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ABSTRACT The purpose of this study was to estimate the frequency of self-management activities among people who have type 2 diabetes in Saudi Arabia. The Arabic version of the Summary of Diabetes Self-care Activities questionnaire was used to identify self-management practices among 210 patients with type 2 diabetes mellitus. Only 15% of participants had a blood glucose level indicative of good glycaemic control (glycosylated haemoglobin ≤ 7 mmol/L). Most reported that they took their medication as prescribed, but many demonstrated low levels of compliance with other self-management practices (overall mean 3.7 days per week). Males and those with lower incomes were less likely to practise self-care activities. Most were given basic advice to undertake self-care activities, but only some were given more detailed information. There are opportunities to improve type 2 diabetes mellitus self-management practices in Saudi Arabia and increase the proportion of patients who achieve good glycaemic control.

Pratiques d’auto-prise en charge chez des patients atteints de diabète de type 2 fréquentant des centres de soins de santé primaires à Médine (Arabie saoudite)

RÉSUMÉ L’objectif de la présente étude était d’estimer la fréquence des activités d’auto-prise en charge chez des personnes atteintes de diabète de type 2 en Arabie saoudite. La version en langue arabe du questionnaire Summary of Diabetes Self-care Activities a été utilisée pour identifier les pratiques d’auto-prise en charge chez 210 patients atteints de diabète sucré de type 2. Seuls 15 % des participants présentaient un taux glycémique révélateur d'un bon contrôle de leur glycémie (hémoglobine glycosylée ≤ 7 mmol/L). La plupart indiquaient avoir pris leur traitement comme prescrit, mais ils étaient nombreux à présenter des taux d’observance faibles pour d'autres pratiques d’auto-prise en charge (moyenne d’observance globale

hebdomadaire : 3,7 jours sur sept). Les hommes et les personnes ayant des revenus plus faibles étaient moins susceptibles de pratiquer des activités d'autosoins. Pour la majorité, ils avaient reçu des conseils élémentaires pour réaliser des activités d'autosoins, mais seule une minorité d'entre eux avait eu des informations plus détaillées. Des opportunités existent pour améliorer les pratiques d'auto-prise en charge du diabète de type 2 en Arabie saoudite et augmenter le pourcentage de patients qui parviennent à un bon contrôle du taux de glycémie.

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Introduction

In the Eastern Mediterranean Region, 7.7% of the population has been diagnosed with diabetes, a figure which has been estimated to double in the next 20 years (1). In Saudi Arabia, research provides some evidence that diabetes is not well managed (2–4). Poor access to health care, ineffective management of chronic disease and poor referral patterns were identified as major challenges to optimum diabetes health care in the country (5–7).

Clearly, a great deal more research is required about the management of diabetes in Saudi Arabia. The present study follows from the successful translation of the Summary of Diabetes Self-care Activities (SDSCA) instrument into the Arabic language and its validation using a Saudi population sample (8,9). This is the first estimation of the frequency of self-management activities in Saudi Arabia that is based on international criteria, as reflected in the study instrument's subscales. The study may inform future projects to improve diabetes care and encourage researchers to undertake similar studies on a wider population base.

Methods

Setting and sample

This paper was part of a larger study that was conducted by June 2011. Out of 35 health-care centres in the Medina catchment area (population 1 100 093), the study was conducted in 3 out of 4 main health centres (average population covered by each centre was about 18 000) (10).

The study locations were representative of Saudi Arabia's diabetes chronic disease management programmes (5). All type 2 diabetes patients attending the clinic during the 2-week data collection period were invited through posters and approached by the researcher and the researcher assistant to participate in the study (approximately 600). A convenience sample of 210 people (70 from each centre with males and females represented equally) agreed to participate in the study.

The inclusion criteria were: diagnosed with type 2 diabetes; able to participate without a mental disability that could affect his/her decisions; no physical disability affecting self-care; and above 26 years of age. Patients who were not registered at the chronic diseases clinics at the study locations were excluded.

Procedure

Participants were recruited through posters that were located in the study locations. In addition, the researcher and the researcher assistant invited patients in the waiting room to participate. Information about the study was mainly presented verbally in detail. Participants were informed that they may record their responses directly on the questionnaire or they may delegate a research assistant or nurse to the task. Although some participants recorded their responses themselves, the majority asked a research assistant or nurse to do so.

For each participant data about the glycosylated haemoglobin (HbA1C) level or fasting blood glucose (FBG) level that had been measured in the past 3 months were obtained from the medical records. The recruitment process was implemented until the required participant quota (n = 70) was attained in each centre, with a mean duration of 2 weeks for each study location.

