MEDICAL SCIENCE

Awareness of Saudi diabetic adults about complications of diabetes mellitus in Hail region

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ABSTRACT

Background: Saudi Arabia has the highest prevalence of type 2 diabetes mellitus which is 32.8% and the anticipated prevalence will be 40.37% in 2025. This study intended to estimate the level of awareness of diabetic adults about complications of diabetes mellitus in the Hail region. *Materials and Methods:* A cross-sectional study was conducted in Hail region, via self-administered questionnaires for 230 participants. Diabetic patients of age 15 years or older were included. The data was analyzed using SPSS version 22. *Results:* Of the total, 20.9% had been diagnosed between 1 to 4 years ago, 27.8% within 5 to 10 years ago; while 37.8% had been diabetics for longer than 10 years. 87.4% of participants believed that diabetes mellitus has serious complications and 11.3% disagreed. 85.7% of participants agreed that high levels of HbA1c for a long time can lead to more serious complications, while 1.7% disagreed and 12.6% expressed a lack of knowledge. Most respondents (93%) thought that there is a relation between retinopathy to diabetes mellitus, 1.3% believed there is none and 5.7% did not know. 89.1% believed that patients should have a follow-up for retinopathy but 0.9% disagreed and 10% were not sure. 87.4% expressed that DM can cause neuropathy while 11.3% expressed a lack of knowledge. 1.3% denied such a relationship. 95.2 % agreed that controlling blood sugar would decrease the complications, while 3.9% were not sure. Only 0.9% disagreed. *Conclusion:* Patients demonstrated a good level of awareness about diabetes mellitus complications in comparison to other populations.

Keywords: Diabetes Mellitus, Complications, Hail, HbA1c, Awareness

1. INTRODUCTION

Diabetes Mellitus (DM) is a collection of conditions that affect the body's ability to properly use insulin, resulting in high blood sugar levels. This chronic condition can lead to long-term damage to various organs, such as the eyes, kidneys, nerves, heart and blood vessels (Holt et al., 2021). DM can be

categorized into 3 major types, including type 1, which is also known as insulin-dependent DM and is caused by a deficiency in the hormone insulin, which helps the body use carbohydrates from food (Chiang et al., 2014). Type 2 Diabetes Mellitus (T2DM) is linked with insulin insensitivity and a third category; gestational diabetes; temporarily occurs during pregnancy (Logan et al., 2017).

Saudi Arabia has the highest prevalence of T2DM i.e., 32.8% (Meo, 2016). It is expected to increase in subsequent years with a predicted prevalence of about 35.37% in 2020, 40.37% in 2025 and 45.36% in 2030. The coefficient of time factor indicates that the prevalence rate has risen during the years 1982-2015.

DM decreases life expectancy by 10 to 30%. This can be attributed to the complications of DM that lead to early mortality (Lee et al., 2021). These complications possibly delayed through adopting lifestyle changes such as consuming a healthy diet, engaging in regular exercise and maintaining a healthy body weight. Blood glucose levels can be maintained by regular monitoring and control through compliance with hypoglycemic agents. Adherence to these measures can be ensured by raising awareness regarding the complications of uncontrolled DM (Tarik et al., 2007).

Review of Literature

Early detection of DM and its complications can ameliorate the quality of life in diabetics. The focus of the current study was on the complications of DM because these complications constitute a burden on patients and the health system alike. Data on diabetics' awareness of DM complications is limited (Murugesan et al., 2007; Gillani et al., 2018; Alsous et al., 2019). In contrary to this study, recent studies were not specifically targeting people with DM and were not focused on their awareness of the complications (Murugesan et al., 2007; Gillani et al., 2018). In a study conducted by Sękowski et al., (2022) more than 50% of the participants had knowledge of only two of the 18 DM complications mentioned in the study. In contrary to the current study, the aforementioned study was targeting public awareness about DM and its complications.

