettes each day [5.79 (3.40) vs 4.11 (1.13)].

The participants in the smoker group had an exhaled CO level of 13.57 (2.03) ppm, which was about 3 times higher than 4.44 (0.52) ppm in the nonsmoker group. The independent-samples t test showed that there was a significant difference in exhaled CO levels between the groups ($t(58) = 19.84$, $P = 0.004$). Moreover, the Pearson correlation coefficient between the exhaled CO levels of the 2 groups was 0.719 ($P = 0.003$). These results indicated that exhaled CO in current smokers could be distinguished from that in ex- or nonsmokers. The CO analyzer showed that 15 students had an average CO level > 6 ppm. The χ^2 test revealed no marked association between the smoking status reported by the exhaled CO measurement and self-report ($\chi^2 = 0.657$, $P = 0.418$). In other words, the results of the exhaled CO measurement were in line with those of the self-report.

The exhaled CO levels were 8.80 (1.0) ppm for men and 5.90 (0.60) ppm for women. Based on the Mann–Whitney U test, the male participants had a significantly higher concentration of exhaled CO ($U = 47.000$, $P = 0.035$) than the female participants.

Discussion

The prevalence of tobacco use was 31.67% among university students, which is consistent with other reports from the Islamic Republic of Iran (*21–23*). The mean number of cigarettes per day and smoking initiation age were 4.68 (1.79) and 19.43 (8.62) years, respectively. No study has investigated the average number of cigarettes per day for university students. However, a recent meta-analysis found a daily rate of 11.6 and 15.0 in Tehran Province (*24*). In the present study, men showed higher exhaled CO levels than the total participants (around 2-fold) and women (around 3-fold). These findings were consistent with the results reported by Moscato et al. (*25*); however, the CO values were not comparable between the studies. Typical exhaled CO values certainly differ across studies even if they used a piCO⁺ Smokerlyzer because mean levels in nonsmokers vary from < 1.5 ppm (*26*) to 3 ppm (*27*). These differences arise from factors such as disparity in environmental CO levels, anthropometric features (e.g., lung capacity), and measurement techniques (*28*). Raiff et al. showed that measures obtained from prolonged expiration led to higher values than those from shorter expiration (*29*). In this regard, the trend of the exhaled CO concentration during expiration may also play a role. Schober et al. suggested 3 phases for CO level (*30*). It is 0 in the primary part of the expiration (phase 1), followed by progressive increases (phase 2), and finally decreases after a plateau (phase 3). Moreover, considerable environmental CO levels could have explained the exhaled CO levels since our study was conducted in a large city, and the participants were exposed to air pollution caused by traffic jams, especially when traveling to the university. Individual subject variability [e.g., lung volume (*28*) and physical activity (*31*)] may influence CO measures but was not considered in our study.

The present study showed that the breath analysis device could be used for accurate determination of tobacco use in adolescents with light smoking (around 5 cigarettes/day). Additionally, this device provided a reasonable alternative to self-reporting. Measurement of exhaled CO using this device at a cutoff point of 6 ppm sounds like a viable measure for distinction between current smokers and ex- or nonsmokers, as opposed to the self-reporting method. These findings were corroborated by previous investigations (*32,33*).

This study had some limitations. The study dealt with a hidden problem in society, especially in universities; therefore, self-reported data faced challenges due to taboos

surrounding women's smoking. As a result, a combination questionnaire together with secret codes instead of names was used to reduce bias. Besides these, restrictions were undertaken to ensure data confidentiality. However, it is likely some of the participants might have avoided giving a socially undesirable response. Moreover, the cross-sectional study design made causal conclusions difficult. Small sample size was another limitation that should be resolved for future investigations. The use of biological measures like exhaled CO is associated with the limitation of measurement among different individuals and receiving false-positive reports. Other factors may have affected our results, such as a lack of financial resources, biological and social variations between the sexes, and poor collaboration from organizations. Additionally, a high number of questions took more time to respond than expected, which could have affected the students' response precision. Also, the results of this study can only be generalized to the university students selected here.

In conclusion, the present study proposed that the exhaled CO levels measured by breath analysis could successfully discriminate current smokers from nosmokers, which is the same as self-reporting. Moreover, the use of exhaled CO allows healthcare providers and policy-makers to implement MPOWER[1] measures, enhance the country-level achievements in interventions targeting the demand for tobacco products, and examine the effectiveness of tobacco use cessation and prevention programmes.

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Competing interests: None declared.

Évaluation du statut tabagique : comparaison des informations auto-déclarées avec la mesure du monoxyde de carbone expiré chez les étudiants universitaires en République islamique d'Iran

Résumé

Contexte : Le tabagisme est considéré comme le principal facteur de risque de nombreuses maladies chroniques et de décès dans le monde. Il est donc important de déterminer le nombre de fumeurs avant de mettre en œuvre des initiatives de lutte antitabac. En raison de la stigmatisation et des mesures dissuasives, il est impossible d'accéder aux informations concernant le nombre de fumeurs par le biais d'un questionnaire d'auto-déclaration.

Objectifs : Comparer les taux de monoxyde de carbone (CO) expiré avec les informations auto-déclarées par les étudiants universitaires en République islamique d'Iran.

Méthodes : La présente étude transversale a inclus un échantillon de commodité de 60 étudiants universitairesrecrutés en 2016 à Téhéran. Il était composé de 30 femmes et de 30 hommes dont l'âge moyen était de 23,1 ans (±15,6). Les entretiens avec les participants se sont déroulés en utilisant une version adaptée du questionnaire de l'Union internationale contre la tuberculose et les maladies respiratoires ; une évaluation ultérieure a été réalisée au moyen d'une analyse de l'haleine. Le statut tabagique a été comparé et ensuite corrélé avec les taux de CO résultants à un seuilde 6 ppm.

Résultats : La consommation moyenne de cigarettes était de 4,7 par jour (±1,8) et le statut tabagique était indiqué pour 19 fumeurs (31,7 %) et 41 non fumeurs (68,3 %) au moment de l'étude. Des corrélations significatives ont été obtenues entre les taux de monoxyde de carbone expiré des groupes fumeurs et non-fumeurs ($p < 0,05$). Indépendamment des mesures du statut tabagique, la fréquence du dépistage des fumeurs était comparable à celle des non-fumeurs ($p = 0,756$).

Conclusions : Comme pour les auto-déclarations, la mesure du CO expiré a réussi à distinguer les fumeurs des non-fumeurs. Cela permet aux prestataires de soins de santé et aux responsables de l'élaboration des politiques d'examiner l'efficacité des programmes de sevrage tabagique et de prévention.

[1] MPOWER = 1) Monitoring tobacco consumption and the effectiveness of preventive measures; 2) Protect people from tobacco smoke; 3) Offer help to quit tobacco use; 4) Warn about the dangers of tobacco; 5) Enforce bans on tobacco advertising, promotion and sponsorship; and 6) Raise taxes on tobacco.

تقييم حالة التدخين: مقارنة التقارير الذاتية بتحليل أول أكسيد الكربون المُستنشق بين طلاب جامعيين في جمهورية إيران الإسلامية

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الخلاصة:

الخلفية: يُعتبر التدخين أحد عوامل الخطر الرئيسية لكثير من الأمراض المزمنة والوفيات في جميع أنحاء العالم. ومن ثَمَّ، من المهم تحديد عدد المُدخنين قبل تنفيذ المبادرات المعنية بمكافحة التبغ. وبسبب الوصم والتدابير الرادعة، أصبح من المستحيل الوصول إلى المُدخنين من خلال الاستبيانات ذاتية الإبلاغ.

الأهداف: هدفت هذه الدراسة إلى مقارنة مستويات أول أُكسيد الكربون المُستنشق بالتقارير الذاتية للطلاب الجامعيين في جمهورية إيران الإسلامية.

طرق البحث: شملت هذه الدراسة المقطعية عينة ملائمة ضمت 60 طالباً جامعياً استُعين بهم في عام 2016 في طهران. ومن بين هؤلاء الطلاب، كان يوجد 30 امرأة و30 رجلاً وكان متوسط عمرهم 23.1 (±15.6) عاماً. وأُجريت مقابلات معهم باستخدام الاستبيان الخاص "بالاتحاد الدولي لمكافحة السل وأمراض الرئة" بعد مواءمته، ثم خضعوا للتقييم مرة أخرى عن طريق تحليل النفس. وقد قورنت حالة التدخين، ثم رُبطت بمستويات أول أكسيد الكربون عند حد 6 جزء في المليون.

النتائج: بلغ متوسط استهلاك السجائر 4.7 (±1.8) كل يوم، وأُبلغ عن حالة التدخين باعتبار أن 19 شخصاً (31.7٪) من المُدخنين حالياً، في حين أن نسبة من لم يتعاطوا التبغ بلغت 41 شخصاً (68.3٪). وقد تم التوصل إلى العلاقات المهمة بين مستويات أول أكسيد الكربون المُستنشق لمجموعات المُدخنين وغير المُدخنين (القيمة الاحتمالية < 0.05). وبغض النظر عن التدابير الخاصة بحالة التدخين، فإن معدل تواتر المُدخنين كان قابلاً للمقارنة مع معدل تواتر غير المدخنين (القيمة الاحتمالية = 0.756).

الاستنتاجات: وعلى غرار التقارير الذاتية، نجح قياس أول أُكسيد الكربون المستنشق في تمييز المُدخنين عن غير المُدخنين. ويتيح ذلك لمقدمي الرعاية الصحية وراسمي السياسات دراسة فعالية البرامج المعنية بالإقلاع عن تعاطي التبغ والوقاية منه.

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Relationship between obesity and depression, anxiety and psychological distress among Iranian health-care staff

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Abstract

Background: Psychological-related disorders such as obesity are a key contributor to morbidity and mortality.

Aims: To assess the association between general and abdominal obesity with depression and anxiety among Iranian health-care staff.

Methods: This cross-sectional study was conducted under the framework of the Study on the Epidemiology of Psychological Alimentary Health and Nutrition. A total of 4361 Iranian health-care staff were analysed for general obesity and 3213 for central obesity. Overweight and obesity was defined as body mass index 25.0–29.9 and ≥ 30.0 kg/m^2, respectively. Abdominal obesity was defined as waist circumference (WC) ≥ 88 cm for females and ≥ 102 cm for males. The Iranian validated versions of the Hospital Anxiety and Depression Scale and the General Health Questionnaire were used to assess depression and anxiety.

Results: Stratified analysis by sex revealed no significant relationship between general obesity, depression and anxiety among males. However, we found an inverse association between abdominal obesity (WC > 102 cm) and severe depression among males. In females, abdominal obesity was significantly associated with anxiety, before and after taking confounders into account. No significant association was seen between abdominal obesity and psychological distress in either sex after controlling for potential confounders.

Conclusions: Abdominal obesity was associated with anxiety in Iranian adult females but not in males. Further studies, particularly prospective research, are required to confirm these findings.

Keywords: obesity, abdominal obesity, psychological health, depression, anxiety

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Introduction

Depression is a common psychological disorder and like obesity, is a key contributor to morbidity and mortality (*1*). Not much research has been performed on the relationship between obesity and mental illness such as depression and anxiety. Depression can adversely affect quality of life and working ability (*1*). Treatment and management of obesity and depression or anxiety are costly; therefore, more studies are required to elucidate the association between obesity and psychological disorders to improve clinical management plans (*2*).

Previous studies have reported a connection between obesity and anxiety and depression, albeit with conflicting results (*3,4*). Some studies have found a negative association of obesity with depression and anxiety (*2*), whereas others have shown a U-shaped association, meaning that underweight and overweight people are more likely to have depression and anxiety than those with normal weight (*5,6*). Despite such evidence, some researchers have not found any relationship between body weight and depression and anxiety (*7*). Furthermore, some investigators have found an association only in men (*8*), while others have found a significant association only in women (*5*).

One of the major reasons for obesity in patients with psychological disorders is medication, which can lead to 2–17 kg weight gain over the course of clinical treatment. Adverse effects of these medications include reduced quality of life and cardiovascular disorders in patients with severe mental illness compared to the general population. In patients with severe weight gain after the first 3 months of beginning medication, lifestyle intervention is suggested (*5*).

It should be borne in mind that most studies in this area have been conducted in western countries and limited data are available from other regions. In particular, studying the relationship between obesity

with depression and anxiety is important among Middle-Eastern populations, where there is a specific pattern of obesity (*9*). Abdominal obesity is prevalent among adult women living in the Middle East. Moreover, previous studies have focused on general obesity, while it seems that the influence of fat distribution within the body on psychological disorders is more important than total body fat. Moreover, previous studies have focused on depression as the main psychological outcome, whereas other conditions like stress and psychological distress might also be associated with obesity. Given the limited details on the relationship between general and central adiposity and psychological disorders in the Middle East, the purpose of this study was to investigate whether obesity is associated with depression, anxiety and psychological distress among Iranian healthcare staff.

Methods

Study participants

We conducted a cross-sectional study within the framework of the Study on the Epidemiology of Psychiatric-Alimentary Health and Nutrition (SEPAHAN). Participants were adults aged 18–55 years selected from 50 healthcare centres of Isfahan Province, Islamic Republic of Iran. Details of the study protocol have been discussed previously (*10*). The study group comprised different categories of employees recruited from different health centres, with different lifestyle and socioeconomic status. So, there was no homogeneity in the study population. These differences were similar to those in wider society.

The required information in the SEPAHAN study was collected in 2 phases. First, a questionnaire that contained information on demographic and dietary data was sent to 10 087 participants and 8691 returned the completed questionnaires (response rate 86.16%). Second, information on psychological health was gathered and 6239 participants returned the completed questionnaires. After linking the completed questionnaires from the first and second phases, 4633 participants had given complete information on diet and psychological factors. We excluded under- and over-reporting of food intake (energy intake outside the range of 800–4200 kcal/day). Finally, data on 4361 participants were analysed for general obesity and 3213 for central obesity. Participants gave signed informed consent to take part in the study.

Anthropometric assessment

Anthropometric data [body height and weight and waist circumference (WC)] were collected using a validated self-administered questionnaire (*11*). Body mass index (BMI) was categorized into normal (≤ 24.9 kg/m^2), overweight (25.0–29.9 kg/m^2) or obese (≥30.0 kg/m^2). The guidelines of the National Cholesterol Education Program were used to define abdominal obesity. Accordingly, participants were classified into 3 categories: normal WC (< 80 cm for women, < 94 cm for men); level 1 abdominal obesity (80–87.99 cm for women, 94–101.99 cm for men); and level 2 abdominal obesity (≥ 88 cm for women, ≥ 102 cm for men) (*12*).

The validity of self-reported anthropometric values was assessed in a pilot study including 200 individuals from the same population (*11*). These values were compared with actual measured values. There was a reasonable correlation between self-reported and measured values. The correlation coefficients were 0.95 ($P < 0.001$) for self-reported body weight, 0.83 ($P < 0.001$) for height, and 0.60 ($P < 0.001$) for WC versus corresponding measured values. The correlation coefficient for report-based BMI (calculated from self-reported body height and weight) and the measurement-based BMI (calculated from measured body weight and height) was 0.70 ($P < 0.001$).

Assessment of psychological profile

Anxiety and depression were measured by the validated Iranian translation of the Hospital Anxiety and Depression Scale (HADS) (*13*). HADS is a screening tool used to measure symptoms of anxiety and depression. HADS consists of 2 subscales, with 7 items measuring anxiety and 7 items measuring depression. Items are rated on a 4-point scale (0–3), with higher scores indicating a higher level of anxiety and depression symptoms. The maximum score of HADS is 21 in each of the subscales. Scores of ≥ 11 on either subscale were considered to be a severe form of depression or anxiety, 8–10 borderline and 0–7 normal (*14*).

Psychological distress was evaluated by the validated Iranian translation of the General Health Questionnaire (GHQ) with 12-items (*15*). GHQ-12 is a short, simple and easy-to-complete questionnaire that measures current and primary mental health, to determine if the respondent is at risk of developing psychological distress. Items are rated on a 4-point response scale comprising: 1, less than usual; 2, no more than usual; 3, rather more than usual; and 4, much more than usual. The total score is 12 or 36 according to the scoring method used. We used the dichotomous scoring style (0-0-1-1). Total score ranges from 0 to 12. Higher scores indicate high levels of psychological distress (*16*). We considered poor mental health to be GHQ-12 score ≥ 4.

Statistical analysis

Statistical analysis was performed using SPSS version 16 (SPSS Inc, Chicago, IL, USA). $P < 0.05$ was considered significant. Data were analysed for the overall population as well as stratified by sex. General characteristics of study participants across different categories of BMI and WC were examined by analysis of variance or χ^2 test. Prevalence of mental illness across categories of BMI and WC was assessed by χ^2 test. Binary logistic regression was performed to explore the relationship between general and central obesity and psychological disorders. This analysis was adjusted for possible confounders including age (continuous), sex (male/female), marital status (single/married/divorced), education (below high school, university graduate), smoking (non-smokers,/ex-smok-

ers/current smokers) and physical activity (never, < 1 h/week, 1–3 h/week and > 3 h/week). In all multivariate models, those with normal BMI or WC were considered as a reference. The logistic regression was applied for different levels of mental illnesses: borderline and severe forms of depression, anxiety and high psychological distress were considered as separate outcomes in the analysis. We also used the combined variable of these 2 levels in the analysis. The growing trend of odds ratios across BMI and WC categories was examined through the use of median values of BMI and WC in each category as a continuous variable.

Results

The general characteristics of the study participants across BMI and waist circumference categories are indicated in Table 1.

Prevalence of overweight and obesity was 37% (43.7% for men and 10% for women) and 9.7% (9.3% for males and 10.0% for females) in the overall population, respectively. Prevalence of abdominal obesity (level 2) was 33.1% for the overall population (18.3% for men and 39.7% for women). Prevalence of abdominal obesity (level 2) was 30.4% for the overall population (16.8% for men and 38.4% for women).

Prevalence of mental illnesses across different categories of BMI in the whole population as well as by gender is shown in Figure 1. Prevalence of severe depression and anxiety was significantly higher in obese participants than in other categories. When the analyses were stratified by sex, such significant differences were only seen among women. Prevalence of depression, anxiety and high psychological distress among abdominally obese (level 2) participants was more than that in other categories of WC in the whole population. The same findings were also observed among women in our stratified analysis.

Sex-stratified analysis revealed no significant relationship between general obesity and depression, anxiety and high psychological distress among men (Table 2). However, abdominal obesity (WC > 102 cm) was inversely associated with severe depression in men. In women, a significant relationship was seen between obesity and severe depression [odds ratio (OR) = 1.45, 95% confidence interval (CI) = 1.0–2.11] as well as severe anxiety (OR = 1.66, 95% CI = 1.03–2.67) (Table 3). However, after adjustment for confounders, these relationships disappeared. Significant relationships were observed between abdominal obesity and depression, in particular severe depression among women; such that abdominally obese women had 63% (OR = 1.63, 95% CI = 1.19–2.24) and 28% (OR = 1.28, 95% CI = 1.03–1.59) higher risk for severe depression and depression (combined borderline and severe depression), respectively, than those with normal WC. Both relationships disappeared after adjusting for confounding variables. Abdominal obesity was significantly associated with anxiety and severe anxiety among women, either before or after taking confounders into account. Although abdominally obese women were 31% more likely to have psychological distress, adjustment for confounders made the association disappears.

Discussion

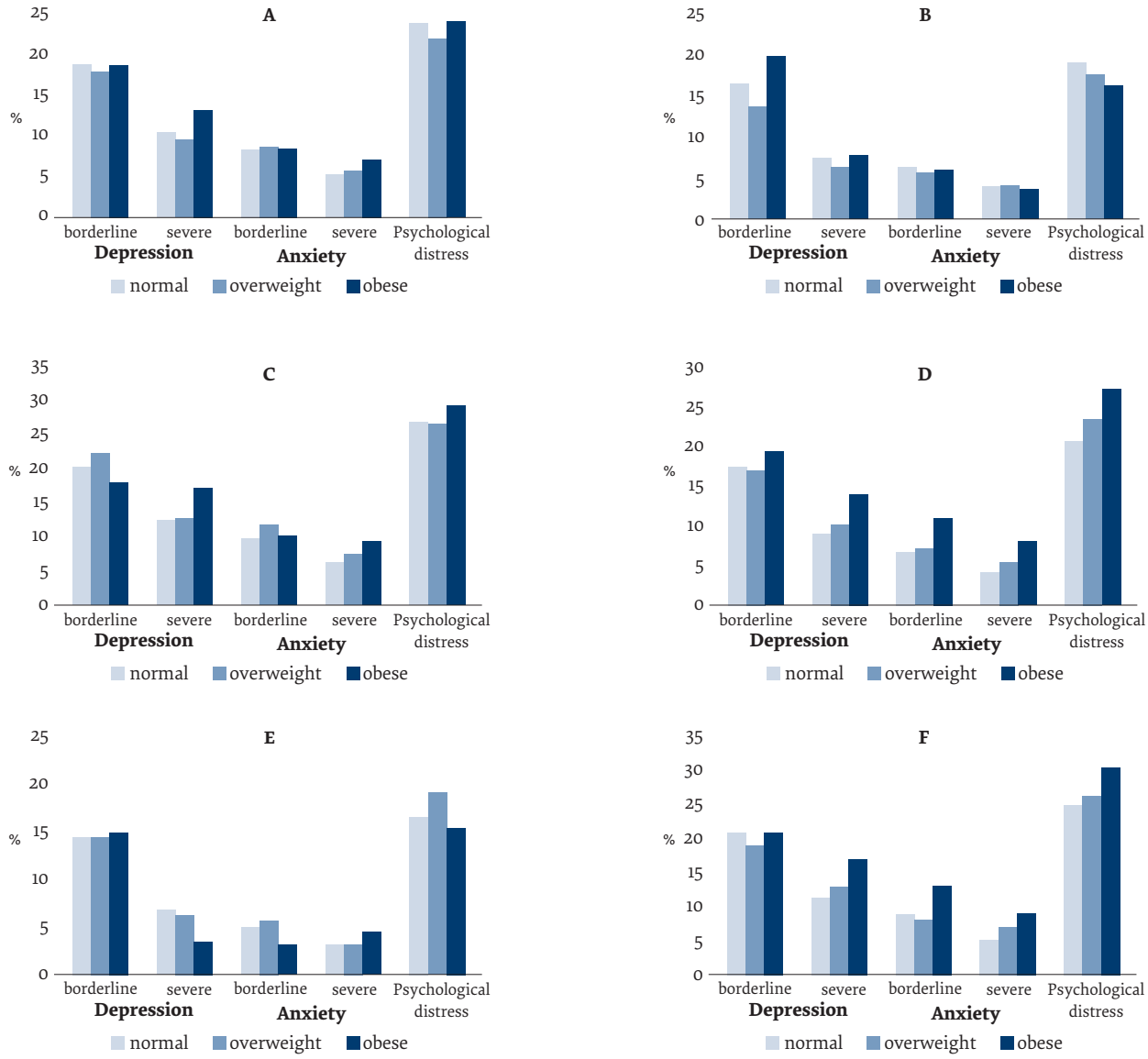
We found an inverse association between abdominal obesity (WC > 102 cm) and severe depression among men. In women, abdominal obesity was significantly associated with anxiety, before and after taking confounders into account. No significant association was seen between abdominal obesity and psychological distress in either sex after controlling for potential confounders.

Table 1 General characteristics of study participants across different categories of BMI and waist circumference[a]

Whole population	BMI categories[b]				WC categories[c]			
	Normal	Overweight	Obese	*P*	Normal	Abdominal obesity level 1	Abdominal obesity level 2	*P**
Age (yr)	34.2 (7.8)	38.3 (7.3)	39.8 (7.3)	< 0.001	34.8 (7.8)	36.8 (7.4)	38.7 (7.2)	< 0.001
Weight (kg)	61 (8.8)	75.3 (9.2)	87.1 (16.9)	< 0.001	62.6 (11.6)	69.5 (12.8)	74.8 (11.7)	< 0.001
BMI (kg/m^2)	22.1 (2.1)	27 (1.3)	33.9 (7.3)	< 0.001	22.6 (3.8)	25.3 (3.1)	28.2 (4.2)	< 0.001
WC (cm)	76.8 (17.1)	87.7 (17.4)	96.6 (20.4)	< 0.001	78.3 (8.1)	88.6 (7.3)	98.48 (8.3)	< 0.001
Married (%)	72.7	90.8	89.7	< 0.001	74.1	86.2	90.0	< 0.001
University graduates (%)	62.2	54.2	46.7	< 0.001	63.8	63.0	53.8	< 0.001
Current smokers (%)	13.7	15.2	14.9	0.082	12.8	12.5	15.8	0.065
Supplement use (%)	8.3	6.7	6.5	0.104	8.6	9.2	7.8	0.524
OCP use (%)	3.3	2.2	3.4	0.103	2.1	3.2	4.2	0.013
Self-reported diabetes (%)	0.9	2.3	3.1	< 0.001	0.8	1.7	2.5	0.005

[a]*All values are mean (standard deviation), unless indicated.*
[b]*Normal weight (≤ 24.9 kg/m^2), overweight (25.0–29.9 kg/ m^2) and obesity (≥ 30.0 kg/m^2)*
[c]*Normal (< 80 cm for women, < 94 cm for men), abdominal obesity level 1 (80–87.99 cm for women, 94–101.99 cm for men), abdominal obesity level 2 (≥ 88 cm for women, ≥ 102 cm for men).*
**Obtained from analysis of variance or $?^2$.*
BMI = body mass index; OCP = oral contraceptive pill; WC = waist circumference.

Figure 1 Prevalence of depression, anxiety and psychological distress according to body mass index (BMI) and waist circumference (WC) categories in the whole population and stratified by sex. (A) Based on BMI categories in the whole population; (B) based on BMI categories in men; (C) based on BMI categories in women; (D) based on WC categories in the whole population; (E) based on WC categories in men; and (F) based on WC categories in women.



Prevalence of depression, anxiety and high psychological distress in developing countries has grown in parallel with increasing prevalence of overweight and obesity. In the current study, we did not observe any significant association between BMI and these mental illnesses. A recent systematic review showed a significant, but weak, cross-sectional relationship between obesity and depression (*17*). While some cross-sectional studies have shown a positive association between depressive symptoms and obesity (*5,7,18*), others have shown an inverse relationship (*19,20*). A negative relationship between central obesity and depressive symptoms has also been reported among Korean women (*21*). Revenes et al. (*22*) suggested that BMI was not related to depression and even might have some preventive effects against anxiety. Rebert et al. (*7,18*) showed that obesity is positively related to depression, might worsen mental disorders, and aggravates pessimism and satisfaction. A recent meta-analysis showed a positive association between BMI and depression in 17 community-based cross-sectional studies in adults (*23*). It is worth noting that all previous studies have been conducted in developed nations, which shows that ethnic differences can affect the strength of the relationship between obesity and depression. Additionally, the current study was from the Middle East, where a particular pattern of obesity is prevalent (*9*). Furthermore, it seems that severity of obesity influences the association between obesity and depression, anxiety and high psychological distress. Some researchers have suggested that this association might be limited to individuals with extreme obesity. For instance, Onyike et al. (*24*) found that, after controlling potential confounders, the association remained significant only in severely obese

Table 2 Multivariable-adjusted ORs and 95% CIs for depression, anxiety and high psychological distress across categories of BMI and waist circumference for men[a]

	BMI status[b]				WC status[c]			
	Normal weight	Overweight	Obese	P_{trend}	Normal	Abdominal obesity level 1	Abdominal obesity level 2	P_{trend}
Depression (borderline+severe)								
Crude	1.0	0.80 (0.64–1.01)	1.28 (0.89–1.84)	0.95	1.0	0.98 (0.70–1.34)	0.84 (0.56–1.26)	0.48
Adjusted[d]	1.0	0.89 (0.66–1.21)	1.50 (0.93–2.42)	0.38	1.0	1.04 (0.70–1.55)	0.71 (0.42–1.20)	0.40
Depression (severe)								
Crude	1.0	0.82 (0.56–1.20)	1.14 (0.62–2.10)	0.83	1.0	0.92 (0.54–1.58)	0.49 (0.21–1.12)	0.16
Adjusted	1.0	0.83 (0.48–1.44)	1.44 (0.61–3.38)	0.79	1.0	0.95 (0.46–1.95)	0.21 (0.04–0.95)	0.10
Depression (borderline)								
Crude	1.0	0.80 (0.61–1.04)	1.34 (0.89–2.02)	0.83	1.0	0.99 (0.68–1.45)	1.0 (0.64–1.57)	0.98
Adjusted	1.0	0.92 (0.65–1.29)	1.50 (0.88–2.55)	0.37	1.0	1.10 (0.70–1.73)	0.91 (0.52–1.59)	0.98
Anxiety (borderline+severity)								
Crude	1.0	0.94 (0.68–1.28)	1.0 (0.59–1.71)	0.85	1.0	1.10 (0.69–1.75)	0.90 (0.49–1.64)	0.96
Adjusted	1.0	1.02 (0.66–1.57)	0.86 (0.38–1.92)	0.85	1.0	0.91 (0.50–1.66)	0.57 (0.24–1.34)	0.26
Anxiety (severe)								
Crude	1.0	1.03 (0.64–1.68)	1.16 (0.53–2.55)	0.72	1.0	1.03 (0.49–2.18)	1.44 (0.64–3.21)	0.47
Adjusted	1.0	1.41 (0.70–2.81)	1.35 (0.43–4.29)	0.38	1.0	0.77 (0.28–2.09)	0.58 (0.16–2.14)	0.38
Anxiety (borderline)								
Crude	1.0	0.87 (0.58–1.31)	0.92 (0.46–1.85)	0.61	1.0	1.17 (0.66–2.09)	0.60 (0.24–1.45)	0.59
Adjusted	1.0	0.89 (0.52–1.52)	0.66 (0.22–1.94)	0.44	1.0	1.07 (0.50–2.24)	0.58 (0.19–1.76)	0.54
Psychological distress								
Crude	1.0	0.91 (0.71–1.17)	0.82 (0.52–1.28)	0.31	1.0	1.19 (0.84–1.68)	0.92 (0.58–1.44)	0.79
Adjusted	1.0	1.05 (0.76–1.45)	1.01 (0.58–1.76)	0.84	1.0	0.99 (0.65–1.53)	0.66 (0.37–1.18)	0.30

[a]*Severe anxiety and depression was defined as Hospital Anxiety and Depression Scale score ≥ 11; 8–10 was considered as borderline. Psychological distress was defined as General Health Questionnaire score ≥4.*
[b]*Normal weight (≤ 24.9 kg/m²), overweight (25.0–29.9 kg/ m²) and obesity (≥ 30.0 kg/m²).*
[c]*Normal (< 94 cm), abdominal obesity level 1 (94–101.99 cm), abdominal obesity level 2 (≥ 102 cm).*
[d]*Adjusted for age, marital status, education, smoking and physical activity.*
BMI = body mass index; CI = confidence interval; OR = odds ratio; WC = waist circumference.

(BMI ≥ 40 kg/ m²) individuals. Although overweight and obesity were highly prevalent in our study, the prevalence of severe obesity was not so high. Different types of obesity and location of fat accumulation might affect psychological disorders. We discovered a significant positive relationship between abdominal obesity and depression, anxiety and high psychological distress in crude models. However, the relationships disappeared after adjusting for potential confounders. A positive association was reported between waist to height ratio and anxiety in women, independent of confounders. However, some studies have proposed that central obesity does not impose further risk for depressive disorders compared with that for general obesity (*25*,*26*).

In the current study, there was no association between general obesity and depression, anxiety and high psychological distress, neither in men nor in women. However, while there was a positive link between abdominal obesity and these psychological disorders in women, an inverse relationship between abdominal obesity and severe depression was observed in men. Earlier studies have mostly shown that abdominal obesity is connected with these psychological disorders

Table 3 Multivariable-adjusted odds ratios and 95% CIs for depression, anxiety and high psychological distress across categories of BMI and waist circumference for women[a]

	BMI status[b]				WC status[c]			
	Normal weight	Overweight	Obese	P_{trend}	Normal	Action level 1	Action level 2	P_{trend}
Depression (borderline+severe)								
Crude	1.0	1.14 (0.95–1.37)	1.15 (0.87–1.53)	0.14	1.0	0.99 (0.78–1.26)	1.28 (1.03–1.59)	0.02
Adjusted[d]	1.0	1.03 (0.82–1.30)	0.86 (0.60–1.24)	0.61	1.0	0.98 (0.73–1.31)	1.02 (0.76–1.38)	0.83
Depression (severe)								
Crude	1.0	1.11 (0.85–1.45)	1.45 (1.0–2.11)	0.05	1.0	1.13 (0.80–1.61)	1.63 (1.19–2.24)	0.001
Adjusted	1.0	0.90 (0.64–1.25)	0.84 (0.51–1.37)	0.42	1.0	1.20 (0.79–1.82)	1.17 (0.77–1.79)	0.50
Depression (borderline)								
Crude	1.0	1.15 (0.93–1.43)	0.97 (0.68–1.38)	0.59	1.0	0.90 (0.68–1.20)	1.08 (0.83–1.41)	0.48
Adjusted	1.0	1.14 (0.87–1.50)	0.89 (0.57–1.38)	0.99	1.0	0.85 (0.59–1.21)	0.94 (0.66–1.33)	0.79
Anxiety (borderline+severity)								
Crude	1.0	1.27 (1.01–1.59)	1.33 (0.94–1.87)	0.02	1.0	1.12 (0.81–1.54)	1.80 (1.36–2.38)	< 0.001
Adjusted	1.0	1.0 (0.75–1.33)	0.96 (0.62–1.49)	0.90	1.0	1.09 (0.74–1.61)	1.47 (1.01–2.14)	0.03
Anxiety (severe)								
Crude	1.0	1.27 (0.91–1.80)	1.66 (1.03–2.67)	0.02	1.0	1.42 (0.88–2.28)	1.99 (1.30–3.07)	0.001
Adjusted	1.0	1.03 (0.67–1.59)	1.12 (0.60–2.11)	0.72	1.0	1.56 (0.87–2.80)	1.86 (1.04–3.34)	0.04
Anxiety (borderline)								
Crude	1.0	1.29 (0.97–1.70)	1.14 (0.73–1.77)	0.19	1.0	0.94 (0.63–1.41)	1.66 (1.18–2.35)	0.002
Adjusted	1.0	0.99 (0.69–1.41)	0.89 (0.51–1.54)	0.73	1.0	0.84 (0.52–1.37)	1.27 (0.80–2.0)	0.21
Psychological distress								
Crude	1.0	0.98 (0.81–1.20)	1.13 (0.83–1.52)	0.56	1.0	1.06 (0.82–1.38)	1.31 (1.03–1.66)	0.02
Adjusted	1.0	0.94 (0.74–1.21)	0.84 (0.57–1.24)	0.39	1.0	1.15 (0.85–1.57)	1.17 (0.86–1.60)	0.33

[a]Severe anxiety and depression defined as Hospital Anxiety and Depression Scale score ≥ 11; 8–10 was considered as borderline'. Psychological distress was defined as General Health Questionnaire score ≥ 4.
[b]Normal weight (≤ 24.9 kg/m²), overweight (25.0–29.9 kg/ m²) and obesity (≥ 30.0 kg/m²).
[c]Normal (< 80 cm), abdominal obesity level 1 (80–87.99 cm), abdominal obesity level 2 (≥ 88 cm).
[d]Adjusted for age, marital status, education, smoking and physical activity.
BMI = body mass index; CI = confidence interval; OR = odds ratio; WC = waist circumference.

in either sex (*22*). Our results are in agreement with some findings (*27*) but in contrast with others (*28*). The negative association between severe depression and obesity in men has also been shown in some studies (*29*). These conflicting results might be explained by the different pattern of abdominal obesity among men and women in different countries and greater relationship between abdominal obesity and depression in women (*30*). The possible mechanisms through which abdominal obesity might affect depression, anxiety and high psychological distress are unknown. Poor self-esteem, unhealthy dietary habits (*31*), binge eating as well as decreased physical activity (*32*) in abdominally obese individuals might provide some reasons. Additionally, abdominal-obesity-related chronic conditions such as diabetes and cardiovascular disease might affect depression, anxiety and high psychological distress. These conditions can cause vascular damage and earlier studies have suggested that vascular damage in brain might predict depression (*33*). Abdominal obesity is related to higher inflammation. Increased concentrations of inflammatory biomarkers might also contribute to depression (*34*). Cortisol secretion (*35*) and sex-dependent steroid hormones (*36*) and their dysregulation occur in individuals with

abdominal obesity with depression, anxiety and high psychological distress. Both depression and anxiety are involved in the hypothalamic–pituitary–adrenocortical axis hyperactivity that could result in increased cortisol secretion.

Increased appetite and reduced physical activity are common symptoms of depression. Initiation or maintenance of exercise programmes or diet change can be affected by reduced motivation or self-efficacy associated with depression or anxiety. Depression or anxiety can enhance risk of weight gain by its impact on binge eating, particularly among women. Medications used to manage mood or anxiety disorders may also lead to weight gain. Some studies have suggested that obesity causes or contributes to depression or anxiety. The stigma attached to obesity (especially for women) may contribute to depression, and this stigma may vary by race/ethnicity or socioeconomic status. Physical activities decrease because of obesity or obesity-related chronic illnesses. Obesity may increase risk of depression and anxiety through distressing physical symptoms or involvement in rewarding or pleasurable activities. Finally, depression and obesity may be linked by environmental or biological factors (*4*).

Our study had several strengths. This was one of the most comprehensive studies with a large sample size in developing countries. The most prevalent psychological disorders including depression, anxiety and psychological distress were examined using validated questionnaires. Sex-stratified subanalysis allowed us to identify sex differences in the investigated associations. Moreover, the analyses were adjusted for several well-known confounding factors. There were also some limitations that could have affected our results. The cross-sectional nature of the study meant that causality could not be established. However, our validation study demonstrated that self-reported values of anthropometric indices could provide reasonably valid data. Questionnaire-based data were used for assessment of depression, anxiety and high psychological distress. Although these questionnaires were valid instruments to measure symptoms (*13*,*15*), they cannot be used as diagnostic tools for these psychological disorders. Confounding variables such eating disorders, use of psychiatric medications affecting weight, and pregnancy were not controlled in our study. Finally, the absence of data on socioeconomic status and its relation to obesity and mental status was another limitation.

In conclusion, this study revealed that abdominal obesity was associated with anxiety only among Iranian adult women. We were unable to find any evidence confirming the relationship between general obesity and depression, anxiety and high psychological distress in this population. Future research, particularly of a prospective nature, is warranted to confirm these findings.

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Relation entre obésité et dépression, anxiété et détresse psychologique parmi le personnel de santé iranien

Résumé

Contexte : Les troubles psychologiques associées à l'obésité constituent un facteur essentiel qui contribue à la morbidité et à la mortalité.

Objectifs : Évaluer le lien entre l'obésité générale et abdominale et la dépression et l'anxiété parmi le personnel de santé iranien.

Méthodes : La présente étude transversale a été menée dans le cadre de l'étude sur l'épidémiologie de la santé psychologique, alimentaire et nutritionnelle. Au total, 4361 membres du personnel de santé iranien ont été dépistés pour l'obésité générale et 3213 pour l'obésité abdominale. Le surpoids et l'obésité ont été définis respectivement en fonction d'un indice de masse corporelle de 25,0-29,9 et supérieur ou égal à 30,0 kg/m^2. L'obésité abdominale a été définie par un tour de taille supérieur ou égal à 88 cm pour les femmes et à 102 cm pour les hommes. Les versions iraniennes validées de l'échelle hospitalière d'anxiété et de dépression et du questionnaire général de santé ont été utilisées pour évaluer la dépression et l'anxiété.

Résultats : L'analyse stratifiée par sexe n'a révélé aucune relation significative entre l'obésité générale, la dépression et l'anxiété chez les hommes. Cependant, nous avons trouvé une association inverse entre obésité abdominale (tour de taille >102 cm) et dépression sévère chez les hommes. Chez les femmes, l'obésité abdominale était associée de manière significative à l'anxiété, avant et après la prise en compte des facteurs de confusion. Aucune association significative n'a été observée entre l'obésité abdominale et la détresse psychologique dans les deux sexes après contrôle des facteurs de confusion potentiels.

Conclusions : L'obésité abdominale était associée à l'anxiété chez les femmes adultes iraniennes, mais pas chez les hommes. Par ailleurs, des études prospectives sont nécessaires pour confirmer ces résultats.

العلاقة بين السمنة والاكتئاب والقلق والضائقة النفسية بين العاملين الإيرانيين في مجال الرعاية الصحية

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الخلاصة:

الخلفية: تُعتبر الاضطرابات النفسية مثل السمنة من العوامل الرئيسية التي تُسهم في حدوث المراضة والوفيات.

الأهداف: هدفت هذه الدراسة إلى تقييم العلاقة بين السمنة العامة وسمنة البطن وبين الاكتئاب والقلق لدى العاملين الإيرانيين في مجال الرعاية الصحية.

