Level of diabetic patients' knowledge of diabetes mellitus, its complications and management

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Abstract

Diabetes mellitus occurs when the blood glucose is too high because of the human body's inability to make insulin at all or is insufficient at making insulin. Increasing patient knowledge of diabetes mellitus leads to increased patient compliance in treatment and collaboration in care plan decision making. There were no known studies regarding the knowledge, attitudes, and practices of Saudi Arabian patients prior to this study. The objective of the present study was to assess and document the level of knowledge, attitudes, and practices of diabetic patients' regarding diabetes mellitus, its complications, and its management. This cross-sectional design was conducted with 906 Saudi Arabian diabetic patients from endocrinology outpatient clinics in 47 hospitals in 8 cities. Self-report pen and paper study was used to obtain results, which were inserted to Excel and transferred to SPSS for analysis. Saudi diabetic patients do not have significant knowledge regarding diabetes mellitus, but are knowledgeable regarding the implications of diabetes mellitus and precautions against diabetes mellitus. This information cannot be generalized outside of Saudi Arabia, yet can be used to inform health care providers in other countries regarding their own diabetic patients, which may impact the self-management of their diseases.

Keywords: Diabetes Mellitus, Diabetes complications, Diabetes assessment, Diabetes management

INTRODUCTION

Diabetes mellitus refers to a disease that develops due to blood glucose being too high. Blood glucose is the primary source of energy in the human body and is derived from food eaten [1, 2]. Blood glucose enters the cells for energy use as a result of insulin, which is created by the pancreas. In some cases, the human body's insulin production is insufficient or non-existent, causing blood glucose to remain in the blood vessels, instead of being created into energy in the cells. Over time, health problems can be derived as a result of having too much blood glucose. There is no cure for diabetes, but it is possible to manage the disease and remain healthy [3]. There are three types of diabetes mellitus: Type 1, Type 2, and gestational [4]. Patients with Type 1 diabetes mellitus are incapable of making insulin. This type of diabetes is commonly diagnosed in children and young adults. It involves the immune system of the human body attacking and destroying the pancreatic cells that make insulin. For survival, Type 1 diabetic mellitus patients must take insulin daily. Patients with Type 2 diabetes mellitus make insulin, but do not make it well or are unable to utilize it well. This type of diabetes mellitus is typically diagnosed in middle or older populations. Gestational diabetes mellitus typically occurs during pregnancy and is resolved following the birth of the baby; however, women with gestational diabetes mellitus are more likely to develop Type 2 diabetes mellitus [4].

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It has been found in previous studies that increasing patient knowledge regarding diabetes mellitus and its resultant complications has benefits in achieving patient compliance in treatment, which may lead to a decrease in complications [5-7]. In fact, patients that are aware of their HbA1c values had better understanding of their care plan and improved assessment ability regarding glycemic control than their counterparts.

In fact, there is a growing body of evidence that individuals suffering from chronic disease, yet engaged and active in their health care tend to have better health outcomes [8-11]. For instance, patients completing programs for chronic disease self-management tend to have higher physical functioning and improved self-efficacy and less acute care requirements than their counterparts [12]. Thus, health outcomes are positively associated with self-efficacy regarding chronic disease [13, 14]. At the same time, collaboration between diabetic patients and health care provides, as well as being engaged in clinical decision making are associated with improved self-care, self-management, and disease outcomes [15].

Despite the wide range of knowledge, there is less known about specific motivations, skills, knowledge, and attitudes that are required by diabetic patients to effectively participate in self-management of their disease. As noted, knowledge regarding target and actual blood pressure, HbA1c values, and cholesterol levels have been recommended by the American Diabetes Association due to their importance [16].

The primary way to measure and track glycemic control is through regular HbA1c value testing. This value represents an important marker of disease control and, as a result, knowledge of this value is an important pre-condition for engagement in self-management [3, 9]. However, this knowledge is not frequently held by diabetic patients, despite knowledge of having the HbA1c test conducted. In these cases, patients knew they had the test done; however, they did not know the value or were inaccurate in the value [17]. Knowledge of diabetes and complications are impacted by ethnicity, educational level, and communication with health care providers [7]. However, despite this knowledge, there are no known studies in Saudi Arabia regarding the knowledge, attitudes, and practices of diabetic patients. As a result, this study may be beneficial to multiple stakeholders, including patients, health care providers, and the support networks of diabetic patients. There is a need for this study to contribute to existing literature regarding the knowledge, attitudes, and practices of diabetic patients in Saudi Arabia, which may contribute to the field through showing another perspective of these variables based on different lifestyles through different cultures and societies.

