



DIABETES AND DIABETIC RETINOPATHY: THE KNOWLEDGE, ATTITUDE AND PRACTICE AMONG THE TYPE 2 DIABETIC PATIENTS OF AL AHSA DISTRICT OF SAUDI ARABIA: A CROSS SECTIONAL SURVEY

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ARTICLE INFO

Article History:

Received 12th November, 2017

Received in revised form 11th December, 2017

Accepted 23rd January, 2018

Published online 28th February, 2018

Key words:

Type 2 diabetes mellitus, knowledge, attitude, practice

ABSTRACT

Objective: To assess the knowledge, attitude and practice of diabetic patients towards diabetes and diabetic retinopathy.

Introduction: Diabetes self-management is a cornerstone of diabetes care. Different studies show lack of sufficient knowledge, positive attitude and good practice among diabetic patients about their disease and its complication due to illiteracy. Thus, before considering any possible intervention it was imperative to assess present knowledge, attitudes, and practices of patients towards the management of diabetes.

Materials and Methods: A cross-sectional primary health care based study was done in the district of Al Ahsa of Saudi Arabia from February 2017 to July 2017 through a structured interview with 2016 type 2 diabetes mellitus patients who were administered a 30-point, verbally administered previously validated questionnaire. Data collected was analyzed descriptively using SPSS version 21.

Results: Fifty one percent (N=1028) were male and forty nine percent (N=968) belonged to the rural area. Over all KAP score of the participants were in the satisfactory range i.e. 205 ± 22.37 (maximum, 300). However some critical information on knowledge was lacking since more than sixty eight percent (N= 1381) of the participant believed that diabetes is caused by excessive use of sugar and chocolate. Likewise more than sixty four percent of the participants (N=1299) agreed that eating dates does not affect the diabetes. Some negative attitude and little wrong practice were detected in this study. The attitude of seventy seven percent of the participant (N=1430) towards annual eye exam was negative as they think that good ocular vision do not require eye examination. As far as practice is concerned more than sixty two percent of the participants (N= 1256) did not practice regular outdoor activities such as exercise. The mean of the overall KAP score for all the respondents was 205 ± 22.37 (maximum, 300). Thirty three percent of patients had poor knowledge of diabetes and the same number of the patients had negative attitudes towards having the disease and thirty two percent of the patents had poor practice towards the management of diabetes. The mean overall KAP score for male patients (210 ± 22.43 , $P = 0.000$) was higher than that of the female patients (202 ± 23.9 , $P = 0.000$). The same was true with rural patients whose KAP score was 220 ± 22.32 , $P = 0.007$, as compared with the urban patients with an overall score of 202 ± 21.32 , $P = 0.007$.

Conclusions: This study showed interesting information regarding the knowledge, attitude and practice of the patients towards diabetes and diabetic retinopathy. There are some critical knowledge, attitude and practice gap which needs to be addressed.

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INTRODUCTION

Diabetes Mellitus is a major public health problem worldwide. The incidence of this disease is growing day by day and it is

estimated that their global number will be doubled by 2025 from its existing number of 177 million (G N Sierra, 2009).

The growing disability through its chronic complications is expected to not only decrease the quality of life of the diabetic

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patients but also impose a huge burden on the world economy. UKPDS study has established that 50% of the type 2 diabetic patients have substantial macro or micro vascular complication at the time of diagnosis. After adjusting for age, the death rate of people with Type 2 diabetes is about twice as high as their non-diabetic population. Diabetic retinopathy is potentially blinding complication of diabetic retinopathy and a leading cause of new cases of blindness in working age group (20-74 years) in the developed nations (NEI Statement, 2004). With the expected increase in the prevalence of diabetic patients in the developing nations diabetic retinopathy is set to pose a serious public health problem in these nations as well. The prevalence of DR worldwide ranges from 6.8 to 44.4% in patients with diabetes mellitus (ADA, 2012). According to one estimate over 4 million people are blind due to diabetes globally. It is expected that the number of people with DR will grow from 126.6 million in 2010 to 191.0 million by 2030, while the number with vision-threatening diabetic retinopathy (VTDR) will increase from 37.3 million to 56.3 million (Y. Zheng *et al*, 2012).

