International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 04-10-2020; Accepted: 18-10-2020; Published: 10-11-2020
www.medicalsciencejournal.com
Volume 6; Issue 11; 2020; Page No. 24-28

Knowledge and practice toward diabetes self-management and diabetes complications among recently diagnosed diabetic patients in hail region

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Abstract
Background: Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia. Patients with diabetes are at higher risks of developing chronic complications, including nephropathy, retinopathy, and cardiovascular and atherosclerotic complications.
Objectives: The aim of this study was to determine the Knowledge, attitude and practice toward diabetes complications among diabetic patient in Hail region.
Methods: A cross-sectional community-based study was conducted at Hail City in December 2019 to February, 2020 using a self-structured questionnaire, randomly selected participants over the age 18 who were diagnosed with diabetes with the past 4 years in different primary clinic and hospitals in Hail city.
Result: A total of 402 participants took part in this study with a response rate of 89.3%. About 5***9.7***% of respondents had a good knowledge, 30.3% had moderate knowledge, and 10% had poor knowledge about diabetes self-care and complications. However, patients' practices are poor with only 301 (79.2%) take their medications regularly, 182 (47.9%) respondents are on medical nutrition therapy, and 81 (21.3%) respondents exercise regularly.
Conclusion: The findings of this study showed that the knowledge toward lifestyle modification and complications of diabetes were found to be good. However, the result of practice of lifestyle modification was low.

Keywords: diabetes mellitus; knowledge; practice

1. Introduction
Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia associated with abnormalities in fat, and protein metabolism. Patients with diabetes are at higher risks of developing chronic complications, including nephropathy, retinopathy, and cardiovascular and atherosclerotic complications [1]. Diabetes mellitus is classified into 3 major types: type 1 (T1DM), type 2 (T2DM) and gestational diabetes. T1DM is characterized by deficit in pancreatic insulin secretion. T2DM is due to failure of peripheral tissues of the body to respond to the action of insulin [2]. The 9th edition released in 2019 estimated that there are currently 487.3 million adults with diagnosed or undiagnosed diabetes. The number is expected to increase to 612.5 million by 2030 and to 762.3 million by 2045 [1]. The projected increase in diabetes prevalence is expected to impact health cost, health care resources, national health budgets, quality of life, and life expectancy [3 4]. In the Middle East and North Africa (MENA), diabetes and its complications were responsible for an estimated 418,900 deaths in adults aged 20–79 years in 2019 (16.2% of all-cause mortality), with about 53.3% of all deaths from diabetes occurred in people under 60 years, making MENA the Region with the second highest proportion of diabetes-related deaths under 60 years of age [1]. Saudi Arabia ranks second as the highest country with the highest prevalence of DM in the MENA with estimated prevalence of DM of 18.3% among adults. With an incidence rate of 31.4 per 100.000 population per year, Saudi Arabia is ranked as the third country in MENA with the highest estimated incidence of T1DM in children and adolescents in 2019. DM constitutes 5% of total deaths for all ages among Saudis [1, 5]. Patients' knowledge about the importance of medication and lifestyle modification is essential element of the management of DM. Patients' knowledge about the complications of DM motivate them to comply with good practices that help delay the onset of DM complications [6-8]. Therefore, health education and increased awareness about DM among diabetic patients is essential strategy to minimize the impacts of diabetes in the community [9-11]. There is sparse literature on diabetic patients' knowledge and practice about DM among diagnosed diabetic patients in Hail Region which is located in the northern part of Saudi Arabia. Such studies are crucial to determine the community needs for health education programs and to guide the implementation of such programs. Therefore, the aim of this study is to assess the knowledge and its resources as well as practice among diabetic patients in Hail Region.

2. Materials and methods
A cross-sectional community-based study was conducted at Hail City in December 2019 to February, 2020 using a self-structured questionnaire to study the awareness of diabetes complications among the diabetic patient in Hail. The inclusion criteria were diabetic patients (Hail citizens), aged 18 years or above with duration of illness since first diagnosed of a minimum of 1 year and a maximum of 3 years. Ethical approval was obtained from the institutional ethics committee prior to the commencement of the study.
Based on the prevalence of diabetes in Saudi Arabia (18.3%), minimum sample size was calculated to be 384