In Ethiopia, Belsti et al., (2019) conducted a study on 402 diabetic patients to measure their level of awareness about DM complications. That study found that only less than 50% of the patients were aware of these complications (Belsti et al., 2019). And in view of the many studies that have been done on the extent to which diabetic patients are aware of the complications of the disease, it has been noted that most of these studies were concerned with specific complications e.g., retinopathy and diabetic foot (Eldarrat, 2011; Pan et al., 2017; Hamzeh et al., 2019; Aronson et al., 2021; Kaushik et al., 2021; Goie and Naidoo, 2016; Alghamdi et al., 2022a; Alghamdi et al., 2022b; Alghamdi et al., 2022c), while in the current study, our interest was about DM complications in general.

To the author's knowledge, this is the first study assessing the knowledge about complications of DM among diabetics in Hail region. Our study aims to estimate and evaluate the level of awareness in terms of complications of DM in Hail region and compare it with other regions (Omer et al., 2017).

Previous studies have assessed the awareness of DM in general, but our study focuses on the complications of DM as they are also an essential component in evaluating the knowledge about the disease (Mohieldein et al., 2011). A previous study conducted in Jeddah focused on the complication of diabetic retinopathy only (Alzahrani et al., 2018). We, in comparison, have inquired the participants about almost all the complications of this disease. Moreover, previous studies also included non-diabetic population (Mohieldein et al., 2011). Our study evaluates awareness in the diabetic population only. Previous studies have assessed the complications in type 2 diabetics only; we will evaluate patients of both type 1 and type 2 DM as there are some common complications that we aim to cover.

This study is designed to investigate the knowledge about complications of DM that diabetics can possibly encounter. It would allow us to take necessary measures in case the awareness level is low. Intervention at an early stage is important as most of the complications can be prevented by raising awareness (Tarik et al., 2007; Omer et al., 2017).

2. MATERIALS AND METHODS

This cross-sectional study was executed in the Hail region, via self-administered questionnaires for 230 participants. The questionnaire consisted of 18 items to assess the awareness of diabetic patients regarding complications of DM in the Hail Region. The respondents were asked about some of their personal information aiming to recognise the respondents' demographic data, like age, nationality, place of residence, gender and academic qualification. The remaining items in the questionnaire were allocated to estimate the awareness of diabetic patients regarding complication of DM. The questionnaire was randomly distributed to a number of primary health care centres in the Hail region.

Diabetic patients of age 15 years or older were included. The data was analyzed using SPSS version 22. The study was conducted through a cross-sectional study design. The study was performed from 1st of March till the end of June 2022 on diabetic adults in the Hail Region. The study period was extended for an additional two months in order to achieve a higher response rate. The data was collected through questionnaires in which the idea of the research was explained to the participants before they filled out the questionnaire. Simple random sampling was utilised to recruit participants. The questionnaire includes the social and demographic data of participants including their age, level of education, occupation, residence, etc. It also includes questions assessing their knowledge regarding the complications of DM, its diagnosis and management. The data were analyzed using SPSS Statistical Program for Social Sciences Version 22.