Based on the background and rationale presented, the objective of the present study was to assess and document the level of knowledge, attitudes, and practices of diabetic patients' regarding diabetes mellitus, its complications, and its management. As diabetes mellitus is a major health concern globally, it is important to assess this information in order to gain an understanding of the quality of life of diabetic patients and their knowledge, attitudes, and practices relating to the disease. This understanding may lead to future recommendations towards treating these patients on a holistic level, which involves an increase in education, potentially impacting the diabetic patient's attitudes and practices in relation to their disease, further improving their quality of life. Moreover, this information contributes to existing literature through the provision of updated assessments of diabetic patients' knowledge, attitudes, and practices regarding self-management of diabetes mellitus and its complications. As a result, this may lead to short-term or long-term changes in care plans, as well as provide health care providers with information regarding changes in the patients' worldview about the disease.

METHODS

The study was conducted using a cross-sectional design. Cross-sectional data is obtained as part of a section of the population and is based on the same time period. At the same time, a cross-sectional design may mean that there is no consideration of time differences. However, a cross-sectional analysis typically involves the comparison of differences among the participants [18].

Participants were selected using convenience sampling method from endocrinology outpatient clinics in 47 hospitals in 8 cities: Riyadh, Jeddah, Taif, Makkah, Dammam, Al Ahsa, Albaha and Asir in Saudi Arabia. The data was collected from 01/09/2019 till 26/09/2019, resulting in a final sample size of 906 patients. Data was obtained through a self-report questionnaire provided to participants through hard copies. The information from the hard copies was transferred to Excel for organizational purposes.

Statistical analysis was done through SPSS. To begin with, demographic data (gender, age, marital status, educational level, and occupation) were analyzed using frequency and percentages. Frequencies were also used to describe the participants' early knowledge of diabetes mellitus, personal knowledge of diabetes mellitus, risk factors of diabetes mellitus, implications of diabetes mellitus, precautions against diabetes mellitus, and further knowledge of precautions against diabetes mellitus. Chi-square analysis was used to determine the knowledge of patients regarding diabetic mellitus, knowledge of implications of diabetes mellitus, and knowledge of precautions against diabetes mellitus.

RESULTS

The demographic statistics are presented in Table 1 based on frequencies and percentages.

Table 1: Demographic Statistics

Variables	Categories	Frequency	Percentage

Gender	Male	542	59.8
	Female	364	40.2
	Total	**906**	**100**
	18-25 years	202	22.3
	26-35 years	187	20.6
	35-45 years	166	18.3
	46-60 years	180	19.9
	61 years and Above	171	18.9
	Total	**906**	**100**
	Single	368	40.6
	Married	371	40.9
	Divorced / Widowed	167	18.4
	Total	**906**	**100**
	Secondary	169	18.7
	High School	459	50.7
	College and Above	223	24.6
	No School	55	6.1
	Total	**906**	**100**
	Unemployed/Housewife	178	19.6
	Student	84	9.3
	Government / Private Employee	310	34.2
	Freelancer	244	26.9
	Retired	90	9.9
	Total	**906**	**100**

Results from Table 1 show that there are more males (542), who make up 59.8% of the respondents; while the females (364) constitute 40.2% of the total 906 respondents.

The age category of the respondents shows that there are 202 persons who are within the ages of 18 and 25 years, and they contribute 22.3% of the respondents. There are 1870 persons between the ages of 26 and 35 years, who comprise 20.6% of the respondents. 100 of the respondents are between the ages of 36 and 45 years, and they make up 18.3% of the total respondents. 100 respondents are between the ages of 46 and 60 years, who comprise 19.9% of the total respondents. 171 of the respondents are above 61 years, and they make up 18.9% of the respondents.

From 906, 368 of them (40.6%) are single; 371 of them (40.9%) are married; and 167 of them (18.4%) are either divorced or widowed.

Education of the respondents reveal that 169 (18.7%) attained secondary school education; 459 (50.7%) have attained high school education; 223 (24.6%) have College degrees; while 55 (6.1%) have not attended any formal school.