The knowledge attitude and practice of the diabetic patients play very crucial role in controlling the diabetes and its chronic complication and thereby reducing the burden of its disability. The knowledge about risk factors and treatment have been considered as an essential therapeutic tool for the patients compliance to lifestyle change and drug therapy. The diabetic patients with better understanding and knowledge of disease and medication have been shown to have better glycaemic control and lesser complication. Conversely poor knowledge of diabetes is associated with increased rate of hospitalization and morbidity (Valentine U Odili, *et al*, 2011). One of the most important factors in achieving the glycaemic control is the patient's Attitude to the diabetes (Rhee M *et al*, 2005). Likewise Self-management and healthy practice is necessary for a better diabetic control. Poor awareness and practices among diabetic patients adversely influence the progression of diabetes and its complications. Various studies have demonstrated that better self-management is highly beneficial in controlling the diabetes and preventing the long term complications (Jones H *et al*, 2003 & Wynn Nyunt S *et al*, 2010).

In a recently concluded study in one of the regions of Saudi Arabia we have found a large number of uncontrolled diabetic patients (Khan AR *et al*, 2009). KAP study of the primary health care physicians in this area has detected a deficit in the practice of the Primary health care physicians towards diabetes mellitus (Khan A R *et al*, 2011). However, our literature search has found scanty studies on the KAP of the diabetic patients of Saudi Arabia. Assessment of knowledge attitude and practice of diabetic patients for diabetes and diabetic retinopathy is important to allow educators and health care providers to address concerns of the diabetic patients and to determine factors affecting glycaemic control and to develop management plan in order to assist patient in the prevention and delay of end organ damage.

MATERIAL AND METHOD

This cross sectional descriptive study was conducted in the month of September 2016. The study population consisted all the adult Type 2 diabetic patients in Al Ahsa district which is expected to be around 119068 (32% of the adult population). The study population included all the diabetic patients attending the chronic disease clinics of all the 3 Ministry of

Health managed health sector area of Al ahsa district. To calculate representative sample, we used Epi Info (version 6; November, 1993). With the assumption that the KAP score of only 35% of the diabetic patients may be satisfactory, the sample size of patients with diabetes could be between 35% and 37% and to achieve the confidence level of 95% we needed 2145 persons with diabetes. To compensate for missing data, additional 10% will be added in the sample to make it 2355. Stratification of the sample to the 3 health sectors of Al Ahsa was done based on the population proportion to the size (PPS). Chronic clinics were randomly selected in each health sectors of Al Ahsa and every second type 2 diabetic patients attending the clinic were selected for the data record after taking their consent.

Data were collected on the status of diabetes (type, duration, and control), residence, education level, blood pressure (BP), age, gender, BMI, recent Hb1AC result, and the results of the ophthalmic examination (specifically, visual acuity and fundus examination results). The Trafford Laboratory reference was considered in defining the control of diabetes with HbA1c less than 6.5% excellent control, HbA1c 6.6% - 7.5% good control, HbA1c 7.6% - 8.9% moderate control, HbA1c greater than 9.0% poor control. NIH definition was used to classify the obesity; underweight was with BMI <18.5 kg/m², Normal 18.6-24.9, Overweight 25-29.9, Obesity 30- 39.9 and extreme obesity > 40 kg/m² (WHO, 2017).

The ethical approval for this study was sought from Ministry of health Saudi Arabia. Data regarding KAP patterns, and barriers to compliance with follow up and treatment regimens for diabetes and diabetic retinopathy were collected using a 30-point, verbally administered previously validated questionnaire used in similarly designed study.