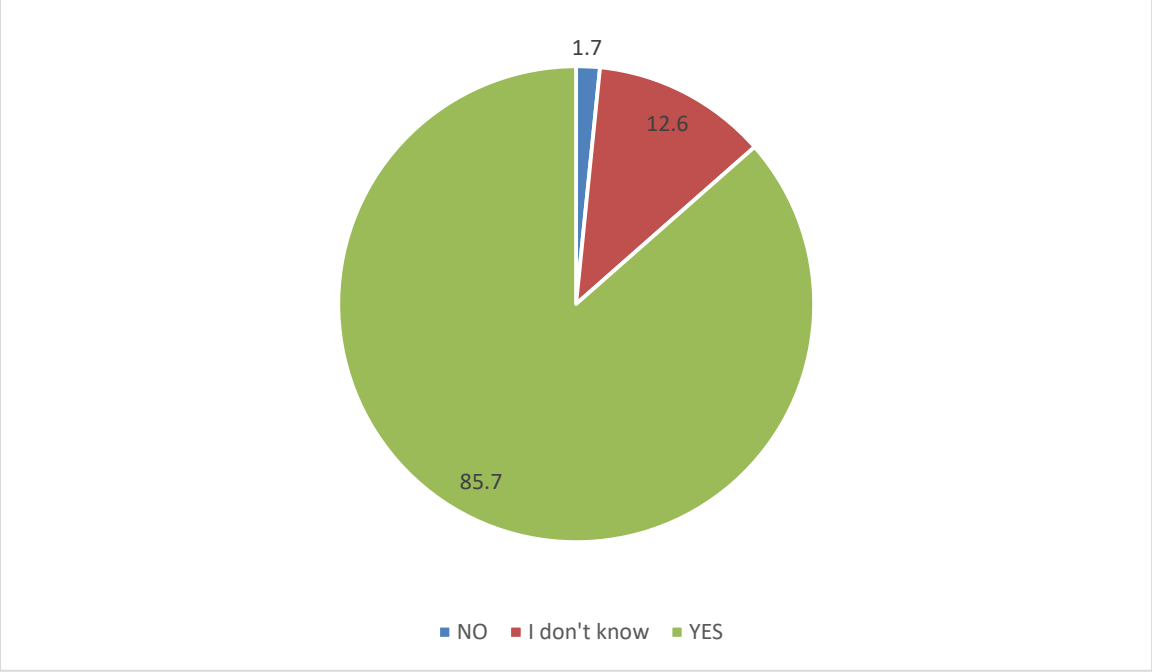
3. RESULTS

Total number of participants included in the study was 230. All of them met the inclusion criteria of the study. The proportion of females 69.1% (n=159) was higher than that of males 30.9% (n=71). Of these participants, 51.74% (n=119) were university graduates and 16.5% (n=38) were elementary school graduates.

Regarding the history of DM, 20.9% of the participants had been diagnosed with DM between 1-4 years ago, 27.8% had had the disease for 5-10 years, while 37.8% had been diabetics for more than 10 years. Regarding the participants' knowledge about DM complications, 87.4% believe that DM has serious complications and 11.3% did not. 1.3% did not agree that DM can cause serious complications (Table 1).

Table 1 Percentage of awareness about DM complications

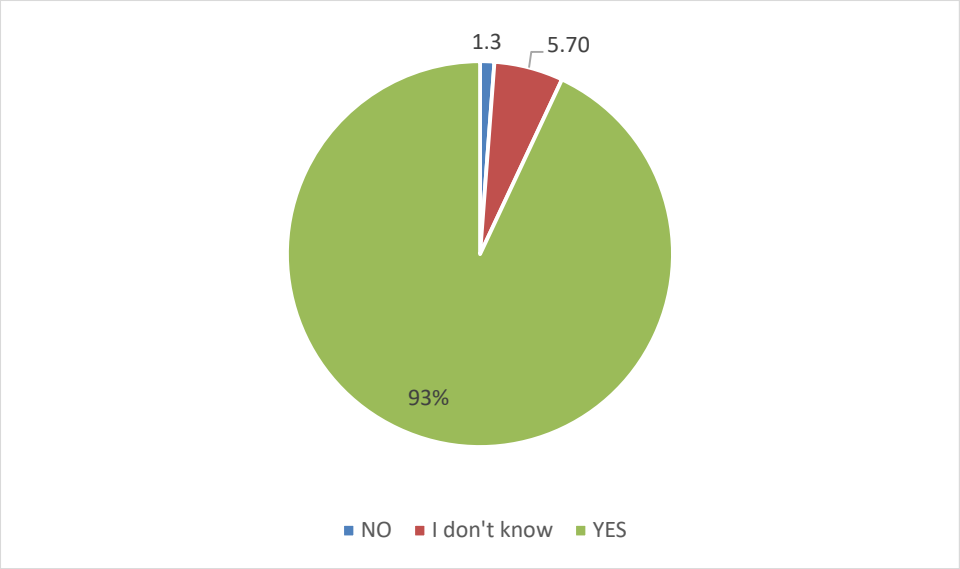
	Frequency	Percent	Valid percent	Cumulative %
No	4	1.6	1.3	1.6
I don't know	26	10.7	11.3	12.3
Yes	213	87.7	87.4	100.0
Total	243	100.0	100.0	