using 95% confidence level, 10% accepted margin of error and 50% response distribution [12]. A total of 562 participants were randomly selected from diabetic patients attending the outpatient clinic in two hospital and five primary health care centers. The questionnaire contained consent of participation and ensured the privacy of the participants. An Arabic language questionnaire was indigenously developed for the purpose of this study after reviewing the literature. The first part of the questionnaire included demographic data that is gender, nationality and duration of disease and family history. This was followed by questions about knowledge (9 items) and practice (4 items). The questionnaire was validated by three experts in patient educational programs. All the questions about knowledge and practice had three choices to choose from: "yes", "no" and "I have this complication" which is considered as a "yes". Data was entered and analyzed using SPSS version 23 software. Demographic data, such as gender, age, level of education, and income, were summarized using counts and percentages. Mean and standard deviation were used to summarize continuous data when appropriate. Independent sample t test was used to test the mean difference in the knowledge and practice scores between genders, while ANOVA followed by Tukey HSD post-hoc test were used for the level of education. Chi squired followed by post hoc analysis of residuals [13] and Bonferroni adjustment of the critical values [14] were used to test the association of the source of information with gender and level of education. A *p* value < 0.05 was considered statistically significant.

3. Results

3.1. Sociodemographic Characteristics of the Study Respondents

From the total of 450 participants that were selected, only 402 respond and completed the questionnaire with a response rate of 89.3%. From a total of 402 *r*espondents, 182 (45.3%) were females. The mean age of the respondents was 38.2 ± 15.45 years, with the female age significantly less than the males age (34.6 ± 13.9; 40.9 ± 16.04). The majority of the respondents 235 (58.5%) were suffering type II diabetes. Most of the respondents 184 (45.8%) are university graduates.

Table 1: Sociodemographic characteristics of the study respondents

Gender	Frequency	Percent
male	220	54.7%
Female	182	45.3%
Type of Diabetes		
Type I	145	36.1%
Type II	235	58.5%
Type III	22	5.5%
Level of Education		
illitrate	37	9.2%
Primary School	36	9.0%
Intermediate School	31	7.7%
Secondary School	114	28.4%
University Degree	184	45.8%
Marital Status		
Single	125	31.1%
Married	240	59.7%
Divorced	17	4.2%
Widow	20	5.0%
Age		
18 - 25 years	114	30.0
26 - 35 years	66	17.4
36 - 45 years	77	20.3
> 45 years	123	32.4

3.2. Knowledge of Study Respondents

The overall knowledge score of respondents about diabetes management and complications is 6.***75*** ± 2.***18***7 out of ***9***. Of all respondents 357 (93.9%) know that medical nutrition therapy reduces complications of diabetes and 355 (93.4%) know that regular exercise reduces complications of diabetes. The average score of respondents regarding the complications of diabetes is 6.95 ± 1.036 (Table 2). There was no significant difference in knowledge scores between gender, marital status, and level of education categories, but there was a significant correlation between the duration since diagnosis of diabetes and the knowledge scores (Figure 1) and there was also a significant difference in knowledge scores between patients with family history of diabetes and those without family history (7.13 ±***2***.150, 6.27 ± 2.175; p value < 0.05).

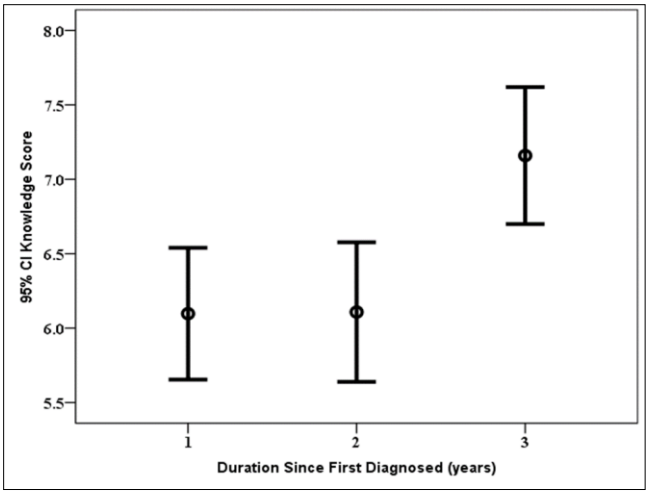

Fig 1: Correlation of Knowledge about diabetes with the duration since diagnosis with diabetese.