From the respondents, 178 of them (19.6%) are unemployed; 84 (9.3%) are students; 310 (34.2%) are government / private

employees, 244 (26.9%) are freelancers; and 90 (9.9%) are retirees.

Table 2 shows the analysis of the early knowledge of diabetes mellitus.

Table 2: Analysis of Early Knowledge of Diabetes Mellitus

		FREQUENCY		
S/N	QUESTIONS	Yes	No	Not Sure
1.	Have you heard the disease "DM"?	906	0	0
2.	Exposure to health education about DM	540	366	0
3.	Family history of DM	556	350	0

906 respondents indicated they have heard of the disease "diabetes mellitus". 540 of them have been exposed to the health education on diabetes mellitus, while 336 of them have not. Also, 556 of the respondents admit they have family history of diabetes mellitus, while 350 of them do not have family history of the ailment. These information reveal that most of the respondent have early knowledge of diabetes mellitus, and majority of them have records of the ailment in their generation.

Table 3 shows the analysis of personal knowledge of diabetes mellitus.

Table 3: Analysis of Personal Knowledge of Diabetes Mellitus

			FREQUENCY	
S/N	QUESTIONS	Responses	Frequency	Percentage
1.	How many types of diabetes mellitus do you know?	One type	190	21
		Two types	174	19.2
		Not sure	180	19.9
		Do not know	193	21.3
		Others	169	18.7
2.	How many years ago were you first diagnosed with diabetes mellitus?	1-5years	160	17.7
		6-10years	182	20.1
		11-15years	191	21.1
		16-20years	180	19.9
		Above 20years	193	21.3
3.	Which type of diabetes mellitus do you have?	Type 1 (Insulin Dependent)	187	20.6
		Type 2 (Non-Insulin Dependent)	360	39.7
		Do not know	177	19.5
		Others	182	20.1

Based on the personal knowledge the respondents have acquired about diabetes mellitus, 190 (21%) and 174 (19.2%) of the respondents are aware of at least one type of diabetes mellitus, while 169 (18.7%) indicated knowledge of other types of diabetes mellitus. However, 193 of the respondents (21.3%) are not aware, while 180 of them (19.9%) are not sure. Notwithstanding, there is enough evidence that the respondents are knowledgeable about various types of diabetes mellitus.

Also, the respondents offered responses on the type of diabetes mellitus they have contracted. 187 of them (20.6%) have type 1; 360 of them (39.7%) have type 2; while 182 (20.1%) have other types. 177 are not sure. These statistics indicate that majority of the respondents are not just knowledgeable about diabetes mellitus, but are also aware of the type they have.

There is evidence that the respondents are not only aware of their diabetic state, but have been diagnosed by a physician. 160 of the respondents (17.7%) were diagnosed between 1-5 years ago; 182 of them (20.1%) were diagnosed between 6-10 years ago; 180 of them (19.9%) were diagnosed between 16-20 years ago; and 187 (20.6%) were diagnosed in the last 20 years.

Table 4 provides the analysis of knowledge of risk factors of diabetes mellitus.

Table 4: Analysis of Knowledge of Risk Factors of Diabetes Mellitus

S/N	QUESTIONS	FREQUENCY		
		Yes	No	Do not Know
1.	Do you think diabetes mellitus is hereditary? (inherited from parents)	350 (38.6%)	369 (40.7%)	187 (20.6%)
2.	Do you think genetic and hereditary factors are risk factors for the development of diabetes mellitus?	371 (40.9%)	356 (39.3%)	179 (19.8%)
3.	Do you think the duration of your diabetes mellitus is an important risk factor in the development of complications?	367 (40.5%)	377 (41.6%)	162 (17.9%)
4.	Do you think that diet and lifestyle modifications are important factors in reducing problems associated with diabetes mellitus?	365 (40.3%)	357 (39.4%)	184 (20.3%)
5.	Do you think the control of your blood glucose levels is an important factor in reducing diabetes mellitus?	337 (37.2%)	374 (41.3%)	195 (21.5%)

From Table 4, the respondents expressed their knowledge on risk factors of diabetes mellitus. A total of 350persons (38.6%) agree that diabetes is hereditary; 371 of them (40.9%) agree that genetic and hereditary factors are risk

factors for development of diabetes mellitus; 367 (40.5%) believe that the duration of diabetes mellitus is an important risk factor in the development of complications; 365 (40.3%) agree that diet and lifestyle modifications are important factors in reducing problems associated with diabetes mellitus; and 337 (37.2%) agree that the control of your blood glucose levels is an important factor in reducing diabetes mellitus. While these respective statistics do not account for 50% of the total respondents, the values obtained nonetheless are substantial, and thus reveal that a large number of the respondents are knowledgeable about the risk factors of diabetes mellitus.