طرق البحث: أُجريت هذه الدراسة المقطعية كجزء من دراسة حول وبائيات الصحة التغذوية النفسية والتغذية. وبلغ مجموع العاملين الإيرانيين في مجال الرعاية الصحية الذين خضعوا لتحليل السمنة العامة والسمنة المركزية 4361 و3213 شخصاً، على التوالي. وعُرّفت زيادة الوزن والسمنة بأنهما منسب كتلة الجسم الذي يبلغ 25.0–29.9 و≤ 30.0 كجم/ م^2، على التوالي. وعُرّفت سمنة البطن على أنها محيط الوسط ≤ 88 سم للنساء، و≤ 102 للرجال. واستُخدمت النسختان الإيرانيتان المُصادق عليهما لمقياس المستشفيات للقلق والاكتئاب والاستبيان الصحي العام لتقييم الاكتئاب والقلق.

النتائج: كشف التحليل الطبقي حسب نوع الجنس عن عدم وجود علاقة وطيدة بين السمنة العامة، والاكتئاب، والقلق بين الرجال. ولكننا وجدنا ارتباطاً عكسياً بين سمنة البطن (محيط الوسط > 102 سم) والاكتئاب الحاد بين الرجال. وفي النساء، ارتبطت سمنة البطن ارتباطاً كبيراً بالقلق، قبل وبعد أخذ عوامل الإرباك في الاعتبار. ولم تُلاحظ علاقة وطيدة بين سمنة البطن والضائقة النفسية في أي من الجنسين بعد السيطرة على عوامل الإرباك المُحتملة.

الاستنتاجات: ارتبطت سمنة البطن بمشاعر القلق في النساء البالغات الإيرانيات ولكن ليس الرجال. كما يلزم إجراء دراسات استباقية خاصة لتأكيد هذه النتائج.

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Does knowing about the long-term health effects of alcohol matter? Evidence from a university sample in Lebanon

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Abstract

Background: Research linking awareness of health effects of alcohol and harmful alcohol drinking status is limited.

Aims: To investigate the association between awareness of long-term alcohol effects and alcohol use disorders.

Methods: University students aged 18–25 years (n = 1155) completed a self-filled survey. Participants were asked if they knew that alcohol causes: (1) problems in the liver; (2) cancers of the mouth, throat, oesophagus and breast; (3) damage to the heart; and (4) weakening of the immune system. Multinomial regression analyses were conducted to assess the association between awareness of long-term alcohol effects and alcohol drinking status, including Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) alcohol use disorders.

Results: One third (32.8%) were past-year drinkers and 18% screened positive for DSM-5 alcohol use disorders. Compared to past-year drinkers with no alcohol use disorders, non-past-year ever drinkers were twice as likely to know about the link between alcohol and cancers of the mouth, throat, oesophagus and breast. Past-year drinkers with an alcohol use disorders were less likely to know about this association. Non-past-year ever drinkers (vs past-year drinkers with no alcohol use disorders) were also 2.6 times more likely to know the alcohol liver risks.

Conclusions: There is a strong inverse relationship between awareness of the effects of alcohol and harmful consumption among young people, providing preliminary support for the protective nature of knowledge on alcohol drinking status. Efforts to increase public awareness of the long-term health effects of alcohol may be useful in reducing alcohol-related harm.

Keywords: alcohol consumption, alcohol use disorders, college students, cancer, health awareness

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Introduction

Globally, alcohol consumption is one of the leading risk factors for death and disability (1). Drinking habits that are formed in young adulthood – a period marked by increased susceptibility to development of addiction and alcohol dependence (2) – are likely to be maintained in adulthood (3). Research data from the United States of America show that alcohol use disorders (AUDs) are most prevalent in young adults aged 18–29 years (4). A meta-analysis has shown that, compared to the general population, people with a diagnosed AUD are 10 times more likely to die from liver cirrhosis as well as mental disorders, which encompass both alcoholism and other mental comorbidity (5).

Despite the overwhelming evidence of the detrimental effects of alcohol on health, public knowledge and awareness of the harmful consequences of alcohol consumption remain low, with around half of adults only aware of some link between alcohol and negative health consequences (6–8). This is especially true for long-term health effects like cancer (9). A recent study found that most Australian adults associated alcohol use with liver cirrhosis and cancer, but only a small proportion associated it with other long-term health effects like heart disease, stroke and cancers of the mouth, throat and breast (10). Studies linking awareness of risk with corresponding alcohol consumption have been limited, with mixed results. One cross-sectional study from England in adults aged ≥ 18 years showed that level of awareness of cancer risk of alcohol was not associated with their risk of AUD, as screened by the Alcohol Use Disorders Test short form (AUDIT-C) (7). Specifically, identifying as no- or low-risk (score < 5) versus high-risk (score ≥ 5) drinkers was not related to cancer awareness, as measured by responses to unprompted questions about health effects of alcohol, as well as identification of cancer types from a list of alcohol-related cancers. However, a study from Australia investigated participant knowledge of various risk factors for cancer, including alcohol use, and found that identification of alcohol use as a moderate/large risk factor for cancer was associated

with lower-risk drinking, as measured by the AUDIT-C (*11*). One longitudinal study found that the development of risk perceptions, measured by asking participants how dangerous the consumption of a substance is to the general population, seemed to influence future use of alcohol, tobacco and cannabis in young people (*12*). This reinforces an earlier study showing that alcohol knowledge, including perceived prevalence and health information related to alcohol consumption, had a negative effect on later alcohol consumption in adolescents (*13*). Thus, while some studies point to a significant association between knowledge of the health consequences of alcohol and drinking patterns (*11–13*), others have found no such effect (*7*). These differences are not because the studies on public awareness of the harmful effects of alcohol used different forms of measurement, with most of the studies using only one or two questions to measure this knowledge (*6,14*).

Besides the mixed results, and the measurement issue, the overwhelming evidence on this topic remains predominantly drawn from western countries, focusing mainly on adults (*6–9,11*). Research data from other parts of the world, particularly Arab countries, remain limited (*15*). Studies from Lebanon have highlighted the common and increasing practice of alcohol consumption among adolescents (*16*). One study reported a 40% increase in the percentage of past-30-day alcohol drinkers among middle-school students between 2005 and 2011, with > 80% of the lifetime drinkers having tried their first alcoholic drink before the age of 14 years (*16*). In Lebanon, alcohol is widely accessible, particularly around schools and universities (*17*), and alcohol policies remain absent or poorly enforced (*15*). Studies investigating risk and protective factors of alcohol consumption in young people in Lebanon date back to 1999 (*18*). More recent discussions with young people have highlighted that alcohol availability and accessibility, social learning from peers and family, and social control have a critical impact on alcohol consumption (*19*).

The present study extends current research on alcohol consumption in college students in general, and Lebanon in particular. By using a robust measure of health awareness, we investigated the association between awareness of long-term alcohol effects and alcohol drinking status, as defined by the Diagnostic and Statistical Manual of mental disorders, 5th edition (DSM-5) (*20*). Consistent with research on knowledge of alcohol effects and related outcomes (*13*), we hypothesized that we would observe a negative association between awareness of long-term alcohol effects and AUDs.

Methods

Study design and participants

A sample of 1155 university students aged 18–25 years was conveniently recruited from 6 public and private universities in Lebanon between April and May 2016. The study followed a cross-sectional survey design. Universities were selected to ensure inclusion of large academic institutions, located in various areas of the country, with varying educational approaches based on 3 languages of instruction (Arabic, French or English), and distinct socioeconomic compositions based on yearly tuition fees. Students were approached by trained field workers on and off campus, including surrounding outlets frequented by students. The study had a good response rate (83.1%) and ethical approval was obtained from the American University of Beirut Institutional Review Board. The data are part of a larger research initiative aimed at gathering evidence to inform a national alcohol policy for Lebanon.

Survey

Students completed a self-filled survey that was initially developed in English, translated into Arabic, and then back translated into English. Students chose to complete the survey in their language of preference. The survey consisted of several questions that measured participants' alcohol consumption, awareness of long-term alcohol effects, as well policy-relevant covariates on perceived alcohol availability, affordability and advertising. Participants who gave oral informed consent completed the survey via pencil and paper.

Measures

Awareness of long-term alcohol effects (explanatory variable)

Participating students were asked if they, based on what they know or believe, thought that drinking too much (whether on a single occasion or over time) causes: 1- problems in the liver (fatty liver, alcoholic hepatitis, and cirrhosis); 2- cancers of the mouth, throat, oesophagus and breast; 3- damage to the heart causing irregular heartbeats, stroke or hypertension; and 4- weakening of the immune system. Responses were dichotomous (yes: correct, and no: incorrect); a "don't know" response was treated as an incorrect answer given that study findings were intended to inform awareness-raising approaches.

Alcohol drinking status (outcome variable)

Past-year drinkers (students who had consumed at least 1 drink in the preceding year) were asked a set of questions to screen for DSM-5 defined AUD (*20*). By answering these questions, they were given an AUD score ranging from 0 to 11, and presence of at least 2 of these symptoms indicated an AUD. Our outcome variable was alcohol drinking status, a categorical measure including: 1- abstainers (never tried alcohol); 2- non-past-year drinkers (tried alcohol but did not drink in the past year); 3- past-year drinkers with no AUD (drank in the past year but did not meet DSM-5 criteria for an AUD); and 4- past-year drinkers with an AUD (drank in the past year and met DSM-5 criteria for an AUD).

Demographic characteristics and other covariates (potential confounders)

Demographics assessed included sex, age (older or younger than 21 years), and level of education (bachelor's degree or higher). Demographics and other covariates were controlled for in our adjusted models. Given the well-established literature on smoking and its associa-

tion with alcohol consumption (*21,22*) and AUDs among young people (*23*), tobacco use was considered. Two variables were combined to measure tobacco use: cigarette use, defined as having smoked ≥ 1 cigarettes per day in the last 12 months (yes, no); and waterpipe use, defined as having smoked 1 waterpipe per week in the last 12 months (yes, no). Waterpipe use is a popular alternative tobacco product among young people in the region (*24–26*). Interpersonal factors, like peer/friend approval of drinking, can also influence substance use in adolescents and young adults (*27,28*). We included the variable perceived friend approval, which was measured by asking to what extent respondents' close friends approved or disapproved of them drinking alcohol. Additionally, exposure to alcohol advertising within the 12 months preceding the survey was recorded, specifically "don't drink and drive" messages on television, radio, social media, billboards, or text messages. Given that the sample consisted of students attending 7 campuses and representing 6 private and public universities in Lebanon, university affiliation was adjusted for in statistical analyses.

Statistical analysis

Statistical analysis was conducted using Stata version 13.0. First, descriptive statistics of the sample were generated for all variables, followed by bivariate analyses of the awareness measures with alcohol drinking status and relevant covariates using Pearson's c^2 statistics and their associated P value. Aligned with the directionality of associations from previous research (*13*), we considered the outcome of this study to be alcohol drinking status and the main explanatory variable to be awareness of effects of alcohol. Multinomial logit analysis was conducted to examine the direction and magnitude of the crude unadjusted associations of awareness of alcohol drinking status (Model 1), and adjusted associations controlling for potential confounders (Models 2 and 3). Model 2 adjusted for age, sex and university affiliation only. Model 3 adjusted for age, sex, university affiliation, level of education, past-year tobacco use, perceived friend approval, and exposure to alcohol advertising. Past-year drinkers without an AUD were assigned as the reference category in all models. All models accounted for clustering at the level of the university to generate more robust standard error estimates. Adjusted and unadjusted odds ratios with 95% confidence intervals (CIs) of awareness of long-term alcohol effects on the outcome of alcohol drinking status are presented in Table 2, but only adjusted estimates were interpreted.

Table 1 Sample characteristics (n = 1155)

Characteristic	Total	Drinker type				
		Abstainers	non-PY drinkers	PY no AUD	PY AUD	χ^2 *P* value
	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	
Age						
< 21	45.28 (523)	58.94 (234)	45.45 (80)	32.45 (123)	42.36 (86)	< 0.001
≥ 21	54.72 (632)	41.06 (163)	54.55 (96)	67.55 (256)	57.64 (117)	
Sex						
Female	49.61 (573)	61.21 (243)	48.86 (86)	44.33 (168)	37.44 (76)	< 0.001
Male	50.39 (582)	38.79 (154)	51.14 (90)	55.67 (211)	62.56 (127)	
Education level						
Bachelor's degree	79.05 (913)	84.13 (334)	73.86 (130)	73.88 (280)	83.25 (169)	0.001
Higher degree	20.95 (242)	15.87 (63)	26.14 (46)	26.12 (99)	16.75 (34)	
Past-year tobacco use						
No	36.10 (417)	57.79 (241)	16.79 (70)	18.71 (78)	6.71 (28)	< 0.001
Yes	63.90 (738)	21.14 (156)	14.36 (106)	40.79 (301)	23.71 (175)	
Perceived friend approval						
Disapprove	28.40 (328)	52.90 (210)	31.82 (56)	6.33 (24)	18.72 (38)	< 0.001
Somewhat approve	48.48 (560)	43.8 (251)	39.29 (156)	53.98 (95)	28.57 (58)	
Strongly approve	14.03 (162)	3.39 (13)	5.99 (23)	64.91 (246)	50.25 (102)	
Don't know	2.68 (31)	4.53 (18)	1.14 (2)	1.58 (6)	2.46 (5)	
Exposure to drunk driving messages						
No	24.33 (281)	15.37 (61)	23.30 (41)	32.98 (125)	26.60 (54)	< 0.001
Yes	64.59 (746)	70.03 (278)	62.50 (110)	58.05 (220)	67.98 (138)	
Don't remember	11.08 (128)	45.31 (58)	19.53 (25)	26.56 (34)	8.59 (11)	

Percentages have been rounded to 1 decimal place and may not total 100.
AUD = alcohol use disorder; PY = past-year.

Table 2 Multinomial logit estimates of ORs for drinker type by awareness of links between drinking and long-term health effects

Awareness of effects of alcohol on	Alcohol drinking status									
	Model 1				Model 2				Model 3	
	OR (95% CI) Abstainers	OR (95% CI) non-PY drinkers	OR PY no AUD	OR (95% CI) PY AUD	OR (95% CI) Abstainers	OR (95% CI) non-PY drinkers	OR PY no AUD	OR (95% CI) PY AUD	OR (95% CI) Abstainers	OR (95% CI) non-PY drinkers	OR PY no AUD	OR (95% CI) PY AUD
Liver problems												
No/Don't know			ref				ref				ref	
Yes	1.11 (0.38–3.24)	1.67 (0.74–3.75)	1.0	0.67 (0.28–1.58)	1.37 (0.43–4.41)	1.80 (0.80–4.08)	1.0	0.66 (0.28–1.52)	2.07 (0.76–5.65)	2.61 (1.33–5.15)*	1.0	0.74 (0.43–1.26)
Cancer of mouth, throat, oesophagus, and breast												
No/Don't know			ref				ref				ref	
Yes	1.80 (0.68–4.71)	2.35 (1.26–4.38)*	1.0	0.46 (0.24–0.89)*	1.96 (0.76–5.0)	2.45 (1.28–4.70)*	1.0	0.45 (0.23–0.90)*	1.45 (0.74–2.85)	2.09 (1.21–3.61)*	1.0	0.47 (0.27–0.83)*
Damage to the heart												
No/Don't know			ref				ref				ref	
Yes	3.19 (1.80–5.66)**	2.93 (1.62–5.31)**	1.0	1.48 (0.76–2.87)	3.38 (1.91–5.98)**	3.01 (1.67–5.43)**	1.0	1.43 (0.74–2.78)	2.26 (1.11–4.62)*	2.17 (1.26–3.75)*	1.0	1.10 (0.72–1.69)
Weakened immune system												
No/Don't know			ref				ref				ref	
Yes	2.75 (1.03, 7.31)*	1.86 (0.97–3.57)	1.0	0.85 (0.38–1.92)	3.00 (1.16–7.71)*	1.92 (1.0–3.68)*	1.0	0.82 (0.37–1.81)	1.31 (0.64–2.67)	1.25 (0.73–2.17)	1.0	0.90 (0.51–1.58)

*AUD = alcohol use disorder; CI = confidence interval; OR = odds ratio; PY = past-year; ref = reference group, *P ≤ 0.05, **P ≤ 0.001. Model 1 = Unadjusted model, Model 2 = Adjusted for age, sex, level of education, and university affiliation Model 3 = Adjusted for age, sex, level of education, university affiliation, past-year tobacco use, perceived friend approval, and exposure to alcohol advertising.*

Results

Sample description

Out of the total 1155 students, 397 (34.4%) were abstainers (never tried alcohol), 176 (15.2%) were non-past-year drinkers (tried alcohol but did not drink in the past year), 379 (32.8%) were past-year drinkers with no AUD (drank in the past year but did not meet DSM-5 criteria for AUD), and 203 (17.6%) were past-year drinkers with a DSM-5-defined AUD (Table 1). Among past-year drinkers with AUDs, data further revealed that they were distributed as follows: 118 (58.1%) with mild AUD, 42 (20.7%) with moderate AUD and 43 (21.2%) with severe AUD.

Sample demographic characteristics are described in Table 1. Of the 1155 students, 582 (50.4%) were male and 632 (54.7%) were aged ≥ 21 years (range 18–25, standard deviation = 1.84). Most participants were pursuing a Bachelor's degree (I = 913; 79.1%) and most smoked tobacco in the past year (cigarettes or waterpipe) (I = 738; 63.9%). Most students were aware that drinking too much causes problems in the liver (fatty liver, alcoholic hepatitis, or cirrhosis) (*n* = 947; 82.0%; data not shown). Fewer students were aware that alcohol consumption can cause damage to the heart, resulting in irregular heartbeat, stroke or hypertension (n = 888; 76.8%; data not shown), or weaken the immune system (*n* = 802; 69.4%; data not shown), or cause cancers of the mouth, throat, oesophagus and breast (*n* = 715; 61.9%; data not shown).

Table 1 also summarizes the bivariate association between alcohol consumption (i.e., drinker types) and demographic data described in the above paragraph, and all the associations were significant. Past-year drinkers with DSM-5 AUDs were more likely to be aged ≥ 21 years, male, completing a BA (vs higher degree), past-year tobacco users, have peers who strongly approved of their drinking, and reported exposure to drink-driving messages.

Association between awareness of long-term alcohol effects and alcohol consumption: multinomial logit regression models

Table 2 presents the unadjusted results (Model 1), adjusted results controlling for age, sex and university affiliation (Model 2), and adjusted results controlling for all the sociodemographic characteristics presented in Table 1 in addition to university affiliation. Abstainers, non-past-year drinkers, and past-year drinkers with an AUD were compared with the reference group of past-year drinkers without an AUD. Only results of

Model 3 are presented are interpreted since the 3 models generated similar findings.

Awareness of each of the 4 long-term alcohol effects varied in their association with the outcome of AUD (Table 2). Non-past-year ever drinkers were 2.6 times more likely to know that alcohol consumption was a risk factor for liver problems. Compared with past-year drinkers with no AUD, non-past-year ever drinkers were twice as likely to know about the link between alcohol and cancer of the mouth, throat, oesophagus and breast, while past-year drinkers with an AUD were about 53% less likely to know about this link. Additionally, abstainers and non-past-year ever drinkers were about twice more likely to know that alcohol can cause damage to the heart, as compared with past-year drinkers with no AUD. Awareness of the links between alcohol consumption and weakening of the immune system was not significantly associated with the outcome of alcohol consumption.

Discussion

In the present study, more than a quarter of the sample were unaware of some link between alcohol consumption and long-term health effects. Our results show that increased awareness of long-term alcohol effects was associated with a decreased likelihood of having AUDs, and that this is dependent on the type of long-term health consequence of which one is aware.

Contrary to a previous study that reported no association between knowledge of the effects of alcohol and actual consumption (*7*), we found an association between knowledge of alcohol-attributable cancer and drinker type – in some cases linked to diagnosable AUD. We found that non-past-year ever drinkers were more likely to know that alcohol could cause cancer of the mouth, throat, oesophagus and breast. Yet, past-year drinkers with a diagnosable AUD, compared with those without an AUD, were less likely to know about the association of alcohol with these cancers. In terms of the link between alcohol and damage to the heart, students who were abstainers or non-past-year ever drinkers were more likely to know about this long-term health effect than were past-year drinkers without an AUD. No associations were observed for drinker type and awareness of alcohol as causing weakening of the immune system. These results were significant even after controlling for a number of potential confounders including age, sex, level of education, past-year tobacco use, perceived friend approval, and exposure to alcohol advertising. Altogether, our results were in the predicted direction, confirming that increasing awareness of specific types of long-term alcohol effects may decrease harmful alcohol use in young adults.

Our approach adds several aspects to previous studies. First, we used multiple measures to capture awareness of long-term effects associated with alcohol consumption, which was not considered in previous studies (*6*,*14*,*30*). Second, we examined the effects of this measure on a clinically useful variable of alcohol abuse, past-year DSM-5-defined AUDs (*20*). Previous studies have either examined a link between knowledge and frequency of alcohol consumption (*8*) or knowledge and high- or low-risk drinking (*7*,*11*). Additionally, this research was conducted in a middle-income country, where literature on this topic is particularly lacking, and where relative morbidity and mortality risks associated with alcohol consumption are particularly high (*31*). The current study provides initial support for the potential effectiveness of awareness campaigns that focus on the links between alcohol and specific long-term health effects. For instance, our findings support the use of health warning labels on retailed beverages in an effort to control alcohol consumption (*9*). For such interventions to have a large impact on society they should be included as components of a comprehensive programme, including evidence-based alcohol control policies (*32*).

Our findings must be interpreted in light of a few study limitations. First, due to the cross-sectional nature of the data, we cannot assume temporal causality between awareness of long-term alcohol effects and alcohol drinking status. However, previous cross-sectional and longitudinal research has demonstrated a link between knowledge of alcohol effects on drinking patterns (*11*–*13*). Second, we relied on self-reported questionnaires for alcohol consumption outcomes, which may have biased the responses, but this method has generally been found to be valid in measuring alcohol consumption (*33*). Third, although the current study included multiple potential confounders in the analysis, there may be others that were not addressed and that could have affected the results, such as religiosity (*34*). Fourth, we measured the association of health awareness with alcohol consumption and acknowledge the theoretical and research literature that notes the limited evidence of a direct association between knowledge and behaviour (*13*,*35*). However, given the understanding of the necessity of awareness, ahead of change in attitudes, as well as the contradictory results found in linking awareness of long-term alcohol effects to alcohol consumption in previous research, we sought to contribute to the literature in this area. Fifth, a limitation of the main exposure variable is that all items assessing awareness of long-term alcohol effects were in the negative, where the correct answer was that alcohol is a risk factor for all suggested health effects. To measure true awareness of long-term effects of alcohol, a more thorough design will be needed where questions about long-term health outcomes that have not been linked to alcohol consumption (e.g., skin disease) are included. Lastly, despite the heterogeneity of the sample consisting of various public and private universities, convenience sampling impedes the ability to generalize the results (mainly the proportions) to all Lebanese college students. Future studies should examine the potentially moderating role of sex, and the mediating role of risk perceptions when investigating the association between awareness of distinct types of long-term effects of alcohol and direct measures of alcohol consumption behaviour.

Conclusion

Young adulthood is a significant opportunity to address harmful alcohol consumption, which is a largely preventable cause of cancer and other long-term health conditions. Our study conclusions have direct implications for harm-reduction strategies aimed at controlling alcohol consumption in this population. By increasing awareness of long-term effects of alcohol such as cancer of the mouth, throat, oesophagus and breast among young adults, interventions could mitigate alcohol-related harm in the short term and may prevent adverse health consequences in adulthood and later stages of life.

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La connaissance des effets à long terme de l'alcool sur la santé est-elle importante ? Données d'un échantillon d'université au Liban

Résumé

Contexte : Les recherches établissant un lien entre la sensibilisation aux effets de l'alcool sur la santé et l'usage nocif de l'alcool sont limitées.

Objectifs : Étudier le lien entre la sensibilisation aux effets à long terme de l'alcool et les troubles liés à l'usage nocif de l'alcool.

Méthodes : Des étudiants universitaires âgés de 18 à 25 ans (n = 1155) ont répondu à une auto-enquête. Il a été demandé aux participants s'ils savaient que l'alcool pouvait provoquer les affections suivantes : 1) problèmes au niveau du foie ; 2) cancers de la bouche, de la gorge, de l'œsophage et du sein ; 3) lésions cardiaques ; et 4) affaiblissement du système immunitaire. Des analyses de régression multinomiale ont été menées pour évaluer l'association entre la connaissance des effets à long terme de l'alcool et le statut de consommation d'alcool, tels qu'ils sont définis dans la section sur les troubles liés à l'usage nocif de l'alcool du Manuel diagnostique et statistique des troubles mentaux, cinquième édition (DSM-5).

Résultats : Un tiers des répondants (32,8 %) étaient des consommateurs d'alcool au cours de l'année écoulée et 18 % ont été dépistés positifs pour des troubles liés à l'usage nocif de l'alcool selon le Manuel susmentionné. Par rapport aux consommateurs de l'année précédente n'ayant pas de troubles liés à l'usage nocif de l'alcool, les non-consommateurs de l'année précédente étaient deux fois plus susceptibles de connaître le lien entre l'alcool et les cancers de la bouche, de la gorge, de l'œsophage et du sein. Les consommateurs de l'année précédente souffrant de troubles liés à l'usage nocif de l'alcool étaient moins susceptibles de connaître cette association. Les non-consommateurs susmentionnés (par rapport aux consommateurs de l'année précédente n'ayant pas de troubles liés à l'usage nocif de l'alcool) étaient également 2,6 fois plus susceptibles de connaître les risques hépatiques liés à l'alcool.

Conclusions : Il existe une forte relation inverse entre la connaissance des effets de l'alcool et l'usage nocif chez les jeunes, ce qui apporte un soutien préliminaire à la nature protectrice des connaissances sur le statut de la consommation d'alcool. Il pourrait être utile de sensibiliser davantage le public aux effets à long terme de l'alcool sur la santé pour éduire les méfaits de ce produit.

هل من المهم معرفة الآثار الصحية لتعاطي الكحول على المدى الطويل؟ البراهين من عينة جامعية في لبنان

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الخلاصة:

الخلفية: لا يوجد كثير من البحوث التي تربط بين الوعي بالآثار الصحية لتعاطي الكحول وحالة تعاطي الكحول على نحو ضار.

الأهداف: هدفت هذه الدراسة إلى تحري العلاقة بين الوعي بالآثار الصحية لتعاطي الكحول على المدى الطويل واضطرابات تعاطي الكحول.

طرق البحث: قام طلاب جامعيون تتراوح أعمارهم بين 18–25 عاماً (العدد = 1155) باستكمال مسح يُمْلَأ ذاتياً. وقد سُئل المشاركون عما إذا كانوا يعرفون أن الكحول يُسبب: (1) مشاكل في الكبد؛ و(2) أمراض سرطان الفم، والحلق، والمرئ، والثدي؛ و(3) تلف القلب؛ و(4) إضعاف جهاز المناعة. وقد أُجريت تحليلات الانحدار المتعددة الحدود لتقييم العلاقة بين الوعي بآثار تعاطي الكحول على المدى الطويل وحالة تعاطي الكحول، ومنها الدليل التشخيصي والإحصائي للاضطرابات النفسية، الطبعة الخامسة (اضطرابات تعاطي الكحول).

النتائج: تبين أن ثلث الطلاب (32.8٪) كانوا يتعاطون الكحول العام الماضي، وأظهر فحصهم أن 18٪ منهم كان إيجابياً لاضطرابات تعاطي الكحول وفقاً للدليل التشخيصي والإحصائي للاضطرابات النفسية، الطبعة الخامسة. ومقارنةً بمتعاطي الكحول العام الماضي دون التعرض لاضطرابات تعاطي الكحول، يزيد بمقدار الضعف احتمال معرفة الأشخاص الذين لم يتعاطوا كحولاً على الإطلاق العام الماضي بالعلاقة بين

تعاطي الكحول وأمراض سرطان الفم والحلق والمريء والثدي. ولم يكن من المُرجح أن يعرف هذه العلاقة الأشخاص الذين تعاطوا الكحول العام الماضي وعانوا من اضطرابات تعاطي الكحول. وزادت احتمالية أن يعرف الأشخاص الذين لم يتعاطوا كحولاً على الإطلاق العام الماضي مخاطر الكحول على الكبد بمعدل 2.6 مرة (مقارنة بالأشخاص الذين تعاطوا الكحول العام الماضي ولم يعانوا من اضطرابات تعاطي الكحول).

الاستنتاجات: توجد علاقة عكسية قوية بين الوعي بآثار الكحول واستهلاك الكحول على نحو ضار في صفوف الشباب، مما يُشكل دعماً أولياً لطبيعة المعرفة الوقائية بشأن حالة تعاطي الكحول. وقد تساعد الجهود المبذولة لزيادة الوعي بالآثار الصحية لتعاطي الكحول على المدى الطويل في الحد من الآثار الضارة المرتبطة بالكحول.

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Impact of household food insecurity on maternal mental health in Egypt

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Abstract

Background: Food insecurity leads to disturbed eating patterns, hunger or poor nutrition and is strongly correlated with poor mental health.

Aims: To determine the impact of household food insecurity on maternal mental health in a rural population in Egypt.

Methods: This community-based cross-sectional study was conducted in Qulubba Village in Minia Governorate. We interviewed 497 mothers with at least one child, using the Household Food Insecurity Access Scale and Hopkins Symptom Check List-25.

Results: Nearly 70% of women resided in food-insecure households. Symptoms of anxiety and depression were significantly more common among food-insecure mothers. By logistic regression analysis, household food insecurity, socioeconomic status, husband working abroad and number of children were significant predictors of maternal distress. Mothers with severe food insecurity were approximately 13 times more likely to experience mental distress than were food secure-mothers.

Conclusions: Household food insecurity was associated with an increased likelihood of poor maternal mental health. The study highlights the need for policies to decrease poverty and programmes for screening and addressing food insecurity. Integrating mental health into programmes addressing food insecurity and providing counselling are recommended.

Keywords: food insecurity, hunger, mental health, mothers, rural area.

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Introduction

Food insecurity is "when people lack secure access to sufficient amounts of safe nutritious food for normal growth and development, and an active meanwhile, healthy life" (*1*). Most recent estimates suggest that nearly 11% of the global population continues to lack sufficient food to live active and healthy lives (*2*).

The health consequences of food insecurity go beyond malnutrition. Food insecurity is indicated as a cause of uncertainty in the household, leading to feelings of stress that in turn lead to symptoms of anxiety and depression which may be related to nutritional deficiency or unhealthy behaviour (*3*). Acquiring foods in socially unacceptable ways may induce feelings of alienation, powerlessness, or shame about one's position on the social hierarchy, and may lead to increased mental health problems and maladaptive behaviour (*4,5*).

The problem of food insecurity in Egypt is becoming increasingly challenging as a result of the numerous internal and external pressures that have accumulated over the years (*6*). In 2016, Egypt suffered from floating the Egyptian currency and a decline in customers' purchasing power as a result of inflation (*7*). In spite of sharp increases in food prices over the past few years due to the economic recession, there has been no assessment of household food insecurity and its impact on maternal mental health in Egypt. Mothers have borne the responsibility of providing care for their children, after floating of the Egyptian currency.

The objective of this study was to determine the impact of household food insecurity on maternal mental health in a rural population in Qulubba, Minia in Egypt.

Methods

Study design

This was a community-based cross-sectional study in a rural area in Qulubba Village, Minia Governorate, Upper Egypt during November 2017 to March 2018. A total of 497 mothers with at least one child were included in the study. Selecting an appropriate checklist for this study was done through EQUATOR (https://www.equator-network.org). The STROBE checklist was used for reporting the study (*8*). A random sampling method was used to select one of the nine districts of Minia Governorate, and one village was chosen randomly, taking into account that the district had homogeneous characteristics. We used random sampling to select households, which were

the primary sampling unit. The village was divided into 4 sectors around a prominent landmark in the village (Rural Health Unit). From each sector, every other household was selected until the required number of households were visited (129 from 2 sectors and 130 from the other 2 sectors) moving from sector to sector. When there was more than 1 household in a building or compound, a number was assigned to each household and one was chosen randomly. If a household did not meet the eligibility criteria, an adjacent house was taken until we reached the targeted sample size.

Study sample

A sample size of 518 households was determined to provide 97% power at the level of 5% significance, considering the prevalence of poverty in rural Upper Egypt as an indirect indicator of food insecurity (49.4%) (*9*), using EPI-INFO 7.2.2.6, and after adding 10% to guard against nonresponse. We successfully recruited 497 households and the response rate was 95.9%.

Data collection

Data were collected using a structured questionnaire. Each participant was interviewed during a home visit, the aim of the study was explained, and the answers to the questionnaire were filled in by the researcher. Each interview took ~25 minutes. The questionnaire included the following measures.

Socioeconomic status (SES) was calculated according to El-Gilany et al. (*10*), who used a modification of the old scoring system of Fahmy and El-Sherbini (*11*). SES was classified as very low (score < 35), low (35–41), middle (42–47) and high (≥ 48), depending on the quartiles of the calculated score rather than a fixed point. The Household Food Insecurity Access Scale (HFIAS) was used to evaluate the food insecurity of participants' families. HFIAS was developed by The US Agency for International Development (USAID) and funded by the Food and Nutrition Technical Assistance (FANTA) Project (*12*). The Arabic version of HFIAS was tested for validity in Lebanon and was found to be a valid and reliable tool to assess HFI (*13*). HFIAS consists of 9 questions. The score is a continuous measure of the degree of HFI in the past 30 days. The higher the score, the higher the HFI. HFIAS categorizes households into 4 levels of HFI: food secure, and mild, moderately and severely food insecure (*12*). The Hopkins Symptom Checklist-25 (HSCL-25) is derived from the 90-item Symptom Checklist and measures mental health (*14*). It is a screening tool designed to detect symptoms of anxiety and depression in the preceding month. It is composed of a 10-item subscale for anxiety and a 15-item subscale for depression, with each item scored on a Likert scale from 1 (not at all) to 4 (extremely). A summary score is calculated by adding all scores and dividing by the number of items. Scores above the cut-off of 1.75 indicate clinically significant distress.

Statistical analysis

Participants with missing information for key variables were excluded from the analysis. SPSS version 20 (SPSS Inc., Chicago, IL, USA) was used for data entry and analysis. Quantitative data are presented as mean and standard deviation, and qualitative data as frequency distribution. The normality of data was assessed using the Kolmogorov–Smirnov test. The relation of each variable to outcome categories was separately tested by the χ^2 or Fisher's exact test for categorical variables, and *t* test or Mann–Whitney for continuous variables. Multivariate binary logistic regression analysis was also undertaken. $P < 0.05$ was considered to indicate statistical significance.

Compliance with ethical standards

The Community Department and Minia Faculty of Medicine approved this study. All data for the women included in the study were kept confidential. All women included in the study were given a code number before data were entered into the computer system, and this procedure was undertaken by the researchers. Full written, informed consent was obtained from all participants.

Results

The total sample included 497 women from randomly selected households. The mean HFIAS score was 7.9 (6.5) with a range of 0–25. Among the studied households, 30.4% were food secure, while 69.6% were classified as food insecure: 14.3%, 38% and 17.3% reported mild, moderate and sever food insecurity, respectively.

Nearly 75% of studied mothers lived in nuclear families (Table 1). The average family size was 5.96 (2.58) and the mean crowding index was 2.1 (0.9). The number of children cared for by mothers was 2.97 (1.28). The mean household size and crowding index were higher in food-insecure than food-secure families and the difference was significant ($P = 0.003$ and < 0.001, respectively). The number of families receiving government support was higher among food-insecure (16.2%) than food-secure (7.9%) families ($P = 0.014$).

A significant association was found between household income and food insecurity. Among food-secure households, 66.3% were able to save money and 1.3% were in debt ($P < 0.001$). Among food-insecure households, 21.4% were able to save money and 15% were in debt ($P < 0.001$). There was no significant difference between food-secure and food-insecure groups regarding family type, number of children, and ration card and livestock possession.

The average age of the mothers was 29.1 (5.5) years (Table 2). Nearly 28% of mothers and 19.7% of husbands in food-insecure households were illiterate compared to 12.6% and 6%, respectively, in food-secure households ($P < 0.001$). University graduates and postgraduates accounted for 19.2% of mothers and 29.1% of husbands in food-secure households, which were higher than 2.6% and 5.8%, respectively, in food-insecure households ($P < 0.001$). Nearly 20% of food-secure mothers were

Table 1 Distribution of household characteristics by food security status of 497 households, rural Minia

Household characteristics	Total (*n* = 497)	Food secure (*n* = 151)	Food insecure[a] (*n* = 346)	
	Mean (SD) (range)	Mean (SD) (range)	Mean (SD) (range)	*t* test *P* value
Household size	5.96 (2.58) (3.0–28.0)	5.43 (1.76) (3.0–14.0)	6.19 (2.84) (3.0–28.0)	-3.03 0.003
No. of children /mother	2.97 (1.28) (1.0–8.0)	2.89 (1.16) (1.0–6.0)	3.01 (1.32) (1.0–8.0)	-0.998 0.319
Crowding index	2.1 (0.9) (0.33–6.0)	1.74 (0.71) (0.6–4.0)	2.32 (0.91) (0.33–6.0)	-6.844 < 0.001
	n (%)	*n* (%)	*n* (%)	χ^2 *p* value
Type of family				
Nuclear	373 (75.1%)	121 (80.1%)	252 (72.8%)	2.992 0.084
Extended	124 (24.9%)	30 (19.9%)	094 (27.2%)	
Ration card possession	403 (81.1%)	125 (82.8%)	278 (80.3%)	0.406 0.524
Livestock possession	280 (56.3%)	92 (60.9%)	188 (54.3%)	1.857 0.173
Governmental support	68 (13.7%)	12 (7.9%)	56 (16.2%)	6.041 0.014
Household income				
Able to save money	174 (35%)	100 (66.3%)	74 (21.4%)	97.382 < 0.001
Meet routine expenses and emergencies	184 (37%)	34 (22.5%)	150 (43.4%)	
Just meet routine expenses	85 (17.1%)	15 (9.9%)	70 (20.2%)	
In debt	54 (10.9%)	2 (1.3%)	52 (15%)	

[a]*Category includes mildly, moderately and severely food insecure.*
SD = standard deviation.

working compared to 6.4% in food-insecure households ($P < 0.001$). There were no significant differences between participants from food-secure and food-insecure households regarding age and marital status.

Women in food-insecure households differed significantly from their counterparts in food-secure households in terms of anxiety symptoms, depression symptoms and total HSCL scores (Table 3). In food-secure households, the median total HSCL score was 1.4 (interquartile range, 1.24–1.68) compared to 1.92 (1.59–2.28) in food-insecure households ($P < 0.001$). Median scores on the depression and anxiety subscales were also higher among food-insecure mothers ($P < 0.001$). Mental distress was classified into low (36.8%), middle (31.6%) and high (31.6%) tertiles. The proportions of mental distress categories were significantly associated with food insecurity, showing that the proportion of mothers with high mental distress in food-insecure households (42.2%) was greater than that in food-secure households (7.3%) ($P < 0.001$).

Binary logistic regression analysis of the relationship between mental health status and HFI and household characteristics showed that, after adjusting for other factors affecting mental distress, 5 variables (HFI, income, SES, husband working abroad, and number of children) retained their significance in the multivariate model (Table 4). Mothers with severe, moderate or mild food insecurity had greater odds of high levels of mental distress than their counterparts in food-secure households. Mothers from a family in debt had greater odds of mental distress than mothers from families able to save money. Mothers from families with income just to meet routine expenses and mothers from families that could meet routine expenses and emergencies had greater odds of mental distress compared with mothers from families able to save money. Mothers from households with high SES were less likely to experience mental distress than mothers from lower SES households. Mothers with husbands working abroad had lesser odds of mental distress. The number of children a mother had was significantly associated with mental distress. An increase of 1 child in a family was associated with a 23% increase in the odds of that mother being mentally distressed.

Discussion

Out of the 497 households in Qulubba, 346 (69.6%) reported some level of food insecurity, with 71 (14.3%), 189 (38%) and 86 (17.3%) categorized as mildly, moderately and severely food-insecure households, respectively. The mean HFIAS score was 7.9 (6.5). However, these results may have overestimated food insecurity because some participants had expectations that the answers would influence their access to government support.

Table 2 Distribution of maternal characteristics by food security status, rural Minia

Maternal characteristics		Food secure (*n* = 151)	Food insecure[a] (*n* = 346)	Test statistic	*P* value
Mother's age (yr)	Mean (SD)	29.26 (5.41)	29.10 (5.55)	*t* 0.3	0.764
	(range)	(19.0–41.0)	(19.0–47.0)		
Marital status, *n*	Married	151 (100%)	334 (96.5%)	Fisher's exact 4.97	0.072
	Divorced	0	9 (2.6%)		
	Widowed	0	3 (0.9%)		
Education level of mother, n (%)					
Illiterate		19 (12.6%)	98 (28.3%)	χ^2 51.44	< 0.001
Below secondary		19 (12.6%)	63 (18.2%)		
Secondary/intermediate institutes		84 (55.6%)	176 (50.9%)		
University/postgraduate		29 (19.2%)	9 (2.6%)		
Working status of mother, n (%)					
Housewife		121 (80.1%)	324 (93.6%)	χ^2 20.48	< 0.001
Working		30 (19.9%)	022 (6.4%)		
Education level of husband, n (%)					
Illiterate		9 (6%)	68 (19.7%)	χ^2 72.41	< 0.001
Below secondary		11 (7.3%)	80 (23.1%)		
Secondary/intermediate institutes		87 (57.6%)	178 (51.4%)		
University/postgraduate		44 (29.1%)	20 (5.8%)		
Working status of husband, n (%)					
Not working		0 (0.0%)	7 (2%)	χ^2 63.947	< 0.001
Unskilled manual worker		16 (10.6%)	81 (23.4%)		
Skilled manual worker		66 (43.7%)	2 (57.8%)		
Trades/business		26 (17.2%)	22 (6.4%)		
Semiprofessional/clerk		17 (11.3%)	28 (8.1%)		
Professional		26 (17.2%)	8 (2.3%)		

[a]*Category includes mildly, moderately and severely food insecure.*
SD = standard deviation.

