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A Study on Impact of Diabetes Knowledge on Glycemic Control and Self-Care Activities Among Adults with Type II Diabetes Mellitus

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ABSTRACT

In this study, adult Indian people with diabetes (PWD) were examined in connection to their knowledge of the condition, glycemic control, and self-care practices. Diabetes mellitus (DM) is a metabolic disease, involving inappropriately elevated blood glucose levels. This is a serious medical problem that has a significant impact on global mortality, morbidity, and health-system costs. Patients with chronic diseases like Diabetes Mellitus can enhance their self-care routines by receiving health education. Chi-square and correlation analysis were used to investigate how knowledge of a condition related to self-care and glycemic control. Majority of the sample was >45–60 years old (51.1%), suffering from type 2 diabetes mellitus for<10 years (54%) and had poor glycemic control (HbA1C≥7%; n=102 participants). Diabetes patients with good glycemic control (HbA1c7) had a similar diabetes knowledge score (DKQ sum-scale score 12; IQR 10.75-14) as those with poor glycemic control (DKQ sum-scale score 12; IQR 10-15). Significantly ($p<0.05$) higher DKQ sum-scale scores were obtained by study participants aged 45-60 years (13; IQR 10-15), participants who had postgraduate level education (15; IQR 13-17), and participants having a family history of diabetes (13; IQR 10.25-15). Glycated haemoglobin levels and disease knowledge do not significantly correlate: however, disease knowledge is significantly correlated with PWDs' self-care practices. These findings will aid in the development of patient-specific diabetes education programmes that will increase the likelihood that diabetes patients will adopt appropriate self-care practices which ultimately aids in achieving target glycemic control.

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INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease, involving inappropriately elevated blood glucose levels. The main subtypes of DM are Type 1 diabetes mellitus (T1DM) and Type 2 diabetes mellitus (T2DM), which classically result from defective insulin secretion (T1DM) and/or action (T2DM) [1].

Diabetes mellitus is a serious medical problem that has a significant impact on global mortality, morbidity, and health-system costs [2]. It remains a major public health concern in developing countries.

Some of the risk factors for T2DM include physical inactivity, smoking, using incorrect dietary practices, drinking alcohol, having obesity, and high blood pressure [2].

Diabetes Knowledge and its Impact in Patients

In an effort to help people with diabetes learn how to best take care of themselves, the CDC (Center for Disease Control and Prevention) has also begun offering Diabetes Self-Management Education and Support (DSMES) services [3]. The patients can better control their diabetes if they are aware of how and when to take their medications, monitor their own blood sugar (glucose) levels, and take care of themselves. Appropriate euglycemic medication use is only one component of effective diabetes care. Patients must also be knowledgeable about their medications, choose healthy foods, engage in regular exercise, and self-monitor their blood glucose levels [4].

The prevalence of diabetes is still rising, despite the many pharmaceutical treatments that are already accessible. One of the main causes of insufficient self-care behaviours and glycemic control is a lack of disease awareness. Patient education is an essential but frequently disregarded part of the management of diabetes. Diabetes is a complex disease that is frequently overwhelming and challenging to control [5]. People with diabetes need to learn how to control their blood sugar levels, diet, and physical activity in addition to managing their medications, foot care, treating related conditions like hypertension, and taking precautions against secondary conditions like renal failure, neuropathy, and heart disease. Diabetes patients must actively control their condition in their daily lives, according to research [6].

The capacity to use healthcare services and information effectively is crucial for this reason [7].

Specific Objective/Aim

To study the impact of diabetes knowledge on glycemic control and self-care activities among adults with Type II Diabetes Mellitus.

General Objectives

1. Assessing the relationship of disease knowledge with glycemic control in adults with Type II Diabetes Mellitus.

2. Assessing the relationship of disease knowledge with self-care practice in adults with Type II Diabetes Mellitus.

METHODOLOGY

Study Design

It was a cross-sectional, observational study. Confidentiality of the study subjects was maintained. Permission of the Head of Department was obtained prior to the study.