Ethical approval was obtained from the authors' affiliated medical and research institutions in both Saudi Arabia and Australia. Verbal consent was obtained from the participants before commencing data collection.

Instruments

The study questionnaire consisted of 4 main sections: sociodemographic data; time since the diagnosis with diabetes and any complications experienced; the Arabic version of the SDSCA (A-SDSCA); and the extended A-SDSCA. In addition, a blood sample was drawn to obtain a recent HbA1C or FBG level.

Sociodemographic variables

Sociodemographic data were re-categorized to allow statistical comparisons between groups. Age was categorized as 50 000 versus ≤ 50 000). Low-income group in this study were those who with annual income up to SR 50 000, taking into account the assumption that they were renting their homes.

Time since first diagnosis and incidence of complications

Previous studies have indicated that there is a positive relationship between diabetes duration and the incidence of medical complications (11). Duration of diabetes incidence was later collapsed and presented as a binary variable with categories **A-SDSCA questionnaire**

The main section of the A-SDSCA instrument consists of 4 self-care subscales: diet (2 items), exercise (2 items), blood glucose testing (2 items) and foot care (2 items) and 2 questions each about medications and smoking. The first 4 subscales ask the respondents to record on how many days (from 0 to 7), they have performed the specified self-care activity. Detailed information was presented in an earlier paper (9). Respondents are also asked if they smoked. If they answered “yes,” they were asked how many cigarettes or waterpipes they smoked per day.

A-SDSCA extended questionnaire

Items included in the extension to the A-SDSCA aim to identify the amount of self-management diabetes education the participants have received. The extension consists of 4 sections: diet (8 items), exercise (6 items), blood glucose testing (5 items) and medications (5 items). To complete these sections, respondents are required to tick boxes for the specific advice that they have received from a doctor, nurse, dietician or diabetes educator at their health-care centre.

Blood glucose level

HbA1C level taken from the participant’s medical record was the measure of blood glucose used if the test had been undertaken during the last 3 months. However, due to data limitation in the study locations, FBG was recorded as an alternative. Participants were identified as having a controlled blood glucose level if they had HbA1C ≤ 7 mmol/L or FBG ≤ 130 mg/dL (12). Any value above these thresholds was considered to be an uncontrolled blood glucose level.

Data analysis

Data analysis was undertaken using SPSS, version 17 software. The main A-SDSCA instrument was scored by calculating the mean for each item then calculating the mean for each

subscale and computing the mean of the total A-SDSCA scale. Binary cut-off variables were also derived to identify the proportion of participants whose self-care management was within recommended self-management practices (13,14). Items from the extension part of the instrument were scored by computing frequencies and percentages. A series of binary variables were derived to summarize data regarding the sociodemographic characteristics of participants, length of time since diagnosis, diabetes complications and blood glucose level.

The frequencies of variables were tabulated. Next, a number of independent samples t-tests were undertaken to determine if any of the self-management activities undertaken by participants varied according to their sociodemographic characteristics, time since diagnosis, presence of complications and blood glucose levels. Statistical significance was defined at the P

Results

Descriptive analysis

Participants' characteristics

As Table 1 shows, the majority of participants in this sample (82%) were aged 26–65 years and there was an equal number of males and females. One-third of participants (33%) had no formal education, and almost 55% had an annual income of SR

Mean scores for A-SDSCA scales and binary outcomes

The mean scores for A-SDSCA scales and binary outcomes for A-SDSCA scales are presented in Table 2 . This shows that participants demonstrated low to medium mean levels of self-management; however, standard deviations of around 2.0 or more indicated a considerable variation in the number of days per week these activities were undertaken.

Binary cut-off scores, which identify the proportion of participants whose self-care management was within ADA recommended guidelines, are also presented in Table 2 . According to the information provided, 29% of participants were unable to manage their diet, 47% did not take enough exercise, 85% did not measure their blood glucose frequently, 41% were lax in their foot care and 25% did not take their medication as prescribed. A total of 27 participants (13%) were smokers at the time of data collection.

Responses to A-SDSCA extension questions

Table 3 presents responses to the A-SDSCA extension questions and shows that 91% of the participants indicated they were advised to follow a low-fat diet plan by their health-care providers; however, 5 patients (2%) reported they did not receive any dietary recommendations. The majority of participants (87%) were advised to engage in low-level exercise, such as walking on a daily basis, while 7 participants (3%) reported they did not receive advice that

stressed the importance of exercise in everyday self-management practices. Other recommendations are presented in detail in Table 3.