The level of HFI (69.6%) identified in this study was higher than 40% in Minia and 35.1% poor dietary diversity of all Egyptians, but lower than 80% in Assuit, using poor dietary diversity as an indirect indicator for food insecurity. However, in our study, food insecurity was substantially higher than 17.2%, which represented combined food insecurity (poor food consumption in terms of inadequate dietary diversity, calorie deficiency, or both) and income poverty (*15*). A potential explanation for the higher prevalence of HFI reported in the present study could be the high rate of poverty as demonstrated by the World Food Programme (*15*), and Minia Governorate has the highest rate of extreme multidimensional poverty, especially in rural areas. Poverty in rural Upper Egypt accounted for 49.4% (*9*), which is substantially higher than that in Lebanon (28.6%) (*16*) and in Viet Nam (13.6%) (*17*) based on national poverty lines. The latest liberalization of the Egyptian currency could also be a factor in rising food insecurity (*18*). Another important factor to consider regarding variations is the difference in measurement instruments used, with HFIAS yielding the highest HFI (in a study that used 3 different food access indicators) (*19*).

In the current study, HFI was not associated with family type, whether nuclear or extended, but rather with family size. Larger households were more likely to be food insecure than small households because increased family size leads to limited income to fulfil the family's needs and to buy adequate and nutritious food. Thus, a lower household income and increased family size tend to worsen HFI (*3,20–22*).

In the current study, maternal marital status was not associated with HFI, which was in agreement with Ihab et al. (*21*) but different from Tadesse Tantu et al. (*22*), who reported that single-head households were 4 times more food insecure. The difference from our study may be attributed to the small number of single-head households.

In the current study, there was a significant association between HFI and educational level of mothers and their husbands. This finding is consistent with Weigel et al. (*23*). This association may be explained by the fact that higher educational level means a better chance of having a better occupation, good income and better living conditions.

We found an association between HFI level and husbands' employment status. Maternal working status

Table 3 Comparison between food security groups regarding mental health status of the studied mothers, rural Minia

Maternal mental health status	Total (*n* = 497) Median (IQR)	Food secure (*n* = 151) Median (IQR)	Food insecure (*n* = 346) Median (IQR)	Test statistic	*P*
HSCL total score	1.76 (1.44–2.12)	1.40 (1.24–1.68)	1.92 (1.59–2.28)	U 10381	< 0.001[a]
HSCL anxiety score	1.70 (1.40–2.20)	1.40 (1.20–1.80)	1.90 (1.60–2.40)	U 12354.5	< 0.001[a]
HSCL depression score	1.73 (1.40–2.13)	1.40 (1.20–1.73)	1.93 (1.60–2.27)	U 10898.5	< 0.001[a]
Probable anxiety (HSCL, anxiety > 1.75)					
Yes	248 (49.9%)	38 (25.2%)	210 (60.7%)	χ^2 53.076	< 0.001
No	249 (50.1%)	113 (74.8%)	136 (39.3%)		
Probable depression (HSCL, depression > 1.75)					
Yes	244 (49.1%)	31 (20.5%)	213 (61.6%)	χ^2 70.814	< 0.001
No	253 (50.9%)	120 (79.5%)	133 (38.4%)		
Symptomatic HSCL-25 (HSCL, total > 1.75)					
Yes	252 (50.7%)	34 (22.5%)	218 (63%)	χ^2 68.948	< 0.001
No	245 (49.3%)	117 (77.5%)	128 (37%)		
Mental distress[b]					
Low	183 (36.8%)	97 (64.2%)	86 (24.9%)		
Middle	157 (31.6%)	43 (28.5%)	114 (32.9%)	χ^2 85.506	< 0.001
High	157 (31.6%)	11 (7.3%)	146 (42.2%)		

[a]*Mann–Whitney test.*
[b]*Mental distress was classified to low (score ≤1.56), middle (score 1.57-2) and high (score > 2) based on tertiles of the HSCL-25.*
HSCL = Hopkins Symptom Check List; IQR = interquartile range.

was also associated with higher prevalence of food security. Generally, working mothers are expected to have better access to food and food security (*22*,*23*).

In the present study, there was a high prevalence of symptoms of anxiety and depression among mothers. This finding was similar to that reported by El-Amin et al., who found a high prevalence of common mental distress among mothers attending Minia health centres (*24*). The current study showed a significant association between food insecurity and poor mental health. With regard to HSCL score, 60.7% of food-insecure and 25.5% of food-secure mothers fulfilled the criteria for anxiety symptoms, and 61.6% versus 20.5% for depressive symptoms. These findings are consistent with earlier studies in low- and middle-income (*25*,*26*) as well as high-income (*27*,*28*) countries. Some authors have reported the opposite relationship, with depression leading to food insecurity (*29*,*30*). For example, Garg et al. analysed data from the Early Childhood Longitudinal Study Birth Cohort (n = 2917) and found that mothers who experienced depression were at greater risk of remaining food insecure over time compared to mothers without depression (*29*). The association between food insecurity and mental health was addressed in adolescents (*31*,*32*). Rani et al. (*31*) found that teenage girls from food-insecure households are more likely to have high levels of anxiety, depression, loss of behavioural control, and mental distress compared with those living in food-secure households. Other studies have reported a bidirectional association between food insecurity and mental distress (*33*).

Our model investigating the association between food insecurity and mental health demonstrated that food insecurity, income, SES, husband working abroad and number of children in the household predicted maternal mental distress. In the unadjusted and adjusted models, women who had experienced food insecurity had greater odds of mental distress compared with women who reported being food secure. This association remained even after the inclusion of other factors affecting mental health such as income, SES and presence of children in the home.

Our results also revealed that women with low income were associated with poor mental health, and women from socioeconomically disadvantaged groups were more likely to have mental distress, which accords with previous studies (*31*).

In the current study, an increase of 1 child was associated with a 23% increase in the odds of that mother being mentally distressed. A similar finding was reported by Abrahams et al. (*3*) in South Africa where the odds of having a diagnosis of a major depressive episode were > 2 times greater in women who had ≥ 3 children. Additionally, having a husband working abroad had a protective effect on mental health. This was possibly due to money received by women, which improved their material resources and access to food.

Table 4 Binary logistic analysis of factors associated with mental distress among mothers

Food security status	Having mental distress[a]			
	Crude OR (95% CI)	*P*	Adjusted OR (95% CI)	*P*
Food secure	1.0 (reference)		1.0 (reference)	
Mildly food insecure	2.38 (1.29–4.37)	0.005	2.19 (1.11–4.31)	0.024
moderately food insecure	5 (3.10–8.09)	< 0.001	2.57 (1.42–4.65)	0.002
severely food insecure	29.44 (13.38–64.8)	< 0.001	12.88 (5.16–32.17)	< 0.001
Income				
Able to save money	1.0 (reference)		1.0 (reference)	
Meet routine expenses and emergencies	3.04 (1.95–4.73)	< 0.001	1.27 (0.74–2.18)	0.391
Just meet routine expenses	8.48 (4.67–15.40)	< 0.001	2.31 (1.13–4.75)	0.022
In debt	16 (7.03–36.44)	< 0.001	4.15 (1.53–11.28)	0.005
SES				
High	1.0 (reference)		1.0 (reference)	
Middle	4.02 (2.35–6.86)	< 0.001	2.26 (1.2–4.25)	0.012
Low	5.51 (3.13–9.70)	< 0.001	2.14 (1.06–4.34)	0.034
Very low	11.75 (6.51–21.2)	< 0.001	3.39 (1.66–6.91)	0.001
Husband				
Present	1.0 (reference)		1.0 (reference)	
Working abroad	0.42 (0.28–0.61)	< 0.001	0.57 (0.36–0.92)	0.022
Violence				
No	1.0 (reference)		1.0 (reference)	
Yes	2.44 (1.6–3.74)	< 0.001	1.296 (0.77–2.18)	0.328
Type of family				
Nuclear	1.00 (reference)		1.00 (reference)	
Extended	0.65 (0.43–0.98)	0.041	0.71 (0.42–1.18)	0.185
No. of children	1.17 (1.02–1.35)	0.027	1.23 (1.03–1.48)	0.025

N.B. Dependent variable mental distress.
R^2= 0.401.
[a] Hopkins Symptom Check List total score > 1.75.
CI = confidence interval; OR = odds ratio; SES = socioeconomic status.

The current study had some limitations: the cross-sectional nature of the data limited causal inferences; there was a lack of cooperation by some participants; and responses to the items in HFIAS depended on cultural and social contexts in ways that may not allow comparison of prevalence from this tool among different countries.

Recommendations

Policy-makers should aim to improve poverty, which would be positively associated with food access. Fundamental reform of the existing economic system is required. It is essential to develop programmes for screening of food insecurity and malnutrition at the household level in order to reach the most-vulnerable people. Screening may be included in national surveys (e.g., Egypt Demographic and Health Survey). Improved targeting of the existing food subsidy system to include more poor households and more-nutritious food items on ration cards, such as meat, eggs and fruits instead of reliance on sugar and oils will be beneficial to the community. Investment in rural populations is a long-term solution through investing in small-scale agriculture and inclusive rural development. Efforts should be directed to empower women economically and socially, especially rural women to protect them and their children from food insecurity.

Conclusion

Household food insecurity may bring additional stress, contributing to worse mental health. Thus, alleviating HFI should be a priority in order to improve mental health. Both HFI and poor mental health need to be studied further to understand the mediators and moderators of their relationship. Intervention studies designed to mitigate or reverse risks are also needed to determine the best evidence for practice and policy.

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Impact de l'insécurité alimentaire des ménages sur la santé mentale des mères en Égypte

Résumé

Contexte : L'insécurité alimentaire entraîne une perturbation des habitudes alimentaires, provoquant la faim ou une mauvaise nutrition ; elle est par ailleurs fortement corrélée à une mauvaise santé mentale.

Objectifs : Déterminer l'impact de l'insécurité alimentaire des ménages sur la santé mentale des mères dans une population rurale en Égypte.

Méthodes : La présente étude transversale en milieu communautaire a été menée dans le village de Qulubba, Gouvernorat de Minia. Nous avons interrogé 497 mères qui avaient au moins un enfant, en utilisant les instruments suivants : l'échelle d'insécurité alimentaire des ménages et la liste de contrôle des symptômes de Hopkins-25.

Résultats : Près de 70 % des femmes vivaient dans des foyers où régnait une insécurité alimentaire. Les symptômes d'anxiété et de dépression étaient significativement plus fréquents chez les mères en situation d'insécurité alimentaire. À l'analyse de régression logistique, l'insécurité alimentaire des ménages, le statut socio-économique, le fait que le mari travaillait à l'étranger et le nombre d'enfants étaient des facteurs prédictifs significatifs de la détresse maternelle. Les mères souffrant d'insécurité alimentaire sévère étaient environ 13 fois plus susceptibles de souffrir de détresse mentale que les mères qui se trouvaient en situation de sécurité alimentaire.

Conclusions : L'insécurité alimentaire des ménages est associée à une probabilité accrue de problèmes de santé mentale maternelle. L'étude souligne la nécessité de politiques de réduction de la pauvreté et de programmes de dépistage et de prise en compte de l'insécurité alimentaire. Il est recommandé d'intégrer la santé mentale dans les programmes qui luttent contre l'insécurité alimentaire et fournissent des conseils à ce sujet.

أثر انعدام الأمن الغذائي للأسر على الصحة النفسية للأمهات في مصر

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الخلاصة

الخلفية: يؤدي انعدام الأمن الغذائي إلى أنماط مضطربة من الأكل أو الجوع أو سوء التغذية ويرتبط ارتباطًا قويًا بسوء الصحة النفسية.

الأهداف: هدفت هذه الدراسة إلى تحديد تأثير انعدام الأمن الغذائي للأسر على الصحة النفسية للأمهات في المناطق الريفية بمصر.

طرق البحث: أجريت دراسة مجتمعية مقطعية في قرية قلبا بمحافظة المنيا. وأجرينا مقابلات مع 497 أمًا لديهن طفل واحد على الأقل، باستخدام مقياس الوصول إلى انعدام الأمن الغذائي للأسر والقائمة التفقديّة قائمة أعراض هوبكنز-25.

النتائج: يعيش ما يقرب من 70٪ من النساء في أسر تفتقر إلى الأمن الغذائي. وكانت أعراض القلق والاكتئاب أكثر شيوعًا بدرجة ملحوظة بين الأمهات اللاتي عانين من انعدام الأمن الغذائي. وبتحليل الانحدار اللوجستي، كان مؤشر التحوُّف الصحي، والوضع الاجتماعي والاقتصادي، وعمل الزوج في الخارج، وعدد الأطفال منبئات مهمة عن ضائقة الأمومة. وتعرّضت الأمهات اللاتي عانين من انعدام الأمن الغذائي الشديد للمعاناة من ضائقة نفسية بنحو 13 ضعفًا مقارنة بأمهات تمتعن بالأمن الغذائي.

الاستنتاجات: ارتبط انعدام الأمن الغذائي الشديد باحتمال تدهور الصحة النفسية للأمهات. وتبرز الدراسة الحاجة إلى سياسات للحد من الفقر وبرامج للتحري عن حالات انعدام الأمن الغذائي والتصدي لها. ونوصي بدمج الصحة النفسية في البرامج التي تعالج انعدام الأمن الغذائي وبرامج تقديم المشورة.

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Effects of khat use on response to antipsychotic medications in patients with newly diagnosed schizophrenia: a retrospective study

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Abstract

Background: Khat contains the amphetamine-like cathinone, and can trigger onset of schizophrenia and exacerbate pre-existing psychosis. However, it remains unknown whether the use of khat complicates the outcome of schizophrenia treatment.

Aims: We tested the hypothesis that patients with schizophrenia who are using khat will fail to respond to standard antipsychotic treatment.

Methods: We retrospectively studied a consecutive series of patients who presented to an adult psychiatric clinic in Al-Amal Psychiatric Hospital in Jazan, Saudi Arabia, between January 1, 2013 and December 31, 2016. Patients with newly diagnosed schizophrenia on antipsychotic monotherapy (n = 1007, 817 men) were included and categorized into khat and non-khat users. A khat chewing index was developed to further categorize low, mild, moderate and heavy khat users. Antipsychotic medications were reviewed to determine their potential and the cause of substitution in association with khat use.

Results: There were 483 (48%) khat users. Olanzapine, haloperidol and aripiprazole were the most frequently used drugs (46.3%, 15.6% and 10%, respectively). The retention rate of the initial drug differed between the khat users and nonusers (53.8% and 78.4%, respectively). The proportion of moderate and heavy users (55% and 49%, respectively) who changed their initial drug was greater than that of low and mild users (35.6% and 44.7%, respectively). Lack of drug efficacy was the most appealing reason for switching the initial drug among moderate (51.7%) and heavy khat users (48.4%).

Conclusions: Khat use hinders an individual's response to initial antipsychotic drug treatment for schizophrenia. Further studies are warranted to investigate the treatment decisions for this group of patients.

Keywords: antipsychotics, drug response, khat, schizophrenia, treatment outcome

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Introduction

Khat is a commonly used drug in the Eastern Mediterranean Region, which is becoming more prevalent in some countries, including Saudi Arabia (*1*). In Jazan, which lies in Southwest Saudi Arabia, khat use has been a traditional practice and the current pattern of use is becoming more excessive (*2*). Khat is consumed by chewing, which continuously produces pharmacokinetic properties (*3,4*). The fresh leaves and twigs of the khat shrub contain high concentrations of cathinone, an amphetamine analogue that produces euphoric effects (*3,4*). The other desired effects reported by khat users include increased energy, empathy, openness, and increased libido (*5,6*). Although limited use may not be accompanied by serious consequences, prolonged exposure can lead to dependence, psychosis and mood disturbances (*7–10*). The World Health Organization (WHO) has stated that khat causes psychological but not physical dependence among moderate users who consume the drug on a daily basis (*11*).

Schizophrenia is a complex neurodevelopmental disorder with high heritability (*12*). Epidemiological studies from the United States of America, Europe, and Australia have consistently demonstrated that half of patients with a first episode of psychosis have co-occurring substance use disorders (in particular, alcohol, cannabis and stimulants), which is at least 3 times higher than that in the general population (*13–15*). Co-occurrence may result in more psychotic symptoms (hyperactivity, mood liability, impulsivity, hostility and uncooperativeness), depressive symptoms, and greater perceived stigma (*7–10*). By contrast, only a few studies have shown that khat has a particular propensity to induce or aggravate psychiatric symptoms in countries where the chewing of khat leaves is common (*8,16,17*). Little is known about the association between khat use and response to antipsychotic treatment in schizophrenia patients. Importantly, clinicians in our region have the impression that khat use has a higher propensity to induce or aggravate psychiatric symptoms and complicate the outcome of schizophrenia treatment in some patients.

This clinical observation was one of the primary motivations to initiate this study. We retrospectively studied a consecutive series of patients who presented over a 4-year period to an adult psychiatric clinic for assessment with a potential first episode of

schizophrenia. We included all patients with newly diagnosed schizophrenia on antipsychotic monotherapy. The antipsychotic medications were reviewed to determine their potential and the cause of substitution in association with khat use. We aimed to test the hypothesis that patients with newly diagnosed schizophrenia who are classified as khat users fail to respond to standard antipsychotic monotherapy. Failure was defined as the need to change the initial antipsychotic drug due to lack of efficacy in controlling the symptoms of schizophrenia and/or intolerable adverse effects.

Methods

Study design

We retrospectively assessed a consecutive series of patients with newly diagnosed schizophrenia who attended an adult psychiatric clinic in Al-Amal Psychiatric Hospital in Jazan, Saudi Arabia, between January 1, 2013 and December 31, 2016. The study hospital is the only government mental health facility in the region.

Patients

We included all adults with newly diagnosed schizophrenia on antipsychotic monotherapy. The term newly diagnosed was defined as having no previous diagnosis of schizophrenia and no history of antipsychotic medication 12 months before their first presentation to the adult psychiatric clinic. Patients' data were collected from the Al-Amal Psychiatric Hospital database. The records were assessed thoroughly by 3 psychiatrists, and the following data were entered on a pre-prepared electronic data collection sheet on the survey monkey database: sex, age, detailed description of symptoms, clinical presentation, investigations, antipsychotic medication, drug combination with other central nervous system (CNS) stimulants or depressants, khat chewing behaviour (duration, frequency and amount), and screening tests for other CNS stimulants. We excluded patients with a history of substance abuse including amphetamines, alcohol and cannabis, and history of medication that could affect dopaminergic neurotransmission within 3 months before the first presentation.

Adult psychiatric clinic: routine investigation and diagnosis

Each patient was assessed thoroughly by a consultant psychiatrist. This included a detailed description of events of interest as well as associated symptoms. Screening tests to detect the presence of amphetamines or cannabinoids were routinely requested. Since chewing khat is more prevalent in this region than in other areas of the country, questioning patients regarding khat use is part of the daily practice in the clinics, and precise information is always obtained. Diagnosis of schizophrenia was established by a consultant psychiatrist according to International Classification of Diseases, 10th Revision.

Khat chewing index

A simple index was developed to measure the degree of khat use according to the data available. The index was also used us to categorize khat users into groups. The idea was based on the smoking severity index with some modifications to measure khat use.

Khat chewing index = amount of khat usually used/session × number of days usually using khat/week during the last year × number of years of using khat

The amount of khat used was calculated and expressed in piles (~1 kg). We did not multiply the number of days per week by 48 weeks, as the same number was used to calculate the amount of khat consumed by all users, and doing so would have increased the result for no reason. Hence, all khat users were categorized into quartile bases in order to develop the following 5 categories: 1- non-khat users; 2- low users, comprising khat users with an index < 25%; 3- mild users, comprising khat users with an index of 25–50%; 4- moderate users, comprising khat users with an index of 50–75; and 5- heavy users, comprising khat users with an index > 75%.

Statistical analysis

Descriptive analyses were performed using SPSS for Mac version 23. For analysis of age differences in terms of the proportion of patients whose initial antipsychotic treatment was substituted, both khat users and nonusers were categorized into three age groups (18–24, 25–44 and 45–64 years). The proportion of patients whose initial antipsychotic treatment was substituted was measured in each age group. Categorical comparisons were carried out using the χ^2 test. The level of significance was set as $P < 0.05$.

Ethical approval

The study was approved by the Jazan Health Human Research Ethics Committee (HREC No. 1437-SCBRE-03). Patient confidentiality was maintained by coding patients' files without disclosure of any private information.

Results

Patient characteristics

We included 1007 patients with newly diagnosed schizophrenia on antipsychotic monotherapy [mean (standard deviation) age: 33.6 (9.7) years, range: 18–77 years] (Table 1). Of those patients, 817 (81.1%) were men and 492 (48.9%) were khat users. Approximately 56% of patients achieved below secondary educational level, while 57.5% were unemployed. Of the 1007 patients, 193 (19%) were lost to follow-up after their first presentation. There was no significant difference between the proportion of khat users and non-khat users lost to follow-up after their first presentation (104/483, 21.5% vs 89/524, 17%, respectively).

Antipsychotic drugs

Atypical antipsychotics were more preferred than the typical agents (Table 2). The most commonly used atypi-

Table 1 Demographic characteristics of newly diagnosed schizophrenia patients between 1 January 2013 and 31 December 2016

Demographic characteristics	Khat users	Non-khat users	Total
Patients, n (%)			
Low	118 (11.7)	524 (52.0)	1007
Mild	123 (12.2)	–	–
Moderate	120 (11.9)	–	–
Heavy	122 (12.1)	–	–
Total	483 (48.0)	–	–
Age, mean (SD) years	33.3 (8.6)	33.9 (10.6)	33.6 (9.7)
Sex, n (%)			
Male	489 (59.9)	328 (40.1)	817 (81.1)
Female	3 (1.6)	187 (98.4)	190 (18.9)
Education, n (%)a			
Less than high school	232 (52.6)	209 (47.4)	441 (43.7)
High school	186 (52.8)	166 (47.20	352 (35.0)
Bachelor degree	35 (47.3)	39 (52.7)	74 (7.3)
Graduate degree	2 (40.0)	3 (60.0)	5 (0.5)
Not educated	35 (28.2)	89 (71.8)	124 (12.3)
Employment, n (%)b			
Employed	188 (57.5)	139 (42.5)	327 (32.5)
Unemployed	264 (45.7)	314 (54.3)	578 (57.5)
Retired	32 (62.7)	19 (37.3)	51 (5.1)
Student	6 (16.7)	30 (83.3)	36 (3.6)
Housewife	0 (0)	13 (100.0)	13 (1.3)

[a]11 cases missed (1.1%); [b]2 cases missed (0.2%).

cal antipsychotic drugs were olanzapine (46.3%), followed by aripiprazole (10.0%), and risperidone (9.3%). Haloperidol was the only typical antipsychotic used (15.6%).

Effects of khat use on antipsychotic drugs

Table 3 shows the effect of khat use on the retention rate of the initial antipsychotic drug. The difference in the initial drug retention rate between khat users and nonusers was significant (53.8% and 78.4% respectively, $P < 0.001$). The proportion of moderate and heavy khat users who changed their initial drug was significantly higher than that of low and mild khat users (55% and 49.2% vs. 35.6% and 44.7% respectively, $P < 0.001$). There was no significant sex difference between khat users and nonusers in terms of the proportion of patients whose initial antipsychotic treatment was substituted.

Table 4 shows the effect of khat use on substitution of the initial antipsychotic drug according to age group. Khat users aged 25–44 and 45–64 years had a significantly greater rate of drug substitution compared to those in the nonuser group (70.4% and 69.2% vs. 29.6% and 30.8% respectively, $P < 0.005$).

Reasons for initial antipsychotic drug substitution

Table 5 indicates that lack of drug efficacy was the most common reason for switching initial antipsychotic drug in 51.7% and 48.4% of moderate and heavy khat users, respectively. Drug adverse effects and noncompliance, although common in those treated with antipsychotics, led to changes in initial drug treatment in a few cases only.

Discussion

This study assessed drug treatment outcomes in a clinically important, but understudied, group of patients with schizophrenia who were khat users and in an area where most people use khat as a tradition. Almost half of schizophrenia patients were khat users. Substitution of initial drug was greater in khat users than nonusers, and in the moderate and heavy khat users than low and mild users. Lack of drug efficacy was the main reason for switching the initial antipsychotic drug. These findings indicate that khat use hinders the response to initial antipsychotic drug treatment for schizophrenia.

The management of schizophrenia has become an enormous challenge and opportunity, particularly in patients with a lifetime history of use of substances like khat (*Catha edulis*). The evaluation and treatment decisions that are implemented in this situation can have an important impact on the subsequent course and outcome of schizophrenia. This study is believed to be the first to address the interaction between antipsychotic drug and khat use in patients with newly diagnosed schizophrenia. The findings shed light on the many questions around appropriate treatment strategies and

Table 2 Frequency of use and maintenance dose of initial antipsychotic drug prescribed to patients with newly diagnosed schizophrenia

Drugs	Patients, n (%)	Maintenance dose, median (range)
Amisulpride	10 (1.0)	400 (200–800)
Aripiprazole	102 (10.1)	15 (5–30)
Clozapine	2 (0.2)	325 (250–400)
Haloperidol	157 (15.6)	10 (2–15)
Haloperidol (+ long-acting haloperidol)	7 (0.7)	10 (5–10])
Olanzapine	466 (46.3)	10 (5–20)
Paliperidone	74 (7.3)	6 (2–9)
Quetiapine	80 (7.9)	300 (100–800)
Risperidone	94 (9.3)	4 (1–8)
Risperidone (+ long acting risperidone)	6 (0.6)	5 (4–8)
Trifluoperazine	9 (0.9)	1 (1–1)

clinical recommendations for this important group of patients.

It has been suggested that excessive limbic dopaminergic activity plays a role in schizophrenia (dopamine hypothesis), with much emphasis on this role through the fact that the antipsychotic effect of typical drugs, such as haloperidol, is due to their blockade of dopamine (D_2) receptors (*18*). However, the dopamine hypothesis does not fully explain all aspects of schizophrenia. Diminished cortical or hippocampal dopaminergic activity has been found to underlie the negative symptoms of schizophrenia (e.g., emotional blunting, social withdrawal and lack of motivation). The atypical antipsychotic agents, which are potent serotonin ($5HT_{2A}$) receptor antagonists with less effect on D_2 receptors, have also been developed and proved to be more effective than the typical antipsychotic agents in treating negative symptoms of schizophrenia. The adverse effects, mainly extrapyramidal dysfunction, of the aforementioned drugs are fewer compared with those caused by typical antipsychotics (*19*). This finding

Table 3 Frequency of substitution of initial (first-line) antipsychotic drug prescribed to patients with newly diagnosed schizophrenia in association with khat use

Khat chewing index	Initial drug not substituted, n (%)	Initial drug substituted, n (%)	Total
Nonusers	411 (78.4)	113 (21.6)	524
Low users	76 (64.4)	42 (35.6)	118
Mild users*	68 (55.3)	55 (44.7)	123
Moderate users*	54 (45.0)	66 (55.0)	120
Heavy users*	62 (50.8)	60 (49.2)	122
Total	671 (66.6)	336 (34.4)	1007

*$P < 0.001$.

was also observed among patients using medication for schizophrenia at Jazan Psychiatric Hospital. Despite the efficacy of the antipsychotics, only 50% of the population responded. Poor response is associated with relapse, exacerbation, and premature discontinuation of treatment. Patients who fail to respond to treatment have a higher risk of hospitalization, and this could result in an increase in treatment cost (*16*,*20*).

Another cause of failure of treating schizophrenia symptoms is comorbid substance abuse, which commonly leads to dual diagnosis. Substance abuse, particularly amphetamines, is responsible for 40% of cases of psychosis (*21*). The dual diagnosis of schizophrenia and substance abuse comprises 50% of all schizophrenia patients (*13*), which is consistent with the results of the present study. It is often challenging to determine whether a patient has primary schizophrenia or substance abuse. Nevertheless, careful clinical interview and substance abuse screening may result in a rapid and accurate diagnosis. In the present study, khat (which is pharmacologically equivalent to amphetamine, but with lower potency) exacerbated schizophrenia symptoms, resulting in treatment failure (*5*,*6*). The treatment failure was more prevalent in the moderate and heavy khat users when we applied the khat chewing index, which determined the potential of drug substitution in association with the degree of khat use.

Much of the available information regarding the chemical constituents in khat arose from studies funded by WHO (*3*). Phenylalkylamines, which bear structural resemblance to the neurotransmitters dopamine and noradrenaline, are believed to be responsible for the psychostimulant nature of khat (*22*). These phenylalkylamines comprise cathinone and 2 diastereoisomers of cathine (norpseudoephedrine and norephedrine). Users of khat traditionally chew the youngest shoots and leaves, which contain the highest concentrations of cathinone (*3*). Cathinone appears to increase dopaminergic neurotransmission in a similar manner to amphetamine, by triggering presynaptic dopamine release and by inhibiting the reuptake of dopamine (*23*–*25*). Cathinone releases serotonin into the CNS (*23*). Therefore, khat can produce dose-dependent psychotic symptoms and worsen pre-existing psychosis. The risk-increasing effects have not yet been fully explained.

It is well established that the psychotic exacerbation of khat is dose dependent (*1*). The khat chewing habit varies from mild to excessive use among the Jazan population. Therefore, the khat chewing index was developed to determine the degree of khat use among individuals with schizophrenia. A total of 1007 patients aged 18–77 years were included in the present study. Data were collected to evaluate the changes in initial antipsychotic medication in relation to the 5 categories of khat use. A significant difference was observed in medication change between the groups. The results indicated a significant difference in medication change among patients with low, mild and heavy khat use compared with non-khat users. This suggests that the physicians usually administer the

Table 4 Comparison between khat users and nonusers in terms of proportion of patients whose initial antipsychotic treatment was substituted, according to age group

Age group (yr)	Number (%) of patients whose initial antipsychotic treatment was substituted		Total
	Khat users	Nonusers	
18–24	29 (48.3)	31 (51.7)	60
25–44	176 (70.4)	74 (29.6)	250
45–64	18 (69.2)	8 (30.8)	26
Total	223	113	336

maximum dose of antipsychotic drugs during the initial treatment, as observed in the present study.

Lack of drug efficiency was the most common reason for switching initial antipsychotic drugs, particularly among mild, moderate and heavy khat users. It significantly exceeded the development of intolerable adverse effects and noncompliance, which are more common in individuals with schizophrenia on antipsychotic drugs. This is despite the fact that, in the present study, antipsychotics were given at their maximum therapeutic doses. Failure to control schizophrenia symptoms prompts physicians to change the initial antipsychotic drug. This can be explained by the dual diagnosis of schizophrenia and khat use since khat intensifies the state of psychosis. This situation may require either increasing the dose or shifting to more efficient antipsychotics. To date, no pharmacological studies have reported the treatment decisions in this important group of patients. Until then, khat abstinence would be the mainstay of treatment, in addition to antipsychotic agents, psychological therapy, social support, and rehabilitation (*11*,*17*,*26*).

While this study had a number of strengths, including the number of individuals studied, it was also limited by its retrospective nature, which we attempted to minimize. In particular, the psychiatric assessment of symptoms, the causative relationship between khat use and antipsychotic efficacy, and the reason for antipsychotic switching, which were revisited and confirmed by the treating psychiatrists. The mean age of patients suggests that even if the diagnosis had been recent, the onset of signs and symptoms could have been earlier. This finding could be explained by the fact that mental health conditions in Saudi Arabia are still considered to be a stigma. The Saudi National Health and Stress Survey (unpublished technical report, 2019) showed that 34% of Saudis meet the criteria for a mental health condition in their life, and only 5% of Saudis seek treatment for their mental health condition in a given year.

The study was limited by the self-reported use of khat, which meant that there was greater potential for information bias arising from the patients. However, taking into account that khat use is a traditional practice in the region, investigating the degree of khat use among patients is part of the daily practice in clinics, and precise information is always obtained. Another potential limitation was the lack of data on the titration pattern of drug dose. This could be explained by the fact that treating physicians usually start with the maximum well-tolerated dose of the antipsychotic drug in khat users. Moreover, we cannot exclude the fact that other confounding factors (e.g., other substance abuse, comorbidities, and adherence to treatment) may have contributed to the necessary change in initial antipsychotic medication (treatment failure). Hence, a prospective study is warranted to determine other confounding factors.

Conclusion

Khat is popular among schizophrenia patients, which makes them vulnerable to drug treatment failure. As we anticipated, antipsychotics were initiated using the maximum therapeutic dose in areas (such as Jazan) where psychostimulant drugs are used. This study opens the door for prospective studies to try and understand the phenomenon of khat use in schizophrenia and encourage the authorities to adopt more aggressive measures to avoid khat use.

Table 5 Cause of initial (first-line) antipsychotic drug substitution in khat users and nonusers

Khat chewing index, n (%)	Adverse effects	Lack of efficacy	Treatment noncompliance	Other reasons	Not substituted	Total
Nonusers	18 (3.4)	42 (8.0)	2 (0.4)	51 (9.7)	411 (78.4)	524
Low users	0 (0.0)	35 (29.7)	2 (1.7)	5 (4.2)	76 (64.4)	118
Mild users*	3 (2.4)	50 (40.7)	0 (0.0)	2 (1.6)	68 (55.3)	123
Moderate users*	1 (0.8)	62 (51.7)	0 (0.0)	3 (2.5)	54 (45.0)	120
Heavy users*	0 (0.0)	59 (48.4)	0 (0.0)	1 (0.8)	62 (50.8)	122
Total	22 (2.2)	248 (24.6)	4 (0.4)	62 (6.2)	671 (66.6)	1007

*$P < 0.001$.

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Competing interests: None declared.

Effets de la consommation de khat sur la réponse aux médicaments antipsychotiques chez les patients atteints de schizophrénie récemment diagnostiquée : étude rétrospective

Résumé

Contexte : Le khat contient de la cathinone de type amphétamine, qui peut déclencher une schizophrénie et exacerber une psychose préexistante. Cependant, on ne sait toujours pas si l'utilisation du khat complique le résultat du traitement de la schizophrénie.

Objectifs : Notre objectif était de tester l'hypothèse selon laquelle les patients atteints de schizophrénie qui consomment du khat ne répondront pas au traitement antipsychotique standard.

Méthodes : Nous avons procédé à une étude rétrospective sur une série de patients qui se sont présentés dans une clinique psychiatrique pour adultes à l'hôpital psychiatrique Al-Amal de Jazan, en Arabie saoudite, entre le 1er janvier 2013 et le 31 décembre 2016. Les patients souffrant de schizophrénie nouvellement diagnostiquée et suivant une monothérapie antipsychotique (n = 1007, 817 hommes) ont été inclus dans l'étude et classés en deux catégories : les consommateurs et les non consommateurs de khat. Un indice de consommation du khat a été mis au point pour mieux catégoriser les personnes ayant une consommation faible, légère, modérée et importante. Les médicaments antipsychotiques ont été examinés afin de déterminer leur potentiel et la cause de la substitution en association avec la consommation de khat.

Résultats : Il y avait 483 consommateurs de khat (48 %). L'olanzapine, l'halopéridol et l'aripiprazole étaient les médicaments les plus fréquemment utilisés (46,3 %, 15,6 % et 10 %, respectivement). Le taux de rétention du médicament initial différait entre les consommateurs et les non consommateurs de khat (53,8 % et 78,4 %, respectivement). La proportion de personnes ayant une consommation modérée et importante (55 % et 49 %, respectivement) qui ont changé leur médicament initial était supérieure à celle des personnes ayant une consommation faible et légère (35,6 % et 44,7 %, respectivement). Le manque d'efficacité du médicament a été la raison la plus populaire pour changer le médicament initial chez les personnes ayant une consommation modérée (51,7 %) et importante (48,4 %).

Conclusions : La consommation de khat entrave la réponse d'un individu au traitement antipsychotique initial de la schizophrénie. Des études supplémentaires sont nécessaires pour examiner les décisions thérapeutiques pour ce groupe de patients.

آثار استخدام القات على استجابة مرضى الفصام المشخصين حديثًا للأدوية المضادة للذهان: دراسة استرجاعية

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الخلاصة

الخلفية: القات يحتوي على «كاثينون» مشابه للأمفيتامين، ويمكن أن يؤدي إلى ظهور الفصام وتفاقم الذهان الموجود مسبقًا. ومع ذلك، لا يزال من غير المعروف ما إذا كان تعاطي القات يعقّد ويفاقم نتائج علاج الفصام.

الأهداف: هدفت هذه الدراسة إلى اختبار فرضية أن مرضى الفصام الذين يستخدمون القات سيفشلون في الاستجابة للعلاج المعياري المضاد للذهان.

طرق البحث: درسنا بأثر رجعي سلسلة متتالية من المرضى الذين قدموا إلى عيادة نفسية للبالغين في مستشفى الأمل والطب النفسي في جازان، المملكة العربية السعودية، في الفترة ما بين 1 يناير/ كانون الثاني 2013 و31 ديسمبر/ كانون الأول 2016. مرضى الفصام الذين تم تشخيصهم حديثًا على العلاج الأحادي بمضادات الذهان (العدد = 1007؛ 817 رجلاً) تم إدراجهم وتصنيفهم إلى متعاطي القات وغير القات. تم تطوير مؤشر مضغ القات لتصنيف متعاطي القات المنخفض، والمعتدل، والمتوسط، والثقيل. تمت مراجعة الأدوية المضادة للذهان لتحديد إمكاناتها وسبب الاستبدال بالاشتراك مع استخدام القات.

النتائج: كان هناك 483 شخصًا (48٪) من مستخدمي القات. وكانت الأدوية الأكثر استخدامًا هي أولانزابين وهالوبيريدول وأريبيبرازول (46.3٪ و15.6٪ و10٪ على التوالي). واختلف معدل استبقاء العقار الأولي بين متعاطي القات وغير المتعاطين (53.8٪ و78.4٪ على التوالي). وكانت نسبة معتدلي التعاطي للقات وكثيفي التعاطي (55٪ و49٪ على التوالي) الذين غيّروا تعاطيهم الأولي أكبر من نسبة منخفضي التعاطي ومتوسطي التعاطي (35.6٪ و44.7٪ على التوالي). وكان عدم فعالية الأدوية هو السبب الأكثر لتغيير الدواء الأولي بين متعاطي القات المعتدلين (51.7٪) ومتعاطي القات بكثافة (48.4٪).

الاستنتاجات: يعوق تعاطي القات استجابة المصاب بالفصام للعلاج بالدواء الأولي المضاد للذهان. وهناك ما يبرر إجراء مزيد من الدراسات لاستقصاء قرارات العلاج لهذه الفئة من المرضى.

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Improved attitudes of interns versus undergraduate medical students towards patients with mental illness in Saudi Arabia

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Abstract

Background: The attitudes of medical students towards mental illness are important since these students will be providing care to this group in the future.

Aims: To assess the beliefs and attitudes of undergraduate medical students regarding mental illness and to compare students at different levels.

Methods: This descriptive, cross-sectional study was conducted among undergraduate medical students in the College of Medicine, Majmaah University, Saudi Arabia, during the 2018–2019 academic years. Male students were included from Years 3–5 (25 from each year) and 25 male interns using the proportionate stratified random sampling method. The participants responded to the Beliefs about Mental Illness (BMI) Scale and the Attitudes towards Mental Illness Questionnaire (AMIQ).

Results: Bonferroni post hoc tests were used to conduct between-group comparisons of the year 3 group, who were at the beginning of their psychiatric training, with the other groups with more training. This revealed significant differences in scores for 11 of 21 items on the BMI Scale ($P < 0.05$). All questions regarding the 4 vignettes of the AMIQ (substance abuse, depression, psychosis, and obsessive compulsive disorders) showed a significant difference between students in year 3 and those in the other groups who had more psychiatric training ($P < 0.05$).

Conclusions: The current medical psychiatric training positively improved the beliefs and attitudes of medical students towards patients with mental illnesses.

Keywords: impact of training; attitude; mental illness; social stigma; psychiatric care

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Introduction

Pre-existing negative beliefs and attitudes can result in closed-mindedness and biased interactions with people. Mental illness carries a negative social stigma, and many affected people are reluctant to seek medical or psychiatric help for this reason. Psychiatric disorders are believed to be associated with supernatural powers and religious beliefs, and various moral and mystic approaches are taken to treat these illnesses (1). Negative attitudes towards mental illness can be caused by low literacy and educational status, as well as lack of knowledge and awareness about psychiatric illnesses (2).