Study Population

Data were collected from diabetic patients in the community and on the premises of three outpatient healthcare facilities located in different areas of Vijayawada, Andhra Pradesh. The data collection was done for 6 months. The validated English versions of the 24-item Diabetes Knowledge Questionnaire (DKQ) and the 16-item Diabetes Self-Management Questionnaire (DSMQ) were used in the cross-sectional study design.

DKQ and DSMQ are utilised in their English and Telugu versions. The Telugu versions were created and approved by a licenced endocrinologist, whereas the English version is freely accessible online. Two previously validated self-administered questionnaires in Telugu or English were given to participants to complete. The investigators read and explained the questions to the participants who couldn't read for themselves.

Sampling Method and Sample Size

180 diabetic patients eventually decided to take part in the study out of the n=200 eligible patients who agreed to do so (response rate is 90 percent). n=176 patients' data were examined after the questionnaires with missing information were excluded.

Study Inclusion Criteria

Subjects must

1. Have been diagnosed with T2DM,
2. Be older than 18 years of age,
3. Have recent glycated haemoglobin (hba1c) lab test results (not older than 2 months at the time of interview),
4. Be able to understand either English or Telugu, and
5. Be willing to participate in the study.

Study Exclusion Criteria

Subjects with:

1. Other forms of diabetes (Type1Diabetes Mellitus, Gestational Diabetes Mellitus),

2. Cognitive impairment, and
3. Any form of terminal illness was excluded from our study.

Study Materials

Informed Consent

Consent was collected using subject specific Informed Consent Form. It was made in two languages (Telugu and English).

Data Collection Form

Data was collected using a self-structured data acquisition form, which consists of details like information on the patients' age (in years), gender, BMI, marital status, smoking status, level of education, employment status, family history of diabetes, duration of diabetes, type of medication, and clinical lab data (the most recent HbA1c reading obtained from the respondents' medical records was used as a gauge of their level of glycemic control) and the Telugu and English versions of the Diabetes Knowledge Questionnaire (DKQ) and the Diabetes Self-Management Questionnaire (DSMQ).

Study Procedure

Data were collected from diabetic patients who provided informed consent and met the inclusion criteria for our study. All adult diabetic patients who met the study's eligibility requirements (n=200) were invited to participate. The consenting participants were asked to provide their demographic data in a convenient, quiet spot nearby or at the healthcare facilities.

Two previously validated self-administered questionnaires in Telugu or English were given to participants to complete. The Telugu and English versions of the Diabetes Knowledge Questionnaire (DKQ) and the Diabetes Self-Management Questionnaire (DSMQ) are being used to assess the participants' knowledge of the condition and their self-care behaviours, respectively.

The investigators read and explained the questions to the participants who couldn't read for themselves. Out of the n=200 eligible patients who agreed to take part in the study, 180 diabetic patients eventually decided to do so (response rate is 90%). n=176 patients' data were examined after the questionnaires with missing information were excluded.

Information on the patients' age (in years), gender, weight, height, marital status, smoking status, level of education, employment status, family history of diabetes, duration of diabetes, type of medication, and clinical lab data were taken from their medical record files. The most recent HbA1c reading obtained from the respondents' medical records was used as a gauge of their level of glycemic control.

Diabetes Knowledge Questionnaire (DKQ)

The Starr County Diabetes Education Study created the DKQ, a 24-item questionnaire that asks patients on their understanding of the origin of their diabetes, its complications, blood glucose levels, food, and physical activity. Recently English and Telugu translations and validations of the DKQ for Indian people with diabetes (PWD) were done.

There are three possible answers on the DKQ: "yes", "no", and "don't know". Each option that is correct receives one point, whereas the incorrect option receives 0 points or a lower score. The way it is scored is by adding up the points each participant receives. A higher score denotes a greater understanding of the condition.

Diabetes Self-Management Questionnaire (DSMQ)

The 16-item DSMQ was used to evaluate self-care practices. In this study, the DSMQ in English and Telugu was translated, verified, and used. On a 4-point Likert scale, the DSMQ evaluates the patient's self-care behaviour during the previous 60 days.

It is divided into four subscales: Glucose Management (GM; 5 items), Dietary Control (DC; 4 items), Physical Activity (PA; 3 items), and 4) Health-Care Use (HU; comprising 3 items). There are seven positively keyed (item no. 1, 2, 3, 4, 6, 8, and 9) and nine reverse-coded items (item no. 5, 7, 10, 11, 12, 13, 14, 15, and 16).

