Research Article

Awareness Assessment of Diabetic Eye Health in a Tertiary Hospital in Saudi Arabia

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Abstract

Background: *Saudi Arabia is considered as the seventh highest rate in the world in terms of diabetes incidence, with about 3.4 million people having been diagnosed with diabetes in 2015. The recent estimate of the disease showed that 24.4% of the adult population is suffering from Diabetes Mellitus (DM).*

Objective of the Study: *Due to this high prevalence of diabetes and its complications in Saudi Arabia, there was a need to perform studies especially in large hospitals of central region to estimate the awareness of consequences due to diabetes mellitus among the population in addition to provide the participants extra knowledge for its ocular and non-ocular complications.*

Materials and Methods: *This is a prospective, descriptive, and observational study conducted among Saudi population aged ≥12 years of age who attended endocrine and family medicine clinics in King Faisal Specialist Hospital and research centre (KFSH&RC) in Riyadh, Saudi Arabia. 559 printed questionnaire forms were distributed for all diabetic and non-diabetic patients attending both clinics in the month of October 2016. The patients who completed the data and signed the approval consent of participation were included in the study. 317 participants were distributed into 2 groups (group 1: 175 diabetic patients and group 2 (control group): 142 non- diabetic one.*

The questionnaire form comprised the following data: File number, age, sex, the presence of diabetes or any other associated systemic diseases and its duration, Address, level of education, approximate distance (km) from home to nearby eye clinic. Level of awareness of DM and its complications was graded from 1(unaware) to 3 (fully aware) according to number of hospital visits per year, regular follow up or visiting the hospital upon ocular complaint, any previous ocular interventions, or non-elective admissions to hospital.

Results: *Age of the patients ranged from 13- 88 years (mean:55.33 years) with an average duration of diabetes 8±2.86 years. 140 patients (44.16%) were from rural areas, 159 patients (50,15%) were males, 124 patients (39.11%) finished at least intermediate or secondary education, 193 (60.88%) were graduates or above. Level of awareness of DM and its ocular complications (level 2-3) was detected in 264 patients (83.28%). 143 diabetic patients (81.71%) valued the importance of at least one ocular examination per year. Only 32 patients of the diabetic group (18.28%) had never underwent ocular check up in the last 12 months.*

Conclusion: *In our study, although 44.16% of the patients were from rural areas and 39.11% were school educated, 83.28% of the participants were aware that diabetes can affect the eyes indicating that the Kingdom of Saudi Arabia had achieved a notable economic growth and improvement in life quality. The study revealed high level of awareness about importance of monitoring DM among studied population, with no significant difference between graduate or school educated persons.*

Keywords: Awareness, Knowledge, Diabetes Mellitus, Ocular complications, Eye Health.

Introduction

Diabetes mellitus (DM), particularly type 2 diabetes mellitus, is a major public health concern worldwide. According to the World Health Organization (WHO), over the next two decades there will be a significant increase in the number of people with type 2 diabetes mellitus, both in developed and developing countries [1].

In the developed world, the estimated increase is approximately 46%, from 55 million in 2000 to 83 million in 2030 [2].

Saudi Arabia is one of the 19 countries of the International Diabetes Federation Middle East & North Africa (IDF MENA) region. 35.4 million People in the MENA Region had diabetes; by 2040 this will rise to 72.1 million. Saudi Arabia is considered as the seventh highest rate in the world in terms of diabetes incidence, with about 3.4 million people having been diagnosed with diabetes in 2015. The recent estimate of the disease showed that 24.4% of the adult population is suffering from DM [3].

Patients with type 1 or type 2 diabetes frequently experience diabetes complications, which are also a major cause of morbidity and mortality. Microvascular and macrovascular problems of diabetes are the two main categories, with the former having a significantly higher prevalence than the latter [4].

Objective of the Study

Due to this high prevalence of diabetes and its complications in Saudi Arabia, there was a need to perform studies especially in large hospitals of central region to estimate the awareness of consequences due to diabetes mellitus among the population in addition to provide the participants extra knowledge for its ocular and non-ocular complications.

Materials and Methods

This prospective, descriptive, and observational study conducted among Saudi population aged ≥12 years of age who attended endocrine and family medicine clinics in King Faisal Specialist Hospital and research centre (KFSH&RC) in Riyadh, Saudi Arabia.

559 printed questionnaire forms were distributed for all diabetic and non-diabetic patients attending both clinics in the month of October 2016. The patients who completed the data and signed the approval consent of participation were recruited in the study. The respondents were encouraged to reply to the self-administered questionnaire in a live visit in the presence of at least one physician or diabetic educator to educate the patients who lacked knowledge about the DM and its complications after completing their response without interviewer assistance.

