Primary health care patients' knowledge about diabetes in the United Arab Emirates

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معارف مرضى مؤسسات الرعاية الصحية الأولية حول السكري، في الإمارات العربية المتحدة

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الخلاصة: حدَّدت هذه الرسالة المستوى القاعدي للمعارف حول السكَّري وما شوهد من فعالية مصادر المعلومات المتعلقة به في أحد المراكز الحضرية للرعاية الصحية الأولية في مدينة العين. وقد أجري استبيان موثَّق، شمل 300 من البالغين من السكريين الذين تم اختيارهم عشوائياً. وقد كانت معارف السكريين عن هذا الداء مرتبطة ارتباطاً مباشراً بمستواهم التعليمي العام. وكانت وسائط الإعلام المقروءة والإلكترونية، والاتصال بممرضة أو طبيب مصادر فعَّالة للتثقيف حول السكري، بينما كان التحدُّث مع الأشخاص "المهمّين" الآخرين، أو إحصائيِّي التغذية أو الصيادلة عديم الفعالية. ويبدو أن التثقيف الذي يرتكز على ممرضة أو طبيب خيار فعَّال للبرامج المستقبلية لتزويد السكريين بالمعلومات.

ABSTRACT This study defined the baseline level of knowledge about diabetes and the perceived effectiveness of sources of diabetes information in an urban primary health care centre in Al-Ain. A validated questionnaire was administered to 300 randomly chosen adult patients with diabetes. Patient knowledge about diabetes was directly related to their level of general education. Written and electronic media, and contact with a nurse or doctor were effective sources of education on diabetes while "conversation with significant others", dietician or pharmacist were not effective. Nurse- or doctor-centred education appears to be an effective choice for future programmes to provide information to patients with diabetes.

Connaissances des patients en matière de diabète au niveau des soins de santé primaires dans les Emirats arabes unis
RESUME Cette étude a défini le niveau de référence des connaissances en matière de diabète et l'efficacité perçue des sources d'information sur le diabète dans un centre de soins de santé primaires à Al-Ain. Trois cent (300) patients adultes diabétiques choisis au hasard ont répondu à un questionnaire validé. La connaissance des patients en matière de diabète était directement liée à leur niveau d'éducation générale. Les médias électroniques et écrits et le contact avec une infirmière et un médecin étaient des sources efficaces d'éducation sur le diabète tandis que « la conversation avec d'autres personnes importantes », un diététicien ou un pharmacien n'en était pas une. L'éducation orientée sur le médecin ou l'infirmière semble être un choix efficace pour les futurs programmes destinés à fournir une information aux diabétiques.

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Introduction

Diabetes is a chronic metabolic disease with significant related morbidity and mortality. Together with hypertension and obesity, diabetes is a principal cause of coronary artery disease, which is the leading cause of death in the United Arab Emirates (UAE) [1].

The age-adjusted prevalence rate of diabetes among Emirati citizens in a 1998 population-based survey was 25.4% in urban areas, 19.8% in suburban areas and 14.1% in rural areas, with no significant differences between males and females (E.V. Dunn, Z. Daar, personal communication, 2000). These values were significantly higher than the overall prevalence of 6% (11% for males 30–64 years and 7% for females aged 30–64 years) found in a limited survey of the same population conducted in 1990 [2]. Similar rates have been found in other ethnically and culturally similar neighbouring Arab countries. A 1997 comprehensive population-based study in Saudi Arabia found an age-adjusted prevalence rate of 12% in urban males and 14% in urban females, and 7% in rural males and 7.7% in rural females [3]. A similar study in Bahrain found age-adjusted prevalence rates of between 23% and 48% depending on ethnicity [4]. In contrast, the estimated 1994–1998 prevalence rate in the United States of America (USA) was 7.6% and in Sweden 3.2% [5,6].

Effective management of diabetes includes the patient developing an understanding of his or her disease and incorporating this knowledge into an effective self-care programme [7,8]. For example, several studies have demonstrated that poor knowledge is associated with an increased rate of hospitalization for unstable diabetes [9,10]. Although education could be provided informally, the evidence suggests that formal programmes are more effective, especially if they are non-didactic and orientated towards behaviour modification [11,12]. At the time of this study no coordinated or comprehensive plan was yet in place to provide education to diabetic patients in the primary health care community of the people under investigation. The aim of our study was to evaluate the baseline knowledge level of diabetes and identify the sources of information the patients perceived to be the most useful in increasing their knowledge. These results could provide valuable information for the planning of educational programmes to improve the health outcomes for people with diabetes in this community and provide an example for similar communities elsewhere in neighbouring Arab countries.

