The ATONE study — assessment of diabetes knowledge in individuals with type 2 diabetes in the Pakistani population

Fibhaa Syed, Mohammad Ali Arif, Adil Ramzan, Rauf Niazi, Saira Musarrat, Mariam Maqbool Kayani

Abstract

Objective: To evaluate knowledge of diabetes using diabetes knowledge questionnaire in diabetic patients.

Methods: The cross-sectional study was conducted at the Pakistan Institute of Medical Sciences, Islamabad, Pakistan, from October to December 2017, and comprised subjects aged >20 years with a diagnosis of type 2 diabetes. The modified version of diabetes knowledge questionnaire was used for data collection. It had 24 questions concerning patient's diabetes knowledge and self-care practices. One point was given for each correct answer. The highest achievable score was 24. A total score of ?12 was considered suggestive of adequate knowledge. SPSS 23 was used for data analysis.

Results: Of the 401 subjects, 175 (43.6%) were males and 226 (66.4%) were females. The overall mean age was 52.9 ±12.3 years, and mean duration of diabetes was 7.95±6.7 years. The mean score on the questionnaire was 9.97±3.93. Only 135(33.7%) patients showed adequate knowledge of the disease. Factors having positive correlation with the score were patient's urban background, level of literacy and their socioeconomic status ($p<0.05$ each). The duration of diabetes and the control of diabetes had no influence on the scores ($p>0.05$ each).

Conclusion: Knowledge about diabetes was found to be generally poor among diabetics.

Keywords: Diabetes knowledge, DKQ, Awareness, Type 2 diabetes, Pakistani. (JPMA 69: 383; 2019)

Introduction

Diabetes is a major health challenge in the 21st century. According to the International Diabetes Federation (IDF) Diabetes Atlas 2017, 425 million people around the globe are suffering from the disease. Out of these, 79% belong to low or middle-income countries (LMICs). If no concrete steps are taken for the prevention of diabetes, the number may rocket to 693 million in 2045. Pakistan ranks 10th in the world in diabetes prevalence.[1] The World Health Organisation (WHO) in 2016 estimated the prevalence of diabetes mellitus in Pakistan to be 9.8%, which is expected to increase in the near future,[2] and at present, an estimated 7.1 million adults in Pakistan suffer from diabetes.[3]

Type 2 diabetes is a metabolic disorder, the effective management of which requires not only medication use but also active patient awareness with appropriate lifestyle modifications. Inadequately controlled diabetes leads to both micro and macro vascular complications. The macro vascular complications include coronary artery disease, stroke, diabetic foot, peripheral vascular disease, while the micro vascular complications include neuropathy, nephropathy and retinopathy, all contributing to significant morbidity.[4,5] Diabetes self-management training and education plays a vital role in the management of diabetes. It is crucial for diabetic patients to be aware of the nature, treatment, risk factors and complications of the disease so as to attenuate the afore-mentioned complications.[6]

Silent but devastating, diabetes will not only pose a substantial problem to public health but also to the economy of most developing nations of the world. This is because a significant proportion of individuals who suffer from the condition in these countries are within the reproductive age.[1,7] These are the individuals who will be responsible for the growth and development of their respective nations.[8] With the advances in management of diabetes and its complications, the approach is becoming more and more specialised by the day, requiring specialised centres with sophisticated infrastructure and equipment, well-trained staff and newer modalities of treatment, all of which are scarce in Pakistan.

Since most of these specialised centres are not available in many Pakistani settings, patient education becomes an element of paramount importance in the prevention and control of this disease. Such education should lead to dietary modification, increased physical exercise and lifestyle changes. Educational programmes should help people assess their risks of diabetes, motivate them to seek proper treatment and care, and inspire them to take charge of their disease.[9] In addition, it should enable early

PIMS (SZABMU), Islamabad, Pakistan.

Correspondence: Fibhaa Syed. Email: fibhaasyed@gmail.com

detection and treatment of complications as well as enhanced early referrals of cases to specialised centres for management and follow-up. The importance of educational programmes in the prevention and control of diabetes mellitus is well recognised.[10]

Keeping in view the importance of patient education in the management of diabetes, the current study was planned to determine the knowledge regarding type 2 diabetes in individuals suffering from the disease, using a validated tool, and to correlate it with various variables.