Table 2: Knowledge assessment towards the complications of diabetes

	Frequency	Percent
Do you know that foot ulcer is a complication of diabetes?		
No	98	25.8%
Yes	261	74.2%
Do you know that cataract is a complication of diabetes?		
No	135	35.5%
Yes	209	55.0%
Do you know that diabetes delays wound healing?		
No	69	18.2%
Yes	248	77.8%
Do you know that neuropathy is a complication of diabetes?		
No	100	26.3%
Yes	178	73.7%
Do you know that diabetes is a risk factor for atherosclerosis and heart diseases?		
No	84	22.1%
Yes	276	77.9%
Do you know that diabetes is a risk factor for fungal infections?		
No	193	50.8%
Yes	183	49.2%
Do you know that diabetes is a risk factor for chronic kidney disease?		
No	117	30.8%
Yes	243	69.2%

3.3 Practices of Study Respondents

Out of the study population, 301 (79.2%) take their medications regularly. However, only 182 (47.9%) respondents are on medical nutrition therapy and 81 (21.3%) respondents exercise regularly at a rate of 3 times per week or more.

Females are significantly more compliant with their medical nutrition therapy than males (p value < 0.05) and there is no significant difference in their compliance with their medication or exercise (Figure 2). Correlation between the practices score and the duration since diagnosis with diabetes was not significant.

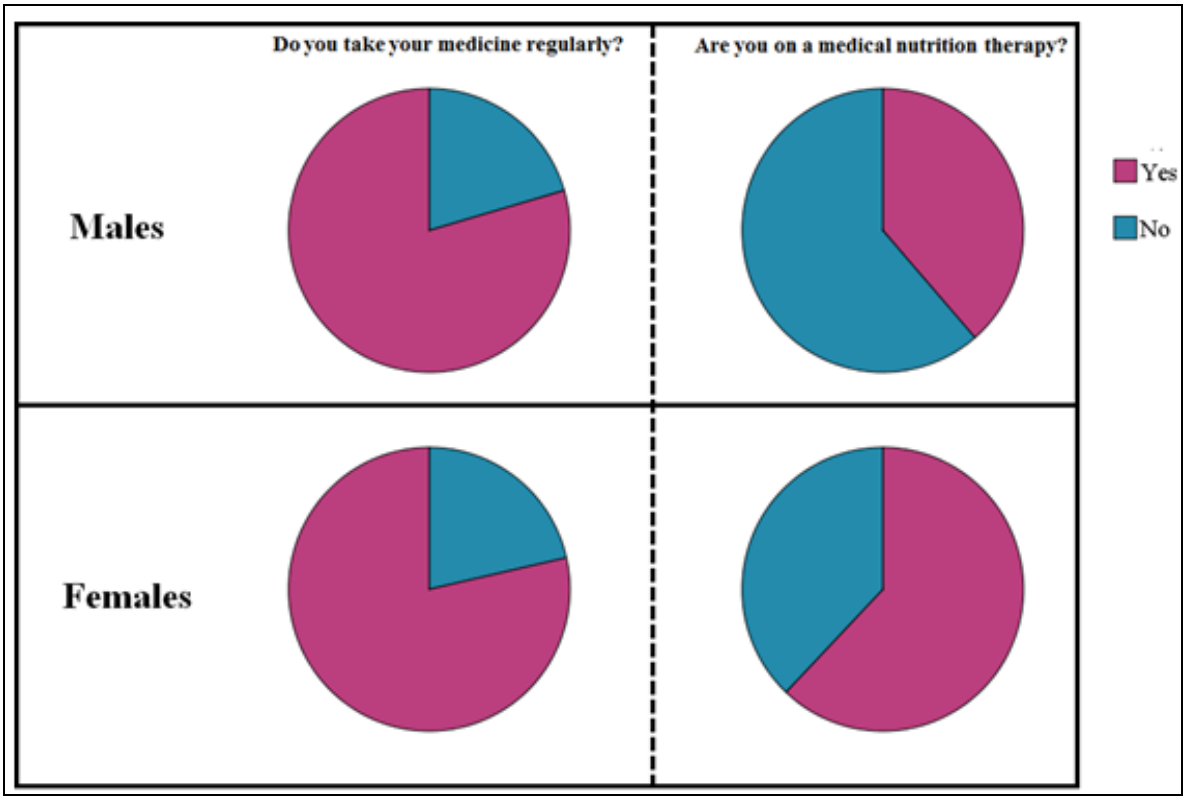

Fig 2: Gender Difference in Compliance to Medication and Medical Nutrition Therapy

3.4 Factors Associated with Knowledge

Analysis of data reveals no significant difference in knowledge among gender, marital status, and educational level categories. The most common source of information is the physician. 191 (503%). Respondents mentioned the physician as their primary source of information (Figure 3). Internet as a source of information was significantly associated with the level of education with 55.2% of those who mentioned internet as a primary source are university graduates (p value < 0.05).