Only the sum scale contains the DSMQ's 16th item, which assesses the respondent's overall level of self-care. DSMQ scoring entails adding up all item scores (after reversing nine negatively keyed items) and converting to a scale from 0 to 10. Better self-care is indicated by a higher score.

Statistical Analysis

Data was analyzed by using GRAPH PAD PRISM SOFTWARE VERSION 9. Demographic and clinical variables were presented by using descriptive statistics. Mann–Whitney U-test and Kruskal–Walli's test was applied to compare groups with non-normal distribution.

American Diabetes Association (ADA) guideline was used to define glycemic control in this study. Patients with values of HbA1c< 7% were classified as "good glycemic control", whereas those with HbA1c$\geq$7% were classified as "poor glycemic control".

Spearman rank-order (two-tailed test) was applied to find the association of DKQ median scores with

DSMQ sum scale and its subscales (GM, DC, PA, and HU). Multiple linear regression was applied to identify significant predictors of diabetes knowledge. Statistical tests were considered significant at p< 0.05.

RESULTS

In Table 1, the respondents' demographic information is displayed. 180 diabetic patients in all took part in the trial. However, 176 patients' data were examined after incomplete questionnaires were eliminated. Males made up 52.3% of the participants in this study, while females made up 47.7%.

The majority of the participants (n=176) were non-smokers (87.5 percent) and were in between the ages of 45 and 60 years. In terms of education, 21.6 percent had no formal education, 32.4 percent had only completed primary level, and the remaining 46 percent had completed secondary, graduate, and postgraduate levels of study.

Also 54 percent of the respondents, or more than half, have had diabetes for less than ten years. Nearly 50% of respondents, or 49.4%, had a normal body mass index, compared to 38.6% who were overweight and 10.8% who were obese.

Approximately 88.1 percent of patients receiving current pharmacological therapy were using oral hypoglycemic drugs; 7.4 percent were using only insulin; and 4.5 percent were using a combination of oral hypoglycemic drugs and insulin. 42 percent of the trial participants had HbA1c levels that were within the normal range.

Table 1 provides specifics on the demographic data of the respondents and how it relates to their knowledge of the disease.

Diabetes patients with good glycemic control (HbA1c7) had a similar diabetes knowledge score (DKQ sum-scale score 12; IQR 10.75-14) as those with poor glycemic control (DKQ sum-scale score 12; IQR 10-15).

Patient's Gender, BMI, smoking status, employment status, diabetes duration, anti-diabetic therapy, and glycated haemoglobin (HbA1c value) were not found to have a statistically significant (p>0.05) association with disease knowledge.

Significantly (p<0.05) higher DKQ sum-scale scores were obtained by study participants aged 45-60 years (13; IQR 10-15), participants who had post-graduate level education (15; IQR 13-17), and participants having a family history of diabetes (13; IQR 10.25-15).

Insignificant relation between (p> 0.05) knowledge of disease and blood glucose testing was observed in subjects with good glycemic control and poor glycemic control; details are presented in Table 2.

Weakly positive correlation of DKQ sum-scale was observed with DSMQ sum-scale (r= 0.23, p < 0.002), and with four sub-scales of DSMQ; namely Glucose Management (r = 0.12, p <0.124), Dietary Control (r = 0.17, p < 0.026), Physical Activity (r = 0.19, p <0.012), and Health care Use (r = 0.16, p < 0.030). Details are presented in Table 3.

DISCUSSION

Patients with chronic diseases can enhance their self-care routines by receiving health education. In order to create a patient-specific and outcome-focused educational intervention, existing literature on patients' disease knowledge is essential. Patients can benefit from using diabetes-related self-care techniques to achieve optimal glycemic control, including healthy eating habits, regular physical activity, blood glucose monitoring, and adherence to the prescribed euglycemic therapy [8, 9].

In India, there is a scarcity of literature on the disease knowledge of diabetics. This study examines the relationship between disease knowledge and glycemic control and self-care practises among people with diabetes in India. Our study found that disease knowledge was higher among study participants aged 45-60 years, as well as those with post-graduate level education, and that the differences were statistically significant (p<0.05).