The questionnaire form comprised the following data: File number, age, sex, the presence of diabetes or any other associated systemic diseases and its duration, Address, level of education, approximate distance (km) from home to nearby eye clinic. Citing possible DM complications, number of hospital visits per year, regular follow up or visiting the hospital upon ocular complaint, any previous ocular interventions, and non-elective admissions to hospital.

317 participants were distributed into 2 groups (group A: 175 diabetic patients and group B (control group): 142 non- diabetic one.

The patients categorized into subgroups depending on their degree of Awareness.

Subgroup 1: comprised patients who had zero or one ocular examination dating for more than 12 months, cited in the questionnaire that the DM had no complications, and reported to eye clinic upon ocular complaint only. (Low level of awareness [level 1]. Subgroup 2 was identified by having an ocular examination dating from 6-12 months, citing less than 3 diabetic complications and had a yearly hospital follow up (moderate level) [level 2] while subgroup 3 included patients who had a retinal examination since less than 6 months, citing ≥ 3 diabetic complications and had quarterly visit to the hospital. (high level) [level 3].

The study protocol was performed in accordance with the ethical standards of the Institutional Research Committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Institutional Review Board (IRB) approval was obtained via the Institutional Review Board of Research Centre of King Faisal Specialist Hospital (REC≠2161007).

Statistical Analysis

Patient demographics and data from questionnaire were collected and tabulated using Excel software (Microsoft, Redmond, WA, USA).

The statistical analysis of data was done using the STATA/MP 12 data analysis software (Stata Corp LP, College Station, TX, USA). The categorical variables (e.g. sex, education level, geographical areas) were presented as frequencies and percentages, whereas the numerical variables were presented as mean ± standard deviation. The continuous variables were compared using the independent Student's t-test/ANOVA or non-parametric (Mann-Whitney U/Kruskal Wallis) test as appropriate, while the categorical variables were compared using the Chi-square test. Statistical significance was set at $P<0.05$.

Results

317 patients were agreed to participate in our study (175 diabetic patients (group A) and 142 non- diabetic one (group B or control group).

Age of all patients ranged from 13- 88 years (mean:55.33±4.61years) with an average duration of diabetes 8±2.86 years. 140 patients (44.16%) were from rural areas, 159 patients (50.15%) were males, 124 patients (39.11%) finished at least intermediate or secondary education, 193 (60.88%) were graduates and above.

Demographic data of both groups and subgroups were summarized in table 1.

Table 1: Demographic data of all patients

Level of Awareness		Group A			Group B			Total
		Subgp*1	Subgp 2	Subgp 3	Subgp 1	Subgp 2	Subgp 3	
No (%)		32 (10.09)	43(13.56)	100 (31.54)	21 (6.62)	42 (13.25)	79 (24.92)	317 (100)
Average **age** (year)±SD		61±3.64	54±2.87	59±4.73	64±7.32	49±2.54	45±6.61	55.33±4.61
Average **duration of DM** (year)±SD		6±1.5	7±3.4	11±3.7	-	-	-	8±2.86
Sex	Male No (%)	18(5.67)	23 (7.25)	17 (5.36)	33 (10.41)	36 (11.35)	32 (10.09)	159 (50.16)
	Female No (%)	39 (12.30)	52 (16.40)	26 (8.20)	11 (3.47)	18 (5.67)	12 (3.78)	158(49.84)
Education	Intermediate Or 2ry No (%)	12 (3.78)	16 (5.04)	24 (7.57)	31(9.77)	22 (6.94)	19 (5.99)	124 (39.12)
	Graduates or above No (%)	39 (12.30)	51 16.08)	33 (10.41)	17(5.36)	20 (6.30)	33(10.41)	193 (60.88)
Geographical area	Rural No (%)	15 (4.73)	21(6.62)	30 (9.46)	19 (5.99)	26 (8.20)	29 (9.14)	140 (44.16)
	Urban No (%)	31 (9.77)	42 (13.25)	36 (11.35)	10 (3.15)	33(10.41)	25(7.88)	177 (55.84)

* subgp=Subgroup.

Correlation Between the Level of Awareness in Diabetic and Control Groups

100 diabetic participants among the diabetic group (57.14%) showed high level of awareness versus 79 (55.63%) participants of the control one with the same level of awareness with a statistical significance (p=0.0001, r=0.023).

Low level of awareness was detected in 32 diabetic patients (18.28%) versus 21 (14.78%) of control group with no statistical significance.