Health professionals' beliefs and attitudes towards mental illness are of particular importance; for example, negative attitudes can result in diagnostic overshadowing, where a physical symptom experienced by a mentally impaired person may be wrongly attributed to the mental impairment (3). Medical students may have preconceived beliefs, ideas and attitudes about their profession and the patients with whom they will be working. A lack of contact or familiarity with patients and a lack of access to accurate information about mental illness may result in negative attitudes among medical graduates, which could be detrimental to patient care and have wider implications for the future of health care and society (4).

Studies from around the world have shown both negative and positive attitudes among undergraduate medical students (5,6). Proper undergraduate training and exposure to psychiatric patients during internship training are associated with positive outcomes in terms of the attitudes of medical students towards mental illness, and may even influence students to choose psychiatry as their specialization (5). A study from Indiana University, United States of America (USA) has shown that 6–8 weeks of junior clerkship in psychiatry improved the attitudes of undergraduate medical students, who subsequently agreed less with the idea that mental illness cannot be cured and more readily accepted interactions with family members of psychiatric patients (7). Therefore, the positive attitudes of medical students towards mental illness appear to be strongly influenced by education and patient exposure. A study from Abha investigated the attitudes of medical students in Saudi Arabia, which showed that innovative undergraduate psychiatric training that comprised voluntary, active and problem-based learning (rather than conventional passive learning based on simple memorization) was

effective in instilling a positive attitude towards mental illness. This voluntary active learning approach in Saudi Arabia was implemented as per the recommendation of Saudi Arabia's Scientific Committee for Mental Health. In February 1986, the Committee convened a meeting at the Ministry of Health in Riyadh, inviting psychiatry representatives from medical schools in Saudi Arabia to analyse this issue. After 1 year, a new elective subject called introduction to psychosomatic medicine was introduced for medical students, which included training in general hospitals in Saudi Arabia. This course facilitated voluntary and active learning using a problem-based approach rather than relying on conventional passive learning that simply required memorization (*8*).

A study from India revealed a lack of empathy and feelings of fear and hatred towards psychiatric patients among undergraduate medical students, which could jeopardize the future of the healthcare system (*9*). The authors attributed this finding to clear gaps in the students' knowledge about mental illness and the various available treatment options owing to the absence of psychiatric training during undergraduate training.

The mental healthcare system of Saudi Arabia is serviced by 27 mental health hospitals. The updated Saudi Ministry of Health Mental and Social Health Atlas signifies the integration of mental health care in primary healthcare centres. There are > 2259 primary healthcare centres in Saudi Arabia, where general practitioners (GPs) are responsible for the identification of mental illness and referral to mental health or teaching hospitals. There is a high demand for psychiatric care in Saudi Arabia, and the Ministry of Health recognizes the role of GPs and their continuous psychiatric training programmes to enhance their ability to identify and manage mental illness at primary healthcare centres, which are the first contact points for citizens in the healthcare system (*10*). There is a lack of literature regarding the accurate estimation of mental illness among the Saudi population, and there is a definite need for improving the skills and knowledge of healthcare professionals, with the latest evidence and research in psychiatry (*11*,*12*).

The present study aimed to examine the current beliefs and attitudes towards mental illness among university medical students, who will be future GPs. Few studies in Saudi Arabia, have assessed students' attitudes towards mental illness and psychiatric training. This study assessed undergraduate medical students' and interns' beliefs and attitudes toward mental illness and compared these between students at different levels.

Methods

Settings and participants

This was an observational cross-sectional study conducted among medical undergraduate students at the College of Medicine, Majmaah University, Saudi Arabia during the 2018–2019 academic years. All participants were men, as this medical school only began enrolling female candidates 3 years ago and students have only reached their 3rd year of study and there are no corresponding samples at higher levels of study. The sample size was calculated using the formula $n = z^2 \times \sigma^2/d^2$, where n = sample size to be estimated, z = 1.96, σ = standard deviation of 5 and d = desired sampling error 1. Each year, 20–30 students are enrolled in the College. From the total student population of 134 in years 3–5, and interns, the sample size was calculated using this formula: $1.96^2 \times 5^2/1^2$ with confidence level of 95% and precision interval of 1% (*13*). A proportionate, stratified, random sampling technique was used to define 4 groups of 25 students from years 3–5 and interns (year 6). The study assessed the changes in the beliefs and attitudes regarding mental illness as the participants received more psychiatric training. Since psychiatric training starts from year 3 of undergraduate medical training and extends until internship, only participants from year 3 to internship were included, and students from years 1 and 2 were excluded. The study details were explained to the participants, and questionnaires were distributed after receiving written informed consent for participation. No personal identification details were collected.

Instrument development and data collection methods

Participants completed the Beliefs about Mental Illness (BMI) Scale and the Attitudes towards Mental Illness Questionnaire (AMIQ) (*14*). In a primary validity study conducted in Virginia, USA, Cronbach's ? was high among American (0.89) and Asian (0.91) students, showing promising evidence of validity (*15*). The BMI is a 21-item questionnaire that assesses 3 dimensions including dangerousness, poor social/interpersonal skills, and incurability regarding mental illness. The AMIQ is a brief, self-completion questionnaire with good psychometric properties that can be used in most situations; it has been already translated into Arabic and has a reliability of 0.79 (*16*,*17*). Respondents read a short vignette describing an imaginary patient and answered 5 questions. We used substance abuse, depression, psychosis, and obsessive compulsive disorder (OCD) vignettes, as these were more relevant in the study area. All names were changed and replaced by Mr. A. A copy of the modified questionnaire is available as a supporting file. Individual questions were scored on a Likert scale, ranging from 0 (completely disagree) to 5 (completely agree). The total score for each vignette ranged from 0 –25, where lower scores indicated more positive attitudes towards mental illness.

Statistical analysis

The collected data were analysed using SPSS version 23 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the data and calculate the standard deviation and mean. Between-group comparisons for BMI and AMIQ were performed using analysis of variance and further analyses using Bonferroni correction, where scores were compared between year 3 students, who were at the beginning of their psychiatric training,

and other student groups with higher levels of training. Statistical significance was considered when *P* was < 0.05.

Results

The BMI Scale scores for the 4 study groups are presented in Table 1. For 12 of the 21 questions regarding the general nature of mental illness and the dangerousness of mentally ill persons, there was a significant difference in scores between the study groups ($P < 0.05$). However, for 9 of the 21 questions regarding social/interpersonal skills and incurability of mental illness, there was no significant difference in the scores between the study groups.

The AMIQ scores among the study groups for the 4 vignettes, including substance abuse, depression, psychosis, and OCD, are presented in Table 2. For the 5 questions in all 4 vignettes, there was a significant difference in the scores between the study groups ($P < 0.05$).

Between-group comparisons of the year 3 group, who were at the beginning of their psychiatric training, and the other groups, who had more training, showed significant differences in the scores ($P < 0.05$) for 11 items of the BMI Scale, while 10 items showed no significant difference (Table 3).

All questions in AMIQ in the 4 vignettes (substance abuse, depression, psychosis, and OCD) showed a significant difference between the year 3 and other groups that had more psychiatric training, particularly in interns ($P < 0.05$) (Table 4).

Discussion

In the present study, we used questionnaires to analyse the beliefs and attitudes of undergraduate medical stu-

Table 1 Beliefs about Mental Illness Scale mean scores for the 4 study groups of 25 participants

		Mean	Standard deviation	F	P
A mentally ill person is more likely to harm others than a normal person	Year 3	2.28	1.62	7.700	< 0.001
	Year 4	1.64	2.23		
	Year 5	1.04	2.03		
	Interns	0.04	0.20		
	Total	1.25	1.88	11.962	< 0.001
Mental disorders would require a much longer period of time to be cured than other general diseases	Year 3	3.16	1.21		
	Year 4	1.52	1.78		
	Year 5	1.88	2.30		
	Interns	0.44	0.768		
	Total	1.75	1.87		
It may be a good idea to stay away from people who have a psychological disorder because their behaviour is dangerous	Year 3	2.00	1.66	5.864	0.001
	Year 4	1.80	1.80		
	Year 5	1.04	1.79		
	Interns	0.36	0.64		
	Total	1.30	1.66		
The term psychological disorder makes me feel embarrassed	Year 3	1.88	1.86	2.303	0.082
	Year 4	1.72	1.67		
	Year 5	1.80	2.16		
	Interns	0.76	1.01		
	Total	1.54	1.76		
A person with a psychological disorder should have a job with only minor responsibility	Year 3	2.56	1.96	4.296	0.007
	Year 4	1.88	1.71		
	Year 5	1.48	1.98		
	Interns	0.84	1.18		
	Total	1.69	1.82		
Mentally ill people are more likely to be criminals	Year 3	2.92	1.19	7.450	< 0.001
	Year 4	1.76	1.64		
	Year 5	1.68	2.21		
	Interns	0.76	1.23		
	Total	1.78	1.77		

Table 1 Beliefs about Mental Illness Scale mean scores for the 4 study groups of 25 participants *(continued)*

		Mean	Standard deviation	F	P
Psychological disorders are recurrent	Year 3	1.56	1.42	1.941	0.128
	Year 4	1.76	1.48		
	Year 5	1.20	1.87		
	Interns	0.80	1.22		
	Total	1.33	1.54		
I am afraid of what my boss, friends and others would think if I was diagnosed as having a psychological disorder	Year 3	1.48	.96	2.329	0.079
	Year 4	1.88	1.59		
	Year 5	1.80	2.14		
	Interns	0.84	1.25		
	Total	1.50	1.58		
Individuals diagnosed by mental illness suffer from its symptoms throughout their life	Year 3	2.32	1.55	3.390	0.021
	Year 4	1.72	1.72		
	Year 5	1.40	1.94		
	Interns	0.88	1.27		
	Total	1.58	1.69		
People who have once received psychological treatment are likely to need further treatment in the future	Year 3	2.44	1.53	3.865	0.012
	Year 4	1.96	2.09		
	Year 5	1.76	2.15		
	Interns	0.76	1.27		
	Total	1.73	1.87		
It might be difficult for mentally ill people to follow social rules such as being punctual or keeping promises	Year 3	1.28	1.31	1.954	0.126
	Year 4	1.40	2.00		
	Year 5	1.92	2.36		
	Interns	0.68	1.41		
	Total	1.32	1.85		
I would be embarrassed if people knew that I am in relationship with a person who once received psychological treatment	Year 3	2.16	1.65	1.604	0.194
	Year 4	1.80	1.94		
	Year 5	2.04	2.35		
	Interns	1.08	1.61		
	Total	1.77	1.93		
I am afraid of people who are suffering from a psychological disorder because they may harm me	Year 3	2.96	1.81	4.850	0.003
	Year 4	1.80	1.78		
	Year 5	1.84	2.29		
	Interns	0.96	1.49		
	Total	1.89	1.97		
A person with a psychological disorder is less likely to function well as a parent	Year 3	2.80	1.87	3.616	0.016
	Year 4	1.72	1.74		
	Year 5	2.20	2.40		
	Interns	1.08	1.55		
	Total	1.95	1.99		
I would be embarrassed if a person in my family became mentally ill	Year 3	2.16	1.72	2.543	0.061
	Year 4	1.64	1.68		
	Year 5	2.16	2.29		
	Interns	0.96	1.31		
	Total	1.73	1.82		

Table 1 Beliefs about Mental Illness Scale mean scores for the 4 study groups of 25 participants *(concluded)*

		Mean	Standard deviation	F	P
I believe that psychological disorders can never be completely cured	Year 3	1.40	1.83	2.315	0.081
	Year 4	1.68	1.77		
	Year 5	2.28	2.39		
	Interns	0.92	1.32		
	Total	1.57	1.90		
Mentally ill people are unlikely to be able to live by themselves because they are unable to assume responsibilities	Year 3	2.20	1.83	2.056	0.111
	Year 4	1.84	1.80		
	Year 5	2.40	2.31		
	Interns	1.16	1.60		
	Total	1.90	1.93		
Most people can be friends with a mentally ill person without knowing	Year 3	3.16	1.55	8.485	< 0.001
	Year 4	2.20	1.94		
	Year 5	2.24	2.42		
	Interns	0.60	1.15		
	Total	2.05	2.02	3.666	0.015
The behaviour of people who have psychological disorders is unpredictable	Year 3	2.24	1.45		
	Year 4	2.16	1.93		
	Year 5	2.28	2.34		
	Interns	0.84	1.37		
	Total	1.88	1.89		
Psychological disorders are unlikely to be cured regardless of treatment	Year 3	1.64	1.82	2.749	0.047
	Year 4	2.36	2.08		
	Year 5	2.16	2.25		
	Interns	0.92	1.53		
	Total	1.77	1.99		
I do not trust the work of a mentally ill person assigned to my team	Year 3	2.08	1.73	2.443	0.069
	Year 4	2.16	2.06		
	Year 5	2.25	2.35		
	Interns	0.96	1.51		
	Total	1.86	1.97		

dents at Majmaah University towards mental illness. We also compared the beliefs and attitudes between medical students in year 3, who had started their psychiatric training, and students in years 4 and 5, as well as interns who had more psychiatric training. The present study demonstrated that there were significant differences in BMI Scale scores between the year 3 group and the other groups concerning the nature and dangerousness of mental illness, while no differences were found regarding social/interpersonal skills and incurability of mental illness. This gives a clear indication regarding the beliefs of medical students. Factors such as social customs, traditional beliefs, and religious beliefs are deeply imprinted in the mind and cannot be easily changed by modern education. Other factors such as economic factors and exposure to social media could also play a role. A similar result was reported by a study from Nigeria, which concluded that psychiatric training favourably changed students' attitudes but could not change beliefs that were deeply rooted in their society (*18*). This was reflected in their response after training as they still believed that psychiatric patients were unpredictable and that mental illnesses were related to supernatural forces.

Regarding attitudes towards mental illness, interns showed a significant difference to year 3 students, as indicated by the AMIQ responses to the 4 vignettes of substance abuse, depression, psychosis, and OCD. This could be attributed to the duration of psychiatric training, which starts from year 3 and extends until internship, thereby positively influencing attitudes towards mental illness. Presently, at Majmaah University, students have a module about the basics of psychology and behaviour in year 3, accounting for 41 contact hours and 2 credit hours, as well as a module comprising lectures and clinical training regarding psychiatric illness in years 4 and 5, accounting for 142 contact hours

Table 2 Comparison of mean test scores of Attitudes towards Mental Illness Questionnaire between the student groups

		Substance abuse case vignette				Depression case vignette				Psychosis case vignette				OCD case vignette			
		Mean	SD	F	P	Mean	SD	F	P	Mean	SD	F	P	Mean	SD	F	P
Do you think this would damage Mr. A's career?	Year 3	2.68	1.68	14.45	< 0.001	3.04	1.59	24.99	< 0.001	3.20	1.71	13.11	< 0.001	3.24	1.56	23.68	< 0.001
	Year 4	1.72	2.15			0.96	1.49			1.64	2.14			1.36	1.47		
	Year 5	0.44	1.12			0.44	0.96			1.28	1.93			1.08	1.32		
	Interns	0.28	0.46			0.32	0.85			0.24	0.52			0.28	0.54		
	Total	1.28	1.77			1.19	1.66			1.59	1.98			1.49	1.67		
Would I be comfortable if Mr. A was my colleague at work?	Year 3	2.36	1.11	21.00	< 0.001	2.68	1.38	22.34	< 0.001	2.52	1.58	6.60	< 0.001	3.12	1.24	13.53	< 0.001
	Year 4	0.84	1.28			1.00	1.00			1.56	1.96			1.80	1.94		
	Year 5	0.60	0.71			0.84	0.85			1.64	2.02			1.20	1.44		
	Interns	0.36	0.70			0.44	0.87			0.44	0.77			0.68	0.90		
	Total	1.04	1.25			1.24	1.34			1.54	1.80			1.70	1.68		
Would I be comfortable about inviting Mr. A to a dinner party?	Year 3	2.44	1.33	8.63	< 0.001	2.52	1.56	12.34	< 0.001	3.24	1.76	12.61	< 0.001	3.52	1.61	17.32	< 0.001
	Year 4	1.44	1.73			1.52	1.36			1.64	2.04			1.56	1.42		
	Year 5	1.12	1.27			0.88	0.93			1.32	1.55			1.68	1.65		
	Interns	0.56	0.92			0.56	0.96			0.52	0.82			0.68	0.95		
	Total	1.39	1.49			1.37	1.43			1.68	1.87			1.86	1.75		
How likely do you think it would be for Mr. A's wife to leave him?	Year 3	2.96	1.24	14.75	< 0.001	3.28	1.43	18.21	< 0.001	2.52	1.26	7.38	< 0.001	3.04	1.10	8.08	< 0.001
	Year 4	1.72	1.65			1.68	1.41			1.64	2.00			1.96	1.81		
	Year 5	1.24	1.36			1.28	1.24			1.44	1.53			2.24	1.79		
	Interns	0.56	0.92			0.68	1.11			0.56	0.92			1.00	1.04		
	Total	1.62	1.57			1.73	1.61			1.54	1.62			2.06	1.63		
How likely do you think it would be for Mr. A to get in trouble with the law?	Year 3	3.68	1.15	18.73	< 0.001	2.52	1.66	7.53	< 0.001	3.76	.88	22.06	< 0.001	4.08	.70	22.25	< 0.001
	Year 4	2.00	2.00			1.48	1.71			1.60	1.87			1.60	1.56		
	Year 5	1.48	1.74			1.36	1.66			1.56	1.58			2.28	1.72		
	Interns	0.56	0.92			0.48	0.92			0.64	1.08			1.16	1.25		
	Total	1.93	1.88			1.46	1.67			1.89	1.80			2.28	1.75		

OCD = obsessive compulsive disorder; SD = standard deviation.

Table 3 Comparison of scores on the Beliefs about Mental Illness Scale between Year 3 and other students

Multiple comparisons Bonferroni dependent variable	Groups		MD	SD	P
A mentally ill person is more likely than a normal person to harm others	Year 3	Year 4	0.64	0.49	1.000
		Year 5	1.24	0.49	0.073
		Interns	2.24	0.49	< 0.001
Mental disorders require a longer period of time to be cured than general diseases	Year 3	Year 4	1.64	0.46	0.003
		Year 5	1.28	0.46	0.038
		Interns	2.72	0.46	< 0.001
It may be a good idea to stay away from a person who has a psychological disorder because their behaviour may be dangerous	Year 3	Year 4	0.20	0.44	1.000
		Year 5	0.96	0.44	0.186
		Interns	1.64	0.44	0.002
The term psychological disorder makes me feel embarrassed.	Year 3	Year 4	0.16	0.49	1.000
		Year 5	0.08	0.49	1.000
		Interns	1.12	0.49	0.144
A person with a psychological disorder should have a job with only minor responsibility	Year 3	Year 4	0.68	0.49	1.000
		Year 5	1.08	0.49	0.183
		Interns	1.72	0.49	0.004
Mentally ill people are more likely to be criminals	Year 3	Year 4	1.16	0.46	0.078
		Year 5	1.24	0.46	0.049
		Interns	2.16	0.46	< 0.001
Psychological disorders are recurrent	Year 3	Year 4	−0.20	0.43	1.000
		Year 5	0.36	0.43	1.000
		Interns	0.76	0.43	0.477
I am afraid of what my boss, friends and others would think if I were diagnosed as having a psychological disorder	Year 3	Year 4	−0.40	0.44	1.000
		Year 5	−0.32	0.44	1.000
		Interns	0.64	0.44	0.884
Individuals diagnosed with a mental illness suffer from its symptoms throughout their life	Year 3	Year 4	0.60	0.46	1.000
		Year 5	0.92	0.46	0.298
		Interns	1.44	0.46	0.015
People who receive psychological treatment are likely to need further treatment in the future	Year 3	Year 4	0.48	0.51	1.000
		Year 5	0.68	0.51	1.000
		Interns	1.68	0.51	0.008
It may be difficult for mentally ill people to follow social rules such as being punctual or keeping promises	Year 3	Year 4	−0.12	0.52	1.000
		Year 5	−0.64	0.52	1.000
		Interns	0.60	0.52	1.000
I would be embarrassed if people knew that I was in a relationship with a person who had received psychological treatment	Year 3	Year 4	0.36	0.54	1.000
		Year 5	0.12	0.54	1.000
		Interns	1.08	0.54	0.290
I am afraid of people who are suffering from psychological disorders because they may harm me	Year 3	Year 4	1.16	0.53	0.181
		Year 5	1.12	0.53	0.217
		Interns	2.00	0.53	0.002
A person with a psychological disorder is less likely to function well as a parent	Year 3	Year 4	1.08	0.54	0.296
		Year 5	0.60	0.54	1.000
		Interns	1.72	0.54	0.012
I would be embarrassed if a person in my family became mentally ill	Year 3	Year 4	0.52	0.50	1.000
		Year 5	0.00	0.50	1.000
		Interns	1.20	0.50	0.116
I believe that psychological disorders can never be completely cured	Year 3	Year 4	−0.28	0.53	1.000
		Year 5	−0.88	0.53	0.592
		Interns	0.48	0.53	1.000

Table 3 Comparison of scores on the Beliefs about Mental Illness Scale between Year 3 and other students *(concluded)*

Multiple comparisons Bonferroni dependent variable	Groups		MD	SD	P
Mentally ill people are unlikely to be able to live by themselves because they are unable to assume responsibilities	Year 3	Year 4	0.36	0.54	1.000
		Year 5	−0.20	0.54	1.000
		Interns	1.04	0.54	0.336
Most people can be friends with a mentally ill person without knowing	Year 3	Year 4	0.96	0.52	0.396
		Year 5	0.92	0.52	0.468
		Interns	2.56	0.52	< 0.001
The behaviour of people with psychological disorders is unpredictable	Year 3	Year 4	0.08	0.51	1.000
		Year 5	−0.04	0.51	1.000
		Interns	1.40	0.51	0.046
Psychological disorders are unlikely to be cured, regardless of treatment	Year 3	Year 4	−0.72	0.55	1.000
		Year 5	−0.52	0.55	1.000
		Interns	0.72	0.55	1.000
I would not trust the work of a mentally ill person assigned to my team at work	Year 3	Year 4	−0.08	0.55	1.000
		Year 5	−0.17	0.55	1.000
		Interns	1.12	0.55	0.259

MD = mean difference; SD = standard deviation

and 6 credit hours. Various teaching methods are used, including lectures, clinical training, simulated patients, videos, flipped classrooms, group discussions, and field visits. In addition to this, students have 12 contact hours engaged in a problem-based learning approach to mental illness as part of their training in family medicine during the same period. In 2009, the national competence framework for medical schools in Saudi Arabia recommended a biopsychosocial approach to clinical encounters (*19*). Accordingly, all medical schools in Saudi Arabia have introduced a 3–12-week clinical clerkship. Majmaah University medical students have a 2-month elective clerkship in psychiatry available during internship. Similar results were published in a study using the questionnaire of Balon et al. from Al-Hassa that involved 56 medical students (*20*). The study showed that participants who had psychiatric training involving 25 hours of lectures and 180 hours of practical training, which add up to 205 contact hours, corresponding to 6 credit hours, had a positive attitude towards mental illness. Regarding the duration of psychiatric training for medical students, a study from Egypt concluded that 3 weeks of psychiatric training resulted in no clear overall trend in attitudes towards mental illness (*21*). Thus, this length of training may not have been sufficient for students to witness improvement in mental illness after treatment; therefore, it might have negatively reinforced the preconceived idea that mentally ill patients are untreatable.

The present study clearly showed that students with a higher level of training had more positive attitudes towards mental illness compared to their juniors. Similar positive findings were reported in a study conducted among students in their final year of clinical training in China using a 21-item Attitude Towards Psychiatry questionnaire (*22*). A similar study conducted in India also revealed that interns demonstrated a significant positive difference in their attitudes towards psychiatric illness compared to other study groups (*23*). Both studies support the findings of the present study, that students with more psychiatric training at a higher level have a more favourable attitude towards mental illness. We also suggest that voluntary and active learning approaches and innovative teaching methods in psychiatry and in the medical curriculum likely contributed to the positive attitude of undergraduate medical students in the present study.

A similar study using the web-based Attitude Towards Psychiatry-30 (ATP-30) scale among medical students and interns from Umm Al-Qura University, Makkah, Saudi Arabia, revealed a neutral to positive attitude to mental illness (*24*). A study from Bahrain using the ATP-30 scale showed a moderately positive attitude towards mental illness with female and junior students demonstrating more positive attitudes than male and senior students, which suggests that greater psychiatric exposure did not result in more positive attitudes of medical students towards mental illness (*25*). Similarly, a number of authors from different countries, including Jamaica, India and Sri Lanka, have observed negative attitudes in nursing and medical students towards psychiatry (*26–28*). The results of the present study are in contrast with those previous studies. This may be because of the duration of training and effective implementation of teaching modules, cultural background of the participants, the questionnaires used to measure the attitudes, and the student populations studied.

The present study suggests that institutions should conduct similar surveys that may bring valuable insights and a neutral or negative attitude among medical students toward patients with mental illness, indicating

Table 4 Comparison of scores on the Attitudes towards Mental Illness Questionnaire for substance abuse, depression, psychosis and OCD vignettes between Year 3 and other students

Substance abuse case vignette					
Dependent variable	**Groups**		**MD**	**SD**	***P***
Do you think that this would damage Mr. A's career?	Year 3	Year 4	0.96	0.42	0.151
		Year 5	2.24	0.42	< 0.001
		Interns	2.40	0.42	< 0.001
Would I be comfortable if Mr. A was my colleague at work?	Year 3	Year 4	1.52	0.28	< 0.001
		Year 5	1.76	0.28	< 0.001
		Interns	2.00	0.28	< 0.001
Would I be comfortable about inviting Mr. A to a dinner party?	Year 3	Year 4	1.00	0.38	0.059
		Year 5	1.32	0.38	0.005
		Interns	1.88	0.38	< 0.001
How likely do you think it would be for Mr. A's wife to leave him?	Year 3	Year 4	1.24	0.37	0.007
		Year 5	1.72	0.37	< 0.001
		Interns	2.40	0.37	< 0.001
How likely do you think it would be for Mr. A to get in trouble with the law?	Year 3	Year 4	1.68	0.43	0.001
		Year 5	2.20	0.43	< 0.001
		Interns	3.12	0.43	< 0.001
Depression case vignette					
Dependent variable			**MD**	**SD**	***P***
Do you think that this would damage Mr. A's career?	Year 3	Year 4	2.08	0.36	< 0.001
		Year 5	2.60	0.36	< 0.001
		Interns	2.72	0.36	< 0.001
Would I be comfortable if Mr. A was my colleague at work?	Year 3	Year 4	1.68	0.30	< 0.001
		Year 5	1.84	0.30	< 0.001
		Interns	2.24	0.30	< 0.001
Would I be comfortable about inviting Mr. A to a dinner party?	Year 3	Year 4	1.00	0.35	0.030
		Year 5	1.64	0.35	< 0.001
		Interns	1.96	0.35	< 0.001
How likely do you think it would be for Mr. A's wife to leave him?	Year 3	Year 4	1.60	0.37	< 0.001
		Year 5	2.00	0.37	< 0.001
		Interns	2.60	0.37	< 0.001
How likely do you think it would be for Mr. A to get in trouble with the law?	Year 3	Year 4	1.04	0.43	0.106
		Year 5	1.16	0.43	0.050
		Interns	2.04	0.43	< 0.001
Psychosis case vignette					
Dependent variable			**MD**	**SD**	***P***
Do you think that this would damage Mr. A's career?	Year 3	Year 4	1.56	0.48	0.009
		Year 5	1.92	0.48	0.001
		Interns	2.96	0.48	< 0.001
Would I be comfortable if Mr. A was my colleague at work?	Year 3	Year 4	0.96	0.47	0.261
		Year 5	0.88	0.47	0.383
		Interns	2.08	0.47	< 0.001
Would I be comfortable about inviting Mr. A to a dinner party?		Year 4	1.60	0.46	9.004
	Year 3	Year 5	1.92	0.46	< 0.001
		Interns	2.72	0.46	< 0.001
How likely do you think it would be for Mr. A's wife to leave him?	Year 3	Year 4	0.88	0.42	0.229
		Year 5	1.08	0.42	0.068
		Interns	1.96	0.42	< 0.001

Table 4 Comparison of scores on the Attitudes towards Mental Illness Questionnaire for substance abuse, depression, psychosis and OCD vignettes between Year 3 and other students *(concluded)*

Substance abuse case vignette					
Dependent variable	**Groups**		**MD**	**SD**	***P***
How likely do you think it would be for Mr. A to get in trouble with the law?	Year 3	Year 4	2.16	0.40	< 0.001
		Year 5	2.20	0.40	< 0.001
		Interns	3.12	0.40	< 0.001
OCD case vignette					
Dependent variable			**MD**	**SD**	***P***
Do you think that this would damage Mr. A's career?	Year 3	Year 4	1.88	0.36	< 0.001
		Year 5	2.16	0.36	< 0.001
		Interns	2.96	0.36	< 0.001
Would I be comfortable if Mr. A was my colleague at work?	Year 3	Year 4	1.32	0.40	0.009
		Year 5	1.92	0.40	< 0.001
		Interns	2.44	0.40	< 0.001
Would I be comfortable about inviting Mr. A to a dinner party?	Year 3	Year 4	1.96	0.41	< 0.001
		Year 5	1.84	0.41	< 0.001
		Interns	2.84	0.41	< 0.001
How likely do you think it would be for Mr. A's wife to leave him?	Year 3	Year 4	1.08	0.42	0.069
		Year 5	0.80	0.42	0.355
		Interns	2.04	0.42	< 0.001
How likely do you think it would be for Mr. A to get in trouble with the law?	Year 3	Year 4	2.48	0.39	< 0.001
		Year 5	1.80	0.39	< 0.001
		Interns	2.92	0.39	< 0.001

MD = mean difference; OCD = obsessive compulsive disorder; SD = standard deviation.

the need for re-evaluation of the psychiatric curriculum and its implementation.

The present study had several limitations that should be noted. First, it had a small sample size and was conducted in a single institution. Second, all participants were men, as an equal sample of female students was not available owing to women only recently being enrolled in the College. Third, only medical students from a single university were included; therefore, the findings can only be extrapolated to male medical students across Saudi Arabia with a similar curriculum. Thus, a multicentre study with a larger sample size involving both male and female medical students is planned to provide more meaningful insight into this problem.

Conclusions

This study showed that a longer training period and a voluntary active learning approach were effective in moderately improving the beliefs and positive attitudes towards mental illness in undergraduate male medical students in Saudi Arabia.

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Amélioration des attitudes des internes par rapport aux étudiants de premier cycle de médecine à l'égard des patients atteints de maladie mentale en Arabie saoudite

Résumé

Contexte : L'attitude des étudiants en médecine vis-à-vis de la maladie mentale est importante car ils fourniront des soins à ce groupe de patients à l'avenir.

Objectifs : Évaluer les croyances et les attitudes des étudiants en médecine de premier cycle vis-à-vis de la maladie mentale et comparer les étudiants à différents niveaux.

Méthodes : La présente étude transversale descriptive a été menée auprès d'étudiants en médecine de premier cycle de la faculté de médecine de l'Université de Majmaah, en Arabie saoudite, au cours de l'année universitaire 2018-2019. Nous avons inclus des étudiants appartenant au sexe masculin de la troisième à la cinquième année (25 étudiants de chaque année) et 25 internes de sexe masculin en utilisant la méthode d'échantillonnage aléatoire stratifié proportionnel. Les participants ont répondu à l'échelle Beliefs about Mental Illness (BMI) et au questionnaire Attitudes towards Mental Illness (AMIQ).

Résultats : Nous avons utilisé les tests post-hoc de Bonferroni pour effectuer des comparaisons entre le groupe de troisième année, dont les membres étaient au début de leur formation psychiatrique, et les autres groupes ayant une formation plus poussée. Cela a permis de mettre en évidence des différences significatives dans les scores pour 11 des 21 items sur l'échelle BMI ($p < 0,05$). Toutes les questions concernant les quatre vignettes de l'AMIQ (toxicomanie, dépression, psychose et troubles obsessionnels compulsifs) ont montré une différence significative entre les élèves de la troisième année et ceux des autres groupes ayant une formation psychiatrique plus poussée ($p < 0,05$).

Conclusions : La formation psychiatrique médicale au moment de l'étude a permis d'améliorer positivement les croyances et les attitudes des étudiants en médecine vis-à-vis des patients atteints de maladie mentale.

تحسُّن اتجاهات الطلاب المتدربين مقارنة بالطلاب الدارسين في كلية الطب تجاه مرضى الاعتلال النفسي في المملكة العربية السعودية

عبد الرحمن الأطرم

الخلاصة

الخلفية: إن مواقف طلاب الطب تجاه الأمراض النفسية مهمة لأنهم سيقدمون الرعاية لهؤلاء المرضى مستقبلًا.

الأهداف: هدفت هذه الدراسة إلى تقييم معتقدات طلاب الطب في المرحلة الجامعية ومواقفهم في ما يتعلق بالأمراض النفسية والمقارنة بين الطلاب في مستويات مختلفة.

طرق البحث: أُجريَت دراسة وصفية –مقطعية بين الطلاب في كلية الطب، جامعة المجمعة، بالمملكة العربية السعودية، خلال السنوات الأكاديمية 2018–2019. وأدرجنا الطلاب الذكور في العام الدراسي الثالث حتى الخامس (25 طالبًا من كل عام) و25 طالبًا متدربًا باستخدام اختيار عشوائي طبقي متناسب. أجاب المشاركون على مقياس للمعتقدات المتعلقة بالأمراض النفسية واستبيان للمواقف تجاه الأمراض النفسية.

النتائج: استخدمنا اختبارات بونفيروني اللاحقة للمقارنات بين مجموعات العام الدراسي الثالث، الذين كانوا في بداية تدريبهم للصحة النفسية، والمجموعات الأخرى التي حصلت على تدريب نفسي أكثر. وكشف ذلك عن اختلافات كبيرة في درجات 11 من أصل 21 بندًا في مقياس المعتقدات المتعلقة بالأمراض النفسية ($P < 0.05$). وأظهرت جميع الأسئلة المتعلقة بالمشاهد الأربعة لاستبيان المرض النفسي (تعاطي المخدرات والاكتئاب والذهان واضطرابات الوسواس القهري) فروقًا كبيرة بين الطلاب في السنة الثالثة والطلاب في المجموعات الأخرى الذين حصلوا على تدريب نفسي أكثر ($P < 0.05$).

الاستنتاجات: أدى التدريب الطبي النفسي الحالي إلى تحسين معتقدات طلاب الطب ومواقفهم تجاه المرضى المصابين بأمراض نفسية.

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Evolution of acute lower respiratory infection in children aged < 5 years in Morocco from 2005 to 2014

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Abstract

Background: Acute lower respiratory infection is a major cause of death in children aged < 5 years in Morocco. The 13-valent pneumococcal conjugate vaccine (PCV) was introduced to the Moroccan National Immunization Programme in 2010.

Aims: To investigate the trend in the incidence of acute lower respiratory infection in children aged < 5 years during 2005–2014 in Morocco.

Methods: Data on acute lower respiratory infection in children aged < 5 years were obtained from the data published annually by the Moroccan Ministry of Health. We used joinpoint regression analysis to estimate the trend in incidence of acute lower respiratory infection during the study period.

Results: The incidence of acute lower respiratory infection increased significantly between 2005 and 2011: by 3.08% annually in children aged < 5 years and by 3.24% annually in children aged 1 to < 5 years. However, the incidence was stable after 2011 as the observed trends were not significant, although the incidence decreased from 2011 to 2014 by 4.26% annually in children aged < 5 years, by 3.57% annually in children aged 1 to < 5 years and by 5.14% annually in urban areas.

Conclusions: Our results suggest a probable influence of the PCV on the trend in incidence of acute lower respiratory infection in Morocco.

Keywords: acute lower respiratory infection, pneumococcal conjugate vaccine, children, joinpoint regression, Morocco

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Introduction

Acute lower respiratory infections (ALRIs), such as pneumonia and bronchiolitis, are the leading cause of morbidity and mortality in children aged < 5 years. According to recent estimates, every year about 120–156 million cases of ALRI occur globally, with ~1.4 million resulting in death. More than 95% of these deaths occur in low- and middle-income countries (*1–3*).

ALRI is caused by a number of infective agents, with *Streptococcus pneumoniae* being the most frequently identified bacterium and respiratory syncytial virus the most common virus (*4*). *S. pneumoniae* is responsible for a large proportion of the morbidity and mortality burden worldwide (*1*). It causes a wide range of diseases, from acute upper respiratory tract infections to severe invasive infections such as meningitis and severe pneumonia (*1*). The Institute for Health Metrics and Evaluation estimated that *pneumococcus* was responsible for 393 000 pneumonia deaths in children younger than 5 years in 2015 (*2*), and it is the leading cause of bacterial pneumonia, with an estimated 335 000 deaths in 2015 (*3*).

The pneumococcal conjugate vaccine (PCV) was introduced in the United States of America (USA) in 2000, and covered the 7 pneumococcal serotypes circulating in the USA (4, 6B, 9V, 14, 18C, 19F and 23F). The National Vaccination Program with 7-valent PCV resulted in a marked decrease in the incidence of severe pneumonia and a reduction in hospital mortality from severe pneumonia (*4*). PCV has also reduced the incidence of pneumonia in unvaccinated populations by reducing colonization of the nasopharynx in vaccinated children (*4*), and through herd immunity (*5,6*). Other studies have also shown a reduction in invasive pneumococcal diseases after introduction of PCV (*7,8*).

In Morocco, ALRI is a major cause of death in children aged < 5 years (*9*). In view of the importance of these infections, Morocco set up a national programme in 1993 to control acute respiratory infections in children. In 1997, the Moroccan Ministry of Health began progressively implementing the World Health Organization's Integrated Management of Childhood Illness (IMCI) strategy. The strategy promotes the use among health workers of evidence-based clinical guidelines in outpatient settings by using standardized clinical case definitions to identify and treat common causes of childhood death. In first-level health facilities, the clinical case definition of pneumonia, which is the main cause of ALRI, is based on

2 simple clinical endpoints: fast breathing and drawing in of the lower chest wall (*10*). The PCV was introduced in the Moroccan National Immunization Programme in 2010 (*9*); the 13-valent PCV was introduced in October 2010 and was replaced by 10-valent PCV in July 2012 (*11*,*12*). The vaccination consists of 3 injections: the first at 2 months, the second at 4 months and the third at 12 months. PCV coverage was 15% in 2010, 23% in 2011 and reached 70–80% from 2012 (data from the Moroccan Ministry of Health).

The aim of the present study was to investigate the trend in incidence of ALRI in children aged < 5 years between 2005 and 2014 in Morocco.

Methods

Study design and population

This study was conducted in Morocco, situated in the northwest of Africa. We considered the administrative division of Morocco into 16 regions (*13*), as the study concerned the period before the divisional change in 2015 (*14*). The estimated population of Morocco in 2014 was around 34 million (*15*), with a life expectancy at birth of 74.8 years (*16*). About 10% of the population was aged < 5 years (*15*). The fertility rate in 2014 was 2.21 births per woman (*15*).

We conducted a retrospective observational study using data provided by the national programme for controlling acute respiratory infections in children and published annually by the Moroccan Ministry of Health (*16*). The definition of ALRI was based only on clinical criteria. Cases were mainly reported from public hospitals and public health centres. Private health facilities do not participate much in the surveillance system. All levels of severity of ALRI were reported but unfortunately, we did not have data stratified by stage of severity.

Data on ALRI in children aged < 5 years from 2005 to 2014, as well as the target populations during these years, were collected from the data published annually by the Moroccan Ministry of Health (*16*). Data on the number of ALRI cases and the target population were collected by region, age group (< 1 year and 1 to < 5 years) and residence (urban and rural).

Statistical analysis

The trend in ALRI incidence was assessed by regression analysis using Joinpoint Regression Program, version 4.2.0.2. The incidence of ALRI was calculated as the number of reported cases divided by the target population by region according to age group (< 1 year or 1 to < 5 years) and residence (urban or rural). Multiple reports for the same child in the same year were removed by the data provider so that a case was counted only once.

The Joinpoint Regression Program is a statistical software package that computes and analyses nonlinear, piecewise trends of time series. The trend is computed in segments that are connected together at joinpoints. If there are no joinpoints, the trend is flat and displayed as a straight line. Joinpoint uses a Monte Carlo permutation test to detect years when significant changes in rate trends occur (*17*). The joinpoint regression is different from other similar models, like piecewise regression, because it has the constraint of continuity at the change points, and the choice of the number of joinpoints and their locations is estimated within the model. A distinguishing characteristic of this model is that the minimum and maximum number of joinpoints allowed is arbitrarily set before the analysis, while the final number of joinpoints is not fixed *a priori* by the researcher, as in a classical piecewise regression model, but it is established on the basis of a statistical criterion.