Subjects and Methods

The cross-sectional study was conducted at the Pakistan Institute of Medical Sciences, Islamabad, Pakistan, from October to December 2017, and comprised subjects aged >20 years with a diagnosis of type 2 diabetes based on the American Diabetes Association (ADA) criteria.[11] The sample size was calculated using Raosoft online sample[12] size calculator with a population prevalence of 9.8%[2] with 95% confidence level and 5% margin of error. After approval was obtained from the institutional review board, subjects were enrolled through convenience sampling technique, and informed consent was obtained from each of them. The study included new and follow-up patients visiting the medical outpatient department (OPD) as well as those admitted to the wards. Those excluded were patients who did not agree to complete the questionnaire and patients with cognitive/hearing impairment.

Details of the age, gender, duration of diabetes, level of literacy, socioeconomic status, control of diabetes, complications, and level of healthcare being availed (primary, secondary or tertiary) were noted.

Worldwide, many knowledge questionnaires have been developed for assessing diabetes patient's knowledge about diabetes and its management. DKQ is a validated tool for evaluating diabetes knowledge among subjects with diabetes.[13] Modified DKQ was utilised which comprises 24 questions concerning patient's diabetes knowledge and their self-care practices. DKQ-24 is derived from the original 60-item version and is a relatively easy-to-use measure of general diabetes knowledge.[14] The DKQ has been translated into Urdu and has been duly validated.[15] Based on patients' ability to read and/or understand DKQ-24 was used to assess patients' diabetes knowledge. It was ensured that answers were given by the subjects after they fully understood the questions. Literate people with diabetes were asked to complete the questionnaire themselves. The questionnaire took approximately 5-15 minutes. One point was given for each correct answer, and none for an incorrect one. The highest achievable score was 24. Scores of DKQ were calculated for each participant. A score of $\geq$12 was considered suggestive of adequate knowledge regarding diabetes, while a lower score showed insufficient knowledge.

Data was analysed using SPSS 23. Continuous variables were reported as means ± standard deviation (SD), and categorical variables glycosylated haemoglobin (HbA1c) and duration of diabetes between DKQ score of $\geq$12 and <12, and chi-square test was applied to find association of different variables such as gender, rural or urban background, patient education, monthly income and family history of diabetes, between both groups. $P < 0.05$ was taken as significant.

Results

Of the 401 subjects, 175 (43.6%) were males and 226 (66.4%) were females. The overall mean age was 52.9 ±12.3 years, mean duration of diabetes was 7.95±6.7 years and the mean HbA1C was 8.66 ±1.9 (Table-1).

Of the total, 74(18.5%) had a history of diabetic foot, 198 (49.3%) had retinopathy, 194 (48.3%) neuropathy, 80(19.9%) nephropathy, 84(20.9%) had cardiovascular complications, and 38 (9.5%) patients had cerebrovascular complications.

Overall mean score of the sample on DKQ-24 was 9.97±3.93 out of a total score of 24, indicating inadequate knowledge about diabetes. Only 135(33.7%) patients showed adequate knowledge with a score of 12 or more.

Table-1: Demographic characteristics of the study population (n=401).

Characteristic	Frequency	Percentage
Gender		
Male	175	43.6
Female	266	66.4
Demographic Background		
Urban	268	66.8
Rural	133	33.2
Patient literacy		
Illiterate	164	40.9
Primary	54	13.5
Middle	56	14
Secondary	45	11.2
Intermediate and above	82	20.4
Marital status		
Married	357	89
Single	44	11
Income(Rupees)		
<Rs20,000	191	47.6
Rs20-40,000	127	31.7
>Rs40,000	83	20.7

Table-2: Association between various factors and Diabetes Knowledge Questionnaire (DKQ) scores.