Bivariate analysis

Bivariate relationships between patients' mean self-care scores and their sociodemographic/clinical characteristics are reported for the 5 self-care subscales of the A-SDSCA (diet, exercise, blood glucose, foot care and medication) in Table 4 . It can be seen that there was a significant relationship between age and foot care, with those aged ≥ 65 years spending less time on average practising foot-care activities than younger participants.

Table 4 also shows that there were significant relationships between sex and diet, blood glucose testing and foot care, with males on average spending less time practising these activities (diffs –1.03, P

Formal education was not significantly associated with most self-care activities. However, it can be seen that those with formal education spent less time practising foot care (diff –1.02; P

Duration of time with diabetes was associated with good exercise self-management, but not with other activities. Participants who had been diagnosed for ≥ 8 years spent significantly fewer days per week exercising than those diagnosed for

Finally, Table 4 shows that participants who smoked spent more time than those who did not on diet and foot care (diff 1.29; P **Multivariate analysis**

The results of linear regression analysis, the independent relationships between the various characteristics of the participants and their total self-management scores, are presented in Tab le 5
. Participants' age, sex, income, level of education, length of time since diagnosis, level of glucose control and smoking habit accounted for 25% of the variability in their total self-management score ($R^2 = 0.251$).
Table 5
shows that women were much more likely than men to undertake appropriate diabetes self-management (β = 0.321; P

Other statistically significant results were found for income and the level of glucose control. Participants with an income SR > 50 000 were more likely than those with a lower income to undertake appropriate diabetes care activities (β = 0.129; P = 0.055). Those with a controlled glucose level were more likely than those with uncontrolled glucose to undertake appropriate diabetes care activities (β = –0.122; P = 0.054). Participant's age, educational level and time since diagnosis had little impact on total self-management scores after adjustment for all other

characteristics.

Discussion

Self-care management practices

A major finding of the study was that only 15% of participants had an HbA1C level ≤ 7 mmol/L (i.e. indicative of good glycaemic control) (12). This result is very similar to previous research findings in Saudi Arabia. Azab found that 21% of patients had a FBG

Another important finding was that participants generally had poor glycaemic control, even though most of them reported that they took their medication as prescribed. The finding that the study participants demonstrated low levels of compliance with most other self-management practices indicates that they did not understand the importance of these practices for moderating their blood glucose levels and minimizing the possibility of developing undesirable complications of the disease. Furthermore, the finding that only 15% of participants had good glycaemic control is strong evidence that medication alone is not the answer to the effective management of type 2 diabetes mellitus. These findings reflect serious limitations in the way type 2 diabetes mellitus self-management is promoted in the study locations.

With regard to self-care management, while 71% of participants reported eating a healthy diet 3 or more days per week, only 12% reported adhering to an optimal diet 7 days per week. This indicates how hard it is to maintain a healthy diet in Saudi Arabia, where social connections are strong and people are expected to attend all social gatherings to which they are invited to eat the traditional food provided (15). This is similar to the situation in the Philippines, where the people have a strong connection with rice as a source of carbohydrate (16). In the Arab context, there is a high probability that traditional social and cultural practices work against the efforts made by people with type 2 diabetes mellitus to maintain an optimal diet.

As to exercise, only 53% of the sample reported that they exercised 3 or more days per week as recommended. This percentage is lower than that reported in similar Asian studies. In a recent Chinese study, it was reported that 40% of participants who had type 2 diabetes mellitus maintained healthy exercise practices throughout the week (17). In another study, 54% of Korean people with type 2 diabetes mellitus who visited a general practitioner maintained good exercise practices (11). A possible reason for the large proportion of participants in the current study not exercising is that 18% were over 65 years of age. They may not be able to perform regular exercise due to general physical decline or poor health. However, it is much more likely to be attributable to the hot climate in Saudi Arabia, which constrains simple exercises such as walking. Also, Saudi Arabian culture is quite unlike Asian culture in that it does not encourage other types of healthy activities for older people such as yoga and tai chi (18).

The overall mean numbers of days per week that self-care activities were practised in this study was 3.7. While the practice of self-care activities is lower than that reported by studies in the United States that have also used the SDSCA instrument (14,16), it is comparable to that found in a recent study in Jordan, where the culture and context are similar to Saudi Arabia (13). In our study, participants' levels of self-management practices were based on whether or not they were performing within classification thresholds that were adapted from the ADA guidelines of 2008 (12). Whereas the results of this study showed that 29% of Saudi participants did not follow their recommended diet 3 or more days per week, the Jordan study found that approximately 19% of the Jordanian sample did not do so (13). Similarly, 68% of participants did not achieve the recommended physical exercise threshold (≤ 2 days/week) compared with 47% in the current study. Conversely, it was reported that 38% of the Jordanian participants tested their blood glucose at home at least 5 days per week, whereas only 15% of the Saudi participants did so. Compliance with medication was reasonable in both studies, but higher in Jordan (91% versus 75%). These results concur with other studies conducted in developed countries that have found a general preference for people to take medication for any health problem, as it is easier than changing their own behaviour (19,20).