The software calculates the annual percentage change (APC) and its 95% confidence interval (CI) for each trend segment. APC is 1 way to characterize trends in incidence rates over time. When the Log Transformation option on the Input File tab is ln(y) = xb, then the output calculates the estimated APC. With this approach, the incidence rates are assumed to change at a constant percentage of the rate of the previous year *(17)*. For example, if the APC is 1%, and the rate was 50 per 100 000 in 1990, the rate was 50 – 1.01 = 50.5 in 1991 and 50.5 – 1.01 = 51.005 in 1992. Rates that change at a constant percentage every year change linearly on a log scale. For this reason, to estimate the APC for a series of data, the following regression model is used (*17*):

$$\log(R_y) = b_0 + b_1 y \text{ where } \log(R_y) \text{ is the natural log of the rate in year } y.$$

$$\text{The APC from year } y \text{ to year } y+1 = \left[\frac{R_{y+1} - R_y}{R_y}\right] \times 100$$

$$= \frac{\{e^{b_0 + b_1(y+1)} - e^{b_0 + b_1(y)}\}}{e^{b_0 + b_1(y)}} \times 100$$

$$= (e^{b_1} - 1) \times 100$$

It is not always reasonable to expect that a single APC can accurately characterize the trend over an entire series of data. The joinpoint model uses statistical criteria to determine when and how often the APC changes. For incidence rates, it is fit using joined log-linear segments, so each segment can be characterized using an APC. For example, incidence rates may rise gradually (positive APC) for a period of several years, rise sharply for several years after that, and then drop gradually (negative APC) for the next several years. Finding the joinpoint model that best fits the data allows us to determine how long the APC remained constant and when it changed (*17*).

For any segment with slope β, the APC is 100 {exp(β) – 1}. The 100(1 – α)% confidence limits are *(17)*:

$$Lower = 100\{exp(\beta - s^* t_d^{-1}(1 - \alpha/2)) - 1\}$$

$$Upper = 100\{exp(\beta + s^* t_d^{-1}(1 - \alpha/2)) - 1\}$$

where d is the degrees of freedom and s is the standard error for the slope and $t_d^{-1}(q)$ is the qth quantile of a t distribution with d degrees of freedom. The P value for a 2-sided test for which the true APC is 0 is calculated based on a t distribution.

The analysis was performed for all children aged < 5 years, followed by a stratified analysis by age group,

residence area and region. We did not perform a sex-specific analysis or other specific analyses because the data published in the Ministry of Health report only included age group. The APCs before and after the joinpoint for the different regions were represented using the Linked Micromaps software.

Ethical approval and consent to participate

This study was approved by the Ethics Committee of the Faculty of Medicine and Pharmacy, Mohamed V University, Rabat. All data are presented in aggregate form without any individual identification in the report of the Ministry of Health of Morocco, which is openly available on the Ministry of Health website (*16*).

Results

During 2005–2014, 2 338 282 cases of ALRI occurred in Morocco (Table 1). Most cases were children aged 1 to < 5 years (1 545 357, 66.1%) and occurred in urban areas (1 401 437, 60.0%).

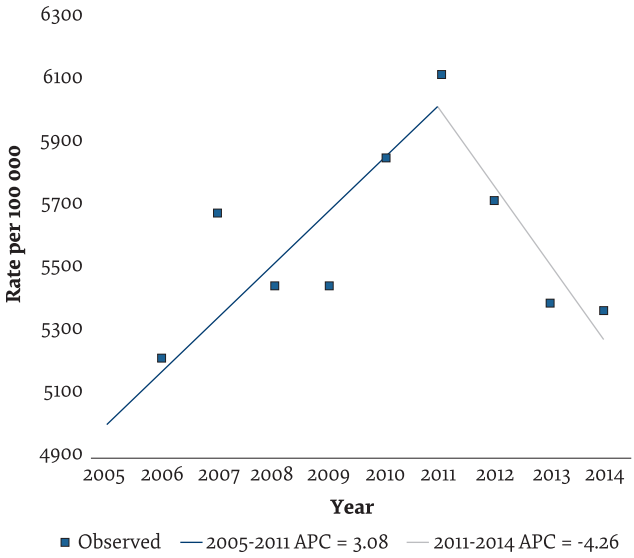
The incidence of ALRI increased significantly between 2005 and 2011: by 3.08% in children aged < 5 years (APC = 3.08, 95% CI: 0.7–5.6) (Figure 1), by 3.24% in children aged 1 to < 5 years (APC = 3.24, 95% CI: 0.6–6.0)

Table 1 Distribution of cases of ALRI in children in Morocco by age group, residence and region 2005–2014

Variable	No. (%)
ALRI in children aged < 5 years	2 338 282 (100.0)
Age group (years)	
0–1	792 925 (33.9)
1 to < 5	1 545 357 (66.1)
Residence	
Urban	1 401 437 (59.9)
Rural	936 845 (40.1)
Region	
Tanger-Tetouan	265 431 (11.4)
Gharb-Chrarda-Beni Hssen	131 207 (05.6)
Taza-Al Hoceima-Taounate	101 525 (04.3)
Oriental	128 073 (05.5)
Rabat-Sale-Zemmour-Zaer	266 172 (11.4)
Grand Casablanca	331 676 (14.2)
Fes-Boulemane	119 871 (05.1)
Chaouia-Ourdigha	118 893 (05.1)
Doukala-Abda	679 19 (02.9)
Marrakech-Tensifet-Al Haouz	304 806 (13.0)
Tadla-Azilal	906 94 (03.9)
Sous-Massa-Draa	213 929 (09.1)
Meknes-Tafilalet	141 039 (06.0)
Guelmim-Es Semara	359 50 (01.5)
Laayoune-Boujdour-Sakia El Hamra	145 53 (00.6)
Oued Ed Dahab-Lagouira	6 544 (00.3)

ALRI = acute lower respiratory infection.

Figure 1 Trend in the incidence of acute lower respiratory infections in children <5 years, Morocco, 2005–2014.



APC = annual percentage change.

and by 4.27% in urban areas (APC = 4.27, 95% CI: 1.3–7.6) (Figure 2A). However, the incidence was relatively stable after 2011 as the observed trends were not statistically significant, although the incidence decreased from 2011 to 2014 by 4.26% in children aged < 5 years (APC = –4.26, 95% CI: –10.9 to 2.8) (Figure 1), by 3.57% in children aged 1 to < 5 years (APC = –3.57, 95% CI: –10.7 to 4.1) and by 5.41% in urban areas (APC = –5.41, 95% CI: –13.6 to 3.3) (Figure 2A). The joinpoints corresponded to the year 2011 (95% CI: 2007–2012) for children aged < 5 years, children aged 1 to < 5 years and in urban areas (Table 2).

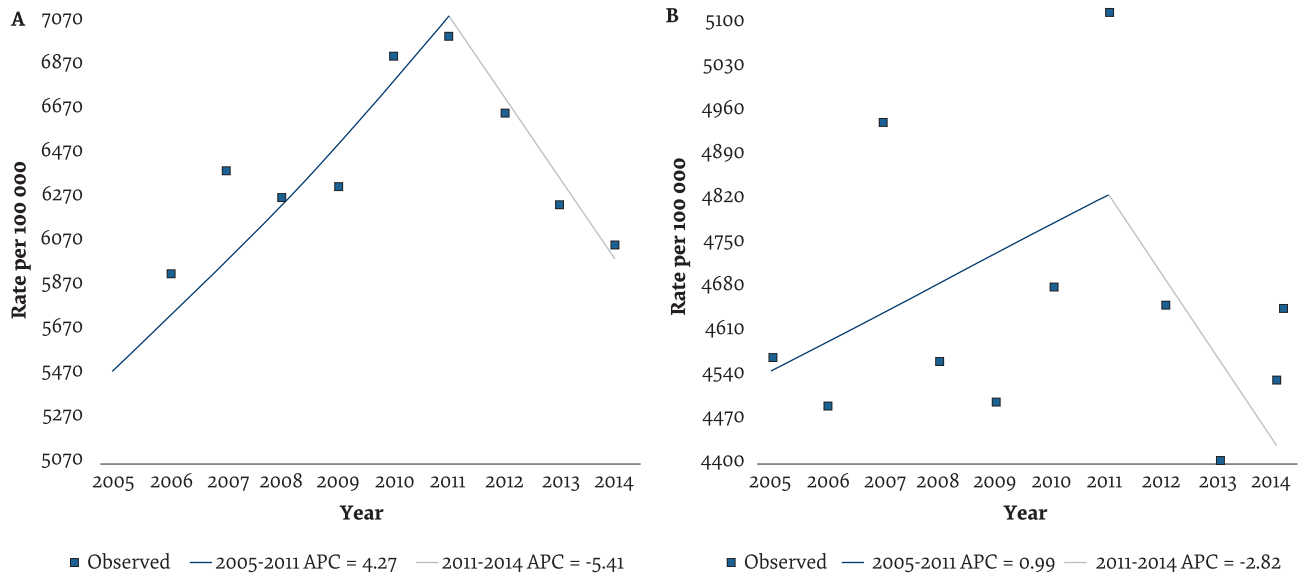
The incidence of ALRI increased from 2005 to 2011: by 2.17% in children aged < 1 year (APC = 2.17, 95% CI: –0.2 to 4.5) and by 0.99% in rural residence (APC = 0.99, 95% CI: –1.4 to 3.4) (Figure 2B) but these increases were not significant. The incidence decreased from 2011 to 2014: by 5.60% in children aged < 1 year (APC = –5.60, 95% CI: –11.7 to 1.0) and by 2.82% in rural residence (APC =–2.82, 95% CI: –9.3 to 4.3) (Figure 2B) but these decreases were also not significant. The joinpoints corresponded to the year 2011 (95% CI: 2007–2012) for children aged < 1 year and in rural residence (Table 2).

In 8 out of 16 regions, there was an increase in the incidence of ALRI before the joinpoint, a significant increase in 3 of them, and a decrease in the incidence after this joinpoint in 12 of 16 regions, a significant decrease in 1 of them (Figure 3, Table 2). The 95% CI of these 8 joinpoints included the period following PVC introduction (Table 2).

Discussion

Our results showed a break in the trend of increasing incidence of ALRI in children aged < 5 years in 2011 (1 year after introduction of the PCV in the national immunization programme in Morocco). The incidence increased significantly before the joinponit (positive APC) and

Figure 2 Trend in the incidence of acute lower respiratory infections in children <5 years by residence, Morocco, 2005–2014: (A) urban residence, (B) rural residence



APC = annual percentage change.

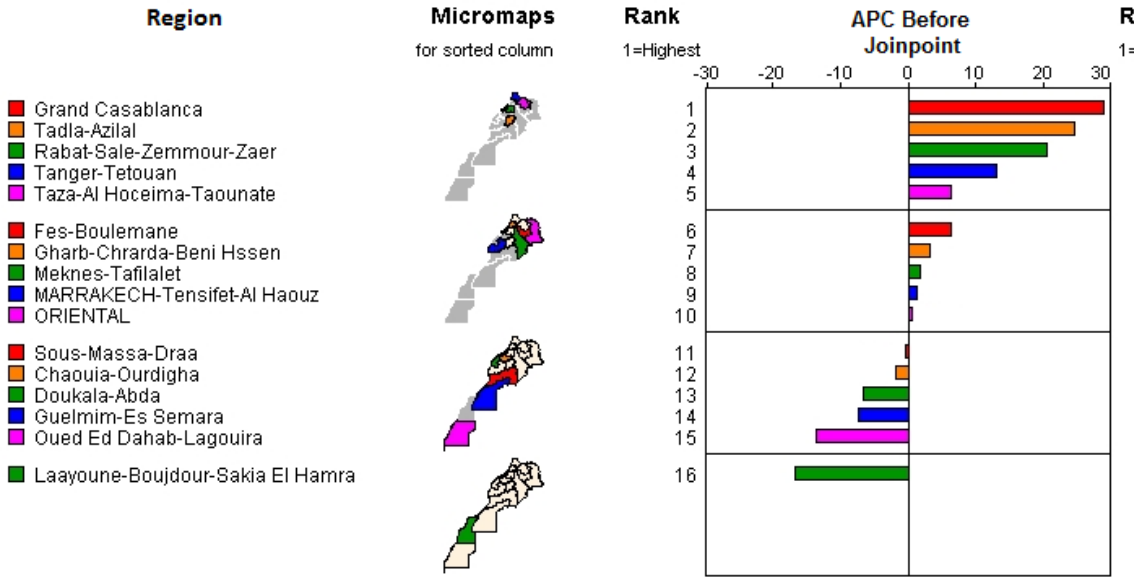
decreased after the joinpoint (negative APC). This decrease could have been due to multiple factors such as a training programme for diagnosis of ALRI, or changes in health system practices. We hypothesize that this decrease could also be explained by the introduction in 2010 of the PCV in the national immunization programme in Morocco. We observed a significant decreasing trend or stabilization in incidence of ALRI, in children aged 1 to <

Table 2 APC in acute lower respiratory infection before and after joinpoints by age, residence and region in Morocco, 2005–2014

Variable	APC before joinpoint	APC after joinpoint	Joinpoint	95% CI
Children aged <5 years	3.08[a]	-4.26	2011	2007–2012
Age group (years)				
0–1	2.17	-5.60	2011	2009–2012
1 to < 5	3.24[a]	-3.57	2011	2007–2012
Residence				
Urban	4.27[a]	-5.41	2011	2007–2012
Rural	0.99	-2.82	2011	2007–2012
Region				
Tanger-Tetouan	13.20	-0.71	2007	2007–2012
Gharb-Chrarda-Beni Hssen	3.32	-4.45[a]	2007	2007–2012
Taza-Al Hoceima-Taounate	6.39	-13.54	2012	2007–2012
Oriental	0.64	-4.02	2011	2007–2012
Rabat-Sale-Zemmour-Zaer	20.66[a]	1.80[a]	2007	2007–2008
Grand Casablanca	28.84[a]	-1.15	2008	2007–2012
Fes-Boulemane	6.36[a]	-13.53	2012	2008–2012
Chaouia-Ourdigha	-1.87	-10.96	2011	2007–2012
Doukala-Abda	-6.72	0.67	2009	2007–2012
Marrakech-Tensifet-Al Haouz	1.40	-1.73	2012	2007–2012
Tadla-Azilal	24.75	-3.20	2007	2007–2009
Sous-Massa-Draa	-0.39	-8.43	2011	2008–2012
Meknes-Tafilalet	1.86	-6.91	2011	2007–2012
Guelmim-Es Semara	-7.30[a]	17.35	2011	2008–2012
Laayoune-Boujdour-Sakia El Hamra	-16.59[a]	27.57[a]	2010	2009–2012
Oued Ed Dahab-Lagouira	13.49[a]	-6.59	2010	2007–2012

[a]*Annual percentage change is statistically different from 0 at = 0.05.*
APC = annual percentage change; CI = confidence interval.

Figure 3 Annual percentage change (APC) before and after joinpoints by region, Morocco, 2005–2014.



5 years, in urban areas, and in 3 of 16 regions, which were among the most populated. The 95% CI of joinpoints included the postvaccination period. This suggests efficacy of the PCV in preventing ALRI. The difference in trend was more evident in urban than rural areas and children aged 1 to < 5 years compared with < 1 year because the number of cases was more important in these 2 groups, so the power was sufficient to show a significant difference.

Several studies have highlighted the effect of introduction of PCV in reducing respiratory infections (*18–21*). Furthermore, randomized clinical trials have shown that PCV prevents pneumonia (*22–24*). However, efficacy estimates have varied according to the case definition of pneumonia. Vaccine efficacy against clinically diagnosed pneumonia was 6% for 7-valent PCV in the Northern California Kaiser Permanente trial (*22*) and 7% for a 9-valent PCV in a Gambian trial (*23*). A trial in South Africa also using a 9-valent PCV reported efficacy of 16% for pneumonia admissions (*24*). Vaccine efficacy estimates were consistently higher when radiological confirmation was included as part of the case definition – 18% in the Kaiser Permanente trial (*22*), 17% in the South African trial (*24*) and 37% in the Gambian trial (*23*).

There were some limitations to our study. (1) The decrease in incidence 1 year after PCV was introduced was not significant, except in Gharb-Chrarda-Beni Hssen. This could have been due to lower statistical power because of limited time (only 3 years) after the joinpoint. (2) The analytical method used was exploratory and did not take into account any other factors that may influence the trend in the incidence of ALRI; in particular, the level of regional implementation of the programme to control ALRI in children. Further analysis, including interrupted time series analysis with a multivariate approach, could be used to answer this question more thoroughly. (3) The surveillance system in Morocco is managed exclusively by the Ministry of Health and it is mostly based on the public sector. While its representativeness could be questioned, the trends shown by the data collected are not biased because there was no change in the surveillance organization during the study period (4). Cases of ALRI are based on passive surveillance data and this may result in under-reporting. However, this bias would have a small effect on our results since under-reporting would persist over time (5). The definition of ALRI was based only on clinical criteria, we did not have information about the causative agents, and ALRI can be caused by bacteria and viruses other than *S. pneumoniae* (6). The calculated incidence was biased because cases counted in the numerator corresponded to those notified only in the public sector (7). We did not include a control group for assessing our results (8). In Guelmim-Essemara, Laayoune-Boujdour-Sakia El Hamra and Oued Ed Dahab-Lagouira, there was a significant decreasing trend in the incidence of ALRI before the joinpoint of PCV introduction and this was stable after the joinpoint, except for Laayoune-Boujdour-Sakia El Hamra. The CI of the joinpoint includes the postvaccination period. These southern regions are desert areas and are less populated. This observation may be also due to an increase in the number of reports following awareness campaigns or other factors favouring a rise in ALRI cases, especially a decline in breastfeeding in these regions.

In spite of these limitations, our study is important because it is the first national study in Morocco to assess the effect of PCV introduction on the trend in the incidence of ALRI, using national epidemiological surveillance data.

Conclusion

Our results suggest that PCV has influenced the trends in incidence of ALRI in Morocco. However, the analytical method used cannot provide strong evidence about this relationship and this hypothesis must be explored by further studies.

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Mesure de l'évolution de l'infection aiguë respiratoire basse chez l'enfant de moins de cinq ans au Maroc de 2005 à 2014

Résumé

Contexte : L'infection aiguë respiratoire basse constitue une cause majeure de décès chez les enfants de moins cinq ans au Maroc. Le vaccin antipneumococcique conjugué 13-valent (VPC 13) a été introduit dans le cadre du Programme de vaccination national du Maroc en 2010.

Objectifs : Mesurer l'évolution de l'incidence de l'infection aiguë respiratoire basse chez les enfants de moins de cinq ans durant la période comprise entre 2005 et 2014 au Maroc.

Méthodes : Des données sur l'infection aiguë respiratoire basse chez les enfants de moins de cinq ans ont été obtenues à partir des données publiées chaque année par le ministère de la Santé marocain. Nous avons recouru à l'analyse de régression joinpoint pour estimer la tendance de l'incidence de ce type d'infections pendant la période de l'étude.

Résultats : L'incidence de l'infection aiguë respiratoire basse a augmenté de manière significative entre 2005 et 2011 de 3,08 % par an chez les enfants de moins de cinq ans et de 3,24 % par an chez les enfants dont l'âge était compris entre un et moins de cinq ans. Cependant, l'incidence était stable après 2011, les tendances observées n'étant pas significatives, bien que l'incidence ait diminué de 4,26 % par an entre 2011 et 2014 chez les enfants de moins de cinq ans, de 3,57 % par an chez les enfants dont l'âge était compris entre un et moins de cinq ans et de 5,14 % par an dans les zones urbaines.

Conclusions : Nos résultats suggèrent une influence probable du VPC 13 sur l'évolution de l'incidence de l'infection aiguë respiratoire basse au Maroc.

تطور عدوى الجهاز التنفسي السفلي الحادة في الأطفال الذين تقل أعمارهم عن 5 سنوات في المغرب في الفترة بين عامي 2005 و2014

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الخلاصة:

الخلفية: تُعتبر عدوى الجهاز التنفسي السفلي الحادة أحد الأسباب الرئيسية للوفاة في الأطفال الذين تقل أعمارهم عن 5 سنوات في المغرب. وأُدخل اللقاح المتقارن المضاد للمكونات الرئوية المكون من 13 عنصراً في البرنامج الوطني للتحصين في المغرب في عام 2010.

الأهداف: هدفت هذه الدراسة إلى تحري الاتجاه السائد في معدل الإصابة بعدوى الجهاز التنفسي السفلي الحادة في الأطفال الذين تقل أعمارهم عن 5 سنوات في الفترة 2005–2014 في المغرب.

طرق البحث: تم الحصول على بيانات عن الإصابة بعدوى الجهاز التنفسي السفلي الحادة في الأطفال الذين تقل أعمارهم عن 5 سنوات من البيانات التي تُنشرها سنوياً وزارة الصحة المغربية. وقد استخدمنا تحليل انحدار النقط لتقدير الاتجاه السائد في معدل الإصابة بعدوى الجهاز التنفسي السفلي الحادة خلال فترة الدراسة.

النتائج: ارتفع معدل الإصابة بعدوى الجهاز التنفسي السفلي الحادة ارتفاعاً كبيراً في الفترة بين عامي 2005 و2011: بنسبة 3.08٪ سنوياً في الأطفال الذين تقل أعمارهم عن 5 سنوات، وبنسبة 3.24٪ سنوياً في الأطفال الذين تتراوح أعمارهم بين سنة إلى أقل من 5 سنوات. وعلى الرغم من ذلك، كان معدل الإصابة ثابتاً بعد عام 2011، إذ أن الاتجاهات الملحوظة لم تكن ذات أهمية، على الرغم من زيادة معدلات الإصابة من عام 2011 إلى عام 2014 بنسبة 4.26٪ سنوياً في الأطفال الذين تقل أعمارهم عن 5 سنوات، وبنسبة 3.75٪ سنوياً في الأطفال الذين تتراوح أعمارهم بين سنة إلى أقل من 5 سنوات، وبنسبة 5.14٪ سنوياً في المناطق الحضرية.

الاستنتاجات: تُشير نتائجنا إلى تأثير محتمل للقاح المتقارن المضاد للمكونات الرئوية على اتجاه معدل الإصابة بعدوى الجهاز التنفسي السفلي الحادة في المغرب.

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Elimination of mother-to-child transmission of HIV in Oman: a success story from the Middle East

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Abstract

Background: In January 2016, the National AIDS Programme (NAP) in Oman introduced a package of interventions, including capacity building for service providers, to improve the quality of HIV services.

Aims: To report the impact of these interventions on the rate of vertical HIV transmission in the period from January 2016 to December 2019. We also describe the virological and obstetric outcomes for HIV-infected pregnant women.

Methods: This was a medical record review of 94 HIV-positive pregnant women (median age 32 years; interquartile range 25-34 years) reported to NAP in 2016–2019.

Results: There were 110 pregnancies in 94 women. The majority (75.3%, 61/81) of women were diagnosed with HIV infection from routine antenatal screening, with 60% (66/110) of pregnancies occurring in women who knew their HIV status at conception. Caesarean section was the most common (50%) mode of delivery. The preterm labour and low birth weight rates were 21.2% and 15.9%, respectively. The antiretroviral coverage during pregnancy was 95.5%, with most (87.8%) women reporting excellent or good adherence. The majority (81.6%) of women achieved HIV viral load of < 400 copies/ml at or near delivery. Almost all infants (99%) were given prophylactic antiretrovirals. The rate of mother-to-child transmission of HIV was 1%.

Conclusion: The obstetric and virological outcomes for HIV-infected pregnant women delivered in 2016–2019 were favourable, with a low rate of mother-to-child transmission of HIV. Oman is now in the process of finalizing application of World Health Organization validation of elimination of mother-to-child transmission of HIV.

Keywords: elimination, HIV/AIDS, mother-to-child transmission, Middle East, Oman

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Introduction

In 2018, there were an estimated 160 000 new human immunodeficiency virus (HIV) infections globally among children aged < 15 years (*1*), which was a remarkable reduction from >400 000 cases in 2000 (*2*). This achievement, arguably one of the greatest public health accomplishments in recent years, was the result of increasing prevention of mother-to-child transmission (MTCT) of HIV globally from 1% in 2000 to 80% in 2017 (*2*) and 92% in 2018 (*1*).

The World Health Organization (WHO) recommends 4 integrated strategies for reduction of paediatric HIV cases. They include prevention of HIV in women of childbearing age, family planning, prevention of MTCT, and care and support for HIV-infected mothers and their infants and families (*3*). Components of the third strategy include highly active antiretroviral therapy (HAART) during pregnancy (*4*), a planned prelabour caesarean section (CS) if indicated (*5*), avoidance of breastfeeding (*6*), and a short course of antiretrovirals for the infants (*7*). A recent systematic review showed that prelabour CS did not result in a significant reduction of MTCT of HIV in the context of viral suppression. Besides, prelabour CS was associated with a 3-fold increase in maternal morbidity compared with vaginal delivery (*8*). WHO recommends that prelabour CS should not be routinely recommended to women living with HIV, and the decision about the mode of delivery should balance the potential risks and benefits for both mothers and infants (*9*). The risk of MTCT of HIV can be reduced to < 1% if preventive interventions are applied effectively (*4*).

A crucial step in prevention of MTCT of HIV is identifying the seropositive status of pregnant women. Antenatal screening for HIV, a partnership between the National AIDS Programme (NAP) and Department of Maternal and Child Health at the Ministry of Health, was introduced in Oman in July 2009 (*10*). The policy recommends routinely offering HIV and syphilis testing to all pregnant women, attending public and private institutions, as part of booking blood tests. Women who have not booked tests and those without a documented HIV test in their antenatal records should have rapid HIV testing at labour. All HIV-positive pregnant women are counselled and referred to a secondary care facility where they are managed by a multidisciplinary team consisting

of specialists in infectious diseases, obstetrics and paediatrics (*11*). The coverage of HIV antenatal screening in Oman has been consistently high (> 95%) over recent years (*12*), and in 2018, 97.24% (86 534/88 990) of pregnant women who attended at least 1 antenatal visit were screened for HIV (*13*).

In January 2016, NAP in Oman introduced a package of interventions, including capacity building for HIV service providers and the development of clinical care pathways to improve the quality of HIV services in the country. The impact of such interventions on the cascade of HIV care in Oman has recently been reported (*14,15*). This study reports the impact of these interventions, along with other specific actions taken by NAP targeting the prevention of MTCT of HIV, on the rate of vertical HIV transmission between January 2016 and December 2019. We also describe the virological and obstetric outcomes for HIV-infected pregnant women who delivered in the same period.

Methods

Study setting

The geography, demographics and HIV prevalence/services in Oman setting have been described elsewhere (*14,15*). The prevalence of HIV in Oman is low (*1*). The first case was diagnosed in 1984, and by December 2018, 3060 HIV/AIDS cases were reported to NAP; 1566 (51.2%) of whom were alive (*16*). Fourteen centres provide free access to HIV treatment and care (*11*). The country has robust and accessible primary health care, and antenatal care coverage and institutional delivery have been around 99.6% over the last 10 years (*12*).

Study population

We studied HIV-infected pregnant women who delivered between January 2016 and December 2019. Women with miscarriages and pregnancy terminations were excluded.

Interventions

(1) Development of capacity building and clinical care pathways is described elsewhere (*14,15*). In summary, the capacity building activities included hands-on training followed by ongoing clinical mentoring for HIV doctors, nurses, counsellors and pharmacists. Streamlined care pathways were developed for new HIV diagnosis, ART initiation, ART switching, treatment failure and retention in care. The pathways recommended that newly diagnosed patients should receive effective counselling and pre-ART preparation. Patients were seen at 2,4,8 and 12 weeks after initiation or modification of ART for adherence support, management of adverse effects, and laboratory monitoring. A nurse or pharmacist contacted patients who missed their clinic visits to reschedule appointments and ensure continuity of ART supply. (2) Case review of HIV vertical transmissions and near misses by NAP and MCH teams. (3) Experienced HIV counsellors, at the secondary care level, gave the initial post-test counselling for newly diagnosed HIV-positive pregnant women instead of the primary health care team. (4) Linkage into and retention in care pathways was developed with a strong emphasis on pregnant women.

Data sources

Patients were identified from the NAP database. NAP collects cohort data for all people diagnosed with HIV in Oman as part of the national HIV surveillance programme. HIV treatment centres send NAP notifications of newly diagnosed cases and annual follow-up clinical information.

Data collection

Data collected included maternal demographics, HIV characteristics [HIV risk, reason for HIV test, baseline CD4 count and HIV viral load (measurements closet to HIV diagnosis)] and ART details [protease inhibitor (PI)-based HAART, non-nucleoside reverse transcriptase inhibitor (NNRTI)-based HAART and integrase-inhibitor-based HAART]. We also recorded hepatitis B and C virus coinfection status and obstetric characteristics: gravidity, parity, gestational age at HIV diagnosis and first HIV clinic appointment for newly diagnosed mothers, and gestational age at first HIV clinic appointment after conception in previously known HIV cases. Social data included history of domestic violence, financial problems and housing issues during pregnancy. Data on key outcomes of interest were also collected, such as self-reported adherence during pregnancy, HIV viral load at or near to delivery (categorized as < 50, 51–399, 400–999 and ≥ 1000 copies/ml), mode of delivery, gestational age at delivery, birth weight (categorized as > 3 kg, 2.5–3.0 kg and < 2.5 kg) and MTCT of HIV. Adherence was categorized as excellent, good and poor if the mother reported taking 100%, ≥ 95% but < 100 %, and < 95%, respectively. Mode of delivery was categorized as spontaneous vaginal delivery, instrumental vaginal delivery and CS. Gestational age at delivery was grouped as ≥ 37, 35–36, 32–34 and < 32 weeks. The rate of MTCT of HIV was calculated as the number of HIV-positive infants divided by the number of infants born to HIV-infected pregnant women. Infants were considered uninfected if the HIV polymerase chain reaction was negative after 3 months of age or if the HIV antibody test was negative after 18 months of age.

Data were collected using a standardized proforma, which was produced by NAP and sent to the respective HIV clinics. Data were collated centrally and entered into Microsoft Excel Office 2016 for analysis. Ethical approval was not sought as this study was a clinical audit, and all data variables were collected routinely as a standard of care.

Results

We identified 124 pregnancies in 2016–2019. Due to incomplete reporting, 14 pregnancies in 2019 were excluded from further analysis. Table 1 shows the maternal characteristics. There were 110 pregnancies in 94 women. The median age was 32 years [interquartile range (IQR) 25–34 years]. The majority (75.3%, 61/81) of women were diagnosed with HIV infection from routine antenatal screen-

Table 1 Maternal characteristics of HIV-positive pregnant women in Oman, 2016–2019

Characteristics	
Age at HIV diagnosis, median (IQR)	32 (25–34) yr
Timing of HIV diagnosis (n = 110)	
Pre-conception	66 (60.0)
Antenatal	44 (40.0)
Reason for HIV testing (n = 81)	
Antenatal	61 (75.3)
Contact of HIV patients	10 (12.3)
HIV/AIDS-related symptoms	4 (4.9)
Patient's request	3 (3.7)
Pre-employment	3 (3.7)
Risk factor for HIV acquisition (n = 94)	
Heterosexual	94 (100.0)
Other	0
HIV disease stage (n = 75)	
Asymptomatic	71 (94.7)
Symptomatic	4 (5.3)
AIDS	0 (0.0)
HBsAg (n = 73)	
Positive	0
Negative	73 (100.0)
Hepatitis C status (n = 73)	
Positive	0
Negative	73 (100.0)
CD4 cell count at baseline, median (IQR)	352 (213–474) cells/mm3
CD4 cell count at or closest to conception, median (IQR)	415 (302–558) cells/mm3
HIV VL at baseline, median (IQR)	23 182 (5630–97 300) copies/mL
Median VL at or closest to conception, median (IQR)	3300 (20–22 550) copies/mL
Residence (n = 110)	
North Batinah	40 (36.4)
Muscat	20 (18.2)
South Batinah	16 (14.5)
Other	34(30.9)
Education (n = 98)	
University	17 (17.3)
Secondary	67 (68.4)
Primary	8 (8.2)
Illiterate	6 (6.1)
Employment (n = 110)	
Employed	14 (12.7)
Unemployed	96 (87.3)
Housing problems (n = 68)	
Yes	2 (2.9)
No	66 (97.1)
Financial problems (n = 71)	
Yes	1 (1.4)
No	70 (98.6)
History of domestic violence (n = 71)	
Yes	2 (2.8)
No	69 (97.2)

Data are n (%) unless otherwise indicated. IQR = interquartile range; VL = viral load.

ing, with 60% (66/110) of pregnancies occurring in women who knew their HIV status at conception. Seventy-one of 75 (94.7%) women were asymptomatic at diagnosis. The median CD4 count at baseline and conception was 352 cells/mm^3 (IQR, 213–474 cells/mm^3) and 415 cells/mm^3 (IQR, 302–558 cells/mm^3), respectively. Eighty-four of 98 (85.7%) pregnancies were in women with at least secondary education. Fourteen of 110 (12.7%) pregnant women were employed. History of domestic violence was reported in 2 of 71 (2.8%) pregnant women.

The obstetric details are shown in Table 2. The median number of previous pregnancies was 1 (0–3), and 35.4% (35/99) were primigravid. The median gestational age at booking and first HIV clinic attendance, in new cases was 9 weeks. CS was the mode of delivery in half of 104 pregnancies. Preterm delivery (< 37 weeks) occurred in 24 of 99 (21.2%) of deliveries. Birth weight was documented in 88 infants, and 14 (15.9%) had low birth weight (< 2.5 kg).

Table 3 illustrates the details of antiretroviral use in mothers and infants. The most used ART during pregnancy was NNRTI-based HAART (57.3%, 63/110), followed by PI-based HAART (29.1%, 32/110). Self-reported adherence to ART during pregnancy was excellent, good and poor in 74.2% (49/66), 13.6% (9/66) and 12.1% (8/66), respectively. Five women were not on ART during pregnancy. Three of them knew their HIV status prior to the index pregnancy and had a longstanding history of disengagement with HIV services. One woman had no antenatal care and was diagnosed with HIV at delivery. The fifth woman was diagnosed with HIV antenatally, but neither the patient nor the medical team attending her labour knew her HIV status, and her infant was infected. The HIV viral load at or closest to delivery was

Table 2 Obstetric details of HIV-positive pregnant women in Oman, 2016–2019

Characteristics	
Parity (n = 109)	
Primigravida	35 (35.4)
Gravida 2	24 (24.2)
Gravida 3	12 (12.1)
Gravida >3	38 (38.3)
No. of previous pregnancies, median (IQR)	1 (0–3)
Gestational age at booking first midwife appointment, median (IQR)	9 (6-14) wk
Gestational age at first HIV appointment in new cases, median (IQR)	9 (7–15) wk
Gestational age at first HIV clinic attendance after conception in old cases, median (IQR)	12 (15–23)
Mode of delivery (n = 104)	
Spontaneous vaginal delivery	49 (47.1)
Instrumental vaginal delivery	3 (2.9)
Caesarean section	52 (50.0)
Gestational age at delivery, median (IQR)	38 (37–38) wk
Gestational age at delivery (n = 99)	
< 32 wk	2 (2.0)
32–34 wk	7 (7.1)
35–36 wk	12 (12.1)
≥ 37 wk	78 (78.8)
Year of delivery (n = 110)	
2016	32 (29.1)
2017	27 (24.5)
2018	33 (30.0)
2019	18 (16.4)
Live birth (n = 110)	108 (98.2)
Birth weight (n = 88)	
> 3.0 kg	42 (47.7)
2.5–3.0 kg	32 (36.4)
< 2.5 kg	14 (15.9)

Data are n (%) unless otherwise indicated. IQR = interquartile range.

Table 3 Details of antiretroviral use in HIV-positive pregnant women and their infants in Oman, 2016–2019

Characteristics	
On HAART at conception (n = 110)	
Yes	64 (57.2)
No	46 (41.8)
Type of ART during pregnancy (n = 110)	
NNRTI-based HAART	63 (57.3)
PI-based HAART	32 (29.1)
INSTI-based HAART	10 (9.1)
None	5 (4.5)
Adherence to ART during pregnancy (n = 66)	
Excellent	49 (74.2)
Good	9 (13.6)
Poor	8 (12.1)
Median VL at or closest to delivery, median (IQR)	20 (20–139) copies/ml
HIV VL at or closest to delivery (n = 98)	
Undetectable	65 (66.3)
51–399 copies/ml	15 (15.3)
400–999 copies/ml	2 (2.0)
≥ 1000 copies/ml	16 (16.3)
Intrapartum ZDV (n = 101)	
Yes	88 (87.1)
No	13 (12.9)
ART received by infants (n = 102)	
ZDV monotherapy	90 (88.2)
HAART	11 (10.8)
None	1 (1.0)
Adherence to infant's ART (n = 68)	
Excellent	46 (67.6)
Good	20 (29.4)
Poor	2 (3.0)
Infant's HIV status (n = 99)	
Negative	98 (99.0)
Positive	1 (1.0)

Data are n (%) unless otherwise indicated. ART = antiretroviral therapy; HAART = highly active antiretroviral therapy; INSTI = integrase inhibitor; IQR = interquartile range; PI = protease inhibitor; NNRTI = non-nucleoside reverse transcriptase inhibitors; VL = viral load; ZDV = zidovudine.

< 400 copies/ml in 81.6% (80/98) of pregnancies, with a median viral load of 20 copies/ml (IQR, 20–139 copies/ml). Intrapartum zidovudine was used in the majority (87.1%, 88/101) of pregnancies. Similarly, most (88.2%, 90/102) infants received zidovudine monotherapy.

HIV testing data were missing for 9 babies; 5 of whom were born towards the end of 2019. The rate of MTCT of HIV was 1% (1/99). For this infant, the mother was diagnosed with HIV late in pregnancy, when she attended antenatal care at around 31weeks gestation on 25 February 2016 at her local primary health centre. She missed her subsequent antenatal clinic appointments, and the medical team were unable to inform her of the HIV diagnosis. She had complex social circumstances and was recalled to the clinic on several occasions without success. She delivered on 6 April 2016 without any HIV interventions in place. She subsequently attended the health centre for postnatal follow-up on 18 May 2016 when she was informed of her HIV diagnosis and urgently referred to the HIV clinic. The viral load of her infant from that day was 8 657 676 copies/ml. The mother's baseline viral load and CD4 count were 17 921 copies/ml and 474 cells/mm^3, respectively.

Discussion

Our data show that CS was the most common (50%) mode of delivery. The preterm labour and low birth weight rates

were 21.2% and 15.9%, respectively. The ART coverage during pregnancy was 95.5%, with most (87.8%) women reporting excellent or good adherence. The majority (81.6%) of women achieved HIV viral load < 400 copies/ml at or near delivery. Almost all infants (99%) were given prophylactic antiretrovirals. The most important outcome of our study is the low (1%) rate of MTCT of HIV.

We observed a higher rate of CS in our study compared to that in the general population in Oman (50% vs 19.4%) (*12*). This is partly due to the use of CS as an intervention to reduce the risk of MTCT of HIV when the maternal HIV viral load is > 400 copies/ml (*5*). The low birth weight rate in our cohort was also higher than the national average (15.9% vs 11.6%) (*12*). Islam et al. recently reported 9.7% preterm labour in 534 singleton live births at a tertiary hospital in Muscat (*17*), which is lower than the 21.2% in our study. HIV infection per se and antiretrovirals can partly explain the higher rates of adverse neonatal complications observed in our cohort (*18–21*). However, our findings of higher rates of preterm delivery, low birth weight and CS are consistent with previous studies conducted among HIV-infected pregnant women (*22–29*). For instance, a recent large population-based cohort study in the United States of America showed that pregnant HIV-positive women had a greater likelihood of CS than their HIV-negative counterparts (*23*). Moreover, neonates born to HIV-infected women were at higher risk of prematurity and intrauterine growth restriction (*23*). The British HIV Association national audit of deliveries in 2013 and 2014 showed that CS occurred in 53.2% (719/1349) of pregnancies (*24*). Also, 11-year data from a large German HIV cohort showed that CS and preterm labour rates were 89.6% (296/330) and 37% (122/330), respectively (*25*).

The virological outcomes in our patients concurred with those achieved in previous studies (*25–29*). HIV viral load < 400 copies/ml at or near delivery in our study was similar to that reported in a German cohort (81.6% vs 85%) (*25*). Moreover, the HIV MTCT rate in our study was low (1%) and comparable to levels reported in the United Kingdom of Great Britain and Northern Ireland and Germany (*5*,*25*). Data about the management of HIV-infected pregnant women in the Middle East and North Africa (MENA) are scarce. A report of 40 pregnancies in HIV-positive women from Saudi Arabia showed that HIV viral load < 1000 copies at delivery and CS occurred in 77.5% (31/40) and 70% (28/40), respectively, with all 39 infants testing negative for HIV infection (*29*).

In January 2016, the NAP in Oman introduced interventions to build the capacity of HIV service providers, which have resulted in remarkable improvements in all aspects of the cascade of HIV care from linkage into care to viral suppression (*14*,*15*). This positive impact was noted in all HIV patients' groups, including pregnant women. HIV infection remains a stigmatized and socially complex disease, particularly in the MENA Region. Therefore, the provision of psychological support to newly diagnosed HIV-positive pregnant women as they adjust to their diagnosis and get ready to start ART is crucial. Our care pathways support patients, including pregnant women as they go through the HIV care continuum from diagnosis to viral load suppression. The face-to-face, multisession adherence support after initiating ART could explain, in part, the favourable clinical outcomes that we observed among our cohort (*30*).