Table 5 provides the analysis of knowledge of implication of diabetes mellitus.

Table 5: Knowledge of Implications of Diabetes Mellitus

S/N	QUESTIONS	FREQUENCY		
		Yes	No	Do not Know
1.	Are you aware that diabetes mellitus can lead to visual problems and blindness?	365 (40.3%)	375 (41.4%)	166 (18.3%)
2.	Do you know that diabetes mellitus can cause changes to the health of your retina (the back of your eye-diabetic retinopathy)?	338 (37.3%)	383 (42.3%)	185 (20.4%)
3.	Are you aware that diabetes mellitus can cause clouding of vision or cataracts?	366 (40.4%)	377 (41.6%)	163 (18%)
4.	Do you know that your diabetes mellitus can cause increase in the pressure of your eyes or glaucoma?	359 (39.6%)	351 (38.7%)	196 (21.6%)

The respondents provided their knowledge about the implications of diabetes mellitus. 365 of them (40.3%) are aware that diabetes mellitus can lead to visual problems and blindness; 338 of them (37.3%) are aware that diabetes mellitus can cause changes to the health of your retina; 366 of them (40.4%) are aware that diabetes mellitus can cause clouding of vision or cataracts; while 359 of them know that diabetes mellitus can cause increase in the pressure of your eyes or glaucoma. These statistics indicate that many of the respondents are knowledgeable about the implications of diabetes mellitus.

Table 6 contains the analysis of knowledge of precautions against diabetes mellitus.

Table 6: Analysis of Knowledge of Precautions Against Diabetes Mellitus

S/N	QUESTIONS	FREQUENCY		
		Yes	No	Do not Know

S/N				
1.	Do you feel that you have sufficient knowledge about the management of your diabetic condition?	366 (40.4%)	350 (38.6%)	190 (21%)
2.	Do you follow a dietary modification to control your diabetes mellitus?	536 (59.2%)	370 (40.8%)	0 (0%)
3.	Do you perform regular sugar monitoring after being diagnosed with diabetes mellitus?	546 (60.3%)	360 (39.7%)	0 (0%)
4.	Do you perform regular exercises?	564 (62.3%)	342 (37.7%)	0 (0%)
5.	Do you have regular medical examinations?	555 (61.3%)	351 (38.7%)	0 (0%)

The respondents provided their knowledge about the implications of diabetes mellitus. 366 of them (40.4%) have sufficient knowledge about the management of your diabetic condition; 536 of them (59.2%) follow a dietary modification to control diabetes mellitus; 546 of them (60.3%) perform regular sugar monitoring after being diagnosed with diabetes mellitus; 564 of them perform regular exercises; and 555 of them (61.3%) have regular medical examinations. For most of the statistics, there is above 50% representation; which suggest that majority of the respondents are knowledgeable about the precautions against diabetes mellitus.

Table 7 provides the analysis of further knowledge on precautions against diabetes mellitus.

Table 7: Analysis of Further Knowledge on Precautions Against Diabetes Mellitus

S/N	QUESTIONS	FREQUENCY			
		Not Important	Slightly Important	Very Important	Do not Know
1.	Eating healthy (diet)	171 (18.9%)	180 (19.9%)	364 (40.2%)	191 (21.1%)
2.	Regular Exercise	185 (20.4%)	186 (20.5%)	344 (38.0%)	191 (21.1%)
3.	Regular blood sugar check ups	169 (18.7%)	348 (38.4%)	200 (22.1%)	189 (20.9%)
4.	Maintaining an ideal body weight	181 (20.0%)	167 (18.4%)	372 (41.1%)	186 (20.5%)
5.	Taking medication regularly	183 (20.2%)	361 (39.8%)	186 (20.5%)	176 (19.4%)
6.	Routine medical check ups	183 (20.2%)	185 (20.4%)	373 (41.2%)	165 (18.2%)
7.	Routine eye examinations	181 (20.0%)	178 (19.6%)	356 (39.3%)	191 (21.1%)

Results obtained from Table 7 summary the precautions adopted by the respondents against diabetes mellitus. 171 (18.9%) of the respondents eat healthy food; 185 (20.4%)

engage in regular exercise; 169 (18.7%) go for regular blood sugar check; 181 (20%) maintain ideal body weight; 183 (20.2%) take their medication regularly; 183 (20.2%) have regular medical checkups; and 181 (20%) have routine eye examinations. While the statistics are lower than 50% representation of the total respondents, there is little evidence that some of the respondents are knowledgeable on precautions against diabetes mellitus.