Methods

The Al-Ain Medical District, which is centred around the oasis city of Al-Ain, is located 130 km inland from the coastal cities of Abu Dhabi and Dubai. The region has the fourth largest regional population in the country after Abu Dhabi (596 592), Dubai (711 000) and Sharjah (415 000). The population in 1998 was 341 300 (12.4% of the total population) [13].

The study clinic was in an urban area of Al-Ain. The average patient attendance per month was 4500. The medical staff consisted of six staff doctors and one resident training in family medicine. All were from medical schools in the Middle East, North Africa or the Indian subcontinent and none held Board Certification in Family Medicine. There were also eleven nurses, five pharmacists and one dentist at the clinic. A dietician attended one day per week. Final-year medical students were assigned to the clinic, and faculty staff from the UAE Uni-

versity Department of Family Medicine attended weekly to provide clinical tutorials. The language used in the clinics was primarily Arabic although English was used at times.

The Diabetes Register of the study clinic listed 450 adults, 300 of whom consented to participate in this study. Only those who spoke Arabic and were competent and willing to participate were included. They were seen during their regular clinic visits or at a specially arranged time.

A questionnaire was used to assess the patient's knowledge of diabetes. The instrument was the Diabetes Knowledge Test (DKT), which was developed and validated by the Michigan Diabetes Research and Training Center (Box 1) [14–16]. This test contains 14 general test items suitable for adults with both type 1 and type 2 diabetes and 9 additional items for adults using insulin. Where necessary, equivalent local foods were substituted in the questionnaire. We only used the 14 general test items as few patients used insulin. Each question had one correct answer, which is given a score of 1. Thus the possible test scores range from 0 to 14. The raw scores are converted to percentages thereafter.

As the study sample did not speak English and it was estimated that two-thirds were unable to read Arabic, a face-to-face interview was used to administer the questionnaire. The interviewer was a bilingual Emirati who conducted all the interviews in Arabic. Informed consent was obtained from each participant.

The type of diabetes and the presence of a family history of diabetes were recorded. Ethnicity was categorized as local (Emirati) and other. Educational status was divided into 5 levels: illiterate, self-educated, primary schooling, secondary schooling and post-secondary. Patients were asked whether they had received any diabetes education.

Each patient was asked to rate specific sources of diabetes education on whether they perceived them to be useful or not. The list of sources included doctor, nurse, dietician, pharmacist, written media, electronic media and conversation with significant others.

SPSS, version 8 was used for statistical analysis. Comparative statistics were calculated using chi-squared analysis for categorical variables and one-way analysis of variance for continuous variables. The level of clinical significance was defined as $P < 0.05$.

Results

All 300 participants in the study completed all sections of the DKT and the other questions.

The demographics of the study sample, corresponding test scores and the statistical significance of differences are shown in Table 1. Only three patients had a health-related professional in their immediate family and no patient was a health-related professional.

The results for individual questions are reported in Table 2, while Table 3 displays the sources of information that patients in the study group perceived to be effective in providing information about diabetes. The test scores for each subgroup and the statistical significance of any difference are also shown.

Discussion

We found that the patient's level of knowledge about diabetes in the community investigated was low, with a mean score

Box 1 **Diabetes Knowledge Test developed by the Michigan Diabetes Research and Training Center, University of Michigan Medical Center**

1. The diabetes diet is:
   a. the way most American people eat
   b. a healthy diet for most people*
   c. too high in carbohydrate for most people
   d. too high in protein for most people

2. Which of the following is highest in carbohydrate?
   a. baked chicken
   b. Swiss cheese
   c. baked potato*
   d. peanut butter

3. Which of the following is highest in fat?
   a. low-fat milk*
   b. orange juice
   c. corn
   d. honey

4. Which of the following is a "free food"?
   a. any unsweetened food
   b. any dietetic food
   c. any food that says "sugar free" on the label
   d. any food that has less than 20 calories per serving*