Additionally, those with a family history of diabetes had more knowledge. The disease awareness of respondents who solely used oral euglycemic medications was identical to that of respondents who used insulin alone or in conjunction with oral euglycemic medications (p>0.05).

However, in a recent study among people with diabetes (PWD) in Pakistan taking solely oral hypoglycemic medications, improved self-care behaviours were noted. The correlation between respondents' gender, BMI, smoking status, employment status, duration of diabetes, glycated haemoglobin (HbA1c value), and illness awareness was, however, statistically negligible (p>0.05) in our study.

Good glycemic control was observed in about 42% (n=74) of the study participants. In contrast to this study, two studies carried out in Pakistan's urban areas showed an opposing trend, with less than one-third of study participants achieving satisfactory glycemic control [10, 11].

Table 1: Patient Demographics

Characteristic	N (%) = 176	DKQ Sum Score Median (IQR)	p-value
Age			0.0300(b)
18 to 45 years	34(19.3)	12(11-15)	
>45 to 60 years	90(51.1)	13(10-15)	
> 60 to 75 years	49(27.8)	12(10-14)	
> 75 years	3(1.7)	6(4-7)	
Gender			0.1268(a)
Male	92(52.3)	12.5(11-15)	
Female	84(47.7)	12(9.25-14)	
BMI (kg/m2)			0.4059(b)
Underweight (<18.5)	2(1.1)	9(8-10)	
Normal (18.5 to < 25)	87(49.4)	12(10-14)	
Overweight (25 to <30)	68(38.6)	12(10-14.75)	
Obese ($\geq$ 30)	19(10.8)	13(10-14)	
Marital Status			
Married	176(100)	12(10-14)	
Unmarried	0(0)		
Smoking			0.8539(a)
Non-smoker	154(87.5)	12 (10-14)	
Smoker	22(12.5)	12(10.75-13)	
Education			<0.0001(b)
No formal education	38(21.6)	10.5(8.75-12)	
Primary level	57(32.4)	12(10-13.5)	
Secondary level	43(24.4)	13(11-15)	
Graduate	31(17.6)	14(12-17)	
Post graduate	7(4)	15(13-17)	
Employment status			0.4868(b)
Jobless	8(4.5)	12(9.5-16.25)	
Housewives/ stay at home	65(36.9)	12(9.5-13.5)	
Business	32(18.2)	13(11-15)	
Doing Job	47(26.7)	12(11-15)	
Retired	24(13.6)	12.5(10-14.75)	
Family History of Diabetes			0.0063(a)
Yes	100(56.8)	13(10.25-15)	
No	76(43.2)	11(9.25-13)	
Diabetes Duration (Years)			0.7253(b)
< 10 years	95(54)	12(10-15)	
10 to 20 years	70(39.8)	12(10-14)	
> 20 years	11(6.3)	13(10-14)	
Anti-Diabetic Therapy			0.3047(b)
Exclusively insulin	13(7.4)	11(9.5-14)	
Combined with medications	8(4.5)	11(9-13)	
Oral hypoglycemic agents only	155(88.1)	12(10-14)	
HbA1c Value (%)			0.9539(a)
Good glycemic control (<7%)	74(42)	12(10.75-14)	
Poor glycemic control ($\geq$ 7%)	102(58)	12(10-15)	

Table 2: Diabetes Knowledge of People with Diabetes According to Glycemic Control