The questionnaires were translated into Arabic to suit the requirement of the target population. The questionnaires consisted of 30 items using a most of them were on Likert scale scoring system. The knowledge question assessed the knowledge about diabetes, its complication, proper management decision, diabetic retinopathy and diet and exercise management. The knowledge section also contained few open ended questions to avoid guessing. The attitude questionnaires had been prepared in accordance with the Diabetic Research and Training Center of University of Michigan (Robert M *et al* 1990). The attitude questions targeted the patients' attitude towards compliance, autonomy; training of medical staffs in order to provide diabetes care, seriousness of noninsulin-dependent diabetes (NIDDM), impact of diabetes on their life and team care. Practice questions on the other hand concentrated on the patient compliance with treatment, diet adherence, exercise and regular follow up. Questionnaires were administered in face-to-face interviews by nurses who were specifically trained for the purpose of the study in order to explain any ambiguity in the questionnaires to participants.

The answers to the questions were scored. Correct answer was awarded 10 marks while neutral choice was awarded as zero marks. This was done for easy calculation in percentage. In the attitude section of the questionnaire, the responses best indicative of a positive attitude was scored 10 marks and the patients with negative attitude were scored zero. The total score achieved by the patient in each section was calculated.

RESULTS

Out of the total 2145 study population, 2016 could complete the questionnaires giving a response rate of 94%. The mean age of the study population was 54.14 years with SD±14.88 (range =22-92 years) while the mean duration of diabetes was 8.82 with SD± 7.28 (range 1-40 years). Fifty one percent (N=1028) were male and forty nine percent (N=968) belonged to the rural area. Seventy nine percent (N=1593) were married while eleven percent (N= 221), eight percent (N=161) and two percent (N=41) were widow, unmarried and divorced respectively. More than forty five percent (N=919) were uneducated while twenty eight percent (N=919), fourteen percent (N=280) and thirteen percent (N=261) were having primary, secondary and graduate level of education respectively. The mean Hb1Ac was 9.98 with standard deviation 10.76 (range 5.3-12.50). Only 22.2% (N=447) of the participants were with normal weight while 33.7% (N=680) and almost similar i.e. 33.8% (N=682) were overweight and obese respectively. Two percent were underweight and more than eight percent (N=167) of them were extreme obese. As far as glycemic control is concerned, only eleven percent (N=220) were excellently controlled, twenty one percent (N=419) were good controlled, more than twenty nine percent (N=592) were moderately controlled and almost forty percent (N=785) were poorly controlled. The mean cholesterol level was 183mg with SD± 44.2 while mean triglyceride was 144mg with SD±90.94. The details of demographic and clinical characteristics is shown in table 1.

Table 1 Demographic and clinical characteristics of the participants (n = 2016)

Characteristics	Number (N)	Percentage(%)
Gender		
Male	1028	51
female	988	49
Age	Mean age 54.14 years)	SD ±14.88 (range =22-92 years)
Duration of diabetes	Mean duration = 8.82	SD ± 7.28 (range 1-40 years).
Control of diabetes		
Excellently controlled	220	11
Good controlled	419	21
Moderately controlled	592	29
Poorly controlled	785	39
Geographic distribution		
Rural	968	48
urban	1048	52
Marital status		
Unmarried	161	8
Married	1593	79
Divorced	221	11
Widow	41	2
Education		
Uneducated		
Primary	919	45.6
Secondary	919	45.6
College	280	13.9
Postgraduate	261	12.9
Weight		
Underweight	40	2
Normal weight	447	22
Overweight	680	34
Obese	682	34
Extreme obese	167	8