On the other hand, there was statistical significance between the diabetic and non -diabetic patients showing moderate level of awareness. (24.57% and 29.57% respectively) (p=0.00053, r=0.002). Moderate to high levels of awareness were detected in 264 participants (83.28%) from both groups. There was a statistical significance difference between the diabetics and non-diabetics showing moderate to high level of awareness as 143 among diabetic (81.71%) were moderately to fully aware of DM and its complications compared to 121 non-diabetic participants (85.21%) (p=0.0034 r=0.02) Figure 1.
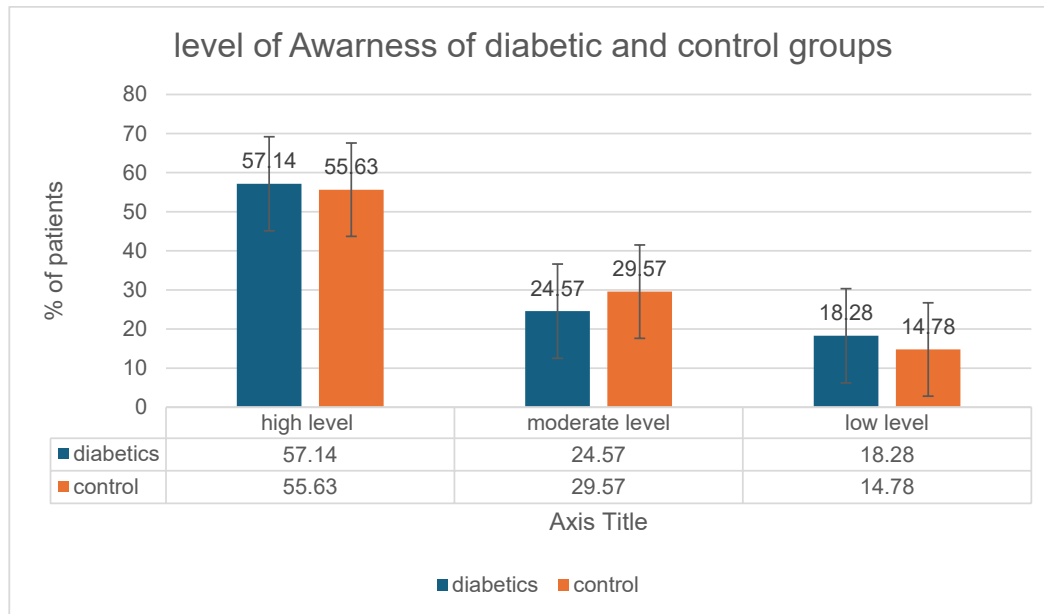
Figure 1: Level of awareness of diabetic and control groups

Correlation Between Levels of Awareness with the Duration of DM

The duration of DM of the participants of subgroup 1,2, and 3 (6±1.5, 7±3.4 and 11 years±3.7) was correlated significantly with their level of awareness (p=0.01, r=0.0043).

Correlation Between the Level of Awareness and Sex

Despite that female diabetic patients were 117 (74.05%) versus 41 (25.94%) non-diabetics, only 26 of all females of the diabetic female group (22.22%) showed high level of awareness. Compared to 17 (29.31%) diabetic males were fully aware about the DM and its complications with a statistical significance (p=0.002, r=0.0078) Table 2.

There was no statistically significant difference between female and male control groups.

Table 2: Correlation between level of awareness and sex

			Sex		Total
			Male No (%)	Female No (%)	
Level of Awareness	Group A	Subgroup1	18 (31.03)	39 (33.33)	175
		Subgroup 2	23 (39.65)	52 (44.44)	
		Subgroup3	17 (29.31)	26 (22.22)	
		Total Group A	58 (100)	117 (100)	
	Group B	Subgroup1	33 (32.67)	11 (26.82)	142
		Subgroup 2	36 (35.64)	18 (43.90)	
		Subgroup3	32 (31.68)	12 (29.26)	
		Total Group B	101 (100)	41 (100)	
Total			159	158	317

Correlation Between Level of Awareness and Education Level

Despite that the graduate participants constituted 123 (70.28%) of the diabetic group, but there was no statistical significance correlation between the different subgroups (p=0.4, r=0.71). As well, the level of education did not alter the level of awareness in the control group Table 3.

Table 3: Correlation between level of awareness and education level

			Education		Total
			Intermediate/2ry No (%)	Graduates/above No (%)	
Level of Awareness	Group A	Subgroup1	12 (23.07)	39 (31.70)	175
		Subgroup 2	16 (30.77)	51 (41.46)	
		Subgroup3	24 (46.15)	33 (26.82)	
		Total Group A	52 (100)	123 (100)	
	Group B	Subgroup1	31 (43.05)	17 (24.28)	142
		Subgroup 2	22 (30.55)	20 (28.57)	
		Subgroup3	19 (26.38)	33 (47.14)	
		Total Group B	72 (100)	70 (100)	
Total			124	193	317

Correlation Between the Level of Awareness and the Patient' Geographical Area

109 diabetic participants (62.28%) were visiting our hospital from urban regions, being one of the biggest tertiary hospitals in Riyadh.