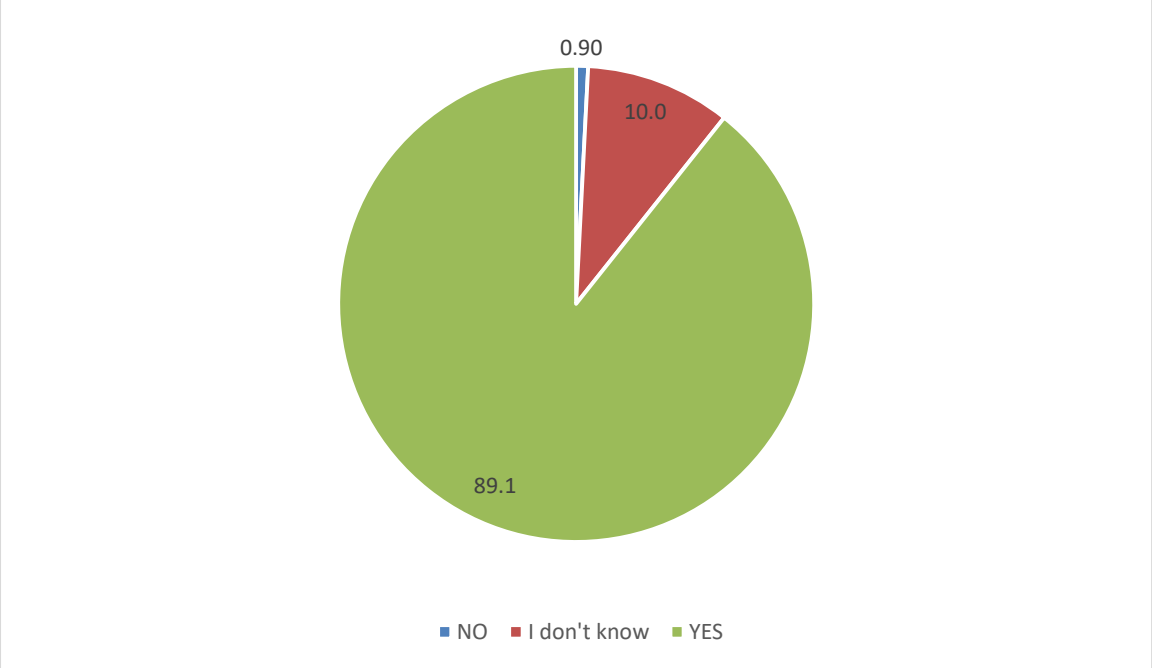
Graph 1 Percentage of awareness about the association of cumulative rise in blood sugar with more complications

85.7% of participants agreed that high levels of HbA1c for a long time can lead to more serious complications, while 1.7% disagreed and 12.6% were not aware of the significance (Graph 1). 93% of participants believed that there is a relationship between retinopathy and DM, while 1.3% disagreed and 5.7% opted to express no knowledge about such a relationship (Graph 2). 89.1% of respondents believed that patients should follow up for retinopathy but 0.9% expressed that there is no need for follow up and the

rest of the participants were not sure (Graph 3). 65.7% of participants thought that heart and vascular problems are a complication of DM and 6.5% disagreed. 27.8% expressed a lack of knowledge (Table 2).



