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Original Article

An assessment of self-care knowledge among patients with diabetes mellitus

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ABSTRACT

Purposes: This study aimed to (1) assess the level of diabetes self-care knowledge among patients with diabetes mellitus and (2) examine the relationship between patients' diabetes self-care knowledge and their demographic and medical characteristics.
Methods: A cross-sectional design was used to implement the study. A convenience sample of 273 diabetic patients were recruited from five primary health-care centers in Amman- Jordan.
Results: The overall level of knowledge of diabetes self-care in the total sample was moderate (58.28% (SD = 18.24)). The highest level of knowledge was meal planning (70.2%) followed by monitoring, causes of diabetes, foot care, symptoms and complication, diabetic medication, and the lowest level was exercise (42.5%). Furthermore, knowledge of diabetes self-care was found to be associated with age, educational status, diabetic medications and years with diabetes.
Conclusion: and Practice implications: The study findings emphasized that diabetic patients had a moderate level of knowledge and there were many of the learning needs for each area of knowledge. The health-care professional has an important role in developing the appropriate diabetes educational programs based on patients' learning needs and patients' characteristics. These programs that enhances knowledge on diabetes could be reduced or prevented diabetes-related complications.

1. Introduction

Diabetes mellitus (DM) is a metabolic disorder characterized by elevated blood glucose levels and disturbances in metabolic processes that can subsequently lead to premature death [1]. International Diabetes Federation (IDF) was estimated that 425 million people worldwide, or 8,8% of adults 20–79 years, will have DM in 2017. Moreover, the number of people with diabetes is expected to increase to 629 million by 2045 [2]. The increase in the prevalence of DM every year demonstrates the necessity to assess patients' learning needs [3]. Learning needs' assessment is an importance role in producing valuable information about the gaps in patients' knowledge [4]. Studies have demonstrated that knowledge about diabetic medications, diet, exercise, glucose monitoring, and foot care is necessary to effectively self -care diabetes [5–7].

In Jordan, many studies were conducted to evaluate the relationships between diabetes self-care knowledge and blood glucose control [8,9]. These studies found that patient with high level of diabetes self-care knowledge had better glycemic control. Therefore, diabetes education which enhances knowledge on diabetes and good self-care practices, has been associated with better glycemic control and quality of life. To develop such an educational program, a baseline assessment of diabetes self-care knowledge, needs to be made. Therefore, the purposes of this study were: (1) to assess the level of diabetes self-care knowledge (foot care, monitoring, meal planning, exercise, and diabetic medications) among patients with DM and (2) to examine the differences in patients' knowledge in relation to their characteristics (age, gender, level of education, duration of the disease, and type of treatment).

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2. Methods

2.1. Design and sample

A cross-sectional design was used to implement the study. A convenience sample of diabetic patients were recruited from five primary health-care centers in Jordan. The required sample size was calculated using G* power 3.0 software. Based on a medium effect size (0.25), and alpha level of 0.05, and a power of 0.80, the minimum required sample was 232 participants. A sample of 273 participants was recruited to assess the level of knowledge about DM among patients with DM.

2.2. Data collection procedure

Patients were invited to participate in the study if they met the following criteria: (a) age of 18 years and older, (b) diagnosed with type one or type two DM, and (c) free from any psychiatric or mental illness. Participants were excluded if they were healthcare professionals such as nurses, technicians and physicians because being a healthcare provider might influence the level of knowledge about DM.

The institutional review board of the five health-care centers approved the study protocol. Eligible participates were asked to sign informed content after they reviewed the aims, nature and risk-benefit of the study. All participants were assured of the confidentiality, voluntary participation and ability to withdraw from the study any time without penalty.

2.3. Instrument development

A 38- item questionnaire was developed for this study. Items included in the instrument covered steps of Diabetes Self-Care Knowledge Questionnaire (DSCKQ-30) and Diabetes Knowledge Test (DKT). This instrument has questions related to diabetes self-care knowledge in seven areas namely causes of diabetes, symptoms and complications, foot care, monitoring, exercise, meal planning, and insulin and diabetic medications. Corresponding number of questions in each area was 6, 6, 4, 6, 4, 7, 5; respectively.