Response to the questions asked in the knowledge section

More than sixty eight percent (N= 1381) of the participant answered that diabetes is caused by excessive use of sugar and

chocolate. However eighty eight percent of the participant (N=1775) agreed that untreated diabetes can cause heart diseases and more than fifty eight percent (N= 1184) disagreed with the statement that weight gain has impact on the level of blood sugar. As far as the knowledge about the ocular complication of diabetes is concerned, more than ninety two percent (N=1859) and more than seventy three percent (N=1474) of the participants agreed with the statement that diabetics need annual eye exam and retina is the main part of the eye damaged due to diabetes respectively. The same was true with the statement that early detection of diabetic eye disease and timely treatment may prevent /delay the damage to the eye, where more than ninety four percent (N=1898) of the participants agreed with the statement. Twenty four percent of the participants (N=475) did not know about the symptoms of diabetes mellitus and only 25.3 % (N=509) agreed that diet control is not needed for the control of the diabetes. However more than sixty four percent of the participants (N=1299) did agree with the statement that eating dates does not affect the diabetes. More than eighty three percent (N=1693) of the participants agreed with the statement that diabetes can cause the loss of sensation in the limbs and fingers and may cause the loss of limbs. The details are shown in table 2.

Table 2 Responses to knowledge questions

Questions	Agree	Neutral	Disagree
Diabetes is caused by excessive use of sugar and chocolate	1381	125	512
If not treated diabetic can cause heart disease	1775	75	166
Weight gain has no impact on the level of blood sugar	720	112	1184
Diet control is not needed if diabetes is controlled	1362	145	509
Eating dates does not affect diabetes	1299	116	601
Diabetes can cause loss of sensation in the hands and fingers, feet and can cause some people to lose the foot or leg.	1693	86	237
Diabetic need annual eye examination	1859	89	68
Retina is the main part that gets the eye damage due to diabetes	1474	113	429
Timely treatment may prevent / delay the damage in the eye due to diabetes	1898	67	51
Symptoms of diabetes	Answered correctly 1541	Answered incorrectly 475	

Response to the questions asked in the attitude section

As far as the attitude is concerned almost ninety five percent (N=1908) were correct while agreeing that diabetic should exercise regularly. More than ninety two percent (N=1875) of the participants agreed that irregular intake of diabetic medication can have negative impact on the control of diabetes. Similarly more than seventy seven percent of the participant (N=1430) agreed with the statement that in the case of good vision diabetics are not required to go for annual eye examination. Seventy percent (N=1464) of the participants were not happy with the health care workers approach for treating their diabetes where they agreed that the health care workers needed special training in providing them effective treatment for diabetes. Almost sixty percent of the participant

(N=1209) disagreed with the statement that merely following the dietary regimen is sufficient in controlling the diabetes. More than seventy nine percent (N= 1595) agree with the statement that diabetes mellitus affects almost every part of the life of the patient. Likewise, more than eighty six percent of the participants (N= 1735) did not agree with the statement that diabetics often waste time and money in eye exam as their eyes are mainly normal throughout the disease. Most of the diabetic patients agreed the importance of self-care in controlling the diabetes. The details are shown in table 3.

Table 3 Response to the attitude questions

Questions	Agree	Neutral	Disagree
Diabetics should exercise regularly	1908	0	108
Not taking doses of medication diabetes will have a negative impact in controlling the disease	1875	15	126
If you think your vision is good, you don't need annual eye examination	1430	134	452
Health care workers need special training to provide effective treatment for patients with diabetes	1464	145	407
Diabetic dietary regimen is sufficient in controlling the diabetes.	386	421	1209
Diabetes affects almost every part of the life of the person injured	1595	254	167
Self-care has played an important role in controlling the diabetes	1750	115	151
Diabetics often waste their time and money in eye exams as their eyes are mostly sound	233	48	1735
Regular visit to dietician for their advice is important for controlling the diabetes	1675	112	229
Good control of blood sugar, reduces the complications of diabetes in the long run	1245	118	656

Response to the questions asked in the practice section

More than sixty two percent of the participants (N= 1256) stated that they don't go for regular outdoor activities such as exercise. Almost three fourth of the participant (N=1494) affirmed that they go for annual blood pressure examination to their Primary health care centers. Only twenty percent of the participants (N=391) did not take diabetic medicine regularly. Almost ninety percent of the participants (N=1814) agreed that self-monitored blood glucose (SMBG) device supplied by ministry of health helped them in controlling their blood sugar level. Only twenty three percent (N=462) of the participants did not use the SMBG machine while nine percent (N=187), twenty percent (N= 410), twenty four percent (N=483) and more than twenty three percent (N=474) each used the SMBG machine for every day of the week, every second day of the week, twice a week and once a week respectively. More than forty six percent (N=924) of the participants did not attend the eye doctor as advised by their family physician.