It is expedient to validate the responses obtained to ascertain if the respondents are significantly knowledgeable on diabetes mellitus, its implications and management. The results of Figure 8 show that the null hypotheses are not all rejected for the questions put forth. This suggests that the respondents are not significantly knowledgeable on diabetes mellitus. Chi-square tests were conducted. The results of Figure 9 reveal that the null hypotheses are all rejected at 5%. This indicates that the respondents are knowledgeable on the implications of diabetes mellitus. The results of Figure 10 reveal that the null hypotheses are all rejected at 5%. This implies that the respondents are knowledgeable on the precautions against diabetes mellitus.

Figure 8: Chi-Square Analysis of Knowledge of Diabetes Mellitus

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The categories defined by Exposure to health education about DM = Yes and No occur with probabilities 0.5 and 0.5.	One-Sample Binomial Test	.000	Reject the null hypothesis.
2	The categories defined by Family history of DM = Yes and No occur with probabilities 0.5 and 0.5.	One-Sample Binomial Test	.000	Reject the null hypothesis.
3	The categories of How many years ago were you first diagnosed with diabetes mellitus? occur with equal probabilities.	One-Sample Chi-Square Test	.435	Retain the null hypothesis.
4	The categories of How many types of diabetes mellitus do you know? occur with equal probabilities.	One-Sample Chi-Square Test	.679	Retain the null hypothesis.
5	The categories of Which type of diabetes mellitus do you have? occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 9: Chi-Square on Knowledge of Implications of Diabetes Mellitus

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The categories of Are you aware that diabetes mellitus can lead to visual problems and blindness? occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
2	The categories of Do you know that diabetes mellitus can cause changes to the health of your retina (the back of your eye-diabetic retinopathy)? occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
3	The categories of Are you aware that diabetes mellitus can cause clouding of vision or cataracts? occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
4	The categories of Do you know that your diabetes mellitus can cause increase in the pressure of your eyes or glaucoma? occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 10: Chi-Square Analysis on Knowledge of Precautions Against Diabetes Mellitus

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The categories of Eating healthy (diet) occur with equal probabilities	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
2	The categories of Regular Exercise occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
3	The categories of Regular blood sugar check ups occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
4	The categories of Maintaining an ideal body weight occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
5	The categories of Taking medication regularly occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
6	The categories of Routine medical check ups occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
7	The categories of Routine eye examinations occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

DISCUSSION

Within the present study, there were more males (59.8%) than females (40.2%). Of the 906 participants, 22.3% were between 18 and 25 years of age, 20.6% were between 26 and 35 years of age, 18.3% were between 36 and 45 years of age, 19.9% were between 46 and 61 years of age, and 18.9% were over 61 years of age. Of the 906 participants, 40.6% were single, 40.9% were married, and 18.4% were divorced/widowed. Of the 906 participants, 18.7% had a secondary school education, 50.7% had a high school education, 24.6% had a college degree, and 6.1% had no formal education. Of the 906 participants, 19.6% were unemployed, 9.3% were students, 34.2% were government/private employees, 26.9% were freelancers, and 9.9% were retired.

The second part of the analysis was based on the participants' early knowledge of diabetes mellitus. Of the 906 participants, all indicated they had heard of 'diabetes mellitus,' 59.6% stated that they had been exposed to the health education on diabetes mellitus, as compared to 37.1% that had not had such education. Moreover, 61.4% of the 906 participants reported having a familial history of diabetes mellitus, as compared to 38.6% not having such history. Based on these findings, it is understood that most participants had early knowledge of diabetes mellitus and most had a familial history. Therefore, because of this familial history, it is likely that these participants had an increased awareness of the complications that can arise as a result of diabetes mellitus.