The case review of HIV vertical transmission (*31*) was invaluable in identifying gaps in services and informing quality improvement initiatives. This exercise identified 3 main problems in the continuum of care for pregnant women, particularly linkage into care. Firstly, the high turnover among primary health care staff, coupled with the limited exposure to HIV cases resulted in poor quality post-test counselling and support for newly diagnosed HIV-positive women in antenatal clinics. Secondly, we identified significant delays of up to 3 weeks in referring new cases to HIV treatment centres while waiting for confirmation of the initially reactive HIV test. Thirdly, the lack of a multidisciplinary approach and escalation mechanisms when dealing with poor maternal compliance with prevention of MTCT interventions, such as missing appointments and declining ART during pregnancy. To rectify these problems, post-test counselling for newly diagnosed HIV-positive pregnant women is now given by experienced HIV counsellors at the secondary instead of primary health care level. Linkage into and retention in care pathways was developed with a strong emphasis on pregnant women. In this pathway, the gestational age of pregnancy determines the urgency of action; for instance, any new diagnosis or loss to follow-up in the second/third trimester is considered a medical emergency. In such a scenario, the case should be discussed with the director of communicable diseases, child protection team and maternal and child health coordinator in the province. The case should also be discussed with the NAP team. This initiative has averted several potential cases of MTCT of HIV since 2016. The HIV-infected infant in our study was born in April 2016 and this was attributed to failure to link the mother into HIV care. Of note, 3.5% (4/115) of the infants born to HIV-positive pregnant women in Oman in 2012–2015 were HIV-infected (Ministry of Health, personal communication). All the four cases were due to poor adherence to ART and disengagement from HIV services during the index pregnancy.

Limitations of our study include those inherent to any retrospective design. Documentation bias and missing data may mean that point estimates were underestimated. It is possible that some of the eligible pregnancies in the study period were not included in the analysis if the NAP was not notified of the pregnancy. This is particularly relevant for pregnant women who knew their HIV status before conception as NAP solely relies on notification from HIV treatment centres. As for the women diagnosed with HIV during pregnancy, NAP is notified by the central laboratory, Department of Maternal and Child Health and HIV clinics. Another limitation was that it was not possible to generalize our findings to other populations due to the small size of our cohort. However, to our knowledge, this was the first

nationwide study that described pregnancy outcomes in HIV-infected women in the MENA Region.

In 2015, WHO established the Global Validation Advisory Committee for Elimination of MTCT of HIV (EMTCT) (32). Since then, many countries have been validated for eliminating MTCT of HIV as a public health problem (33). The validation has process and impact targets. The process indicators are population-level antenatal care coverage (at least 1 visit) of ≥ 95%, coverage of HIV testing of pregnant women of ≥ 95%, and ART coverage of HIV-positive pregnant women of ≥ 95%. The impact targets are a population case rate of new paediatric HIV infections due to MTCT of ≤ 50 per 100 000 live births and an HIV MTCT rate of < 2% (4-year cumulative data are required for low prevalence countries such as Oman). Oman meets both the process and impact criteria for EMTCT of HIV validation.

To conclude, the obstetric and virological outcomes for HIV-infected pregnant women delivered in 2016–2019 were favourable. The NAP interventions, introduced in 2016, have built on the success of the HIV antenatal screening programme and closed the gaps in the continuum of HIV care for pregnant women, paving the way for eliminating MTCT of HIV in Oman. The country is now in the process of finalizing application of the WHO EMTCT.

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Élimination de la transmission mère-enfant du VIH à Oman : un exemple de réussite au Moyen-Orient

Résumé

Contexte : En janvier 2016, le Programme national de lutte contre le sida à Oman a mis en place un ensemble d'interventions, comprenant le renforcement des capacités des prestataires de services, afin d'améliorer la qualité des services de lutte contre le VIH.

Objectifs : Signaler l'impact de ces interventions sur le taux de transmission verticale du VIH au cours de la période comprise entre janvier 2016 et décembre 2019. Nous décrivons également les résultats virologiques et obstétricaux pour les femmes enceintes touchées par le VIH.

Méthodes : Il s'agissait d'un examen des dossiers médicaux, notifiés au Programme national de lutte contre le sida de 2016 à 2019, pour 94 femmes enceintes séropositives (âge médian : 32 ans ; intervalle interquartile : 25-34 ans).

Résultats : Il y avait 110 grossesses chez 94 femmes. La majorité (75,3 %, 61/81) des femmes ont reçu un diagnostic d'infection par le VIH lors du dépistage prénatal systématique, et 60 % (66/110) des grossesses se sont produites chez des femmes qui connaissaient leur statut sérologique au moment de la conception. La césarienne était le mode d'accouchement le plus courant (50 %). Les taux de travail prématuré et de faible poids de naissance étaient respectivement de 21,2 % et 15,9 %. La couverture antirétrovirale pendant la grossesse était de 95,5 %, la plupart des femmes (87,8 %) signalant une excellente ou une bonne observance. La majorité (81,6 %) des femmes ont atteint une charge virale VIH inférieure à 400 copies/ml à l'accouchement ou à proximité. Presque tous les nourrissons (99 %) ont reçu des antirétroviraux prophylactiques. Le taux de transmission mère-enfant du VIH était de 1 %.

Conclusion : Les résultats obstétricaux et virologiques des femmes enceintes séropositives ayant accouché entre 2016 et 2019 étaient favorables, avec un faible taux de transmission mère-enfant du VIH. Oman finalise actuellement l'application de la validation de l'élimination de la transmission mère-enfant du VIH par l'Organisation mondiale de la Santé.

القضاء على انتقال فيروس العوز المناعي البشري من الأم إلى الطفل في عُمان: قصة نجاح من الشرق الأوسط

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الخلاصة

الخلفية: في يناير/ كانون الثاني 2016، قدَّم البرنامج الوطني للإيدز في عُمان حزمة من التدخلات، اشتملت على بناء قدرات مقدمي الخدمات، بغرض تحسين جودة الخدمات الخاصة بفيروس العوز المناعي البشري.

الأهداف: هدفت هذه الدراسة الى الإبلاغ عن تأثير التدخلات على معدل الانتقال الرأسي لفيروس العوز المناعي البشري في الفترة من يناير/ كانون الثاني 2016 إلى ديسمبر/ كانون الأول 2019. أيضًا وصفنا النتائج الفيروسية والتوليدية للحوامل المصابات بفيروس العوز المناعي البشري.

طرق البحث: روجعت السجلات الطبية لـ 94 حاملًا مصابات بفيروس العوز المناعي البشري (العمر الوسيط 32 سنة؛ المدى الرباعي للعمر 25–34 سنة) اللواتي أُبلغ عنهن إلى البرنامج الوطني للإيدز في الفترة 2016–2019.

النتائج: حدثت 110 أحمال لدى 94 امرأة. وشُخِّصت إصابة غالبية النساء (75.3٪، 61/ 81) بفيروس العوز المناعي البشري من خلال الفحص الروتيني قبل الولادة، مع حدوث حمل لدى 60٪ (66/ 110) من نساء كن يعرفن إصابتهن بالفيروس عند الحمل. وكانت العملية القيصرية أكثر طرق الولادة شيوعًا (50٪). وبلغت معدلات الولادة المبتسرة وانخفاض وزن المواليد 21.2٪ و15.9٪ على التوالي. وبلغت التغطية بمضادات الفيروسات القهقرية خلال الحمل 95.5٪، مع التزام معظم النساء (87.8٪) التزامًا ممتازًا أو جيدًا بالعلاج. وحققت غالبية النساء (81.6٪) حملًا فيروسيًّا لأقل من 400 نسخة/ مل عند الولادة أو بالقرب منها. وأُعطِيَ جميع الرضع تقريبًا (99٪) مضادات الفيروسات القهقرية الوقائية. وبلغ معدل انتقال العدوى بفيروس العوز المناعي البشري من الأم إلى الطفل 1٪.

الاستنتاجات: لقد كانت النتائج التوليدية والفيروسية للحوامل المصابات بفيروس العوز المناعي البشري التي جرت في الفترة 2016–2019 مبشِّرة، مع انخفاض معدل انتقال فيروس العوز المناعي البشري من الأم إلى الطفل. ان عُمان الآن بصدد وضع اللمسات الأخيرة على تطبيق مصادقة منظمة الصحة العالمية على القضاء على انتقال فيروس العوز المناعي البشري من الأم إلى الطفل.

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Epidemiology of work-related lower back pain among rehabilitation professionals in Saudi Arabia

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Abstract

Background: Occupational and physical therapists are at risk of musculoskeletal pain and injuries possibly due to their work-related activities, posture and affected body mechanics.

Aims: To investigate the epidemiology of lower back pain among rehabilitation professionals.

Methods: A cross-sectional survey of 259 physical and occupational therapists in rehabilitation centres in Saudi Arabia was conducted during July–August 2019, using the Modified Nordic Questionnaire. Data on different measures of lower back pain, and its consequences and risk factors were collected. Logistic regression analysis was done to identify significant predictors of lower back pain.

Results: Rehabilitation professionals experienced 73.7% 1-year lower back pain prevalence, 52.5% intense pain that lasted ≥ 1 day, 22.4% chronic lower back pain, 23.9% sick-leave-seeking lower back pain and 18.5% medical-care-seeking lower back pain. Difficult/impossible activities of daily living in standing up (45.5%), employment (44.0%), climbing stairs (33.9%), walking (33.0%), sitting (29.3%), sleeping and travel (29.8% each), awakening (23.0%), social life (26.2%), and personal care (15.7%) were reported. Lower back pain was responsible for stopping work in 32.5% of participants, with a mean 1.38 (±2.96) days off work during the last year. One half of participants (50.3%) were treated by physiotherapy, 25.1% by medical care, and 39.3% requested rest days and/or sick leave. Physical stress and < 10 years' experience were significant predictors of lower back pain.

Conclusion: Prevalence of lower back pain was high among rehabilitation professionals, with a high impact on activities of daily living. Physiotherapy was the main management adopted. Educational programmes are necessary to teach proper use of body mechanics, and sports activity programmes to reduce the risk of lower back pain and arrange for proper rest periods.

Keywords: physical therapy, prevalence, ergonomics, consequences, occupational lower back pain.

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Introduction

The World Health Organization defines work-related diseases as any disease that occurs as a consequence of exposure to multiple work-related risk factors and causes (1). Low back pain (LBP) is the most frequently reported work-related musculoskeletal disorder associated with physical demands of various professions (2). LBP is characterized by 1 or more of the following measures: pain that lasts for 1 year; daily pain for ≥ 3 months; intense pain that lasts for 1 day; and pain that results in seeking medical care and/or sick leave (3,4). Throughout the typical work day, patient care staff may find themselves ascending or descending stairs, bending, twisting, lifting heavy objects or transferring patients; all of which can contribute to the onset of LBP, especially if optimal body mechanics are not utilized. Physical work that requires poor posture and frequent lifting, bending or twisting is a risk factor for LBP (5). Work-related LBP often leads to disability and affects the activities of daily living (ADLs) such as mobility, dressing, sitting and standing (6).

Rehabilitation professionals, including physical therapists (PTs), occupational therapists (OTs), physical therapy assistants and certified OT assistants all may encounter some type of patient care that involves manual lifting or manoeuvring at some point throughout the typical work day. OTs and PTs both receive training in their respected professional courses in proper body mechanics and self-protection while handling and transferring patients (7). However, despite this training, these professionals are still at risk for musculoskeletal injuries associated with patient handling. PTs and OTs are responsible for treating patients who have various types of pain. Higher levels of work-related LBP could be due to extreme loads in the work setting or faulty musculoskeletal techniques used in treating patients. Therapists may overload their muscles and joints during treatment sessions, which increases the risk of LBP (7,8). These injuries are due to patient transferring, ambulation,

repositioning, and related repetitive tasks that are often done in an irregular body position, unconsciously, and can lead to LBP (*9*).

In a recent systematic review and meta-analysis in Saudi Arabia, pooled prevalence rates of LBP of 40.8%, 65.0% and 81.4% were obtained for week, year and career, respectively, across all professional groups (*10*). Nurses and PTs were more susceptible to LBP than the other professions were; age, body mass index, and female gender were the most commonly reported individual risk factors; and work-related activities requiring back bending and twisting, lifting and pulling objects, and manual patient handling were the main occupational risk factors.

However, evidence of LBP in rehabilitation staff is limited, and even conflicting in the current literature (*1*). Therefore, further research is needed to expand research on the prevalence and severity of LBP and its impact on ADLs among rehabilitation staff. The aim of this study was to investigate work-related LBP among PTs and OTs in Saudi Arabia by estimation of the prevalence of work-related LBP, determination of its predictors, its personal and occupational consequences, and the different management methods adopted for it.

Methods

Study population

All registered members of the Saudi Physical Therapy Association (SPTA) and Saudi Occupational Therapy Association (SOTA) were invited to complete an online electronic questionnaire. Pregnant women and individuals with LBP caused by injuries or birth defects were excluded.

Sample size and sampling techniques

Based on a prevalence of 68% of LBP among rehabilitation professionals in a previous study (*8*), and by using Raosoft sample size calculator, with a confidence level of 95% and a margin of error of 5%, the estimated sample size was 274 rehabilitation professionals. The sample size required was 329 participants after accounting for nonresponses or incomplete data. A convenience sampling technique was used to select the participants. All potential participants (~1200) were invited to participate via SOTA and SPTA social media channels (Email, Twitter, Instagram and Facebook), with a link to the data collection tool. They were reminded to participate within 2 weeks from the first invitation date. A total of 259 completed questionnaires were analysed (response rate 22%).

Data collection

The previously validated Modified Nordic Questionnaire was constructed in a survey monkey that limits 1-time participation per unique IP address, and distributed via social media to the potential participants (*3,4,11,12*). It was structured into 4 sections. (1) Demographic characteristics: age, sex, height, weight and comorbidity such as diabetes, hypertension and arthritis. (2) Lifestyle information: rehabilitation professionals' lifestyle and behaviour such as exercise (walking and running, for 15 minutes/day) and smoking habits. (3) Occupational characteristics: nature of the participants' rehabilitation tasks, such as lifting of heavy objects and/or patients, work load and, sick leave due to LBP. (4) Work-related LBP: LBP within the last year, using the modified Nordic Questionnaire (*3*), LBP impact on work and ADLs, sick leave because of LBP, and manageability of pain. Definitions of LBP were according to different measures/characteristics adopted from previous studies (*3,4,11,12*). Reliability of the questionnaire was assessed in terms of internal consistency. Cronbach's was calculated, and a coefficient of 0.81 was considered adequate.

Ethics approval and consent to participate

This research was approved by the Institutional Review Board (IRB) of The Ministry of National Guard-Health Affairs, Riyadh, Saudi Arabia (Ref. RSS19/040/R). Each participant was provided a research information/consent form. The researchers invited the rehabilitation professionals, via their corresponding societies, to take part in the study. The purpose of the study and how to fill in the questionnaire were explained, and all issues regarding confidentiality and privacy were assured and protected at all times. No written consent was sought, as there were no personal identifiers on the questionnaires, and this was approved by the IRB. Submission of responses to the questionnaire was considered to constitute implied consent. The voluntary nature of participating in the survey was made explicit and unambiguous in the cover letter.

Data analysis

SPSS version 25 was used for data entry and analysis. Descriptive statistics such as frequency and percentages, mean score and standard deviation of all independent variables were used. Statistical analysis was used to test associations of the LBP prevalence and rehabilitation professionals' personal and work-related characteristics. The χ^2 test and Fisher's exact test were used for qualitative variables and Student's *t* test for quantitative variables. Bivariate analysis was used to examine relationships between LBP and possible risk factors. Multiple logistic regression analysis was applied to identify the significant predictors of LBP, with the following variables as independent variables; gender, age group (< 30 and ≥ 30 years), running practice (yes or no), direct patient contact (yes or no), duration of experience in current work (<10 and ≥ 10 years), duration of shift (6–9 or 10–12 h) and physical stress (yes or no). $P \leq 0.05$ was considered statistically significant.

Results

Demographic characteristics

The personal characteristics of 196 PTs and 63 OTs are shown in Table 1. Most of them were single (61.4%), with a mean age of 29.27 (7.04) years and mean work duration

Table 1 Rehabilitation professionals' personal characteristics

Characteristics	n = 259	%/ratio
Male/female ratio	109/150	1:1.4
Marital status (single/married ratio)	159/100	1:1.6
Diabetes	10	3.9%
Arthritis	1	0.4%
Trauma/fracture of spine, pelvis, legs	17	6.6%
Spinal problems (e.g., scoliosis)	19	7.3%
Back surgery	3	1.2%
	Mean	**SD**
Age (21–63 yr)	29.27	7.04
Duration of employment in current job (1–32 yr)	5.79	5.27
Working days in 1 week	2.39	0.71
Weight (37–128 kg)	70.42	16.47
Height (136–188 cm) 164.77	10.33	
BMI (14.82–44.06 kg/m²)	25.66	4.98
Lifestyle behaviour	***n***	**%**
Walking > 15 min/d	185	71.4
Running > 15 min/d	41	15.8
Others > 15 min/d	98	37.8
Smoking	40	15.4

BMI = body mass index; SD = standard deviation.

of 5.8 (5.3) years. Their mean body mass index was 25.7 (5.0) kg/m². Most participants (71.4%) practiced walking for > 15 minutes/day but only 15.8% practiced running for > 15 minutes/day, and 15.4% were smokers.

Work-related characteristics

Most participants (92.3%) were in direct contact with patients, and office work was the nature of the work for only 7.7% of participants (Table 2). Only 14.3% of participants undertook shift work, while the majority undertook day work (85.7%). Shifts of 6–9 hours were reported by 96.1% of participants, with only 3.9% reporting shifts of 10–12 hours duration shift.

Prevalence of lower back pain

LBP during the past year that lasted at least 1 day was prevalent among 73.7% of participants and intense pain that lasted at least 1 day (score > 6) was prevalent among 52.5% (Table 3). Chronic LBP pain (22.4%), sick-leave-seeking LBP (23.9%) and treatment-seeking pain (18.5%) were also reported. Days of sick leave due to LBP ranged from 0 to 30 days per participant during the past year, with an average of 1.38 (2.96) days, and the average number of days/month with LBP was 4.89 (6.32).

Consequences of lower back pain

Among the 191 participants with LBP in the past year, the following ADLs were reported as difficult or impossible: climbing stairs (33.9%), sitting (29.3%), walking (33.0%), standing up (45.5%), sleeping (29.8%), getting out of bed (23.0%), social life (26.2%), travel (29.8%), employment (44.0%) and personal care (15.7%) (Table 3). Physiotherapy was the main management modality adopted (50.3%), followed by medical care (25.1%). Seeking sick leave and/or rest days was reported by 39.3% of participants with LBP. Nearly one third (32.5%) of participants reported stopping work in the past year because of LBP, with a mean of 1.38 (2.96) days.

Factors associated with lower back pain

Table 4 shows that age > 30 years was significantly associated with LBP ($P = 0.013$). The practice of running for > 15 minutes/day was a protective factor against LBP ($P = 0.043$). Less than 10 years' experience ($P < 0.001$), direct contact with patients ($P = 0.047$), enrolment in 6–9-hour shifts ($P = 0.013$), and exposure to physical stress ($P = 0.005$) were all significantly associated with LBP. However, after adjustment for all potential variables, < 10 years' experience in the current job ($P = 0.034$) and exposure to physical stress ($P < 0.001$) were the only significant predictors of LBP (Table 5).

Discussion

In the present study of rehabilitation professionals in Saudi Arabia, most participants (73.7%) reported having LBP for at least 1 day in the past year, which was similar to some previous studies (*11*,*13*–*15*), but higher than in others (*16*–*18*). These differences in LBP prevalence rates could be explained by the difference in methodology and definition of LBP adopted (*3*). In the present study, the preva-

Table 2 Work characteristics

Work nature	*n*	%
Direct contact with patients	239	92.3
Office work	20	7.7
Shift nature		
Day work	222	85.7
Shift work	37	14.3
Shift hours		
6–9/shift	249	96.1
10–12shift	10	3.9
Work days/week	5.2 (0.6)	
Work experience		
≤ 10 yr	215	83.0
> 10 yr	44	17.0
Intensity of workload		
Light/moderate	163	62.9
Heavy/overwhelming	96	37.1
Type of workloada	***n***	**%**
Physical stress	179	69.1
Sitting > 4 h/shift	16	6.2
Standing/moving > 4 h/shift	140	54.1

[a]*Categories are not mutually exclusive.*

Table 3 Prevalence and consequences of lower back pain among rehabilitation professionals in the past 12 months

Measures of prevalence(n = 259)[a]	*n*	%
LBP in past 12 mo	191	73.7
Chronic LBP daily for ≥ 3 mo	58	22.4
Intense pain that lasted ≥ 1 d	136	52.5
Medical-care-seeking LBP	48	18.5
Sick-leave-seeking LBP	62	23.9
Intensity of LBP (n = 191)[b]	***n***	**%**
Mild	75	39.3
Moderate	95	49.7
Severe/intense	21	11.0
Sickness absence for LBP (n = 191)	***n***	**%**
None	129	67.5
1–6 d	50	26.2
1–2 wk	12	6.3
Mean (SD) (d)	1.38 (2.96)	
Difficult/impossible ADL (n = 191)[a]	***n***	**%**
Getting out of bed	44	23.0
Sleeping	57	29.8
Sitting	56	29.3
Standing up	87	45.5
Walking	63	33.0
Climbing stairs	61	33.9
Personal care	30	15.7
Social life	50	26.2
Travel	57	29.8
Employment	84	44.0
Overall	76	39.8
How was LBP managed (n = 191)[a]	***n***	**%**
Medication	48	25.1
Rest day/sick leave	75	39.3
Physiotherapy	96	50.3
Others	30	15.7

[a]*Categories are not mutually exclusive.*
[b]*Based on respondent self-reports.*
ADL = activity of daily living; LBP = lower back pain.

lence rates were: chronic LBP (22.4%), intense LBP (52.5%), medical-care-seeking LBP (18.5%), and sick-leave-seeking LBP (23.9%). LBP has a high prevalence among healthcare providers and has serious medical and professional consequences (*19*). Stopping work due to LBP is considered to be the main indicator for evaluation of the professional consequences of LBP. In the present study, LBP was not the main reason for seeking sick leave as most rehabilitation professionals were on leave for < 1 week because of it. The rate of sick leave of 32.5% due to LBP in our survey was similar to that in other studies (*3*,*20*). In our study, the mean duration of stopping work was 1.38 days/year, which is lower than 4.5 and 15 days reported by nurses (*3*,*20*,*21*). Disability due to chronic LBP varied between 11% and 76% (*22*,*23*). In our study, more than one third of all rehabilitation professionals with LBP reported limitation in 1 or more of the following ADLs: sleeping, getting out of bed, standing up, walking, sitting, climbing stairs, travel, employment and personal care. Our study showed that the magnitude of the effect of LBP was profound while the level of experienced LBP was mostly minimal and moderate. One of the possible reasons for this was the fact that the questionnaire did not attach the clear/operational definition of a number of asked variables, so the response was subjected to response bias. Due to the potential bias, the outcomes of this study may give an impression that working in rehabilitation activities is hazardous. Variation in rates of disability in different studies could be attributed to the different methods used in the measurement of disability.

Heavy workload was reported by most of the rehabilitation professionals in our study in terms of heavy objects/physical assistance and physical stress. Physical stress was associated with higher prevalence of LBP, and participants with physical stress were nearly 4 times more likely to contract LBP than those with no physical stress. This finding was in agreement with other studies (*3*,*20*,*24*). Length of work experience was a significant protector against LBP, with participants with < 10 years' experience being 3 times more likely to contract LBP than those with ≥ 10 years. Previous studies have shown that with experience, healthcare workers learn how to protect their backs and become more familiar with how to deal with heavy objects without hurting their backs (*25*,*26*). Other work-related factors such as shift hours and shift nature, did not show significant associations with LBP prevalence. However, it is difficult to separate the staff's risk factors from the work-related risk factors (*3*).

In agreement with previous studies (*3*,*24*), we found that the practice of running for > 15 minutes/day by rehabilitation professionals was a protective factor against LBP. However, after adjusting for different confounders, this association was not seen. Association between LBP and some sociodemographic and personal characteristics of healthcare providers such as age (*3*), gender (*3*,*25*,*26*), marital status (*3*), obesity (*3*,*12*,*24*,*27*,*28*), smoking (*3*,*25*,*29*) and comorbidity, such as arthritis, diabetes or spinal problems, have been investigated. However, none of these factors was a predictor of LBP among rehabilitation professionals in our study.

Lower back pain is managed by medication, physiotherapy or surgical intervention (*25*). In the present study, physiotherapy was used in 50.3% of the cases, as compared to only 11.5% in a previous study on nurses (*20*). This finding might reflect the fact that rehabilitation professionals are more convinced of the effect of physiotherapy in relieving LBP than other treatment modalities, such as drug treatment, which was adopted by only 25.1% of LBP sufferers in our study. Rehabilitation professionals are supposed to have more easy access to physiotherapy than other healthcare workers have.

Table 4 **Prevalence of lower back pain and association with some characteristics among rehabilitation professionals**

Sociodemographics	*n*	%	χ^2	*P*	OR (95% CI)
Sex					
Male	74	67.9	3.33	0.07	1.68 (0.97–2.93)
Female	117	78.0			
Age					
≤ 30 yr	53	63.9	6.17	0.013*	2.06 (1.16–3.65)
> 30 yr	138	78.4			
Marital status					
Single	119	74.8	0.26	0.61	1.16 (0.66–2.04)
Married	72	72.0			
Comorbidity	***n***	**%**	χ^2	***P***	**OR (95% CI)**
Obesity					
Yes	97	78.2	1.76	0.19	1.47 (0.83–2.59)
No	93	71.0			
Diabetes					
Yes	8	80.0	2.10	0.65	1.44 (0.30–6.97)
No	183	73.5			
Arthritis					
Yes	1	100.0	FET	1.0	—
No	190	73.6			
Spinal problem					
Yes	32	84.2	2.52	0.11	2.08 (0.83–5.22)
No	159	71.9			
Lifestyle	***n***	**%**	χ^2	***P***	**OR (95% CI)**
Walking > 15 min/d					
Yes	133	71.9	1.15	0.28	1.42 (0.75–2.69)
No	58	78.4			
Running > 15 min/d					
Yes	25	61.0	4.10	0.043*	0.49 (0.24–0.99)
No	166	76.1			
Other sports > 15 min/d					
Yes	67	68.4	2.36	0.13	1.55 (0.88–2.72)
No	124	77.0			
Smoking					
Yes	30	75.0	0.04	0.84	0.93 (0.43–2.01)
No	161	73.5			
Work-related characteristic	***n***	**%**	χ^2	***P***	**OR (95% CI)**
Work nature					
Direct contact	180	75.3	3.93	0.047*	2.50 (1.11–6.32)
Office	11	55.0			
Shift duration					
6–9 h	187	75.1	6.12	0.013*	4.52 (1.24–16.56)
10–12 h	4	40.0			
Shift nature					
Day work	165	74.3	0.27	0.60	0.82 (0.38–1.76)
Shift work	26	70.3			
Heavy objects					
Yes	106	57.6	2.891	0.089	1.61 (0.93–2.81)
No	32	45.7			

Table 4 Prevalence of lower back pain and association with some characteristics among rehabilitation professionals *(concluded)*

Work-related characteristic	*n*	%	χ^2	*P*	OR (95% CI)
Workload					
Light/moderate	133	75.1	0.56	0.45	1.25 (0.70–2.25)
Heavy overwhelming	58	70.7			
Sitting hours					
> 4	12	75.0	0.014	0.91	1.07 (0.33–3.45)
< 4	179	73.7			
Standing hours					
> 4	108	77.1	1.82	0.18	1.46 (0.84–2.55)
< 4	83	69.7			
Physical stress					
Yes	147	82.1	21.01	0.005*	3.76 (2.10–6.74)
No	44	55.0			
Working days/week					
3–5	143	75.7	1.33	0.25	0.70 (0.38–1.28)
> 5	48	68.6			
Experience					
≥ 10 yr	23	52.3	12.62	< 0.001*	3.26 (1.66–6.41)
< 10 yr	168	78.1			

**Statistically significant.*
CI = confidence interval; FET = Fisher's exact test; OR = odds ratio.

This study had some limitations. The study had a cross-sectional design; therefore, causal associations between LBP and individual/lifestyle and professional factors were not guaranteed. This was a retrospective study using a questionnaire, thus there may have been recall bias. The Modified Nordic Questionnaire used in this study did not attach operational or clear definitions for many available items or answers, so there could have been response bias. The study sample was not representative of all rehabilitation professionals in the study setting, thus the study might have been subject to selection bias. However, while the numbers are not representative, they provide baseline and important results that show that problems do occur in this population, which warrant further investigation. The fact that only 259 of 274 participants responded to the survey, due to the limited time allocated for this study that was part of a prescheduled summer training for university students, may have affected the power of the study, with a shift of the predetermined level of precision of 0.05 to 0.06. Nevertheless, this was the first study in Saudi Arabia to investigate this group of rehabilitation professionals in a comprehensive survey about LBP and its individual and professional consequences.

Conclusion

Lower back pain is prevalent among rehabilitation professionals. Both personal and professional risk factors found in our survey are in accordance with those in the literature. LBP was not the main reason for sick leave. Physiotherapy was the main management modality adopted. Physical stress and < 10 years' experience were

Table 5 Significant predictors of low back pain among rehabilitation professionals

Independent variables	β	SE	*P*	OR	95% CI
Age (< 30 yr = 1)	-0.11	0.44	0.81	0.90	0.38–2.12
Running (yes = 1)	-0.68	0.39	0.08	0.51	0.24–1.08
Direct patient contact (yes = 1)	0.24	0.55	0.66	1.27	0.43–3.72
Experience (< 10 yr = 1)	1.08	0.51	0.034*	2.94	1.08–7.95
Duration of shift (6–9 h = 1)	1.16	0.73	0.11	3.19	0.76–13.32
Physical stress (yes = 1)	1.31	0.31	<0.001*	3.72	2.02–6.86
Constant	-1.79	0.82	0.03	0.17	

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

significant predictors that may be difficult to avoid. As a result, it may be beneficial for hospital administrators to adopt certain strategies, such as shorter shifts, sports programmes emphasizing physical activity practices and improved ergonomics and psychological health in their workplace. Conducting periodic assessments on rehabilitation professionals may be necessary for early detection of LBP. Future studies are needed to evaluate the most effective methods for LBP prevention.

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Épidémiologie des douleurs lombaires liées au travail parmi les professionnels de la réadaptation en Arabie saoudite

Résumé

Contexte : Les ergothérapeutes et les physiothérapeutes sont à risque de douleurs et de traumatismes musculosquelettiques pouvant être liés à leurs activités professionnelles, à leur posture et à leur mécanique corporelle affectée.

Objectifs : Étudier l'épidémiologie de la lombalgie chez les professionnels de la réadaptation.

Méthodes : Une enquête transversale a été menée auprès de 259 physiothérapeutes et ergothérapeutes dans des centres de réadaptation en Arabie saoudite entre juillet et août 2019, à l'aide du questionnaire nordique modifié. Des données ont été recueillies sur différentes mesures de la lombalgie, ses conséquences et ses facteurs de risque. Une analyse de régression logistique a été réalisée pour identifier les facteurs prédictifs significatifs de la lombalgie.

Résultats : Les professionnels de la réadaptation ont souffert de lombalgie au moins une fois durant l'année précédant l'étude pour 73,7 % ; 52,5 % d'entre eux ont connu une douleur intense ayant duré un jour ou davantage, 22,4 % ont souffert de lombalgie chronique, 23,9 % de lombalgie ayant occasionné un congé de maladie et 18,5 % de lombalgie ayant nécessité le recours à des soins médicaux. Les activités difficiles/impossibles de la vie quotidienne en posture debout (45,5 %), durant l'emploi (44,0 %), la montée des escaliers (33,9 %), la marche (33,0 %), la position assise (29,3 %), le sommeil et les voyages (29,8 % chacun), le réveil (23,0 %), la vie sociale (26,2 %) et les soins personnels (15,7 %) ont été signalées. La lombalgie a occasionné un arrêt de travail chez 32,5 % des participants, pour 1,38 jour (±2,96) au cours de la dernière année. La moitié des participants (50,3 %) ont été traités par kinésithérapie, 25,1 % par soins médicaux et 39,3 % ont demandé des jours de repos et/ou des congés de maladie. Le stress physique et le fait d'avoir moins de 10 ans d'expérience étaient des facteurs prédictifs significatifs de la lombalgie.

Conclusion : La prévalence de la lombalgie était élevée chez les professionnels de la réadaptation, avec un impact important sur les activités de la vie quotidienne. La physiothérapie était la principale prise en charge adoptée. Des programmes éducatifs sont nécessaires pour enseigner la bonne utilisation de la mécanique corporelle et des programmes d'activités sportives pour réduire le risque de lombalgie et prévoir des périodes de pause appropriées.

وبائيات ألم أسفل الظهر المتعلقة بالعمل بين العاملين في إعادة التأهيل في المملكة العربية السعودية

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الخلاصة

الخلفية: اختصاصيو العلاج المهني والطبيعي مُعرَّضون للآلام والإصابات العضلية الهيكلية، وقد يرجع ذلك إلى الأنشطة المتعلقة بعملهم ووضعية الجسم وتضرُّر ميكانيكا الجسم.

الأهداف: هدفت هذه الدراسة إلى تقصي السمات الوبائية لآلام أسفل الظهر بين العاملين في إعادة التأهيل.

طرق البحث: أُجريَ مسح مقطعي لما مجموعه 259 من العاملين في العلاج الطبيعي والمهني في مراكز إعادة التأهيل في المملكة العربية السعودية خلال شهرَيْ يوليو / تموز و أغسطس / آب 2019، باستخدام استبيان «نورديك» المعدَّل. وجُمعت بيانات عن المقاييس المختلفة لألم أسفل الظهر وعواقبه وعوامل الخطر المرتبطة به. وحُلِّل الانحدار اللوجستي لتحديد المنبِّئات المهمة بألم أسفل الظهر.

النتائج: عانى 73.7٪ من العاملين في إعادة التأهيل من ألم أسفل الظهر لمدة سنة، وعانى 52.5٪ من ألم شديد دام يومًا واحدًا أو أكثر، وعانى 22.4٪ من ألم مزمن أسفل الظهر، وطلب 23.9٪ إجازات مرضية بسببه، وطلب 18.5٪ الرعاية الطبية. وذُكر أن أنشطة الحياة اليومية الصعبة/المستحيلة التي تعرضوا لها كانت في أثناء الوقوف (45.5٪)، وفي العمل (44.0٪)، وصعود الدرَج (33.9٪)، والمشي (33.0٪)، والجلوس (29.3٪)، والنوم والسفر (29.8٪ لكل منهما)، والاستيقاظ (23.0٪)، والحياة الاجتماعية (26.2٪)، والرعاية الشخصية (15.7٪). وتسبب ألم أسفل الظهر في توقف 32.5٪ من المشاركين عن العمل، بمعدل 2.96 (1.38) يوم خلال السنة الماضية. وحصل نصف المشاركين (50.3٪) على العلاج الطبيعي، وحصل 25.1٪ على الرعاية الطبية، وطلب 39.3٪ أيام راحة و/ أو إجازة مرضية. وكان الإجهاد البدني مع أقل من 10 سنوات في العمل منبِّئًا مهمًّا بألم أسفل الظهر.

الاستنتاجات: كان معدل انتشار ألم أسفل الظهر مرتفعًا بين أوساط العاملين في إعادة التأهيل، وله تأثير كبير على أنشطة الحياة اليومية. وكان العلاج الطبيعي هو العلاج الرئيسي المعتمد. وتُعد البرامج التعليمية ضرورية لتعليم الاستعمال السليم لميكانيكا الجسم، وبرامج الأنشطة الرياضية كذلك ضرورية للحد من خطر الإصابة بألم أسفل الظهر، وللترتيب للحصول على فترات راحة مناسبة.

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Prevalence and predictors of colour vision defects among Egyptian university students

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Abstract

Background: Nowadays, widespread usage of colours increases the need for accurate estimation of colour vision defects and their effect on performing daily activities and study/work tasks.

Aims: To determine the prevalence and predictors of colour vision defects among Assiut university students and to identify their relationship with self-reported visual function and perceived difficulties in performing daily activities.

Methods: A cross-sectional study was conducted among 1426 students at Assiut University, Egypt. Data were collected by self-administered questionnaire consisting of: personal characteristics, prior awareness of colour vision defects, difficulties in daily colour vision activities, and visual function. Colour vision was assessed using Ishihara's test of colour deficiency.

Results: The prevalence of colour vision defects among students was 6.9% (red–green colour vision was 4.3% and total colour blindness was 2.6%). Students with colour vision defects had significantly higher odds ratios for difficulties in daily activities and study/work tasks related to colour perception. Students with colour vision defects had significantly lower mean values of general health, role difficulties, and colour vision scores compared to students with normal colour insight. Male sex and family history of colour vision defects were risk factors.

Conclusions: A non-negligible percentage of Egyptian university students had colour vision defects, which had a negative impact on performing daily activities, executing study/work tasks, and choice of study/work specialties. Colour vision defects affected quality of life with regard to general health, role difficulties and colour vision. Male sex and family history of colour vision defects are nonmodifiable risk factors. This emphasizes the need for genetic counselling, especially in consanguineous marriage.

Keywords: prevalence, colour vision defects, colour blindness, visual function questionnaire, Egypt

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Introduction

Colour blindness or colour vision deficiency is the inability or decreased ability to perceive colour differences under normal lighting conditions. It is one of the commonest disorders of vision and divided into congenital and acquired forms (*1,2*). Congenital colour vision defects (CVDs) are the most common X-linked genetic disorder in humans. CVDs are more frequent in men, and the colour-deficient person can miss one or more pigments. Colour confusions are mainly between red, yellow and green hues and between blue-greens and greys. Red–green CVD is the most common form of colour vision deficiency (*3–5*). Acquired CVDs reflect a problem that occurs anywhere along the visual pathway from the photoreceptors to the visual cortex (*5*).

Reported prevalence of CVDs varies from 1.6% to 13.99% among different countries (*6,7*). This variation could be attributed to the precision of the conducted survey, population criteria and marriage restriction between individuals who share a common ancestor due to geographical isolation or religious belief (*4*).

Use of colour vision is a basic requirement in activities of daily living such as clothing, work, cooking and driving (*8*). CVDs can significantly negatively affect quality of life, studying and occupation, and can increase the risk of road traffic accidents (*9–13*). People with CVDs are at a distinct disadvantage when performing certain visual activities, and they might also be excluded from pursuing particular occupations (*1*).

The main risk factors for CVDs include positive family history for CVDs, male sex (*14,15*), and consanguineous marriage (*14*). In Egypt, there have been few large-scale studies on prevalence rates of CVDs. A study conducted among 267 student volunteers in Menofia University Campus reported that the prevalence of red–green CVD was 8.75% (*5*). The present study aimed to identify the prevalence and predictors of CVDs among Assiut University students, as well as the relationship between CVDs and self-reported visual function and perceived difficulties in performing daily activities of study and work.

Methods

Study site and design

This cross-sectional study was conducted in Assiut University, which is located in the capital city of Asyut Governorate. It is the largest university in Upper Egypt with educational capacity for nearly 70 000 undergraduate students.

Study population and sampling method

The studied population was 1426 randomly selected students. The sample size was calculated using Epi-Info statistical package version 7. The sample size was estimated for population survey with the following parameters: expected frequency 2.3% (*13*); an acceptable margin of error of 1.15 (*16*); confidence level of 95%, and design effect 2. The researcher used design effect 2 to increase precision of having a representative sample of the studied population. It was used to compensate for applying a multistage sampling technique instead of a simple random sample. The minimum required estimated sample size was 1304 subjects, which was raised to 1434 subjects to avoid dropout and nonrespondents. Eight subjects were excluded from the analysis due to missing data in their completed questionnaires.

Data were collected from October 2018 to March 2019. A multistage sampling technique was used for recruitment. First, a proportionate sampling technique was used to choose the faculties, including the number of students in each faculty. Six faculties were chosen: Engineering, Commerce, Law, Nursing, Dentistry and Art. Second, a simple random sampling method was used to choose the classes/sections in each faculty. From the selected classes/sections, we recruited all students who agreed to participate in the study on the survey day.

Two tools were used as follows: A self-administered questionnaire that divided into four sections 1- Personal characteristics included: age; sex; parents' consanguinity; family history of CVDs; self-reported presence of refractive error and its type; and presence of chronic disease (*17*). 2- Self-reported presence of CVDs includes whether the subjects thought that they had defective or normal colour vision (prior awareness of CVD). Those who were aware of their CVD were asked about the timing of their first awareness of their defect and how they recognized it (*18*). 3- Difficulties associated with CVDs with regard to the activities related to daily life, studying or work (*9*,*10*,*13*,*18*). 4- Visual Function Questionnaire (VFQ) version 2000 was created by RAND under the sponsorship of the National American Eye Institute to measure self-reported influence of visual disability and visual symptoms on domains of general health and tasks related to daily visual functioning. It comprises 25 questions include one general health question and 11 vision-targeted constructs: global vision rating; difficulty with near vision activities; difficulty with distance vision activities; limitations in social functioning due to vision; role limitations due to vision; dependency on others due to vision; mental health symptoms due to vision; driving difficulties; limitations with peripheral vision; limitations with colour vision; and ocular pain. The researchers translated the English version into Arabic, which was revised by a linguistic consultant. Scoring, recoding and averaging of items to create subscales were conducted in accordance with the manual (*19*).