When asked about the role of treating ophthalmologist in giving advice on the prevention and treatment of ocular complications of diabetes, almost fifty four percent (N=1036) of the participants answered that their treating ophthalmologist did not give them proper advice on the prevention and treatment of ocular complications of diabetes. Eighty six percent (N=1730) of the participant were aware about the signs and symptoms of hypoglycaemia and stated that they took

sweets immediately when they felt dizzy. The details are shown in table 4.

Table 4 Response to the practice questions

Questions	Agree	Neutral	Disagree
I visit my family physician every month for my blood pressure check up	1494	176	346
I go for outdoor physical activity (like sports, exercise, walking)regularly	524	236	1256
I ignore the loss of sensation in the feet as it is normal in patients with diabetes	1235	117	664
I do not take diabetic medicine regularly (either oral or insulin) when the blood sugar is controlled	391	243	1382
Self-monitor blood glucose device (SMBG), supplied by the Ministry of Health helps me to control the level of blood glucose.	1814	122	80
I don't go to the eye doctor for annual eye examination as advised by my family physician	924	212	880
If the vision is clear, there is no need for retinal examination	1515	117	384
The treating ophthalmologist gives me advice on the prevention and treatment of ocular complication of diabetes and I follow it	891	89	1036
When I feel dizzy, I immediately pick up sweets	1730	123	163
Practice of SMBG use by the participants	Daily 187	Once weekly 474	Twice weekly 958

KAP Score

The mean of the overall KAP score for all the respondents was 205 ± 22.37 (maximum, 300).The knowledge score was 67.02± 15.0 (maximum, 100), attitude score was 67.08 ± 13.47 (maximum, 100) and practice score was 67.62 ±14.0 (maximum, 100). The mean overall KAP score for male patients (210 ± 22.43, P = 0.000) was higher than that of the female patients (202 ± 23.9, P = 0.000). The same was true with rural patients whose KAP score was 220 ±22.32, P = 0.007, as compared with the urban patients with an overall score of 202 ± 21.32, P = 0.007. Table 5 shows the mean total score by sex and geographical area.

Table 5 KAP Score of the participants

Variables	Knowledge (Maximum =100)	Attitude (Maximum =100)	Practice (Maximum =100)	Overall KAP (Maximum =300)
Sex				210 ± 2.43
Male	70.02± 15.0	69.06 ± 13.47	71.10 ±14.0	202 ± 23.9
Female	65.05± 13.34	68.70± 12.38	68.34± 13.0	P = 0.000
Geographic distribution				220 ±22.32
Rural	73.25±12.34	72.44±11.23	74.21±11.43	202±21.32,
urban	65.34±11.56	65.23±12.45	68.23±12.67	P = 0.007

DISCUSSION

Knowledge, attitude, and practice (KAP) surveys are widely used to gather information for planning public health programme in many countries. A KAP survey can be useful when the research plan is to obtain general information about public health knowledge regarding treatment and prevention practices, or about sociological variables, such as income, education, occupation, and social status. The present study was based on this principle of KAP study. This study has provided a useful insight for future planning of public health programme towards diabetes and diabetic retinopathy. Unlike many studies from developing as well as from developed countries which reported poor knowledge of diabetes among diabetic patients,

this study shows over all better level of KAP score with the mean of 205 ± 22.37 (maximum, 300) (Srinivasan, Nithin Keshav *et al*, 2017. Rani PK, Raman R, Subramani S, Perumal G, *et al*, 2008, Babik WG, Aedha AI, Ahmed AM, *et al*, 2017).