Each question in questionnaire had one correct answer that can be selected from three or four responses. The participants' responses were analyzed as either correct or wrong response. One point was given for each correct response and zero for wrong responses. Average mean for each question was calculated by dividing the number of correct answers by 273 then multiplied by 100. In addition, the study included questions on demographic and medical characteristics such as age, gender, level of education, duration of the disease, and type of treatment.

The content validity of the scales was established by seeking the opinion of a panel of eight members were selected for their experiences in the field of nursing or medicine. All the nursing experts were university staff members; they include two professors and two associate professors. The jury panel also included endocrinologists who have the medical background. They were asked to comment on the structure of the knowledge test, clarity of the questions and suitability of options for each question. Modifications were implemented and approved by the eight experts.

A pilot study was conducted using 28 diabetic patients to ascertain the validity and reliability of the instrument. The Cronbach's alpha reliability of the knowledge scale in the pilot study with 28 diabetic patients showed a value of 0.76. The reliability with the total sample of 273 diabetic patients showed a value of 0.87.

2.4. Data analysis

Data were entered and analyzed using the IBM Statistical Package for Social Sciences (IBM SPSS Statistics) version 22.0 for Windows with a significance level of 0.05. Descriptive statistics were calculated for sample demographic (i.e., age, gender, marital status, and level of education) and medical characteristics (i.e., duration of diabetes, and type of treatment). Independent sample *t*-test and One-way analyses of variance (ANOVA) tests were used to examine the differences in knowledge of diabetes self-care in relation to demographic and medical characteristics. Moreover, Scheffe post hoc test was followed to figure out specific groups differences for significant results.

3. Results

3.1. Characteristics of participants

Majority of the study participants were male (59.3%), married (65.9%), and above 45 years old (52.4%). The level of literacy in the participants was moderate with up to 30.4% of patients having attained a primary school education and 26.7% having been educated to secondary level. Approximately half of participants had diabetes for more than 10 years (n = 124, 45.4%) and they were using oral hypoglycemic drug (OHD) only as a type of treatment for DM (n = 127, 46.5). The details of these demographic and medical characteristics are presented in Table 1.

3.2. The level of self-care knowledge among patients with DM

The level of knowledge was categorized into three levels; low (mean < 33%), moderate (mean = 33–66%), and high (mean > 66%). The overall level of knowledge of diabetes self-care in the total sample was moderate (58.28% (SD = 18.24)). Furthermore, participants had the highest level of knowledge on area related to meal planning (70.2%) followed by monitoring, causes of diabetes, foot care, symptoms and complication, diabetic medication, and the lowest level was exercise (42.5%) as shown in Table 2.

Table 1
Sample characteristics (N = 273).

Variables	N	(%)
Age (years)		
18–35	60	22.0
35–45	70	25.6
>45	143	52.4
Gender		
Male	162	59.3
Female	111	40.7
Educational level		
Illiterate	59	21.6
Preparatory and primary	83	30.4
Secondary and diploma	73	26.7
Baccalaureate or more	58	21.2
Duration of diabetes (years)		
<5	52	19.0
5–10	97	35.5
>10	124	45.4
Types of treatment		
Insulin only	89	32.6
OHD only	127	46.5
Insulin and OHD	57	20.9

Table 2
The level of knowleadge in each area related to diabetes self-care (N = 273).

Areas of knowledge	M (%)[a]	SD[b]
Meal planning	70.17	23.63
Monitoring	67.03	28.37
Causes of diabetes	57.63	21.29
Foot care	57.42	22.53
Symptoms and complications	54.88	23.63
Diabetic medications	49.30	33.08
Exercise	42.49	27.59
Total	58.28	18.24

[a] M (%) = Mean Percentage.
[b] SD = Standard Deviation.