Assessment of colour vision: each student was assessed individually, both eyes at the same time, under good daylight using Ishihara's test of colour deficiency (24-plate edition). The plates were placed nearly 75 cm from the subjects and tilted so that the papers' plane was at right angles to the line of vision. The subjects were asked to read their impressions on the test plates. Differentiation of colour vision into either normal or defective (red, green or total colour blindness) was determined based on the standard guide provided with the chart.

Ethical considerations

The present study was reviewed and approved by the Nursing Ethical Review Committee of Assiut University. The ethical considerations included obtaining written informed consent, voluntary participation, and maintenance of students' privacy and confidentiality. The study was conducted in adherence with the guidelines of the Declaration of Helsinki.

Statistical analysis

Statistical analysis was done using SPSS version 16. Qualitative data are presented as frequencies and percentages while mean and standard deviation are used to express quantitative data. The reliability of VFQ was calculated and Cronbach's α coefficient for the scale was 0.905. After testing data normality, the Mann–Whitney test was performed to illustrate the difference between subjects with CVDs and normal visual function. Univariate logistic regression analysis was performed to identify perceived difficulties of daily activities as dependent variables (some difficulty/no difficulty) and CVD (yes/no) as an explanatory variable. Univariate and multivariable logistic regression models were applied to identify the predictors of CVDs; CVD as a dependent variable (yes/no) and the explanatory variables were sex, parents' consanguinity, presence of positive family history, self-reported presence of chronic disease, and refractive error. The significance level was considered to be $P < 0.05$. Graphs were drawn using Microsoft Excel 2016.

Results

Personal characteristics, correct definition of CVD, and experience with testing colour insight

Students' age ranged from 17 to 25 years, with a mean value of 20.35 (1.5) years (Table 1). There were 840 (58.9%) female students and parents' consanguinity was reported by 35.3% of participants. About 9% of students mentioned a positive family history of CVDs and about

10% had a chronic disease. About one quarter reported having refractive error and myopia was the commonest type. Only 2.7% correctly defined CVD. Twenty percent previously performed a colour blindness test and 63.6% performed it on entering university.

Table 1 Personal characteristics, correct definition of CVD, and experience with CVD testing among Assiut University students in 2018

Variable	Frequency (n = 1426)	Percent (%)
Age (years)		
Mean (SD) (range)	20.35 (1.5) (17–25) years	
Sex		
Male	586	41.1
Female	840	58.9
Consanguinity between mother and father		
Yes	503	35.3
No	923	64.7
Family history of CVD		
Yes	127	8.9
No	850	59.6
Don't know	449	31.5
Self-reported presence of chronic disease		
Yes	140	9.8
No	1286	90.2
Undergo previous eye surgery		
Yes	54	3.8
No	1372	96.2
Self-reported presence of refractive error		
Yes	344	24.1
No	1082	75.9
Type of refractive error (n = 344)		
Myopia	259	75.3
Hyperopia	47	13.7
Astigmatism	27	7.8
Myopia and astigmatism	11	3.2
Definition of CVD		
Correct answer	38	2.7
Wrong answer	168	11.8
Don't know	1220	85.5
Previous colour blindness test		
Yes	283	19.8
No	1041	73.0
Don't know	102	7.2
When test performed (n = 283)		
Entering school	39	13.8
Entering university	180	63.6
Military faculty examination	56	19.8
At entering university and military faculty examination	8	2.8

CVD = colour vision defect.

Prevalence of CVDs and prior awareness of having abnormal colour vision

Figure 1 portrays the prevalence of CVDs among 1426 students. Combined types of CVDs were seen in 99 students (6.9%), among whom, 4.3% had red–green colour blindness and 2.6% had total colour blindness. Higher proportions of red–green colour blindness (7.7%) and total colour blindness (5.5%) were detected among male than female students (1.9% and 0.7%, respectively).

Among the 99 students with CVDs, 65 (65.7%) were unaware of having abnormal colour vision, while 34 (34.3%) were aware of having CVD before the survey. Prior awareness included perception of difficulties in daily activities related to colour (n = 20, 58.8%), previous colour blindness test (n = 8, 23.5%) and having another family member with a CVD (n = 6, 17.6%). Five students (14.7%) recognized their CVD at the primary school stage, 18 (52.9%) at the preparatory/secondary stage and 11 (32.4%) at university stage.

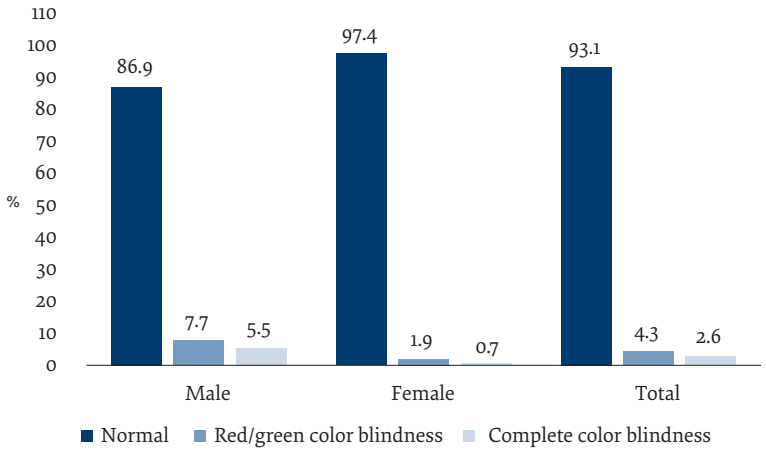
CVDs and perceived difficulties of colour-related daily activities

Among 99 CVD subjects, the number who perceived difficulties in daily activities based on colours was: choice of clothing colours (n = 27, 27.3%); distinguishing the colours of tools used during hobbies and craft work (n = 18, 18.2%); identification of flowers and plants (n = 11, 11.1%); and determining the ripeness of fruit and vegetables (n = 9, 9.1%) and whether meat is cooked (n = 23, 23.2%). The number of CVD subjects who reported difficulties with other activities were: satisfactory adjustment of TV colour (n = 17, 17.2%); recognizing skin conditions such as rash (n = 20, 20.2%); taking the wrong medication (n = 18, 18.2%); and participation in or watching sports activities because of sport shirt colours (n = 15, 15.2%).

For work/study tasks, the number of those who reported that CVD had a negative effect on choice of study field/work; was 15 (15.2%) reported exclusion from work/study due to problems with distinguishing colours; 23 (23.2%) reported having colour difficulties in their daily work/study activities; 20 (20.2%) reported having colour difficulties in their previous work/study activities; and 27 (27.3%) reported difficulties working on computers.

Table 2 shows the perceived difficulties in daily activities and work/study tasks related to colour insight. Compared to students with normal colour vision, students with CVDs had significantly higher odds ratios (ORs) for having difficulties in daily activities and work/study tasks related to colour perception. For example, choosing clothes or wall colours (OR = 2.89), recognizing abnormal skin rash (OR = 2.05), taking the wrong medication (OR = 3.46), and choice of study/work field (OR = 2.78). However, no significant differences in the perceived difficulties related to colour vision were detected between students with CVDs and normal colour vision with regard to adjustment of colours on television (OR = 1.47) or determining ripening of fruit and vegetables (OR = 0.84).

Figure 1 Prevalence of colour vision defects among 1426 Assiut University students in 2018



CVDs in relation to self-perception of visual function

Table 3 shows the association of CVDs with measured VFQ items. Students with CVDs had significantly lower mean values for general health, role difficulties, and colour vision scores compared to students with normal colour vision ($P < 0.05$). No significant associations were detected between CVDs and other items of visual function perception.

Predictors of CVDs

Table 4 shows that male students had significantly higher susceptibility for CVDs compared to female students (OR = 6.55). Those with a positive family history of CVDs had significantly higher odds of having defective colour vision (OR = 8.48). Parents' consanguinity and self-reporting presence of chronic disease or refractive error were not significant predictors of CVDs.

Discussion

There have been few studies of colour blindness in Egypt, and the present study is the first to identify the predictors of CVDs in young people in Egypt. It also explored the relationship between self-reported visual function and perceived difficulties in performing daily activities and study/work tasks among Assiut University students in Upper Egypt. The prevalence of CVDs among students was 6.9%: red–green colour blindness was 4.3% and com-

Table 2 Perceived difficulties of daily activities and study/work tasks related to CVD among 1426 Assiut University students in 2018

Difficulties of daily activities and study/work tasks	Odds ratio	95% confidence interval	*P*
Choosing the colours of clothes, accessories, cars , wall paint, furniture and cosmetics	2.89	1.81–4.65	<0.001
Distinguishing the colours of wires, threads, tools, wool, paints and other things during hobbies and crafts work	2.58	1.49–4.47	0.001
Identification of flowers and plants based on their colours	2.68	1.36–5.29	0.004
Determining the ripening of fruit and vegetables based on their colours	0.84	0.41–1.72	0.84
Determining if meat is cooked based on its colour	1.86	1.14–3.05	0.013
Satisfactory adjustment of TV colour balance	1.47	0.85–2.54	0.168
Recognizing skin conditions such as rash and sunburn	2.05	1.21–3.44	0.007
Taking the wrong medication because of difficulties with their colours	3.46	1.98–6.055	< 0.001
Participation in or watching of sports activities because of sport shirt colours	3.21	1.76–5.84	< 0.001
Choosing of study field/work affected by colour vision	2.78	1.53–5.04	0.001
Exclusion from work/study due to problems with distinguishing colours	4.88	2.71–8.80	< 0.001
Having colour difficulties in daily work/study activities?	4.84	2.88–8.14	< 0.001
Having colour difficulties in previous work/study activities?	4.16	2.42–7.16	< 0.001
Work on computer	2.60	1.62–4.17	< 0.001

Univariate regression analysis; difficulties in daily activities and study/work tasks (dependent variable), CVD (explanatory variable).
CVD = colour vision defect.

Table 3 Relation of CVD with perception of visual function among 1426 Assiut University students in 2018

Variables	CVD (*n* = 99) mean (SD)	Normal colour perception (*n* = 1327) mean (SD)	*P**
General health	57.82 (29.59)	65.32 (26.81)	0.015
General vision	80.60 (17.25)	78.70 (23.61)	0.91
Ocular pain	78.28 (21.93)	82.23 (20.96)	0.05
Near activities	88.67 (15.14)	89.86 (15.29)	0.40
Distant activities	88.72 (14.54)	89.05 (15.88)	0.49
Vision specific			
Social functioning	89.52 (16.43)	91.21 (16.48)	0.13
Mental health	82.32 (19.23)	85.34 (17.61)	0.169
Role difficulties	78.40 (26.11)	83.24 (25.51)	0.039
Dependency	89.98 (19.12)	92.89 (17.08)	0.205
Driving	82.73 (20.52)	85.91 (18.87)	0.249
Color vision	86.22 (21.57)	91.34 (18.64)	0.003
Peripheral vision	90.15 (17.06)	90.20 (18.96)	0.64

**Mann-Whitney U test. CVD = colour vision defect.*

plete color blindness was 2.6%. A higher prevalence of CVDs was found among male students (red–green colour blindness was 7.7% and total colour blindness was 5.5%) compared to female students (1.9% red–green colour blindness and 0.7% total colour blindness). The higher prevalence observed among male students was mainly due to the X-linked recessive inheritance of CVDs (*1*).

Similar prevalence rates of CVDs (8.75%) were reported by an Egyptian study conducted in Menofia University Campus (*5*) and in a Turkish survey (7.33%) on 941 young healthy men (*20*). An Iraqi study in Erbil City, Kurdistan Region, among 1856 preliminary, secondary and college students found a prevalence of red–green colour blindness of 6.25% (8.47% among male and 1.37% among female students) (*21*). A study in Northern India among 1028 children found that the prevalence of CVDs ranged from 5.26% to 11.36% among boys and 0– 3.03% among girls (*2*). Another Indian cross-sectional study among Muslims in Manipur found that the prevalence of red–green colour blindness was 5.28% (8.73% in male and 1.69% in female participants) (*17*).

However, different results were observed in some other studies. A higher prevalence of CVDs was reported in an Iranian population-based study conducted among 3132 participants in Mashhad (13.93% in the total study population; 15.85% in male and 12.96% in female participants) (*7*). The prevalence of CVDs among male secondary school students in Jizan City, Saudi Arabia was 21.3% (*14*). The difference might be explained by the inclusion of a wider age range, racial differences or higher rate of parents' consanguinity. Other studies have reported lower prevalence rates. A study conducted among 1305 public school children in Durban, South Africa, found a prevalence of CVDs of 2.2% (4.2% in boys and 0.6% in girls) (*22*). A study conducted among 1635 Nigerian students from public secondary school found that the prevalence of CVDs was 2.3% (3.8% among boys and 0.9% among girls) (*13*). A Jordanian study conducted among 1418 university students from Zarka Private University and the Hashemite University reported a prevalence of red–green colour blindness of 1.6% (8.72% among men and 0.33% among women) (*6*).

A lower prevalence of CVDs was observed among students who enrolled in practical faculties, especially medical education. For example, among medical students in Nepal, prevalence of CVDs was 5.6% (*23*). Prevalence of CVD was 1.6% among 303 first-cycle students of the Faculty of Medicine and Biomedical Sciences of the

Table 4 Risk factors for CVD among 1426 Assiut University students in 2018

Risk factors	Unadjusted			Adjusted		
	OR	95% CI	*P*	OR	95% CI	*P*
Male sex	5.63	3.46–9.15	< 0.001	6.55	3.92–10.94	< 0.001
Family history of CVD (Yes)	7.34	4.62–11.67	< 0.001	8.48	4.98–14.45	< 0.001
Parent consanguinity (Yes)	1.51	1.0–2.29	0.049	0.91	0.57–1.46	0.706
Presence of chronic disease (Yes)	2.03	1.17–3.53	0.012	1.44	0. 75–2.76	0.275
Refractive error (Yes)	1.33	0.85–2.09	0.214	1.33	0.80–2.23	0.274

Unadjusted and adjusted regression models of CVD: dependent variable was CVD, reference categories for explanatory variables were; female sex, family history (no), parents' consanguinity (no), presence of chronic disease (no), and presence of refractive error (no).
CI = confidence interval; CVD = colour vision defect; OR = odds ratio.

University of Yaoundé, Cameroon (*24*). CVD prevalence was 1.77% among 1126 preparatory students (3.5% among men and 0.5% among women) who subsequently join Saudi colleges of medicine, dentistry, applied medical sciences, nursing, and clinical pharmacy (*15*). This might be explained by the presence of strict health prerequisites for practical faculties and students' awareness of their CVDs that limited their opportunity or willingness to join medical, paramedical and nursing faculties.

Difficulties have been reported among people with CVDs in performing everyday tasks such as hobbies, plant/flower identification, ripeness of fruits and vegetables, and taking the wrong medication (*9*,*13*,*18*,*22*). Moreover, they reported that it could affect their choice of and exclusion from certain occupations or study fields. Similarly, in the present study, students with CVDs had significantly higher odds of having difficulties related to colour perception in daily activities and work/study tasks compared to students with normal colour vision.

No previous studies have explored the relationship of CVDs with the VFQ. In the current study, CVDs had a limited effect on quality of life with regard to vision. Students with CVDs had a significantly worse perception of general health, role difficulties, and colour vision compared to students with normal colour vision. In contrast, no significant differences were detected in other domains of the VFQ, such as difficulty with near/distance vision activities, social functioning limitations, dependency on others, mental health symptoms, driving difficulties, limitations with peripheral vision, and ocular pain. These domains were reported to be affected by disorders related to visual acuity, cataract, nuclear opacity and optic neuritis (*25*–*27*).

In the current study, male students and students with a positive family history of CVDs had significantly higher susceptibility for CVDs. Consistent with these results, a study done in Jizan City, Saudi Arabia revealed that CVDs were significantly associated with positive family history (*14*). Another Saudi study, in Makkah, found that male sex and positive family history of CVDs were significant predictors for CVDs (*15*). Positive family history seems closely associated with high consanguinity in populations carrying the genes responsible for the CVDs in the family. Adjusted regression in the current study showed that parents' consanguinity was not a risk factor for CVDs. Variations in the association of CVDs with parents' consanguinity were reported in the Saudi studies (*14*,*15*).

Self-reporting the presence of refractive error was not a risk factor for CVDs in the present study. These results were consistent with a study conducted among preparatory Saudi university students at Makkah, where CVDs were not significantly associated with other visual defects (*15*).

Conclusions and recommendations

We found that a non-negligible percentage of Egyptian university students had CVDs, especially among male students, and a large proportion were unaware of their CVD. The study provides a snapshot of CVDs among Egyptian students. However, it is of limited value as it reflects the size of the problem only among university students. A large, representative study of young people (both students and non-students) in different Egyptian regions is recommended to determine the prevalence of CVDs throughout Egypt. In this study, CVD had a negative impact on performing daily activities, executing study/work tasks, and choice of study/work specialties. Moreover, it affected the quality of life with regard to general health, role difficulties and colour vision. Male sex and having a positive CVD family history increased the risk of CVDs. Unfortunately, sex and positive family history are non-modifiable risk factors for CVDs. It is recommended that those who have a positive family history of CVDs ask for genetic counselling, especially in consanguineous marriage. Moreover, studies should be performed to mitigate the difficulties perceived by people with CVD subjects in colour-vision activities.

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Prévalence et facteurs prédictifs des anomalies de la vision des couleurs chez les étudiants égyptiens

Résumé

Contexte : Actuellement, l'utilisation généralisée des couleurs augmente la nécessité d'une estimation précise des anomalies de la vision des couleurs et de leurs effets sur l'exécution des activités quotidiennes ainsi que sur les tâches d'étude/de travail.

Objectifs : Déterminer la prévalence et les facteurs prédictifs des anomalies de la vision des couleurs chez les étudiants de l'Université d'Assiout et identifier leur relation avec la fonction visuelle autodéclarée et les difficultés perçues dans l'exécution des activités quotidiennes.

Méthodes : Une étude transversale a été menée auprès de 1426 étudiants de l'Université d'Assiout (Égypte). Les données ont été recueillies au moyen d'un questionnaire auto-administré portant sur les caractéristiques personnelles, la connaissance préalable des anomalies de la vision des couleurs, les difficultés au niveau des activités quotidiennes liées à la vision des couleurs et la fonction visuelle. La vision des couleurs a été évaluée à l'aide du test d'Ishihara sur la déficience dans la perception des couleurs.

Résultats : La prévalence des anomalies de la vision des couleurs chez les étudiants était de 6,9 % (anomalies de la vision des couleurs de type rouge-vert 4,3 % et daltonisme total 2,6 %). Les étudiants ayant des anomalies de la vision des couleurs avaient des odds ratios significativement plus élevés pour les difficultés liées à l'exécution des activités quotidiennes et des tâches d'étude/de travail liées à la perception des couleurs. Ceux qui avaient des anomalies de la vision des couleurs présentaient des valeurs moyennes significativement plus faibles pour la santé générale, les difficultés liées au rôle et les scores de vision des couleurs par rapport aux étudiants ayant une perception normale des couleurs. Le sexe masculin et les antécédents familiaux d'anomalies de la vision des couleurs constituaient des facteurs de risque de ces dernières.

Conclusions : Un pourcentage non négligeable d'étudiants universitaires égyptiens présentaient des anomalies de la vision des couleurs. Ces anomalies avaient un impact négatif sur l'exécution des activités quotidiennes, des tâches d'étude/de travail ainsi que sur le choix des spécialités. Elles affectent la qualité de vie pour ce qui concerne la santé générale, les difficultés liées au rôle et la perception de la vision. Le sexe masculin et les antécédents familiaux des anomalies de la vision des couleurs sont des facteurs de risque non modifiables de ces dernières. Cela souligne la nécessité du conseil génétique, en particulier dans le cas des mariages consanguins.

انتشار اختلالات رؤية الألوان بين الطلاب الجامعيين المصريين والعوامل المنبئة بذلك

صفاء عثمان، شيماء خلف، هبة محمد، داليا السبتي، دعاء عثمان

الخلاصة:

الخلفية: في الوقت الحاضر، زاد انتشار استخدام الألوان على نطاق واسع من الحاجة إلى تقدير دقيق لاختلالات رؤية الألوان وتأثيرها على أداء الأنشطة اليومية ومهام الدراسة/ العمل.

الأهداف: هدفت هذه الدراسة إلى: تحديد مدى انتشار اختلالات رؤية الألوان والعوامل المنبئة بذلك بين طلاب جامعة أسيوط وتحديد علاقتها بوظيفة الإبصار المُبلغ عنها ذاتياً والصعوبات المتصورة في أداء الأنشطة اليومية.

طرق البحث: أُجريت دراسة مقطعية شملت 1426 طالباً في جامعة أسيوط، مصر. وقد جُمعت البيانات من خلال استبيان يُستكمل ذاتياً ويتكون من: الخصائص الشخصية، والوعي المسبق باختلالات رؤية الألوان، وصعوبات أداء الأنشطة اليومية التي تتضمن رؤية الألوان، والوظيفة البصرية. وقد أُجري تقييم رؤية الألوان باستخدام اختبار إيشيهارا للكشف عن اختلالات رؤية الألوان.

النتائج: بلغت نسبة انتشار اختلالات رؤية الألوان بين الطلاب 6.9٪ (بلغت نسبة اختلال رؤية اللونين الأحمر والأخضر 4.3٪، وبلغت نسبة عمى الألوان التام 2.6٪). وكانت نسبة الأرجحية بالنسبة للصعوبات في الأنشطة اليومية ومهام الدراسة/ العمل المرتبطة بإدراك اللون أعلى في الطلاب المصابين باختلالات رؤية الألوان. وكان متوسط قيم الصحة العامة، وصعوبات الأدوار، ودرجات رؤية الألوان أقل في الطلاب المصابين باختلالات رؤية الألوان، مقارنة بالطلاب الذين يتمتعون برؤية طبيعية للألوان. وتضمنت عوامل الخطر المرتبطة باختلالات رؤية الألوان نوع الجنس الذكري والتاريخ العائلي للإصابة باختلالات رؤية الألوان.

الاستنتاجات: يشكل الطلاب الجامعيون المصريون المصابون باختلالات رؤية الألوان نسبة لا يُستهان بها. وكان لاختلالات رؤية الألوان تأثير سلبي على أداء الأنشطة اليومية، وتنفيذ مهام الدراسة/ العمل، واختيار تخصصات الدراسة/ العمل. وقد أثرت اختلالات رؤية الألوان على جودة الحياة من حيث الصحة العامة وصعوبات الأدوار، ورؤية الألوان. ويُعتبر نوع الجنس الذكري والتاريخ العائلي للإصابة باختلالات رؤية الألوان من عوامل الخطر غير القابلة للتغيير. ويؤكد ذلك الحاجة إلى طلب المشورة في مجال الأمراض الوراثية، خاصة في حالات زواج الأقارب.

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Experiences and needs of patients with lower limb amputation in Saudi Arabia: a qualitative study

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Abstract

Background: The effect of amputation on the social and psychological well-being of patients has been established. However, the experiences and needs of amputees for the process of adjustment varies among individuals and cultures.

Aims: This study aimed to explore the experiences and needs of lower limb amputees for social and psychological adjustment in Saudi Arabia, according to their own perspective.

Methods: Thirteen patients with lower limb amputation (mean age 47 years) were recruited from a large rehabilitation centre in Saudi Arabia for participation in interviews. A focus group discussion with 6 amputees was followed by individual, semistructured interviews with 8 amputees (which included 1 from the focus group) between November 2017 and March 2018.

Results: Patients' needs and reactions prior to and after amputation were controlled by the surrounding support system. Hopelessness and depression, body image distress, religious attitude, and family and community support all contributed to shape the overall patient experience, including psychological and physical adjustment.

Conclusions: Facilitating the re-integration of patients with lower limb amputation patients into their communities, as well as providing the required support system, is crucial to ensure a healthy adjustment process for amputees.

Keywords: lower limb amputation, patient experiences, patient needs, Saudi Arabia

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Introduction

Amputation is a treatment of choice in several health conditions. Many factors shape a patient's psychological reaction to amputation, including age, type and level of amputation, time since amputation, social support, and active coping mechanisms (*1–3*).

Most patients who experience limb amputation encounter a series of multifaceted psychological responses (*1*). Depression is a common psychological reaction among amputees that may linger for 10–20 years after amputation and negatively affect an amputee's attempt to adjust socially and psychologically with their physical situation. (*3–5*). Amputees experience devastation and distress, as well as occasional denial, shortly after amputation (*6–8*). Poor social support and self-image are some of the main concerns that prevent a healthy coping experience (*6*).

Experiences and needs before and after amputation, among amputees from Arabic and Islamic cultures have not been previously studied. Culture plays an important role in shaping an individual's lifestyle, beliefs and attitudes, as well as their family and social network (*9*). In Saudi Arabia, 3745 cases of amputation were reported from medical rehabilitation centres and departments in 2018 (*10*). More than half of these cases were due to diabetes, and other causes included road traffic accidents, other accidents and malignancies. Two thirds of amputees do not receive rehabilitation services, for unreported reasons (*11*). The economic impact of treating amputees is burdensome, and not meeting their needs may add to its consequences (*12*).

The aim of the current study was to explore the adjustment experiences of amputees in Saudi Arabia and their needs before and after amputation.

Methods

Study design

This was a phenomenological study of the lived experiences of lower limb amputees within their community. The researchers had an etic perspective; looking at participants' experiences without preconceptions. Two authors (WA and RA) work in close contact with amputees, which made them more familiar with the expressions, sentiments and ways to establish rapport with the participants.

Study setting

The study was conducted at Sultan Bin Abdulaziz Humanitarian City (SBAHC); a major nonprofit rehabilitation hospital and medical centre in Riyadh. Patients at this hospital are required to pay for services, but many receive government support to cover treatment and rehabilitation expenses.

Sampling and recruitment

This study was approved by the Institutional Review Board of SBAHC (013/2017/23, August 2017). A focus group discussion was followed by semistructured interviews with lower limb amputees from SBAHC between November 2017 and March 2018. Participants for the focus group were conveniently chosen from the Inpatient Rehabilitation Unit. From the 11 participants who were eligible, 6 attended at the time of the focus group, including 1 amputee who works at the centre.

A convenience sample of 3 inpatients and a purposive sample of 4 more patients were invited to participate in the semistructured interviews. Interviews were conducted and analysed 4 weeks after the discussion. Patients were included if they were Saudi nationals aged ≥ 18 years. We included individuals of both sexes and with different levels of education, as well as with various times since and levels of amputation. Individuals were not chosen if they lacked the capacity to provide informed consent or had severe mental illness.

Data collection

The focus group discussion took place in a quiet meeting room at SBAHC and lasted 1 hour. Three interviews took place in the same room and the others were conducted in the patient's room and lasted 30–45 minutes. Data collection was conducted by NA in the presence of RA or WA. The topic guide was developed based on guidelines previously used in similar studies (*6*,*7*,*9*,*13*) and amended according to the aim of this project (Table 1). Semistructured interviews were used to handle sensitive issues (e.g., feelings and spiritual attitudes). Triangulation of data collection techniques, probing questions, more than one coder, and transparency in reporting the results were used to ensure trustworthiness of the findings.

Table 1 Topic guide for focus group discussion

– What does the word amputee mean to you?
– What was the story behind your limb amputation?
– What was your main concern before amputation? (probe: concerns about self-image, social functioning and physical functioning)
– How was your life before being an amputee? How did it change after? (psychological, social and religious)
– Can you identify some of the challenges faced by lower-limb amputees? (challenges on accepting self-image, social challenges, physical challenges and psychological challenges)
– What are the strategies you took (are taking) to adapt to your life after amputation? (probe: rehabilitation support including prosthesis, family and friends, talking to other amputees, spiritual support, and psychological counselling)
– What do you think amputees want from the community?
– What do you think professionals and community could do to facilitate integration of new amputees back into the community?
– Is there anything else you would like to add?

Data analysis

All interviews were audio-recorded, transcribed verbatim, and analysed in their original Arabic language. Thematic analysis was used to provide a sequential structure for the data analysis. An iterative approach was adopted in order to cover patient experiences. Familiarization with the range, depth and diversity of the data was performed by NA and WA. They agreed on an initial coding frame that was then applied to other transcripts, with the flexibility to enable other codes to be added. Key themes were developed and quotations were used to provide supporting evidence (Table 2). Themes were investigated until saturation was achieved. NVivo software (version 11.4.2) was used to manage the data.

Results

Six and 8 patients participated in the focus group and semistructured interviews (3 men and 5 women, including 1 man from the focus group). Participant age ranged between 26 and 71 years. Time since amputation ranged between 4 and 15 years, and levels of amputation varied among the participants (9 above knee, 3 below knee and 1 at ankle level). Six of the participants had bilateral above-knee amputation. Two main themes emerged from analysing the data: experiences and needs before amputation, and experiences in social and psychological adjustment after amputation (Table 3).

Experiences and needs before amputation

Patient attitude

Differences in reactions between those who were about to lose their limb at a young age and those who underwent amputation at an older age were found. A participant peacefully noted: "I told the doctor if this is (foot amputation) what you see as the best for me then…go for it! This is what God wants for me." (male, 67 years, focus group). Another participant added: "I might die at any time…losing a limb is not a big deal" (male, 73 years). A 26-year-old woman who had her leg amputated at the age of 12 years due to bone cancer explained: ".. when I heard 'cut her leg' I cried hysterically, because that means I will never be able to walk again."

Those who had their limbs amputated due to trauma and those who lost them due to vascular disease showed differences in their reaction to amputation. Participants who underwent surgery to restore the limb before amputation, were less frustrated. One participant explained: "I was glad that all the suffering will end…" (male, 29 years, focus group).

Consultation with religious men to lead prayers for amputees before their operations was common. Although they subsequently underwent amputation,

Table 2 Process of deriving themes from the focus group discussion and the interviews with amputation patients

Primary codes	Categories	Themes
– Patients' attitude before amputation – Family support before amputation – Family attitude before amputation	1. Older patients tended to take a resilient attitude while younger patients were more sensitive. 2. Amputees who underwent restorative surgery were, unlike those who lost their limb due to trauma, more accepting of their situation. 3. Consulting religious men for emotional support 4. Need for support/empathy from the family	Experiences and needs before amputation
– Hopelessness and depression – Spiritually related attitude – Body image distress and self-esteem	1. Worrying of the unknown due to no knowledge about amputation and its consequences made amputees hopeless. 2. Some younger participants experienced depression 3. Limb loss was associated with sins 4. Being more religious after amputation 5. Body image consciousness when around spouse, relatives and strangers causes depression 6. Depending on others	Experiences in social and psychological adjustment after amputation
– Family support – Community support	1. Parents' and children's support 2. Parents' close supervision 3. Spouse support (*a priori* theme) 4. Amputees did not want to be helped/ pitied in public. 5. No work problem (*a priori* theme) 6. Limitations to functional ability	Physical and psychological support

participants reported that they felt emotional and physical improvement afterwards. A 51-year-old woman said: "My daughter called a religious man who came to the hospital to read Quran on me and my affected leg…I definitely felt better, my leg started to be less painful. I was so comfortable…".

Family support and attitude

Participants' experience with family support before amputation varied. For example, a 48-year-old woman noted: "Everyone was crying… I was broken from the inside and seeing my kids crying was not helping at all. I had to find a way to calm them down, when I actually needed someone to calm me down…I went to my room and cried for a whole day and at the same time managing to hide the distress I was feeling…" In contrast, a 51-yeard-old woman explained that the balance between those who cried and those who were strong for her made the news of the amputation easier to accept: "I can't forget my dad's face… it was the first time I saw him crying… my daughter was strong and she was focusing on making me feel better…" Support and empathy were equally needed by participants before amputation. They felt important to their families and loved ones when they shared their emotions, and at the same time, they needed people who were strong and able to hide their emotions. This same patient added: "At that time, I have sensed how precious I am to my father."

Experiences in social and psychological adjustment after amputation

Hopelessness and depression

Having limited knowledge about amputation, in addition to not knowing someone who had been through the same situation, contributed to a state of hopelessness for the amputees. A 32-yeaar-old man noted: "I was worried about my future. Being able to walk again has never crossed my mind." A 35-year-old man added: "…My friend told me that his cousin lost both her legs and she is able to walk now with prosthesis… I was so sad I couldn't even hold onto that hope." A 51-year-old woman said: "(a physiotherapist) here from the centre had arranged a meeting for me to see one of the prosthesis users … I could not believe my eyes when I saw her (the prosthesis user)!" A 35-year-old man who had lost both limbs due to a car accident noted: "I woke up to find that both my legs were gone!… I was so angry I wished that I died before I got my legs amputated!"

Nervous breakdown and the development of clinical depression were mentioned by younger participants. "I was sad, crying whenever I'm alone…" (female, 26 years). "I was diagnosed with depression and I was using medications and consulting a psychiatrist for that." (male, 35 years)

Spiritually related attitudes

Psychological reaction to amputation was shaped by the patients' religious beliefs and spirituality. Losing a limb was associated with being a sinful person. "I can tell from their looks that they dislike me because they believe that I am not a good person and that's why I got punished by Allah (God)…but this is not true" (female, 51). The same participant added: "I used to constantly think…Why me? What did I do wrong to deserve that?" Reliance on and strengthening one's faith in God had a positive role in patients' psychological ability to adjust to life after amputation. Most participants stated being more religious after amputation. "I cannot say no…I pray more, and I hope more from God." (female, 36 years, focus group). According to the participants, being more spiritual was a source of hope and strength to be better able to cope with their physical and psychological health. "Every time

Table 3 **Themes and subthemes**

Themes	Subthemes
Experiences and needs before amputation	– Patients' attitude before amputation – Family support and attitude before amputation
Experiences in social and psychological adjustment after amputation	– Hopelessness and depression – Spiritually related attitude – Body image distress and self-esteem
Physical and psychological support	– Family support – Community support

I pray, I feel that Allah is hearing me, and he is supporting me. It makes me stronger… no, I still haven't reached the ultimate peacefulness though I did in others' eyes." (male, 32 years).

Body image distress and self-esteem

Being conscious about the changes in their appearances made most of the participants worry about being accepted by their community and by their families. A 35-year-old man who had both legs amputated 4 months after getting married noted: "I was worried that my wife would leave me as I don't look 'good' or… mutilated." A 51-year-old woman noted: "I did not like to go to malls or see strangers… people keep staring at me as if I were an alien!" Looking different from others may restrict amputees from moving forward with their lives. Although patients were able to assert their value, the struggle was deeper. "I admit that I wanted to quit studying at the university many times due to that feeling I had. Even if I tried to convince myself to live with my new different look peacefully and accept my new self…I am in a constant battle from the inside." (female, 26 years). A 51-year-old woman explained that it was the change in her body image that put her in a state of depression: "It was important for me to look normal. People talk and stare… it made me sad and not wanting to see anyone." Self-esteem was affected by amputees' body image and limited physical function. Participants reported being hesitant to go back to work after amputation due to their looks. One teacher noted: "I did not know how I could go back to work and meet my young students…I did not want to hear negative comments…" (female, 51 years). Another noted: "Feeling dependent after all the years of giving and providing for my family was difficult." (male, 61 years, focus group). In contrast, older participants expressed their surrender to their situation and tended to respond with words that reflected their gratification with what was destined to happen.

Physical and psychological support

Parents and children were mentioned by the participants as being their main source of support, even among married patients. One married participant stated: "My father was ready to do anything to help me through this…when I got home, I found my house to be fully equipped with handicapped facilities." (male, 35 years). Another single participant added: "My mum used to make sure that I was being entertained the whole time." (female, 36 years, focus group). Two young female participants reported needing support; however, too much of that may backfire on their ability to adjust mentally and physically to their new life. A participant who seemed to understand her mother's concerns noted: "My mum never left me alone! She used to come with me to school and then to the university every day the whole day to make sure that I don't need anything. It was tiring for her… and a bit limiting for me." (female, 26 years). Older patients, including those with spouses, tended to get their physical, psychological and financial support from their children. Spousal role in the physical support of amputation patients was also reported; however, this was not as significant as parental support. When asked about his wife's role as a supporter, a 35-year-old man reported: "My wife used to help my mother to take care of me when I most needed it."

It was important for the participants to feel comfortable in their environment. This included the workplace and other places that required regular visits, such as supermarkets and government departments. It was important for the participant to find wheelchair ramps, elevators, and disabled bathrooms in the places they visited. One participant stated:

"The community make us feel handicapped, but we are not!" (female, 36 years, focus group).

Since these facilities are not available everywhere in Saudi Arabia, people must ask, or be approached voluntarily by others for help, which may add to their psychological instability. A 26-year-old woman noted: "Every time someone helps with carrying the wheelchair, they ask about my leg and how I lost it…other passers-by try to hear my story…it is annoying." Another patient added: "I remember an old lady saying, "you are young, you don't deserve this". I don't like the look of pity I get." (female, 36 years, focus group).

Discussion

The current study was conducted to explore the needs for better physical and psychological adjustment among lower limb amputees. Interviews indicated that patients needed a balanced environment for healthy expression of their emotions and that their physical and emotional symptoms could be alleviated by cultural and spiritual traditions. Furthermore, this study showed that in contrast to community support, family support was effective for adaptation and improvement of quality of life.

Having the opportunity to go through the decision-making process may lead to higher perceived control and improved adjustment (*14*). This study showed that previous distress of participants who underwent amputation after a series of reconstructive operations appeared to have more control over their emotions and needs. In contrast, those who underwent amputation due to trauma had greater difficulty in accepting their condition shortly after surgery.

It could be argued that depressive reactions are a normal reaction to amputation rather than depression *per se* (*1–5*). Nevertheless, this study showed that depressive reactions could be minimized with patient education. Similar to previous studies (*15*), our results suggested that meeting with other amputees was the most useful source of information and support. This was possibly because emic sources of support and information were more trustworthy for patients.

Adaptation to body image could be used as a potential measure of psychological adjustment to amputation (*8*,*16*). Participants in the present study showed self-consciousness of their postamputation body image. In contrast to participants of previous studies (*17*,*18*), younger participants showed limited acceptance to their new identity as amputees, and this affected their self-esteem around their families and loved ones.

Participants considered spirituality as a key element of the support system utilized in order to adjust to their new situation. In line with findings of other studies, we found that participants' spiritual beliefs stabilized their lives, provided meaning for the experience of disability, assisted them with coping, and enhanced their spiritual connection (*19*,*20*). Simultaneously, some amputees believed that going through amputation was a punishment from God for their sins; the latter belief made them isolate themselves from the community. Another study on families of intensive care patients in Saudi Arabia found that families believed that illness was a test from God, rather than a punishment (*19*).

Family support is the main source of psychological strength among amputees and patients with chronic disease in general (*21–24*). This is the first study to explore patient needs from their family before amputation. Participants reported needing a balanced reaction to enable them to feel strong and express their emotions simultaneously. Potential amputees may suppress their true feelings if their families overlook the support they could provide.

In contrast with other research conducted in similar cultural settings, this study found that parents and/or children, were the main source of support for lower-limb amputees (*25–27*). Participants in our study reinforced the role of their parents, or their children for older patients, in improving physical and emotional adjustment. Patients did acknowledge their spouses' role, but seemed to take this for granted.

Our study explained that local cultural and social context factors may make amputees feel handicapped. It has been noted in a qualitative study that people develop their identity and interpretation of their look from other peoples' perspective (*28*). In concordance, participants in the current study did not like to be pitied or helped by others when logistics were lacking.

The experiences of disadvantaged patients who did not utilize rehabilitation services could be different from those in the present study. Future research should look at the experiences of less-advantaged lower limb amputees who have poor access to rehabilitation services. The role of spouses and religious/traditional healers in the physical and psychological adjustment could be further explored.

Conclusions

A range of unmet needs, which involved family, community and religious support, was identified among lower-limb amputees. This study calls upon policy-makers to participate in reducing social and psychological implications of amputation as a disability, by empowering amputees to acquire their right of independence and social inclusion by providing all the necessary logistics. Healthcare professionals should pay more attention to patient needs and support systems by involving families and religious healers in amputees' treatment plans, in addition to introducing success stories and life examples to alleviate the emotionally destructive news of amputation.

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Expériences et besoins des patients amputés d'un membre inférieur en Arabie saoudite : étude qualitative

Résumé

Contexte : L'effet de l'amputation sur le bien-être social et psychologique des patients a été établi. Cependant, les expériences et les besoins des personnes amputées pour le processus d'adaptation varient selon les individus et les cultures.

Objectifs : La présente étude visait à examiner les expériences et les besoins des sujets amputés des membres inférieurs en matière d'adaptation sociale et psychologique en Arabie saoudite, selon leur propre perspective.

Méthodes : Treize patients amputés d'un membre inférieur (âge moyen de 47 ans) ont été recrutés dans un grand centre de réadaptation en Arabie saoudite pour participer à des entretiens. Un groupe de discussion thématique avec six patients a été suivi d'entretiens individuels et semi-structurés avec huit patients (dont un ayant participé au groupe de discussion thématique) entre novembre 2017 et mars 2018.