A similar study in Sri Lanka the researchers have reported good knowledge about diabetes among diabetic patients (H. M. M Herath, N. P. Weerasinghe, H. Dias and T. P. 2017).

There were considerable numbers of patients (88% and > 64%) who in our study think that eating excessive sugar cause the diabetes and consuming dates does not affect the diabetes. The people of Saudi Arabia are very traditional and their customary diet has been the dates. Dates are also a symbol of hospitality and they consume it as religious symbolism. According to the practical experience of physicians specializing in endocrinology and diabetes, high intake by diabetics in Saudi Arabia in a single day is considered one of the main reasons for blood sugar irregularity (Mohammad Rasooldeen, Arab news, 2016). The high number of uncontrolled diabetic in our study seems to be the result of the lack of proper information about the sugar levels on dates from nutritionists and other experts.

Majority of the participants in our study had good knowledge about the diabetic retinopathy and other complications of diabetes unlike other similar studies in Pakistan and Bangladesh where knowledge about diabetic retinopathy was found deficient. (Muhammad Saleh Memon, Sikander Ali Shaikh *et al*, 2015) Bangla desh (Kh. Shafiu Rahaman, Reza Majdzadeh, Kourosh Holakouie Naieni and Owais Raza, 2017)

Similarly more than seventy seven percent of the participant (N=1430) agreed with the statement that in the case of good vision diabetics are not required to go for annual eye examination. Belief that the diabetics do not require retinal examinations or treatment as their vision is good is one of the reasons for noncompliance for annual retinal exam (Karinya Lewis, 2015).

In our study seventy percent (N=1464) of the participants were not happy with the health care workers approach for treating their diabetes where they agreed that the health care workers needed special training in providing them effective treatment for diabetes. Similar types of observations were made in similar studies. (Priscilla W. Powell, Sarah D. Corathers, Jennifer Raymond, 2015). Multidisciplinary health care provided by multidisciplinary health care teams with skills and expertise and with individualized attention is the need of the hour if we want effective control of the diabetes and its complications (American Association of Diabetes Educators, 2008).

Most of the diabetic patients in our study agreed the importance of self-care in controlling the diabetes. Importance of diabetic self-care and the barrier to self-management has been expressed by diabetic patients in many similar studies. Though the participants in our study agreed the importance of self-care but more than sixty two percent of them (N= 1256) did not go for regular outdoor activities such as exercise. Non adherence to life style modification such as exercise is a matter of concern as observed by many studies where little or no outdoor activities were reported from diabetic patients in Egypt and Nepal. (Amal El-Abbassy, 2015, Anju Gautam, Dharma Nand Bhatta, and Umesh Raj Aryal, 2015)

Self-monitoring of blood glucose (SMBG) with the help of portable glucometers by the diabetic patient at home is considered as one of the major components of diabetes management. This technique allows the diabetic patients to establish greater glycemic control. Not only that, this technique also help patients better understand the impact of lifestyle on glycemic control and adjust the insulin dose. The government of Saudi Arabia has provided free glucometer to each patient for SMBG. In spite of these fact twenty three percent of the participants in our study never used the SMBG. The regular use of SMBG has been found less prevalent in a similar study in USA where only twenty four percent of the type 2 diabetics used the SMBG. However, unlike Saudi Arabia the patients are not provided free glucometer in USA (Alyce S Adams, Connie Mah, 2003).

CONCLUSION

This study showed interesting information regarding the knowledge, attitude and practice of the patients towards diabetes and diabetic retinopathy. There are some critical knowledge, attitude and practice gap which needs to be addressed.

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How to cite this article:

Dr. AtaurRahman Khan *et al* (2018) 'Diabetes And Diabetic Retinopathy: The Knowledge, Attitude And Practice Among The Type 2 Diabetic Patients Of Al Ahsa District Of Saudi Arabia: A Cross Sectional Survey', *International Journal of Current Medical and Pharmaceutical Research*, 4(2), pp. 3016-3021.