3.3. Association between participants' characteristics and their self-care knowledge

The study showed that knowledge of diabetes self-care was associated with age, younger patients (18–35 years) were most likely to be knowledgeable in causes of DM, foot care, monitoring, meal planning, and diabetic medications ($F = 9.86$, $p < 0.05$, $F = 13.10$, $p < 0.05$, $F = 26.33$, $p < 0.05$, $F = 14.08$, $p < 0.05$, and $F = 22.66$, $p < 0.05$, respectively). In addition, participants who were holding baccalaureate degree or more were most likely to be knowledgeable on causes of DM, monitoring, meal planning, and diabetic medications ($F = 19.10$, $p < 0.05$, $F = 26.33$, $p < 0.05$, $F = 14.08$, $p < 0.05$, and $F = 22.66$, $p < 0.05$, respectively). However, the study showed no significant association between gender and all the areas of self-care knowledge among study participants ($p > 0.05$).

In term of medical characteristics, participants who had diabetes for over 10 years were found to be more knowledgeable in foot care, symptoms and complications, monitoring, exercise, and diabetic medications ($F = 4.01$, $p < 0.05$, $F = 8.68$, $p < 0.05$, $F = 13.83$, $p < 0.05$, $F = 6.21$, $p < 0.05$, and $F = 29.39$, $p < 0.05$, respectively) than those who had the disease less than 5 years and between 5 and 10 years. In addition, participants who had taken OHD alone were found to be more knowledgeable in all area of diabetes self-care than those who had taken OHD with insulin and those who had taken insulin alone (see Table 3).

4. Discussion

The assessment of diabetes self-care related knowledge is an important first step in developing appropriate diabetes education programs. Therefore, this study was conducted with 273 participants to assess their level of knowledge about diabetes self-care. The findings of this study were consistent with other studies from Saudi Arabia, Iraq, Trinidad, and Bangladesh, that showed that patients with DM demonstrated moderate level of self-care knowledge [10–13]. However, studies from elsewhere have also reported contrasting finding [6,14,15]. Possibly, the consistence of this finding with some studies and inconsistence with other studies might be due to resemblance in the demographic and medical characteristics of the participants.

The main areas of the knowledge test were seven areas, namely causes of diabetes, symptoms and complication, foot care, monitoring, exercise, meal planning and diabetic medications. Regard to these areas, the study indicated that participants had the lowest level of knowledge on area related to exercise. This area contains questions to expose the participants' knowledge regarding (1) the importance of physical activity, (2) the needed period of physical activity for diabetic patients, (3) physical activity and blood-glucose monitoring, and (4) the effects of lifestyle modifications compared with diabetic medications. This finding was consistence with previous studies that showed that the majority of participants had poor knowledge regarding the benefits of exercise [16–18]. This finding calls the needs to develop diabetes education programs for patients with DM to improve their knowledge about the benefit of exercise that wills prevent or reduce the development of diabetes -related complications.

In term of demographic characteristics, the finding of this study indicated that the majority of participants were aged over forty-five. This is in line with previous studies that revealed that the incidence of chronic diseases tends to increase with age [18–22]. In addition, this finding was consistent with other studies that

Table 3
Comparison between characteristics of the study participants and self-care knowledge areas.