Of the 906 participants in relation to knowledge acquired regarding diabetes mellitus, 21.0% are aware of one type of diabetes mellitus, 19.2% are aware of two types of diabetes mellitus, 19.9% are not sure of the number of types of diabetes mellitus known, and 18.7% know of other types of diabetes mellitus. According to the participants, 17.7% were diagnosed with diabetes mellitus 1 to 5 years ago, 20.1% were diagnosed with diabetes mellitus 6 to 10 years ago, 21.1% were diagnosed with diabetes mellitus 11 to 15 years ago, 19.9% were diagnosed with diabetes mellitus 16 to 20 years ago, and 21.3% were diagnosed with diabetes mellitus over 20 years ago. Of the participants, 20.6% reported having Type 1 diabetes mellitus, 39.7% reported having Type 2 diabetes mellitus, 19.5% reported not knowing what type of diabetes mellitus they have, and 20.1% reported having another type of diabetes mellitus. Based on this information, not only are participants knowledgeable about diabetes mellitus, but they also know what type they have. This could be due to experience having the disease or through conversations with their health care provider.

Of the 906 participants, 38.6% agreed that diabetes mellitus is hereditary, 40.9% agreed that risk factors for diabetes mellitus development include genetics and hereditary factors, 40.5% stated that the duration of diabetes mellitus represents an important risk factor in relation to complication development, 40.3% agree that modifications to diet and lifestyle can assist in reducing diabetes mellitus complications, and 37.2% stated that blood glucose level control is critical in reducing diabetes mellitus. Through these findings, less than 50% of each category had knowledge of risk factors. However, as a whole, the participants had at least some knowledge regarding diabetes mellitus risk factors. This information can be used in the health care setting for the development of education programs that will help bridge the gap in relation to information known and unknown.

Of the 906 participants, 40.3% reported being aware that visual problems and blindness can arise as complications of diabetes mellitus, 37.3% reported being aware that retina health changes can arise as complications of diabetes mellitus, 40.4% reported being aware that vision clouding or cataracts can develop as complications of diabetes mellitus, and 39.6% reported being aware that eye pressure or

glaucoma can develop as complications of diabetes mellitus. Therefore, it is understood that most of the respondents were aware of the implications and potential future complications of diabetes mellitus. As a result, it is possible that these individuals will be proactive in treatment and self-management of their needs in order to decrease the likelihood of these types of issues.

It was found that 40.3% of the 906 participants have sufficient knowledge regarding the management of diabetes mellitus, 59.2% engage in modifications of diet to control diabetes mellitus, 60.3% engage in regular monitoring of blood glucose after their diagnosis of diabetes mellitus, 62.3% regularly exercise, and 61.3% have regular medical examinations. As seen, typically, over 50% of the participants are proactive in educating themselves regarding diabetes mellitus and work to manage their diabetes mellitus.

Of the 906 participants, 18.9% focus on eating healthy foods, 20.4% focus on engaging in regular exercise, 18.7% focus on completing regular blood glucose checks, 20.0% each focus on maintaining an ideal body weight and having routine eye examinations, and 20.2% each focus on taking their medication as prescribed and attend regular medical checkups. It is evident that there is a lower representation of the participants in preventing complications.

The findings of Chi square analysis show that the participants are not significantly knowledgeable of diabetes mellitus, yet are knowledgeable regarding the implications and precautions of diabetes mellitus. Based on the data, it is implied that further education can be provided regarding diabetes mellitus. This would be beneficial because it may promote improved self-management of diabetes mellitus. However, health care providers will need to improve their appointment procedures with their patients in order to ensure they receive the education they need. As a result of these efforts, self-efficacy and awareness in patients with diabetes mellitus may increase, leading to improved outcomes, fewer complications, and fewer acute care instances.

CONCLUSIONS

In conclusion, Saudi diabetic patients do not have significant knowledge regarding diabetes mellitus. However, they are knowledgeable regarding the implications of diabetes mellitus and precautions against diabetes mellitus. The study is limited in that the data was only obtained by Saudi diabetic patients. This information then cannot be generalized outside of Saudi Arabia. However, it can be used to inform health care providers in other countries regarding their own diabetic patients and provide possible gaps in patient knowledge, which may impact their self-management of their disease. As a result, while the present study cannot be generalized specifically for other countries, the conclusions can be used to develop possibilities of educational needs in other countries.

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