5. Glycosylated hemoglobin (hemoglobin A1) is a test that is a measure of your average blood glucose level for the past:
   a. day
   b. week
   c. 6–10 weeks*
   d. 6 months

6. Which is the best method for testing blood glucose?
   a. urine testing
   b. blood testing*
   c. both are equally good

7. What effect does unsweetened fruit juice have on blood glucose?
   a. lowers it
   b. raises it*
   c. has no effect

8. Which should not be used to treat low blood glucose?
   a. 3 hard candies
   b. ½ cup orange juice
   c. 1 cup diet soft drink*
   d. 1 cup skim milk

9. For a person in good control, what effect does exercise have on blood glucose?
   a. lowers it*
   b. raises it
   c. has no effect

10. Infection is likely to cause:
    a. an increase in blood glucose*
    b. a decrease in blood glucose
    c. no change in blood glucose

11. The best way to take care of your feet is to:
    a. look at and wash them each day*
    b. soak them for one hour each day
    c. buy shoes a size larger than usual

12. Eating foods lower in fat decreases your risk of:
    a. nerve disease
    b. kidney disease
    c. heart disease*
    d. eye disease

13. Numbness and tingling may be symptoms of:
    a. kidney disease
    b. nerve disease*
    c. eye disease
    d. liver disease

14. Which of the following is usually not associated with diabetes?
    a. vision problems
    b. kidney problems
    c. nerve problems
    d. lung problems*

Correct answers.

Table 1 **Test scores and demographics**

Characteristic	No.	%	Test score[a]	Significance
Sex				
Male	153	51	60.8 ± 12.4	$P < 0.0001$
Female	147	49	50.2 ± 12.6	
Age (years)				
< 25	8	3	59.6 ± 12.6	$P = 0.01$
26–35	109	36	19.3 ± 46.4	
36–45	149	50	20.7 ± 48.6	
> 45	34	11	14.4 ± 33.0	
Nationality				
Emirati	174	58	60.4 ± 12.6	$P = 0.01$
Other	126	42	50.4 ± 12.6	
Education				
Illiterate	172	57	37.2 ± 18.4	$P = 0.01$
Self-educated	18	6	48.3 ± 15.3	
Primary school	38	13	55.3 ± 14.7	
Secondary school	45	15	61.4 ± 15.3	
Post-secondary	27	9	65.5 ± 10.9	
Diagnosis				
Type 1 diabetes	28	9	66.8 ± 14.5	$P < 0.0001$
Type 2 diabetes	272	91	44.2 ± 19.4	
Family history of diabetes				
No	179	60	50.3 ± 12.6	$P < 0.0001$
Yes	121	40	70.0 ± 12.3	
Previous diabetic education				
No	186	62	40.8 ± 22.0	$P < 0.0001$
Yes	114	38	68.1 ± 17.6	

[a]*Mean % scores ± standard deviation excluding question 5.*

below 50%. This may have been inadvertently lowered by the zero correct response rate to the question concerning glycosylated haemoglobin (HbA1c) which probably reflected the general lack of availability of this test at the time of the study.

The same questionnaire has been used in a community-based study in the USA [16]. Their study sample was drawn from two large and two small Michigan communities. The patients were either referred to the study by their health care providers or self-selected following local advertising. All participants were over 18 years, had diabetes and had received diabetes care in their community from a variety of providers. A comparison of the demographics of the two communities shows that the study group had a higher proportion of males, was younger, had a shorter duration of diabetes, had received far less education about diabetes and had a similar proportion of type 2 diabetes. The test score was 69 ± 22, a substantially higher result than found in our study.

Table 2 **Test scores for individual questions**			
Question	% correct	Question	% correct
1	87	8	23
2	52	9	98
3	53	10	23
4	1	11	56
5	0	12	84
6	46	13	14
7	35	14	31

Mean % score ± standard deviation = 43 ± 31%.
Mean % score excluding question 5 = 46 ± 30%.

The level of school education in our study sample was very low, with 57% being illiterate and only 24% having post-primary school education. This reflects the relatively recent availability of educational opportunities in the UAE. Universal education has only been widely available since the 1970s and secondary school to year 12 only relatively recently. Hence, completion of secondary school may not include year 12 in some cases. Post-secondary education was in the early stages of development until the late 1980s.