Patient characteristic	DKQ score <12	DKQscore ≥12	P value
Demographic Background			
Urban	170	98	0.05
Rural	96	37	
Gender			
Male	114	61	0.367
Female	152	74	
Patient education			
Illiterate	127	37	0
Primary school	42	12	
Middle school	35	21	
Secondary school	23	22	
Intermediate and above	39	43	
Monthly income (Rupees)			
<20,000	154	37	0
20-40,000	84	43	
≥40,000	26	57	
Family history of diabetes			
Yes	154	83	0.367
No	110	54	
Mean duration of diabetes(years)	7.98±6.98	7.99±6.35	0.951
Mean HbA1C	8.68±1.87	8.65±1.97	0.881

Patients' knowledge with regard to diabetes was significantly influenced by only three factors: whether they hailed from a rural or urban area, their literacy, and their monthly income ($p<0.05$ each). Gender, duration of diabetes, HbA1C levels had no association with the DKQ scores ($p>0.05$ each). The presence of any macro or micro vascular complications did not significantly impact their diabetes knowledge either ($p>0.05$) (Table-2).

Only 12.7% (n=51) patients knew that eating too much sugar and sweet foods was not a cause of diabetes, while 15.2% (n=61) patients gave a negative, correct response to the statement that diabetes is caused by the failure of kidneys to keep sugar out of the urine. Only 33.4% (n=134) of the patients knew that the kidneys do not produce insulin. The fact that diabetes was due to a lack of effective insulin in the body was known to 63.6% (n=255) patients and a similar percentage 65.5% (n=263) was aware that if one had diabetes, one's children were at a greater risk of developing diabetes. Merely 37.7% (n=151) individuals knew about the two main types of diabetes.

The correct level of blood sugar considered high was known to 58.6% (n=235) of the patients. Awareness regarding the symptoms of hypoglycaemia was observed in 35.4% (n=142) individuals. As regards to diet, 63.7% (n=255) were of the opinion that diabetes required a special diet. Similarly, 66.3% (n=266) did not understand the influence regular exercise can have on the requirement of insulin or medication. Diabetes if left untreated could lead to a rise in blood sugars was known to 80.8% (n=324) patients. Of our study population, 70.6 % (n=283) patients knew that they needed to take extra care while cutting their toe-nails, however only 12.7% (n=51) knew that they could not cleanse a cut with iodine or alcohol. The patients did show good knowledge about the complications of diabetes as they scored well on questions assessing impact of diabetes on the circulation (51.1%, n=205), neuropathy (65.8%, n=264) and nephropathy (71.6%, n=287).

Discussion

Diabetes mellitus is a global health problem. It poses a significant health burden to our country. Appropriate management not only includes the proper use of pharmacological therapy, but also embodies lifestyle and dietary modifications, regular glycaemic checks, and periodic screening for complications. Hence disease knowledge is mandatory for optimum management of patients.

In our study population, the majority (66.3%), that is approximately two-third of the population, did not show adequate knowledge about diabetes. Several studies conducted in Pakistan show poor knowledge of disease in type 2 diabetics, although none of the studies used a validated tool like the DKQ-24 and mostly relied on self-developed questionnaires. These studies show that diabetic patients exhibit poor knowledge of the disease.[16-20]

In a previous study carried out in Peshawar, more than 50% participants did not know what diabetes was or the importance of screening other family members.[15] In our study only 12.7 % patients were aware of the fact that eating too much sugar and sweet foods is not a cause of diabetes, but a study carried out in an Islamabad hospital found 68% of the patients aware of this fact.[17] This was perhaps because most of the study population in the later study was literate and had a better social standing.

The knowledge of complications of diabetes in our patients like poor circulation (51.2%), poor wound healing (67.6%), neuropathy (65.9%) and nephropathy (71.6%) was reasonable. In a study carried out in Khyber-Pakhtunkhwa (KP), only 37.5% patients had good knowledge of the overall complications of diabetes mellitus. However, the knowledge about renal problems was better, that is 66.7%, and about different types of neuropathy it was 47-65%.[18] Another study carried out in Multan showed that 97.1% of the study population had poor knowledge of the disease.[19] Studies evaluating

diabetes knowledge carried out in Karachi and Lahore similarly showed only 38% and 35% patients respectively were aware that the disease can involve various body organs.[20,21]

Three factors were found to influence diabetes awareness in our patients: literacy, demographic background, and monthly income. Literacy was positively correlated in a few studies from our country[16,18,20] while socioeconomic conditions were found to influence knowledge in studies from Multan and Karachi.[18,19] Urban background was associated with better diabetes-related knowledge in the Islamabad study.[17]