There was no statistical significance difference between the urban and rural regions in the different subgroups of diabetic group (p=0.46) as 71.55 % of the urban diabetic participants had moderate to high level of DM complications awareness compared to 77.27% rural one.

In addition to 85.29%, 74.32% of control urban and rural groups respectively had moderate to high levels of awareness Table 4.

Table 4: Correlation between the level of awareness and the patient' geographical area

			Geographical area of the patient		Total
			Rural No (%)	Urban No (%)	
Level of Awareness	Group A	Subgroup1	15 (22.72)	31 (28.44)	175
		Subgroup 2	21 (31.81)	42 (38.53)	
		Subgroup3	30 (45.45)	36 (33.02)	
		Total Group A	66 (100)	109 (100)	
	Group B	Subgroup1	19 (25.67)	10 (14.70)	142
		Subgroup 2	26 (35.13)	33 (48.52)	
		Subgroup3	29 (39.18)	25 (36.76)	
		Total Group B	74(100)	68 (100)	
Total			140	177	317

Discussion

Our study was conducted in a biggest Saudi referral hospital in Riyadh province indicating that our results representing an adequate sample of Saudi population in addition that the high number of recruited participants (No=317) gave better statistical analysis. The purpose of our study was not only to estimate the awareness of consequences due to diabetes mellitus but also educate the respondents to its complications.

Our study was unique in adding control group and generalizing all complications of DM and not only specifying the diabetic retinopathy.

To our knowledge, our work was the first research discussing Awareness level of DM in Riyadh. Other studies were performed in Aljouf and Hail province of Saudi Arabia [5].

Regionally other studies were performed in Oman and Turkey [6,7]. Globally, studies from Malaysia and India were also measuring the level of awareness [8,9].

The current study showed 100 diabetic participants among the diabetic group (57.14%) showed high level of awareness compared to 79 (55.63%) participants of the control one.

Our results were like that was published in India and China: An Indian hospital-based study on knowledge, attitudes, and practices found that a good number of respondents had positive knowledge on and attitudes towards diabetes but not for the practices [10].
While the Chinese study recorded that mean diabetes knowledge score among Chinese patients with type 2 diabetes was good [11].

This contrasted with the study performed by Deniz Çaliskan in Ankara 2005 who concluded that Awareness of DM amongst diabetics is very low and mainly determined by their education levels [12].

Another study on knowledge and perceptions of diabetes in a semiurban Omani population found that subjects' level of knowledge was suboptimal [13].
A study in Pakistan among people with diabetes attending the department of Medicine, Khyber Teaching Hospital, Peshawar, found that the knowledge scores were low in most areas of diabetes care [14].

Our study revealed that the female diabetic patients are less aware than male diabetics.
This was in accordance with the study done by Farzana Saleh who concluded that patients who were old, formally educated, female, and belonged to upper-middle and high-income groups tended to practice less in glycemic and weight management [15].

Although Murugesan et al had more female participants in their study group, they observed lower rates of education and lower levels of awareness among them [16].

In contrast to the results of Rani et al who observed that women in the general population had significantly better knowledge about the disease [17].

Our research showed that with increasing the duration of DM, the awareness of the patients increased. An Indian study done on 2010 concluded the same knowledge [10].

The level of education in our study did not alter the level of awareness in the diabetic or control group, this was correlated to present wide different broadcasting ways like YouTube, twitter, Facebook. allowing them to be aware about the disease without reading a journal or newspaper.

In the study done in Gambia, the authors emphasized that level of education, duration of illness and knowledge of a family member with diabetes were important predictors of knowledge [18].

109 diabetic participants (62.28%) in our research were visiting our hospital from urban regions, being one of the biggest tertiary hospitals in Riyadh.
There was no statistical significance difference between the urban and rural regions in the different subgroups of diabetic group.

This reflected the improving health facilities in the Saudi rural areas with the appearance of telemedicine and computer- aided diagnosis system through the artificial intelligence.

The work of Rameez et al stressed on the need for targeting all the practitioners, paramedics, and the multipurpose workers at the grassroot levels. This would go a long way in creating better disease awareness and public motivation, thus helping prevent or delay the onset of DM-related complications [19].

Conclusion: In our study, although 44.16% of the patients were from rural areas and 39.11% were school educated, 83.28% of the participants were aware that diabetes can affect the eyes indicating that the Kingdom of Saudi Arabia had achieved a notable economic growth and improvement in life quality. The study revealed high level of awareness about importance of monitoring DM among studied population, with no significant difference between graduate or school educated persons.

Conflicts of interest: There are no conflicts of interest.

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