	F Statistics				t-Statistics
	Age (years) 1. 18-35 2. 35-45 3. >45	Educational level 1.illiterate 2.Preparatory 3.Secondary 4.baccalaureate or more	Duration of DM (years) 1. < 5 2. 5-10 3. > 10	Types of treatment 1.Insulin only 2. OHD only 3. Insulin & OHD	Gender Male = 162 Female = 111
Causes of diabetes	9.86* 1 > 2 & 3	19.10* 2 & 3 & 4 > 1 4 > 2 & 3	2.71	5.16* 1 > 2 & 3	.62
Symptoms and complications	1.28	1.28	8.65* 3 > 2 & 1	8.27* 1 > 2	.22
Foot care	13.10* 1 & 2 > 3	13.10* 2 & 3 & 4 > 1 4 > 2	4.01* 3 > 2 & 1	4.47* 1 > 2	.28
Monitoring	26.33* 1 & 2 > 3	26.33* 2 & 3 & 4 > 1 3 & 4 > 2	13.83* 3 > 2 & 1	10.53* 1 > 2 & 3	.19
Exercise	0.75	0.75	6.21* 3 > 2 & 1	7.30* 2 > 3	.30
Meal planning	14.08* 1 & 2 > 3	14.08* 2 & 3 & 4 > 1 3 & 4 > 2 4 > 3	2.75	3.10* 1 > 2	.76
Diabetic medications	22.66* 1 > 2 & 3	22.66* 3 > 1 & 2 4 > 1 & 2	29.39* 3 > 1 & 2	48.22* 1 & 3 > 2	1.24

*p value is significant at $\alpha = 0.05$ (2 -tailed).

reported that the majority of patients with DM were aged between 50 and 59 years old [23,24].

The second aim of this study was to examine the differences in patients' knowledge in relation to their characteristics (age, gender, level of education, duration of the disease, and type of treatment). This study showed no significant association between gender and self-care knowledge. Studies from Kuwait, Nepal, and Bangladesh also reported similar findings [13,25,26]. There appears to be contradiction among different studies, some showing higher diabetes knowledge among male while the other female [27.28]. However, the findings of this study showed that the level of knowledge of diabetes self-care was associated with age, educational status, diabetic medications and years with diabetes. Regarding to age, the study found out that younger patients (18–35 years) were most likely to be knowledgeable in self-care diabetes. This is in line with previous findings that clarified that the younger patients were most likely to retain what they were thought, and they remember and recall faster than older groups. As a result, the diabetes education programs would be designed to meet the needs of older patients.

In term of educational status, the study showed that the participants who were holding baccalaureate degree or more were more likely to be knowledgeable in self-care diabetes than those who attained primary or secondary education or illiterates. This is not surprising as knowledge is gained through education. This finding was consistent with other studies from United Arab Emirates [15], Bangladesh [14], and Ethiopia [6]. This finding calls for an urgent diabetes education programs with simple concepts need to be for this group of population.

In term of duration of diabetes, the study showed that the participants who had lived with the diabetes for over 10 years were found to be more knowledgeable in self-care diabetes than those who had lived with the disease less than 5 years and between 5 and 10 years. This was consistent with the finding of previous studies that found higher level of diabetes knowledge with increasing number of years of disease [25,29,30].

Possibly, the reason for this finding may be related to nature of diabetes, newly diagnosed patients might not realize the need to self-care until the symptoms are appeared, unlike patients who have had the disease for many years, whose symptoms have appeared, and they go around seeking for solution. This group of patients is most likely to self-care to relieve themselves of the discomfort able symptoms related to diabetes. There is need to create a special diabetes education program for newly diagnosed patients to prevent and reduce the development of diabetes complications.

Moreover, based on the findings of this study, further research to examine the differences in patients' knowledge in relation to their characteristics is encouraged. Although different characteristics were examined in this study, further aspect, which might to contribute to the level of self-care knowledge among patients with DM, should be examined in future research. These aspects could include social support, financial status, suffering from other chronic diseases, and type of diabetes.

5. Conclusion

The study findings emphasized that diabetic patients had a moderate level of knowledge and there were many of the learning needs for each area of knowledge. These findings could have major consequences for the occurrence of diabetes-related complications. The development of the appropriate educational programs has been associated with reduce or prevent these complications and better clinical outcomes. Therefore, health care professionals should be educated and trained to deliver an appropriate educational program based on their patients' learning needs and their characteristic that might enhance the self-care knowledge among patients with DM.

Disclosures

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dsx.2018.10.010.

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