Taking into consideration regional data, several studies from India also confirm poor knowledge and understanding of diabetes and its complications in diabetic patients.[22-24]

The knowledge varied from 24-50% in these studies. However, better knowledge was demonstrated in a study that was conducted in Indian Gujrat in patients mostly seen by physicians in private set-ups.[25] In Bangladesh, diabetics, pre-diabetics and those with undiagnosed diabetes all demonstrated poor disease knowledge and this trend was higher in those with pre-diabetes and undiagnosed diabetes than those with known diabetes - 16.3%, 17.8% and 55.6% respectively.[26] In another study in Bangladesh the proportion of patients with poor, average and good diabetes knowledge was 17%, 68% and 15% respectively.[27] Chinese population of diabetics has also demonstrated meagre knowledge regarding diabetes in several studies with only from 35.4% to 37.2% individuals with good knowledge.[28,29]

In some publications, an association was found between diabetes knowledge and gender, with females showing a better know-how of the disease.[30-32] Two studies carried out in Pakistan[18,19] in KP and Multan showed that males were more knowledgeable than females. However, we could not demonstrate any significant difference in knowledge between the genders.

Diabetes is an emerging health challenge in Pakistan. The current health infrastructure may be inadequately equipped to tackle this problem, hence effective control and preventive strategies based on well thought-out educational programmes needs to be implemented. Diabetic patients must be properly educated about lifestyle and dietary modifications along with the importance of compliance with medication so as to achieve glycaemic control and prevent the serious complications that can result as a consequence of the disease.

Diabetes knowledge must be imparted to the patients at diagnosis and reinforced throughout the follow-up period. It was demonstrated in the study carried out in KP that more than 50% patients had never received any education about diabetes. Those who had been educated received only a time of approximately 5 minutes because of the busy out-patient department.[16] In our hospital, we have a regular diabetic clinic catering to only diabetic patients. Patients are given hand-outs in Urdu regarding diabetes management and self-care. We also have a television screen installed in the waiting area and it continuously shows a video made by the consultants of our hospital to educate the diabetics. Since the last several years, our hospital, along with other leading hospitals nationwide, has started to celebrate the World Diabetes Day on November 14. The day is marked with various awareness campaigns, including walks, group discussions, free screening camps and seminars for the education of the public. Clearly these measures alone are not sufficient, taking into view the poor diabetes knowledge of our patients. Having a proper patient registry so that patients can be seen by appointment and given adequate time can improve the quality of patient education and management. The poor knowledge may also be due to inadequate knowledge and training of the healthcare providers. Various studies have shown inadequate knowledge of the healthcare staff.[33] Appropriate trainings must be arranged for healthcare professionals to impart proper education to the patients and the general population. Education through mass media can improve the knowledge, especially in rural areas.

Given the high incidence of pre-diabetes, the general population must be sensitised through various television programmes, newspaper articles, mobile messages, seminars and support groups and societies. It is imperative that information is transmitted in the local and regional languages, since a majority of our population has not received any formal education and may not be well-versed in either English or Urdu. Furthermore, education regarding both communicable and non-communicable diseases must be introduced in the school curricula. Help of religious leaders and scholars must also be sought, taking leads from countries like Iran and Bangladesh. In Iran religious scholars not only aid in the dissemination of knowledge relating to diabetes, but also issue guidelines and decrees that the people follow with reverence.[34] In Bangladesh, meetings are held with religious scholars of large mosques and principals of government-accredited madrasas. The Imams help compose a religious sermon (Khutba) for the Friday congregation that helps spread awareness in about prevention of diabetes in the light of

religious knowledge.[35]

Patient education improves self-care practices in type 2 diabetics.[36-38] Additionally, patients who are regularly involved in self-care practices achieve better glycaemic control. A meta-analysis which reviewed 11 randomised control trials (RCTs) indicated that culturally-apt diabetes health education is operative in achieving target glycaemic control in type 2 diabetics and improving the knowledge and attitudes of the individuals.[39] Hence, timely intervention to improve the knowledge pertaining to diabetes is the need of the hour.