Résultats : Les besoins et les réactions des patients avant et après l'amputation étaient déterminés par le système de soutien environnant. Le désespoir et la dépression, la détresse liée à l'image corporelle, l'attitude religieuse et le soutien familial et communautaire ont tous contribué à façonner l'expérience globale du patient, y compris l'adaptation psychologique et physique.

Conclusions : Faciliter la réintégration des patients amputés des membres inférieurs dans leur communauté, ainsi que fournir le système de soutien nécessaire, est crucial pour assurer un processus d'adaptation favorisant la santé à ces derniers.

تجارب واحتياجات مرضى بتر الأطراف السفلية في المملكة العربية السعودية: دراسة نوعية

نورا أبوعمه، وسيم الدبيان، رباب أبو زيد

الخلاصة:

الخلفية: ثبُت أن البتر يؤثر على السلامة الاجتماعية والنفسية للمرضى، غير أن تجارب مرضى البتر واحتياجاتهم من أجل عملية التكيف تختلف من ثقافة إلى أخرى ومن فرد إلى آخر.

الأهداف: هدفت هذه الدراسة إلى التعرف على تجارب واحتياجات مرضى بتر الأطراف السفلية من أجل التكيف اجتماعياً ونفسياً في المملكة العربية السعودية، وفقاً لوجهة نظرهم الخاصة.

طرق البحث: استُعين بثلاثة عشر مريضاً من مرضى بتر الأطراف السفلية (بمتوسط عمر 47 عاماً) من أحد المراكز الكبرى لإعادة التأهيل في المملكة العربية السعودية، وذلك للمشاركة في مقابلات معهم. وعقدت مقابلات شبه منظمة مع 8 من مرضى البتر (أحدهم من مجموعة التركيز) عقب مناقشة مع 6 من مرضى البتر في مجموعة تركيز، وذلك في الفترة بين نوفمبر/ تشرين الثاني 2017 ومارس/ آذار 2018.

النتائج: تحكم نظام الدعم المحيط في احتياجات المرضى وردود أفعالهم قبل البتر وبعده. وقد ساهم كل من اليأس والاكتئاب والشعور بالضيق من صورة الجسم والموقف الديني والدعم الأسري والمجتمعي في تشكيل تجربة المرضى بشكل عام، ويشمل ذلك عملية التكيف النفسي والبدني.

الاستنتاجات: من الضروري تيسير إعادة دمج مرضى بتر الأطراف السفلية في مجتمعاتهم وتوفير نظام الدعم المطلوب لهم لضمان تحقق عملية تكيف مرضى البتر بصورة صحية.

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Developing and validating the Arabic version of the Diabetes Quality of Life questionnaire

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Abstract

Background: The Diabetes Quality of Life (DQoL) questionnaire has been used frequently among people with diabetes.

Aims: To develop and validate a revised Arabic version of the DQoL questionnaire for patients in Jordan with type 2 diabetes.

Methods: We recruited patients with type 2 diabetes from 3 public health clinics in Jordan. The original DQoL questionnaire was translated to Arabic and then back-translated by a different translator, and the 2 versions were compared. Prior to circulating the final version of the questionnaire, a cognitive validity test was applied to ensure that all the questions were clear. The final Arabic version of the DQoL questionnaire, along with a questionnaire that included demographic and other health-related questions, were circulated to the participants. The questionnaire data were analysed using exploratory factor analysis and confirmatory factor analysis after excluding duplicated questions and questions that included > 10% missing data. Cronbach's α was also conducted to confirm internal consistency.

Results: Analysis validated an Arabic version of DQoL questionnaire that included 29 items divided into 3 factors: worries, impact and satisfaction. Different variables were associated with DQoL scores including insulin administration, low income status, marital status, and presence of diabetic complications.

Conclusions: We validated an Arabic tool that can be used to evaluate QoL among Arabic-speaking patients with type 2 diabetes.

Keywords: Arabic, Diabetes Quality of Life Instrument, Jordan, type 2 diabetes

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Introduction

Diabetes mellitus (DM) is a widespread disorder that effects patients from different age groups and sexes, and is a complex disease that involves both genetic and environmental factors. The most common forms of DM are type 1 and type 2. Type 2 is characterized by insulin resistance and deficiency of insulin secretion. The 3 P symptoms are hallmarks for DM: polydipsia, polyuria and polyphagia. Other symptoms may include losing weight, fatigue, and resistant sores (*1*). DM may cause several complications if not controlled properly, including cardiac disease, stroke, retinopathy that may progress to blindness, kidney failure, and limb amputations resulting from progression of diabetic foot problems.

Quality of life (QoL) is a wide concept with many domains that measures satisfaction with life. QoL includes both health-related and non-health-related aspects. Non-health-related domains include economic, political, and social factors. Health-related QoL (HRQoL) evaluates how a person perceives the effect of a disease and its treatment on the quality of their life (*2*). rather than on the presence or absence of an illness when measuring health status. The World Health Organization (WHO) defines HRQoL as an individual's physical, mental and social welfare and not only the absence of illness (*3*). Diabetes has a huge effect on the lives of patients, because of constant constraints including dieting, exercising and regular monitoring of blood sugar levels, in addition to complications that affect HRQoL. In patients who have had DM for 15 years, ~2% may suffer from blindness, 10% partial blindness, 30–45% some degree of retinopathy, 10–20% nephropathy, and 20–35% neuropathy (*4*). These complications decrease HRQoL and increase the cost of DM management. The gradual worsening of these complications further aggravates the anxiety and depression that people with diabetes may have (*5*), with an estimated 20.3% having depression (*6*), which correlates with low HRQoL (*7*). Other complications associated with DM can also decrease HRQoL, including sexual dysfunction (*8*). Depression can also increase progression of diabetes due to low medication compliance (*9*).

According to the International Diabetes Federation, 12.8% of adults aged 20–79 years have diabetes, with 55 million people in the Middle East North Africa (MENA) region. This region has the second highest prevalence of diabetes after North America and the Caribbean (*10*). In the MENA region diabetes and related complications caused death to 418,900 deaths – 16.2% of all deaths in adults aged 20–79 years in 2019. The economic burden of the disease was estimated to be US$2.9 billion in 2019 (*10*). The IDF

estimates that 9.9% of Jordanians have diabetes (*10*). In 2015, disability-adjusted life years because of diabetes were 1052 among Jordanian men and 965 among women (*11*). According to the Global Health Data Exchange, 14.24% of total deaths in Jordan in 2017 were caused by DM (*12*).

Therefore, a tool to measure HRQoL is important for appropriate management of DM; however, there is no validated tool for the Jordanian population. One widely used tool is the Diabetic Quality of Life (DQoL) questionnaire (*13*), which has demonstrated strong validity and reliability (*14*). The questionnaire has been translated into different languages and used in several countries including the United States of America (*15*), Malaysia (*16*), China (*17*), Turkey (*18*) and Spain (*19*). The DQoL questionnaire has been used in 82 studies (*20*); however, it has yet to be used in published studies in Arabic countries. The aims of the present study were, therefore, to validate an Arabic version of the questionnaire, evaluate QoL of patients with type 2 diabetes, and examine the factors that may influence it among the Jordanian population.

Methods

Study design

The current study validated an Arabic version of the DQoL questionnaire to measure QoL in people with type 2 diabetes. Patients were approached from 1 January to 30 April 2019, at 3 government health clinics in Jordan (2 in the capital Amman and 1 in Madaba). These clinics are characterized by close follow-up of patients and continuity of care as the patients must see a physician to obtain their prescriptions on a monthly basis. Two clinics were chosen from Amman as almost 42% (*21*) of the Jordanian population reside there. Additionally, the clinics in the capital serve many patients from the surrounding areas that lack proper medical services. The clinic in Madaba received patients from both urban and rural areas and ~30% of Madaba residents reside in rural areas (*21*).

Materials and procedure

The DQoL questionnaire (Appendix 1) has been used for several years in several countries and in different languages. The questionnaire is composed of 46 items divided into 3 factors: satisfaction (15 items), impact (20 items) and worries (11 items divided into social/vocational and diabetes-related). The satisfaction and impact questions included a 5-point Likert scale [very satisfied (1 point), quite satisfied, satisfied, little satisfied, and very dissatisfied (5 points)]. In the original English-language questionnaire, questions related to worries about diabetes are divided into 2 sections: worries about social/vocational issues and worries about the future effects of diabetes. Responses to these are dichotomous with Yes or No options. However, having dichotomous and 5-point Likert scales may cause serious issues when attempting to validate questionnaires; therefore, these statements were converted to 5-point Likert scale responses.

Construction of the Arabic version of the DQoL questionnaire started with translation and selection of the items to be included; redundancy in questions were evaluated and duplicated items were omitted to shorten the questionnaire and improve factor loadings and discriminant validity. Prior to circulating the questionnaire, 20 other participants were given cognitive interviews to ensure that all questions were clear to the respondents. The data from these 20 participants were not included in the final data analysis.

Ethical approval was obtained from Al-Zaytoonah University and the 3 selected clinics. In addition to the DQoL questionnaire, a demographic data sheet was developed to obtain background information from participants including: sex, age, educational level, marital status, income level, and duration of illness. This data sheet, along with a consent form, a questionnaire that included other health-related questions and the final Arabic version of the DQoL questionnaire (Appendix 2) were circulated to 800 literate outpatients who had type 2 diabetes, and 725 of these agreed to participate. Relevant clinical indicators such as haemoglobin (Hb) A1c, and diabetic complications and other comorbidities were collected from patients' medical records. Diabetic complications included diabetic foot, neuropathy, nephropathy, retinopathy and cardiovascular diseases (CVDs; e.g., stable and unstable angina pectoris, and myocardial infarction). Medication information was also obtained from the records.

There are several perspectives on how to estimate the appropriate sample size for factor analysis; some focus on the number of total participants, and others argue that sample size should be calculated using the ratio of the number of participants to number of items in the questionnaire, with a commonly suggested ratio of 20:1 (*22*). Therefore, to obtain an appropriate sample size in accordance with the previously mentioned approaches, we required a sample size of 700 participants.

The survey was translated by 2 independent bilingual translators, who were native Arabic speakers and proficient in English. The 2 translations were compared, and changes were made accordingly. The questionnaire was recirculated to 50 patients in their next follow-up visit to evaluate test–rest reliability. The follow-up visit was ~30 days after the index visit.

Statistical analysis

In the final data analysis, items were evaluated based on response rates; items that had > 10% missing answers were excluded. Estimation of missing values was important to recognize and ignore unrelated items. Prior to factor analysis, data imputation with maximization expectation procedure was applied to items that had missing data that did not reach the cut-off point of 10%. Exploratory factor analysis (EFA) was conducted using principal component analysis to evaluate the most suitable model for the study data. The Kaiser–Meyer–Olkin value and Bartlett's Test of Sphericity were conducted to evaluate the suitability of the data for EFA. Communalities were examined, and any item < 0.4 was deleted. Parallel analysis was conducted, and

scree plots were examined to determine the appropriate number of factors to be extracted. A pattern matrix was generated using direct oblimin rotation, which was chosen because the factors were significantly correlated. Any item that had a loading < 0.4 in all factors or had a loading of ≥ 0.4 in more than 1 factor were excluded. Discriminant validity was evaluated by examining the factor correlation matrix. Internal consistency for each subscale was evaluated by calculating Cronbach's α.

Confirmatory factor analysis (CFA) was conducted on the same data in accordance with Bengt Muthén's method, to evaluate the model fit by examining different indicators, including: CMIN/DF (minimum discrepancy), which has an acceptable range of 2–5; comparative fit index (CFI), and Tucker–Lewis coefficient (TLI), ≥ 0.9 is considered acceptable; and root mean square error of approximation (RMESA), ≤ 0.08 is considered acceptable. The percentage of participants who had the highest or lowest possible score were calculated to evaluate the presence of ceiling and floor effects; these effects were considered present if > 15% of the participants scored the maximum or minimum possible (*23*).

Four stepwise multiple linear regressions were conducted to evaluate factors associated with the DQoL questionnaire total mean score and the mean scores of each factor. These models included administration of insulin, glucagon-like peptide-1 receptor agonist, metformin, sulfonylurea, nonsulfonylurea, sodium–glucose cotransporter-2 inhibitors, dipeptidyl peptidase 4 inhibitors, and thiazolidinediones. The model also included number of drugs, number of complications (neuropathy, nephropathy, retinopathy, CVD, diabetic foot, hypertension or dyslipidaemia), HbA1c level, married status, low income, number of years having diabetes, age, sex, body mass index, and smoking status. Log transformation was performed to achieve linearity. Cook's distance was calculated to measure the impact of influential cases on the model, and values > 1 was considered problematic. Normality of errors was assessed by examining standardized residual histograms and variance inflation factor (VIF) was calculated to evaluate multicollinearity. Finally, independence of errors was evaluated by the Durbin–Watson test.

Pearson correlation was applied to evaluate test–retest reliability. All statistical analysis was conducted using SPSS version 20 and Amos version 22.

Results

Nine duplicate items were identified and removed from the DQoL questionnaire (Table 1).

The questionnaires from 725 (378 male) participants were included in the analysis. The response rate was 90.6%. Eight items were excluded from the analysis due to > 10% missing data; these items are listed in Table 2.

Imputation of data on the remaining items was conducted using the maximization expectation procedure. EFA was conducted on the remaining 29 items; the characteristics of the sample are displayed in Table 3. The only significant difference found between the sexes was in smoking status, which was significantly higher in men.

Kaiser–Meyer–Olkin test result was 0.91 and Bartlett's Test of Sphericity was χ^2 (406) = 21975.94, $P < 0.01$. These results showed that the study data were suitable for factor analysis. Scree plots and parallel analysis indicated that a 3-factor model was suitable for the study data.

The 3 factors were satisfaction, impact and worries. All the items included in the model loaded on their original factors as intended in the original English questionnaire. The communalities ranged between 0.45 and 0.95 and the loadings from 0.65 to 0.98 (Table 4). Cronbach's α indicated good internal consistency in all 3 factors.

The ceiling and floor effects were evaluated by calculating the percentage of participants that had the highest or lowest possible score, and none of factors reached the 15% cutoff point. CFA indicated a good fit for the suggested model: CMIN/DF = 4.88, CFI = 0.94, TLI = 0.93 and RMSEA = 0.07.

Table 1 Items removed from Diabetes Quality of Life Questionnaire due to duplications

Item retained	Item removed
S5. How satisfied are you with the flexibility you have in your diet?	I9. How often do you feel restricted by your diet?
S6. How satisfied are you with the burden your diabetes is placing on your family?	I5. How often does your diabetes interfere with your family life?
S8. How satisfied are you with your sleep?	I6. How often do you have a bad night's sleep?
S9. How satisfied are you with your social relationships and friendships?	I7. How often do you find your diabetes limiting your social relationships and friendships?
S10. How satisfied are you with your sex life?	I10. How often does your diabetes interfere with your sex life?
S13. How satisfied are you with the time you spend exercising?	I12. How often does your diabetes interfere with your exercising?
S11. How satisfied are you with your work, school, and household activities?	I13. How often do you miss work, school, or household duties because of your diabetes?
	W6. How often do you worry about whether you will miss work?
S 14. How satisfied are you with your leisure time?	I15. How often do you find that your diabetes interrupts your leisure-time activities?

I = impact; S = satisfaction; W = worries.

Table 2 Items excluded from analysis due to > 10% missing values

Item deleted
W1. How often do you worry about whether you will get married?
W2. How often do you worry about whether you will have children?
W3. How often do you worry about whether you will not get a job you want?
W4. How often do you worry about whether you will be denied insurance?
W5. How often do you worry about whether you will be able to complete your education?
W11. How often do you worry about whether someone will not go out with you because you have diabetes?
I20. How often do you hide from others the fact that you are having an insulin reaction?
S10. How satisfied are you with your sex life?

I = impact; S = satisfaction; W = worries.

The stepwise linear multiple regression (Table 5) indicated that the mean of the total score of DQoL questionnaire was associated with HbA1c, insulin treatment, number of complications, low-income group, diabetic foot, CVD and nephropathy. The model explained 52.4% of the variance, the mean score for the Satisfaction factor was associated with HbA1c, insulin, diabetic foot, number of complications, being currently married, and CVD. The mean score for the Impact factor was associated with low income, HbA1c, insulin treatment, nephropathy, number of complications, diabetic foot, and CVD. The mean score for the Worries factor was associated with number of complications, HbA1c, and low income.

Test–retest reliability was tested by using Pearson's correlations and all the items had a correlation > 0.8, which indicated good test–retest reliability.

Discussion

We formulated and validated a summarized Arabic form of the DQoL questionnaire. The items in this study all loaded in their original designated scales in the original English questionnaire (*13*). However, our model consisted of 29 items loaded in 3 scales only, worry, impact and satisfaction, unlike the original model that included 46 items divided into 4 scales (*13*). This was mainly due to the exclusion of most of the items that were included in the vocational/social worry scale, mainly because of a high level of missing data (exceeding the 10% threshold limit). These items were irrelevant to many of our respondents; for example, "How often do you worry about whether you will get married?" as many of recruits were already married. This applied to the rest of the deleted items that asked about concerns regarding completing their education, having children, getting a job and being covered by insurance. Additionally, item W6 was a duplicate of item S11; therefore, it was omitted from the questionnaire. The only item that remained from the original vocational/social worry scale was W7, which was loaded in the new worry scale. A previous study had also reported a large amount of missing data in these items as they did not apply to many of the respondents (*16*). The new formulated Worry scale comprised 4 items that were converted from dichotomous questions to 5-Likert scale questions to be more suitable for EFA. Other items from the Impact scale were also omitted to avoid redundancy, which shortened the 46-item lengthy survey to 29 items and improved its discriminant validity and factor loadings.

The results of the Arabic version were also compared with the Malaysian version of the DQoL questionnaire (*16*). The result of the present study resembled the 3-factor model of the Malaysian version, which consists only of 18 items, as more items were dropped that were identified as duplications, including (I14) "How often do you find yourself explaining what it means to have diabetes?", and (I16) "How often do you tell others about your diabetes?". However, we felt that these 2 questions were not identical as explaining the impact of diabetes is different from merely stating that you have diabetes. Other items had low communalities and thus were not included in the Malaysian version.

Our study indicated that insulin has a negative effect on QoL. The literature reports contradictory finding when evaluating the effect of insulin therapy on QoL of people with diabetes (*24*). Insulin therapy can improve QoL (*25*), mainly due to better glycaemic control (*26*). In contrast, other studies have reported a negative effect of insulin therapy on QoL due to hypoglycaemic episodes (*27*), as well as the pain and inconvenience associated with insulin administration (*28*). Furthermore, insulin is usually prescribed in more severe cases (*29*) that are likely to have more complications. These conflicting findings may be due to variations in sampling and methodology (*24*), in addition to insulin type (*25*) and injection device (*30*). We also confirmed the previously reported association between HbA1c and QoL (*31*). Better QoL is likely to lead to better self-care behaviour, which results in lower HbA1c (*9*).

Currently married individuals had lower satisfaction when compared to unmarried patients. Several studies have reported a correlation between marital quality and adherence to diabetes care (*32*), and that marital stress is associated with an increase in serum glucose level due to the effect of stress hormones (*32*). The results of our study did not contain the omitted questions about sexual activity; if these questions were included this correlation may have been more significant.

As reported previously (*33*), low income was associated with low QoL. This may be attributed to the lack of knowledge of available options for managing DM (*33*), in addition to other lifestyle variables including nutritional intake.

Finally, as expected and as reported previously, the presence of different complications including diabetic foot CVD and nephropathy in addition to number of complications were all associated with lower QoL in our sample.

Table 3 **Sample characteristics**

Variables	Male (*n* = 378)	Female (*n* = 347)	*P*
Age, years	58.1 (9.68)	58.97 (9.56)	0.22
HbA1c	7.44 (1.43)	7.36 (1.46)	0.50
No. of years of diabetes	7.65 (3.77)	7.99 (3.90)	0.23
No. of drugs	2.02 (0.92)	1.99 (0.86)	0.65
No. of complications	2.14 (1.21)	2.22 (1.24)	0.39
Smoking			
Smoking	144 (38.1%)	31 (8.9 %)	<0.01
Ex-smoker	54 (14.3%)	9 (2.6 %)	–
Non-smoker	180 (47.6 %)	307 (88.5 %)	–
BMI			
Underweight	9 (2.4%)	3 (0.9%)	0.13
Normal	53 (14 %)	45 (13%)	–
Overweight	183 (48.4 %)	153 (44.1 %)	–
Obesity	133 (35.2 %)	146 (42.1%)	–
Marital status			
Single	47 (12.4%)	58 (16.7%)	0.42
Married	293 (77.5%)	253 (72.9%)	–
Divorce	20 (5.3%)	19 (5.5%)	–
Widow	18 (4.8%)	17 (4.9%)	–
Income	104 (27.5%)	108 (31.1%)	0.29
Education			
Primary	75 (19.8%)	59 (17.0%)	0.13
Secondary	93 (24.6%)	78 (22.5%)	–
Diploma	74 (19.6%)	53 (15.3%)	–
Bachelor's degree	128 (33.9%)	150 (43.2%)	–
Higher degree	8 (2.1%)	7 (2.0%)	–
Drugs			
Insulin	154 (40.7%)	126 (36.3%)	0.22
Metformin	375 (99.2 %)	338 (97.4%)	0.08
GLP1RA	22 (5.8 %)	28 (8.1 %)	0.24
Sulfonylurea	105 (27.8 %)	93 (26.8 %)	0.80
Thiazolidinediones	23 (6.1 %)	30 (8.6%)	0.20
Nonsulfonylurea	1 (0.3%)	3 (0.9%)	0.35
SGLT2	3 (0.8%)	3 (0.9%)	1.0
DPP4 inhibitor	79 (20.9 %)	68 (19.6 %)	0.71
Complications			
Cardiovascular disease	67 (17.7 %)	60 (17.3 %)	0.92
Diabetic foot	25 (6.6%)	23 (6.6 %)	1.0
Neuropathy	75 (19.8%)	69 (19.9 %)	1.0
Nephropathy	41 (10.8 %)	43 (12.4%)	0.56
Retinopathy	57 (15.1 %)	70 (20.2 %)	0.08
Hypertension	237 (62.7%)	216 (62.2%)	0.94
Dyslipidaemia	307 (81.2 %)	289 (83.3%)	0.5

Results presented as mean (SD) or frequency (percentage). Kaiser–Meyer–Olkin test result was 0.91 and Bartlett's test of sphericity was χ^2 *(406) = 21975.94, P < 0.01.*
BMI = body mass index; DPP4 inhibitor = dipeptidyl peptidase-4 inhibitor; GLP1RA = glucagon-like peptide 1 receptor agonist; HbA1c = haemoglobin A1c; SGLT2 = sodium–glucose cotransporter 2.

We conducted cognitive interviews to ensure that the questions were clear for our sample of patients. Additionally, the high internal consistency confirmed the clarity of the questionnaire. The Arabic version of the DQoL questionnaire can therefore be used to measure HRQoL in patients with diabetes. Evaluating QoL is important when treating people with diabetes, as patients with low HRQoL may not comply with

Table 4 Descriptive statistics and reliability of the Arabic version of Diabetes Quality of Life Questionnaire

Domain (item number)	Factor loading	Communalities (min–max)	Cronbach's α	Corrected item-total correlation	Mean
Satisfaction items (S1–S9, S11–S15)	0.65–0.98	0.45–0.95	0.97	0.63–0.97	2.81
Impact items (I1–I4, I8, I11, I14–I19)	0.71–0.83	0.52–0.71	0.94	0.67–0.7	2.06
Worries items (W7–W10)	0.79–0.91	0.69–0.79	0.88	0.73–0.75	2.39

important medical instructions that influence control of their condition (*9*). Therefore, using the Arabic version of DQoL could help in the management of diabetes, and future work may include measuring the benefit of detection and management of DQoL when managing patients with diabetes in Jordan and neighbouring Arab countries. Furthermore, the Arabic version of the DQoL questionnaire can be used to compare the QoL in patients with diabetes in Arabic-speaking countries, which has not been possible until now. It will also be possible to make comparisons between HRQoL among patients with diabetes, relying on data collected using the English-language version of the questionnaire.

Our data showed some similarities and some differences with other work focusing on diabetes conducted in Arab countries. For example, using the Audit of Diabetes Dependent Quality of Life (ADDQOL19), Al-Shehri found that Saudi women with diabetes had significantly poorer QoL than men had (*34*). This replicates other research conducted in Gaza (*35*) using the WHO Quality of Life-BREF (WHOQOL-BREF), which found that women with diabetes were more negatively affected than men. These findings contrast with ours, but as Al-Shehri noted, such differences may be in part due to wider gender inequalities in some communities, which were perhaps less evident in our Jordanian sample. Our results do replicate those of other work in relation to complications. We found poorer QoL for those with complications, supporting studies in Saudi Arabia using the Short Form-36 questionnaire (SF-36).

One limitation of our study was that illiterate patients were not included, who may have struggled more with medication instructions related to the management of their condition. Another limitation was that dropping the 17 questions could have affected the content validity of the questionnaire, particularly the impact of diabetes on sex life, and may not have captured the complete impact of diabetes in all groups. However, summarizing the questionnaire and limiting duplication will encourage patients to participate and complete the questionnaire accurately. Furthermore, this summarized version is more applicable to all ages and different marital status, which makes it easier to conduct in a general setting without needing different versions for specific groups. Moreover, in a conservative society as in Jordan and other Arabic countries, many would be reluctant to talk openly about their sexual activities. In fact, high nonresponse rates have been reported in privacy-related items from the DQoL questionnaire, in addition to many respondents complaining about the length of the questionnaire.

Conclusion

This validated Arabic version of the DQoL questionnaire could be used to evaluate HRQoL in Arab-speaking patients by examining the overall score and the scores of the different subscales. This could aid with diagnosis and management of DM in Jordan and neighbouring countries.

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Table 5 Multiple regression results for different factors affecting the scores of Diabetic Quality of Life Questionnaire

Variables	Mean total score			Satisfaction			Impact			Worry		
	β	*P* value	95% CI	β	*P* value	95% CI	β	*P* value	95% CI	β	*P* value	95% CI
HbA1c	0.15	<0.01	0.13–0.17	0.17	<0.01	0.13–0.20	0.15	<0.01	0.12–0.18	0.11	<0.01	0.06–0.15
Insulin	0.24	<0.01	0.18–0.31	0.23	<0.01	0.13–0.33	0.31	<0.01	0.21–0.4		N/S	
Low income	0.19	<0.01	0.12–0.26		N/S		0.59	<0.01	0.48–0.69	0.15	0.022	0.02–0.28
Currently married		N/S		0.16	<0.01	0.05–0.27		N/S			N/S	
Diabetic foot	0.3	<0.01	0.16–0.42	0.33	<0.01	0.11–0.54	0.28	<0.01	0.08–0.49		N/S	
CVDs	0.19	<0.01	0.01–0.28	0.20	<0.01	0.06–0.34	0.21	<0.01	0.07–0.34		N/S	
Nephropathy	0.18	<0.01	0.08–0.29		N/S		0.33	<0.01	0.17–0.49		N/S	
Total complications	0.11	<0.01	0.08–0.15	0.12	<0.01	0.10–0.18	0.09	<0.01	0.03–0.14	0.16	<0.01	0.10–0.21

CI = confidence interval; CVDs = cardiovascular diseases; HbA1c = haemoglobin A1c; N/S = not significant.

Élaboration et validation de la version arabe du questionnaire sur la qualité de vie des patients diabétiques

Résumé

Contexte : Le questionnaire sur la qualité de vie des patients diabétiques est fréquemment utilisé auprès de ces derniers.

Objectifs : Élaborer et valider une version arabe révisée du questionnaire sur la qualité de vie des patients diabétiques pour les patients jordaniens atteints de diabète de type 2.

Méthodes : Nous avons recruté des patients atteints de diabète de type 2 dans trois centres de santé publique en Jordanie. Le questionnaire original a été traduit en arabe. Il a ensuite fait l'objet d'une rétro-traduction par un traducteur différent, et les deux versions ont été comparées. Avant de diffuser la version finale du questionnaire, un test de validité cognitive a été appliqué pour s'assurer que toutes les questions étaient claires. La version arabe finale du questionnaire sur la qualité de vie des patients diabétiques, ainsi qu'un questionnaire comportant des questions démographiques et d'autres questions liées à la santé, ont été distribués aux participants. Les données issues du questionnaire ont été analysées à l'aide d'une analyse factorielle exploratoire et d'une analyse factorielle confirmatoire après exclusion des questions dupliquées et des questions comportant plus de 10 % de données manquantes. Le coefficient alpha de Cronbach a également été réalisé pour confirmer la cohérence interne.

Résultats : L'analyse a permis de valider une version arabe du questionnaire comprenant 29 items répartis selon trois facteurs : inquiétudes, impact et satisfaction. Différentes variables ont été associées aux scores du questionnaire sur la qualité de vie des patients diabétiques, notamment l'administration d'insuline, le statut de revenu faible, le statut marital et la présence de complications diabétiques.

Conclusions : Nous avons validé un outil en arabe qui peut être utilisé pour évaluer la qualité de vie chez les patients arabophones atteints de diabète de type 2.

إعداد النسخة العربية لاستبيان جودة الحياة لمرضى داء السُكَّريّ والتحقق من صحتها

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الخلاصة:

الخلفية: كان استبيان جودة الحياة لمرضى داء السُكَّريّ يُستخدم كثيراً بين الأشخاص المصابين بداء السُكَّريّ.

الأهداف: هدفت هذه الدراسة إلى إعداد نسخة عربية مُنقحة لاستبيان جودة الحياة لمرضى داء السُكَّريّ والتحقق من صحتها لمرضى النمط 2 من داء السُكَّريّ في الأردن.

طرق البحث: استعنا بمرضى مصابين بالنمط 2 من داء السُكَّريّ من 3 عيادات للصحة العامة في الأردن. ولقد تُرجمت النسخة الأصلية لاستبيان جودة الحياة لمرضى داء السُكَّريّ إلى اللغة العربية، ثم أُعيدت ترجمتها مرة أخرى بواسطة مُترجم مختلف، ثم قورنت النسختان. وقبل تعميم النسخة النهائية للاستبيان، أُجري اختبار التحقق من المعرفة لضمان وضوح جميع الأسئلة. وعُممت على المشاركين النسخة العربية النهائية لاستبيان جودة الحياة لمرضى داء السُكَّريّ، إلى جانب استبيان آخر تضمن أسئلة سكانية وأخرى متعلقة بالصحة. وجرى تحليل بيانات الاستبيان باستخدام التحليل العاملي الاستكشافي والتحليل العاملي التوكيدي، بعد استبعاد الأسئلة المتكررة والأسئلة التي تضمنت بيانات ناقصة بنسبة أكبر من 10٪. كما استُخدم مقياس كرونباخ لتأكيد الاتساق الداخلي.

النتائج: أثبت التحليل صحة النسخة العربية لاستبيان جودة الحياة لمرضى داء السُكَّريّ الذي اشتمل على 29 بنداً مقسماً إلى 3 عوامل: المخاوف، والأثر، والرضا. وارتبطت متغيرات مختلفة بدرجات استبيان جودة الحياة لمرضى داء السُكَّريّ، مثل إعطاء الأنسولين، وحالة الدخل المنخفض، والحالة الزواجية، ووجود مضاعفات السُكَّريّ.

الاستنتاجات: تحققنا من صحة أداة عربية يمكن استخدامها لتقييم استبيان جودة الحياة بين مرضى النمط 2 من داء السُكَّريّ الناطقين باللغة العربية.

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Appendix 1. Original Diabetes Quality of Life Questionnaire

Satisfaction	
1. How satisfied are you with the amount of time it takes to manage your diabetes?	
2. How satisfied are you with the amount of time you spend getting checkups?	
3. How satisfied are you with the time it takes to determine your sugar level?	
4. How satisfied are you with your current treatment?	
5. How satisfied are you with the flexibility you have in your diet?	
6. How satisfied are you with the burden your diabetes is placing on your family?	
7. How satisfied are you with your knowledge about your diabetes?	
8. How satisfied are you with your sleep?	
9. How satisfied are you with your social relationships and friendships?	
10. How satisfied are you with your sex life?	
11. How satisfied are you with your work, school, and household activities?	
12. How satisfied are you with the appearance of your body?	
13. How satisfied are you with the time you spend exercising?	
14. How satisfied are you with your leisure time?	
15. How satisfied are you with life in general?	

Impact	
1. How often do you feel pain associated with the treatment for your diabetes?	
2. How often are you embarrassed by having to deal with your diabetes in public?	
3. How often do you have low blood sugar?	
4. How often do you feel physically ill?	
5. How often does your diabetes interfere with your family life?	
6. How often do you have a bad night's sleep?	
7. How often do you find your diabetes limiting your social relationships and friendships?	
8. How often do you feel good about yourself?	
9. How often do you feel restricted by your diet?	
10. How often does your diabetes interfere with your sex life?	
11. How often does your diabetes keep you from driving a car or using a machine (e.g., a typewriter)?	
12. How often does your diabetes interfere with your exercising?	
13. How often do you miss work, school, or household duties because of your diabetes?	
14. How often do you find yourself explaining what it means to have diabetes?	
15. How often do you find that your diabetes interrupts your leisure-time activities?	
16. How often do you tell others about your diabetes?	
17. How often are you teased because you have diabetes?	
18. How often do you feel that because of your diabetes you go to the bathroom more than others?	
19. How often do you find that you eat something you shouldn't rather than tell someone that you have diabetes?	
20. How often do you hide from others the fact that you are having an insulin reaction?	

Worry: social/vocational	
1. How often do you worry about whether you will get married?	
2. How often do you worry about whether you will have children?	
3. How often do you worry about whether you will not get a job you want?	
4. How often do you worry about whether you will be denied insurance?	
5. How often do you worry about whether you will be able to complete your education	
6. How often do you worry about whether you will miss work?	
7. How often do you worry whether you will be able to take a vacation?	

Worry: diabetes-related	
8. How often do you worry about whether you will pass out?	
9. How often do you worry that your body looks different because you have diabetes?	
10. How often do you worry that you will get complications from your diabetes?	
11. How often do you worry about whether someone will not go out with you because you have diabetes?	

Appendix 2 **Modified Arabic Diabetes Quality of Life Questionnaire**

القسم الأول: المعلومات الشخصية

1 – **الجنس** : ذكر ☐ أنثى ☐

2 – **العمر**:

3 – **المستوى التعليمي** :

1 – ابتدائي ☐ 2 – ثانوي ☐ 3 –دراسات عليا ☐

4 – بكالوريس ☐ 5 – دراسات عليا ☐

4 – **الحالة الاجتماعية** :

_____

5 – **متوسط الدخل** :

1 – اقل من 500 دينار / شهريا ☐

2 – 500–1000 دينار / شهريا ☐

3 – أكثر من 1000 دينار. ☐

6 – **سنوات الاصابة بالمرض** :

_____

القسم الثاني : مستوى الرضا

الرقم	العبارة	1 –راضي جدا	2 – راضي بعض الشيء	3 –راضي	4 – لست راض بعض الشيء	5 – لست راض ابدا
1 –	ما مدى رضاك عن مقدار الوقت الذي تستغرقه لعلاج مرض السكري لديك؟					
2 –	ما مدى رضاك عن مقدار الوقت الذي تقضيه في إجراء الفحوصات؟					
3 –	ما مدى رضاك عن الوقت الذي تستغرقه لفحص مستوى السكر لديك؟					
4 –	ما مدى رضاك عن علاجك الحالي؟					
5 –	ما مدى رضاك عن مرونة نظامك الغذائي؟					
6 –	ما مدى رضا العبء الذي يفرضه مرضك على عائلتك؟					
7 –	ما مدى رضاك عن معرفتك بمرض السكري؟					
8 –	ما مدى رضاك عن نمط نومك؟					
9 –	ما مدى رضاك عن علاقاتك الاجتماعية؟					
10 –	ما مدى رضاك عن عملك ومدرستك وأنشطتك المنزلية؟					
11 –	ما مدى رضاك عن مظهر جسمك؟					

الرقم	العبارة	1–راضي جدا	2– راضي بعض الشيء	3–راضي	4– لست راض بعض الشيء	5– لست راض ابدا
12–	ما مدى رضاك عن كمية الوقت الذي تقضيه في التمارين الرياضية؟					
13–	ما مدى رضاك عن كيفية قضاء وقت فراغك (اجازاتك)؟					
14–	ما مدى رضاك عن الحياة بشكل عام؟					

القسم الثالث: التأثير

الرقم	العبارة	1– ابدا	2–قليل جدا	3–احيانا	4–عادة	5–طوال الوقت
1–	هل تشعر عادة بآلام يسببها علاج مرض السكري؟					
2–	هل يتسبب لك التعامل مع مرض السكر في الأماكن العامة الشعور بالحرج؟					
3–	هل ينخفض مستوى السكر لديك عادة؟					
4–	هل تشعر بتعب جسدي بسبب مرض السكري عادة؟					
5–	هل تشعر بالرضا عن نفسك عادة؟					
6–	هل يمنعك مرض السكري من قيادة السيارة أو استخدام آلة (على سبيل المثال ، آلة كاتبة) عادة؟					
7–	كم مرة تضطر الى شرح ما يعنيه وجود مرض السكري؟					
8–	هل تخبر الآخرين عادة عن مرض السكري؟					
9–	هل اغاظك الاخرون لعدم قدرتك على تناول الحلويات بسبب إصابتك بمرض السكري؟					
10–	هل تشعر أنك تضطر الى استخدام الحمام كثيرا بسبب مرض السكري؟					
11–	هل تضطر الى أكل طعام لا يناسب مرض السكري بدلا من إخبار المحيطين بك بأنك مصاب بداء السكري؟					

القسم الرابع: القلق ذو صلة بمرض السكري

الرقم	العبارة	1– ابدا	2–قليل جدا	3–احيانا	4–عادة	5–طوال الوقت
1–	هل تقلق فيما يتعلق بقدرتك على أخذ إجازة؟					
2–	هل تقلق بشأن تغيّبك عن الوعي عادة؟					
3–	هل تقلق بسبب اختلاف شكل جسدك بسبب مرض السكري؟					
4–	هل تقلق بشأن تعرضك لمضاعفات مرض السكري في المستقبل؟					

Expanding universal health coverage among refugees and migrants: challenges and opportunities[1]

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Introduction

The Sustainable Development Goals (SDGs) provide an opportunity for the international community to address migration health issues, particularly through targets 3.8 (achieve universal health coverage [UHC], including financial risk protection, access to quality essential health care services, and access to safe, effective, quality and affordable essential medicines and vaccines for all) (1); and 10.7 (facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies) (2).

The inclusion of refugees and migrants in strategic health-care planning and delivery is of particular relevance to the WHO Eastern Mediterranean Region where they constitute a sizable population and are often vulnerable to poor health due to living conditions and limited access to quality health care and other social services. At a time when the Region is facing the challenges of the COVID-19 pandemic, exclusion makes the implementation of prevention and control measures among refugees and migrants more difficult, increasing the risk of the pandemic spreading among these populations, in host countries and in countries of return.

To mark Universal Health Coverage Day 2020 (12 December), a roundtable discussion was held on 10 December 2020 as part of a series of events bringing health partners and stakeholders together to review and discuss the opportunities and challenges facing the expansion of UHC in the Region (3).

The event was co-organized by the WHO Regional Office for the Eastern Mediterranean, International Organization for Migration (IOM) Regional Office for the Middle East and North Africa, UN High Commission for Refugees (UNHCR) Middle East and North Africa, and United Nations Relief and Works Agency for Palestine Refugees (UNRWA).

The objectives of the meeting were to:

- identify opportunities for collective actions by health actors at regional and country levels to expand UHC among refugees and migrants;
- identify lessons learned and good practices employed to date.

Summary of discussions

Participants agreed that a set of entitlements based on 'Health for All' (4) is required, must be applied with equity to all including internally displaced persons, refugees and migrants, and that financing must be supported by partners. To meet these demands, WHO is working towards finding innovative ways to ensure that this becomes a reality. The impact of the COVID-19 pandemic on the Region is in addition to an unprecedented set of health-care emergencies (5). Meanwhile, GAVI announced plans to allocate 5% of all vaccines that come through the COVAX facility to high-risk populations in humanitarian settings (6). Participants also agreed that UHC is the key strategy to promoting the health of refugees and migrants, which requires the integration of refugee and migrant health considerations into national policies and strategies and ensure that "no-one is left behind" (7).

Recommendations

1. Promoting migrant-inclusive health policies and migrant-friendly services as a critical aspect of UHC;
2. adopting a holistic approach to UHC that views migration as a social determinant of health, and acknowledges how and where people migrate directly impacts the health of migrants;
3. strengthening regional partnerships and cooperation on borders and along mobility corridors;
4. establishing a new "normal" for health care settings and streamlining primary health care provisions;
5. including all refugees and migrants in COVID-19 vaccine campaigns;
6. strengthening data collection and management regarding migrant health for the effective inclusion of migrants into national health policies and programming;
7. fostering closer working practices with academia to review responses to the pandemic provided by national health systems, UN agencies and partners, and to identify lessons learned.

[1] This summary is extracted from the Report on the roundtable discussion on Expanding universal health coverage among refugees and migrants: challenges and opportunities, 10 December 2020 (https://applications.emro.who.int/docs/WHOEMEHS003E-eng.pdf?ua=1).

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WHO events addressing public health priorities