Explanatory variables

Given the heterogeneity of sociodemographic characteristics among people with type 2 diabetes mellitus that has been noted in all countries, it is important to know if there are certain groups within the population who are likely to attend to self-care activities more or less than others. The results of this study show that in Saudi Arabia those who were older, male or low-income earners were less likely to practise specific self-care activities. While older age was solely associated with foot care, and low income was solely associated with blood glucose testing, male sex was significantly related to diet, blood glucose testing and foot care.

The results also showed that those who had good glycaemic control were more likely to manage their diet appropriately and test their blood glucose more regularly; those who had no formal education were more likely to care for their feet; and those who smoked were more likely to attend to diet, foot care and medication. In contrast to more developed countries, people in Saudi Arabia who have little formal education and thus low social status are more likely, rather than less likely, to follow medical advice. As to smoking, the 27 smokers in the study were predominantly younger people. They might not be involved in social gatherings to the same extent as older people, and thus not subjected to the unhealthy diet of rice and meat typically offered at these events. Another possible explanation is that smoking has decreased their appetite for food (21).

With regard to the practice of self-care activities, sex, income, glycaemic control and smoking were all independent explanatory factors. Given that glycaemic control is most likely an outcome of good self-management rather than a predictor of it and that smoking is known to do much

more harm than good, it follows then that sex and income remain as the 2 potential issues for health-care providers to consider. Worldwide, low income has been identified as a barrier to attaining recommended self-management practices such as blood glucose monitoring (22). Low income restricts patients' ability to access health-care services and purchase specialized equipment. Low income, or financial strain, also acts as a proxy measure for the experience of life stress, which is associated with increased morbidity and mortality (23). The fact that health-care services are free in Saudi Arabia does not mean people who are on a low income have equal access or opportunity. As mentioned previously, the health-care system does not, for example, provide a glucometer for all patients with type 2 diabetes mellitus. Furthermore, it is likely that those on low incomes are not able to visit a health-care centre regularly due to difficulties with work scheduling, child-care and transport.

A possible explanation for better dietary practices among women could be that they are more likely to be mindful of their diet than men are (24). Because women are considered a dependent population group in Saudi, it is not surprising that they more readily adhere to advice about diabetes self-management (18). The culture, social norms and religious commands encourage those of lower status to abide by those in important educational and religious positions.

Advice given by health-care providers

The responses to the A-SDSCA extension questions in the current study make it clear that a great majority of participants were given at least basic advice by their health-care providers to undertake self-care activities. However, it is also evident that fewer people were given more detailed information about diet and exercise, such as eating fruit and vegetables and exercising continuously for at least 20 minutes 3 times per week. In this regard, the advice given fell short of meeting international standards of self-management education (12). The failure to encourage patients to practise self-management activities may be considered a major limitation of the current health education approach in primary health care in Saudi Arabia. Further research is required in Saudi to substantiate this claim or to refute it. If it is substantiated, the health-care authorities must act to improve the standard of self-management education given to people with type 2 diabetes mellitus.

Limitations of the study

The study has a number of strengths, but there are also 2 potential limitations. First, as participants were purposefully sampled to achieve equal representation of the sexes, and two-thirds of those people who were invited to participate declined to do so, sample bias is possible. However, the characteristics of those who did participate were very similar to those obtained in other Saudi studies and there is little indication that they were a socioeconomically advantaged group (4,6,25). More importantly, there was no indication that people declined to participate because they were illiterate. In fact, many people requested that the questions be read to them and that the researcher complete the questionnaire. Second, the exploratory

cross-sectional study design did not allow cause-and-effect relationships between explanatory variables and self-management outcomes to be examined.

Conclusion

There are opportunities to improve type 2 diabetes mellitus self-management practices in Saudi Arabia. The contribution of nurses and other team members is scant in the literature. Appropriately qualified diabetes educators could take the lead in supporting patients to play an active role in managing their treatment plan, exploring effective self-management strategies, and learning to take advantage of the Saudi Ministry of Health and community resources. Due to the small sample in the current study, further studies are strongly recommended.

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