Conclusion

Knowledge regarding diabetes in the study population was seriously deficient. Literacy, monthly income and demographic backgrounds were the strongest determinants of diabetes-related knowledge.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. International Diabetes Federation. IDF Diabetes Atlas. 8th Edition, 2017.
2. Roglic G. World Health Organization. Global Report on Diabetes. Geneva, Switzerland: World Health Organization, 2016.
3. 7.1 Million Pakistanis have diabetes. [Online] [Cited 2018 February 02]. Available from: URL: www.dawn.com/news/1296299
4. Goren B, Fen T. The metabolic syndrome: Review. Turk Klinik J Med Sci. 2008; 285:686-96.
5. Stratton IM, Adler AI, Neil HA, Matthews DR, Manley SE, Cull CA, et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): Prospective observational study. BMJ. 2000; 321:405-12.
6. Mensing C. Comparing the Processes: accreditation and Recognition. Diabetes Educ. 2010; 36:219-43.
7. Vandenheede H, Deboosere P, Gadeyne S, De Spiegelaere M. The associations between nationality, fertility history and diabetes-related mortality: a retrospective cohort study in the Brussels-Capital Region (2001–2005). J Public Health. 2012; 13:100–7.
8. Maina WK, Njenga EW, Muchemi EW. Knowledge, attitude and practices related to diabetes among community members in four provinces in Kenya: a cross-sectional study. Pan Afr Med J. 2010; 13:15–8.
9. Tan AS, Wan S, Wong ML. Patient education in the management of diabetes mellitus. Singapore Med J. 1997; 13:156–60.
10. Jane K, Joanne M, Gallivan C. National Diabetes Education Program and the Role of Partnership in the Prevention and Management of Diabetes. Oxford: Oxford Scholarship, 2011.
11. American Diabetes Association. Introduction: Standards of Medical Care in Diabetes-2018. Diabetes Care. 2018; 41:S1-S2.
12. Raosoft online sample size calculator, [Online] 2014 [Cited 2018 February 12]. Available from: URL: http://www.raosoft.com/samplesize.html
13. Eigenmann C, Skinner T, Colagiuri R. Development and validation of a diabetes knowledge questionnaire. Pract Diab Int. 2011; 28:166-70.
14. Gracia AA, Villagomez ET, Brown SA, Kouzekanani K, The Starr County Diabetes Education Study Development of the Spanish-language diabetes knowledge questionnaire; Diabetes Care. 2018; 41:S1-S2.
15. Bukhsh A, Lee SWH, Pusparajah P, Khan AH, Khan TM. Psychometric Properties of the Urdu Version of Diabetes Knowledge Questionnaire. Front Public Health. 2017; 5:139.
16. Gul N. Knowledge, attitudes and practices of type 2 diabetic patients. J Ayub Med Coll Abottabad.2010; 22:128-31.
17. Gul N.Knowledge, attitudes and practices of type 2 diabetic patients. J Ayub Med Coll Abottabad.2010; 22:128-31. SAME AS REF 16
18. Iqbal T,Rashid F, Saleem SA, Shah SA, Khalid GH, Ishtiaq O. Awareness about diabetes mellitus amongst diabetics. J Rawal Med Coll. 2013; 17:294-6.
19. Ullah F , Afridi AK, Rahim F, Ashfaq M, Khan S, Shabbier G, et al. Knowledge of diabetic complications in patients with diabetes mellitus.
J Ayub Med Coll Abottabad.2015; 27:360-3.
20. Siddique K, Malik R, Usman A, Ishfaq K. Gender, Socioeconomic Status and Health Behaviours of Patients in Type II Diabetes Management in Multan, Pakistan. Isra Med J.2017; 9:141-8,
21. Ather NA, Aziz S, Javed A, Karim MT. Awareness of Diabetic Complications in Type 2 Diabetic Patients. J Dow Uni Health Sci. 2016;10:65-9.
22. Ahmad R, Younis BB, Masood M, Noor W. Diabetes Awareness - Knowledge Attitude and Practice Of Diabetic Patients In A Tertiary Care Setting. Esculapio J Services Inst Med Sci. 2011; 7:24-7.
23. Dinesh PV, Kulkarni AG, Gangadha NK. Knowledge and self-care practices regarding diabetes among patients with Type 2 diabetes in Rural Sullia, Karnataka: A community-based, cross-sectional study. J Family Med Prim Care. 2016; 5:847–52.
24. Mehta NV, Trivedi M, Maldonado LE, Saxena D, Humphries D. Diabetes knowledge and self-efficacy among rural women in Gujarat, India. Rural Remote Health. 2016; 16:3629.
25. Muninarayana C, Balachandra G, Hiremath SG, Iyengar K, Anil NS. Prevalence and awareness regarding diabetes mellitus in rural Tamaka, Kolar. Int J Diabetes Dev Ctries. 2010; 30:18-21.
26. Solanki JD, Sheth NS, Shah CJ, Mehta HB. Knowledge, attitude, and practice of urban Gujarati type 2 diabetics: Prevalence and impact on disease control. J Educ Health Promot. 2017; 6: 35.
27. Islam FM, Chakrabarti R, Islam MT, Wahab M, Lamoureux E, Finger RP, et al. Prediabetes, diagnosed and undiagnosed diabetes, their risk factors and association with knowledge of diabetes in rural Bangladesh: The Bangladesh Population-based Diabetes and Eye Study. J Diabetes. 2016; 8:260-8.
28. Fatema K, Hossain S, Natasha K, Chowdhury HA, Akter J, Khan T, et al. Knowledge attitude and practice regarding diabetes mellitus among Nondiabetic and diabetic study participants in Bangladesh. . BMC Public Health. 2017; 17:364.
29. Yang H, Gao J, Ren L, Li S, Chen Z, Huang J, et al. Association between Knowledge-Attitude-Practices and Control of Blood Glucose, Blood Pressure, and Blood Lipids in Patients with Type 2 Diabetes in Shanghai, China: A Cross-Sectional Study. J Diabetes Res. 2017; 2017: 3901392
30. Li Z, Jin H, Chen W, Sun Z, Jing L, Zhao X, et al. Influencing Factors of Knowledge, Attitude, and Practice regarding Medical Nutrition Therapy in Patients with Diabetes: A National Cross-Sectional Study in Urban China. J Diabetes Res.2017; 2017: 8948452.
31. Santos a PFL, Santos a PR, Ferraria GCL, Fonseca GAA. Knowledge of Diabetes Mellitus: Does Gender Make a Difference? Osong Public Health Res Perspect. 2014; 5:199-203.
32. Borges TT, Rombaldi AJ, Knuth AG. Knowledge on risk factors for chronic diseases: a population-based study. Cad Saude Publica. 2009; 25:1511e20.