Graph 2 Percentage of awareness about Diabetic Retinopathy



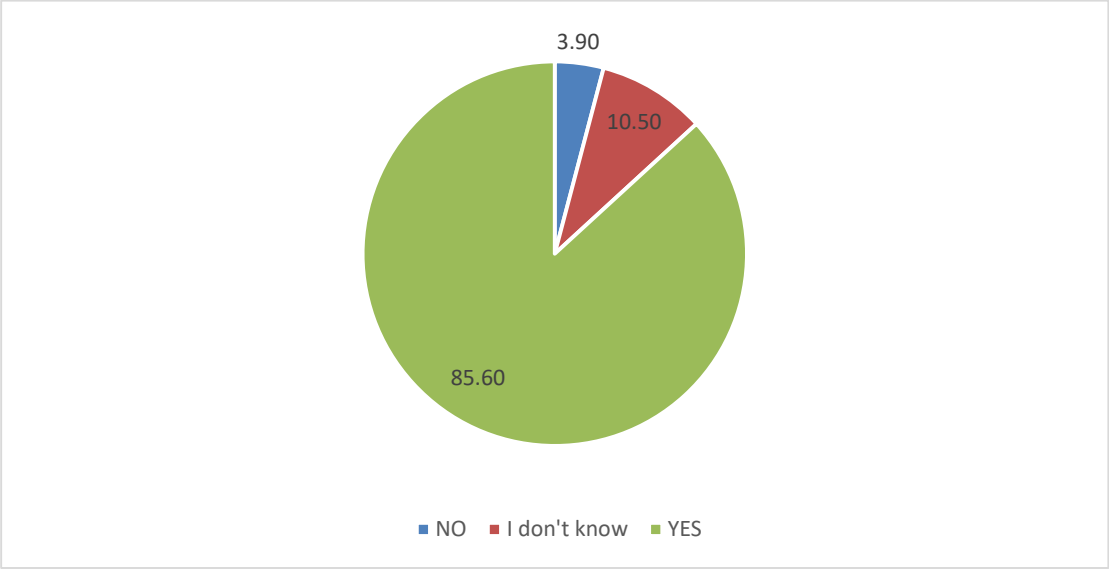
Graph 3 Percentage of awareness about the regular follow-up of the retinal status

Table 2 Percentage of awareness about the cardiovascular complications of DM

	Frequency	Percent	Valid percent	Cumulative %
No	17	7.0	6.5	7.0
I don't know	67	27.6	27.8	34.6
Yes	159	65.4	65.7	100.0
Total	243	100.0	100.0	

85.6% of participants believed that DM has an impact on the kidneys while 3.9% did not believe in the harmful effects of DM on the kidneys and 10.5% did not know anything about it (Graph 4). 77.4% of participants considered that regular follow-up with a

nephrologist is necessary for diabetics, 2.2% disagreed and 20.4% were not aware of the importance of regular follow-ups (Table 3). 87.4% of participants believed that DM can cause neuropathy, 1.3% disagreed and 11.3% were not aware of such an association (Table 4). 95.2% of respondents thought that lowering blood glucose levels would reduce the likelihood of developing complications of DM, 0.9% disagreed and 3.9% were not sure of it (Graph 5).



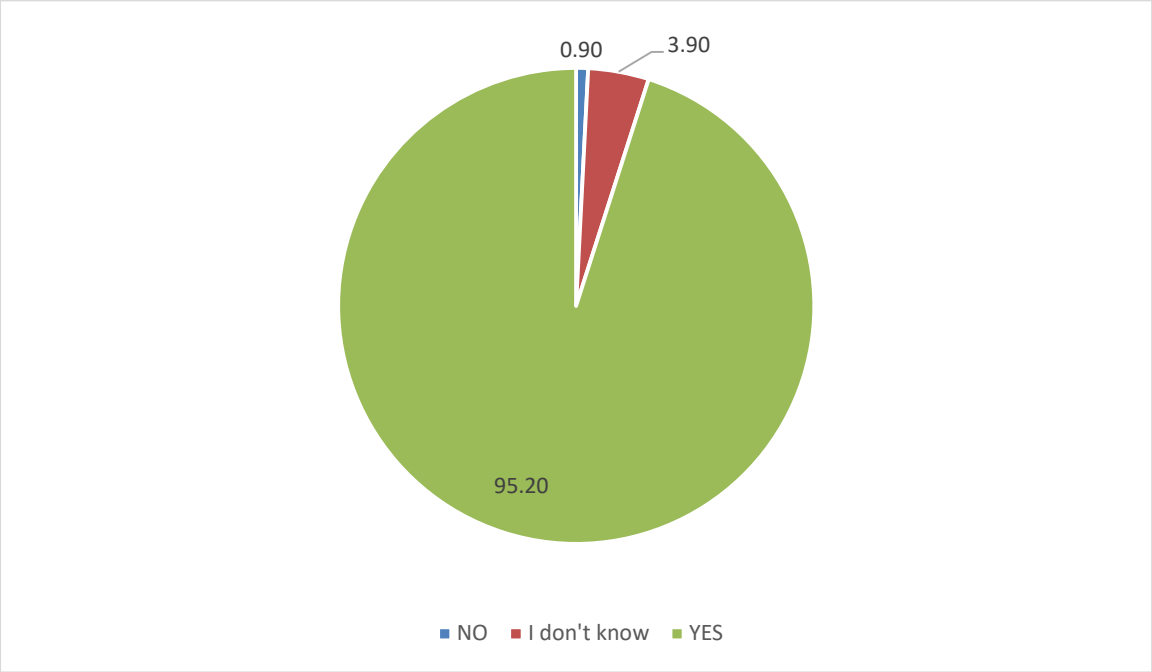
Graph 4 Percentage of awareness about diabetic nephropathy