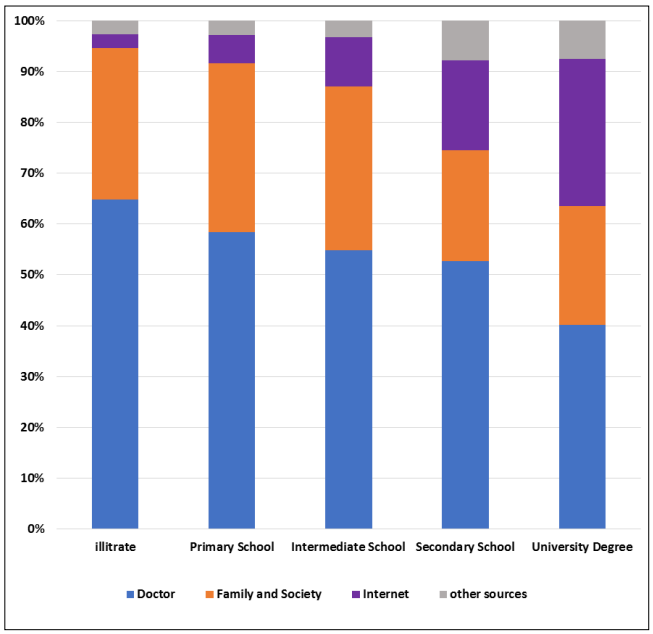

Fig 3: Patients' Level of Education and its Relation to the Source of Information

4. Discussion

Previous studies have provided evidence that patient's knowledge and practice toward diabetes will significantly affect the outcome [15]. In this study, we aimed to investigate the knowledge and practice of adult diabetic patient who were recently diagnosed with diabetes. We surveyed 402 respondents with a minimum duration since diagnosis of 1 year and a maximum of 3 years. Of the 402 respondents, 57.4% were males, the average age of the respondents was 38.2 ± 15.45 years.

The majority of studies carried in MENA have reported that diabetes knowledge and awareness is generally poor among diabetic patients [16, 17]. However, studies in MENA and in Saudi Arabia used different instruments to assess knowledge among diabetic patients, which makes it difficult to compare our results with those of other. In our study, the average knowledge score for respondents was 6.75 ± 2.187 out of 9. About 59.7 % of respondents had a good knowledge with scores above 6 out of 9, 30.3% had moderate scores with scores above 3 and below 7 out of 9, and 10% had poor knowledge with scores less than 4 out of 9. These findings seem to be consistent with studies held previously to assess knowledge of diabetic patient about diabetes in other regions of Saudi Arabia [18, 19]. Knowledge of diabetic patients was better than public knowledge as described in a previous study carried by Aljofan *et al* in Hail region in 2019 [20]. Aljofan *et al* also provided evidence that education level can impact the knowledge of the public about diabetes. Our study showed no correlation between knowledge about diabetes and the educational level of the diabetic patient, this discrepancy may likely be due to the involvement of diabetic patients into health educational programs and their motivation to learn about the disease.

Similar to other previous studies, our study found significant correlation of knowledge with longer duration of diabetes and positive family history of diabetes, but not with gender, marital status, or level of education [21-24].

Our study highlight the role of medical care practitioners in educating the patient about diabetes especially those with low level of education. The internet and other sources of knowledge are identified as an effective sources by patients with high educational levels, but not for those with low level of education. These finding are of value for selecting educational strategies for programs according to level of education of the target patients.

Although the knowledge of respondents about the role of nutritional therapy and regular exercise in delaying the complications of diabetes is fair, their practice towards nutritional therapy and exercise is poor and far below their knowledge. Diabetes educational programs should focus on motivating the patients to improve their compliance with nutritional therapy and exercise.

This study has several limitations, one limitation is that it was conducted only among patients attending a few hospitals and health care centers and hence may not be generalizable to the overall diabetic population in the region. A second limitation is that the questionnaire reliability was not tested for internal consistency and the fact that questions were designed to be answered by "yes" or "no", which may had affected the validity of the information obtained due to the tendency of the respondents to choose "yes" as an answer [25]. A third limitation is the low response rate (89.3%) that might had jeopardized the randomness of the sample selection and probably be the reason for the misdistribution of respondent among the categories of the age groups.

5. Conclusion

The findings of this study showed that the knowledge toward lifestyle modification and complications of diabetes were found to be good. However, the result of practice of lifestyle modification was low. These findings should be considered in designing programs for patients education by focusing on motivating the patients to improve their practices.

6. Acknowledgement

All authors would like to express our gratitude and appreciation to the University of Hail College of Medicine Research and Ethical Committee for approval of the ethical clearance. The authors also would like to give great thanks the participants for their unlimited information.

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