33. Demaio AR, Otgontuya D, Courten M de, Bygbjerg IC, Enkhtuya P, Oyunbileg J et al. Exploring knowledge, attitudes and practices related to diabetes in Mongolia: a national population-based survey. BMC Public Health. 2013; 13:236.
34. Ahmed A, Jabbar A, Zuberi L, Islam M, Shamim K. Diabetes related knowledge among residents and nurses: a multicenter study in Karachi, Pakistan. BMC Endocr Disord. 2012; 12:18.
35. Larijani, B, Zahedi F. Patient centred care in diabetology: an Islamic perspective from Iran. J Diabetes Metab Disord. 2013; 12: 18.
36. Khan AKA. Diabetes awareness through religious leaders. Indian J Endocrinol Metab. 2013; 17: 178–9.
37. Saurabh S, Sarkar S, Selvaraj K, Kar SS, Kumar SG, Roy G. Effectiveness of foot care education among people with type 2 diabetes in rural Puducherry, India. Indian J Endocrinol Metab. 2014; 18:106–10.
38. Gujrathi A, Dhakne S, Almale B, Mahale M, Vankudre A, Gosavi S. Impact of community based diabetic patient education on glycaemic status, life style and self care practices among type 2 diabetes patients in an urban slum of Mumbai, India. Int J Interdiscip Multi discip Stud. 2014; 1:279-87.
39. Hawthorne K, Robles Y, Cannings-John R, Edwards AG. Culturally appropriate health education for Type 2 diabetes in ethnic minority groups: a systematic and narrative review of randomized controlled trials. Diabet Med. 2010; 27:613–23