The USA study found similar test scores between those who had received primary education (UAE 55.3 ± 14.7, USA 54.02 ± 22.07) and secondary education (UAE 61.4 ± 15.3, USA 60.34 ± 17.79 if year 12 is excluded: 68.36 ± 16.59 including year 12). However, there was a wide discrepancy between the studies among those with school education beyond 12 years (UAE 65.5 ± 10.9, USA 77.23 ± 16.00 for 13–15 years and 74.11 ± 15.15 for > 15 years). This may reflect the absence of any health-related professionals in the study group; however, no data on the USA group are available. As patients with no formal education were significantly represented in our study group, it is not surprising the mean score was significantly lower than in this American population.

Other studies have also found school education to be a key factor in diabetic knowledge. A study using the same questionnaire found a mean score of 36.3 in a small ($n = 26$) group of African–Americans 50% of whom had education to less than eighth grade, and concluded that school education was a significant cause of this difference [17]. A study in Mexico City involving 570 patients and a different questionnaire came to the same conclusion [18]. School education may also account for the disparity seen in the scores in relation to sex, age and nationality as males, younger people and Emiratis had received more educational opportunities than other members of the community under study.

Although this study was conducted in only one of the 23 government-funded clinics in this health region, all but one are similar in terms of their management of diabetes.

No single source of information about diabetes was perceived as effective by more than 36% of the study sample. This probably reflects lack of exposure, as only 38% responded that they had received any diabetes education. Of those who did perceive diabetic education to be effective, only four sources were suggested by at least 25% of the study group. Interestingly, those who chose written media, nurse or doctor had a higher test score than those who ranked these sources as not effective, while those who chose "conversation with significant others" as effective had no significant difference in score from those who ranked this as ineffective. Those who perceived education from the nurse as effective had the highest score, with written media close behind and doctor slightly lower. Although the actual source of information was not recorded, the data suggest that

Table 3 **Test scores and perceived effectiveness of information sources**

Information source	Effectiveness[a]	No.	%	Score[b]	Significance
Written media	Yes	109	36	59.8 ± 14.9	P < 0.0001
	No	191	64	38.7 ± 18.6	
Nurse	Yes	93	31	62.8 ± 13.0	P < 0.0001
	No	207	69	38.9 ± 18.2	
Doctor	Yes	83	28	53.3 ± 18.0	P < 0.0001
	No	217	72	43.7 ± 20.2	
Conversation with	Yes	75	25	46.6 ± 20.5	NS
significant others	No	225	75	46.3 ± 19.9	
Electronic media	Yes	13	4	65.0 ± 17.1	P < 0.001
	No	287	96	45.5 ± 19.9	
Dietician	Yes	5	2	60.0 ± 10.0	NS
	No	295	98	46.2 ± 20.1	
Pharmacist	Yes	1	0	76.9 ± 0.0	NS
	No	299	100	46.2 ± 20.0	

[a]As perceived by the patient.
[b]Mean % scores ± standard deviation.
NS = not significant.

these three sources may have been the most effective and "conversation with significant others" not effective.

Unfortunately the lack of any diabetes educators in the care delivery model at the time of the study precluded an assessment of the impact of this type of health professional, who would be a key component of the diabetes management team in other settings [19]. In the absence of diabetes educators and bearing in mind the very low level of literacy, the findings suggest that the most effective method of intervention to improve diabetes knowledge in the setting under study would be via nurse-centred and doctor-centred programmes.

The dietician, pharmacist and the electronic media were not seen as effective sources of patient information about diabetes by most of the study sample. However, those that did choose these options scored highly in the test of knowledge, but due to low numbers the difference was only significant for electronic media.

In conclusion, the population under study displayed a lower level of diabetes knowledge than a sample in a USA community-based study using the same questionnaire. However, when school education was controlled for, the levels of knowledge were similar. Nurse-centred or doctor-centred programmes and written material appear to be the most effective sources of information about diabetes. Considering the very low level of literacy, concentrating education programmes around the nurse and the doctor would seem most likely to succeed. Development of diabetes education programmes with these features might increase the level of knowledge about diabe-

tes and result in an improved outcome for diabetes in a country where diabetes is very prevalent and a leading cause of death.

Acknowledgements

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Note from the Editor

We would like to inform our readers that the next issue of EMHJ will be Vol. 7 No. 6 and will include the EMHJ reviewers' panel for the year 2001.