Table 3 Percentage of awareness about the regular follow-up of the kidney function

	Frequency	Percent	Valid percent	Cumulative %
No	5	2.1	2.2	2.2
I don't know	50	20.6	20.4	22.4
Yes	188	77.4	77.4	100.0
Total	243	100.0	100.0	

Table 4 Percentage of awareness about diabetic neuropathy

	Frequency	Percent	Valid percent	Cumulative %
No	3	1.2	1.3	1.2
I don't know	28	11.5	11.3	12.8
Yes	212	87.2	87.4	100.0
Total	243	100.0	100.0	



Graph 5 Percentage of awareness about the role of controlling blood sugar in delaying complications

4. DISCUSSION

This study aimed to estimate the level of knowledge about DM complications in diabetics in Hail region as it would ensure patients' compliance and subsequently help in the control of the disease. In the current study, more than 50% of the population comprised university graduates and vast majority of the participants were females. A large number of participants have been diabetic for more than ten years. The results of our current study concluded that diabetic patients in the Hail region had good levels of awareness regarding DM complications. This awareness is crucial in order to avoid the risks of such complications (Waheedi et al., 2017; Chavan et al., 2015).

More than three-quarters of the participants believed that DM might produce serious complications. And most of them were aware of the fact that poor DM control; indicated by high HbA1c, can predispose to complications. A large majority of the participants knew that retinopathy is one of the greatest complications of DM and that diabetics should have regular follow-ups with an ophthalmologist.

More than 50% of the participants believed that cardiac diseases are a complication of DM. A large proportion also knows that DM might produce neuropathy. Moreover, more than three-quarters of the population considered DM a risk factor for renal diseases. In addition to that, most of them understood the importance of regular follow-ups. Most of the participants concluded that controlling blood sugar levels would decrease the likelihood of developing DM-associated complications. This awareness among the majority of the study participants can be attributed to the efficacious patient education, as patient education plays a crucial role in avoiding such consequences (Nazar et al., 2016). Findings from this study revealed that 12.6% of the respondents were not acquainted of the significance of HbA1c in determining DM complications. Therefore, health professionals should dedicate efforts to raise awareness in this regard.

5. CONCLUSIONS

Diabetic population in the Hail region demonstrated a good level of knowledge regarding DM complications as compared to the population in Makkah. Long-term DM complications can be minimized by efficacious patient education. Awareness of DM complications amongst diabetics is critical in improving their quality of life. Furthermore, this study exhibited considerable knowledge about the risks of poor blood sugar control, indicated by high HbA1c, which can lead to very serious complications. Although diabetics in this study demonstrated a good level of awareness regarding the complications of DM, there is still a necessity for more efforts in order to adopt a thorough education strategy about DM in the Hail region.

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Authors' contribution

Each author contributed to the data analysis and interpretation and they all contributed to the final draft's critical review and approval. They are also each accountable for the manuscript's content and similarity score.

Ethical consideration

All procedures performed in studies involving human participants were following the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. (Ethical approval number: EC-00051/CM/UOH.01/19) date: 03\02\2019.

Informed consent

Informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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