S.no	Questions	Correct Answers			p-value
		Total (n=176)	Good Glycemic Control (<7% n=74)	Poor Glycemic Control	
1.	Eating too much sugar and other sweet foods is a cause of diabetes.	89 (50.6)	38(51.4)	51 (50)	0.8595
2	The usual cause of diabetes is lack of effective insulin in the body.	93 (52.8)	43 (58.1)	50 (49.0)	0.2331
3	Diabetes is caused by failure of the kidneys to keep sugar out of the urine	48 (27.3)	22(29.7)	26 (25.5)	0.5330
4	Kidneys produce insulin	37(21.02)	21(28.4)	16(15.7)	0.0414
5	In untreated diabetes, the amount of sugar in the blood usually increases.	162(92.0)	68(91.2)	94(92.1)	0.9489
6	If I am diabetic, my children have a higher chance of being diabetic.	120(68.1)	49(66.2)	71(69.7)	0.6335
7	Diabetes can be cured.	108(61.3)	40(54)	68(66.7)	0.0898
8	A fasting blood sugar level of 210 is too high.	160(91)	64(86.5)	96(94.1)	0.0821
9	The best way to check my diabetes is by testing my urine.	71(40.3)	33(44.6)	38(37.2)	0.3272
10	Regular exercise will increase the need for insulin or other diabetic medication.	95(53.4)	40(54)	55(54)	0.9861
11	There are two main types of diabetes: Type 1 (insulin dependent) and Type 2 (non-insulin dependent).	86(48.9)	40(54)	46(45)	0.2407
12	An insulin reaction is caused by too much food.	16(9)	7(9.4)	9(8.9)	0.8848
13	Medication is more important than diet and exercise to control my diabetes.	72(41)	24(32.4)	47(46)	0.0685

Continued on next page

Table 2 continued

S.no	Questions	Total (n=176)	Correct Answers Good Glycemic Control (<7% n=74)	Poor Glycemic Control	p-value
14	Diabetes often causes poor circulation	129(73.2)	55(74.3)	74(72.6)	0.7927
15	Cuts and abrasions on diabetes heal more slowly.	151(85.6)	67(90.5)	84(82.3)	0.1246
16	Diabetics should take extra care when cutting their toenails	150(85.2)	64(86.4)	86(84.3)	0.6884
17	A person with diabetes should cleanse a cut with iodine and alcohol.	9(5.1)	4(5.4)	5(4.9)	0.8810
18	The way I prepare my food is as important as the foods I eat.	158(89.8)	66(89.2)	92(90.2)	0.8277
19	Diabetes can damage my kidneys	141(80.1)	58(78.4)	83(81.4)	0.6232
20	Diabetes can cause loss of feeling in my hands, fingers and feet.	142(80.7)	57(77.0)	85(83.3)	0.2955
21	Shaking and sweating are signs of high blood sugar.	34(19.3)	15(20.3)	19(18.6)	0.7852
22	Frequent urination and thirst are signs of low blood sugar	48(27.3)	15(20.3)	33(32.4)	0.0756
23	Tight elastic hose or socks are not bad for diabetics.	11(6.3)	5(6.8)	6(5.9)	0.8130
24	A diabetic diet consists mostly of special foods	22(12.5)	9(12.2)	13(12.7)	0.9081

According to a study, diabetic patients who were female had considerably better self-care management scores than diabetic patients who were male. More than half of the participants were obese, and the majority of participants (76.9%) had poor glycemic control. In a prior trial conducted in Saudi Arabia, where more than half of the individuals had glycemic control of greater than 7%, similar results were seen [12].

Self-efficacy is based on social cognitive theory and can be defined as individuals' confidence or people's beliefs about their capabilities to produce specific behavior that are necessary to attain their goals [13].

In our investigation, we observed a statistically insignificant correlation between having more knowledge about diabetes and having lower HbA1c values ($p>0.05$). In our study, we found a statistically significant relationship between greater diabetes knowledge and improved self-care behaviours ($p<0.05$). A similar trend was also reported in a study conducted in Ethiopia, where a high level of disease knowledge was significantly associated with patients' literacy and their good self-care practices [14]. Also, Dussa et al reported that disease knowledge in Indian people with diabetes (PWD) was not correlated with their HbA1c levels [15].

High self efficacy was found to be significantly associated with the effect of glycosylated hemoglobin and other self-care behaviors such as diet, foot care and exercise [16, 17]. Along with inadequate self-care practices and poor disease knowledge, poor glycemic control may also be a result of more severe disease and inadequate treatment intensification. Diabetes is a chronic condition that worsens over time. The majority of the patients in our study (88.1%) used OHA and had had the disease for less than ten years.

Further findings indicated that subject's knowledge about the disease, its associated complications, normal blood glucose levels, and its monitoring is not correlated with good glycemic control. As a whole, majority of the study participants had adequate knowledge about Glucose management, diet, physical activity and healthcare use which was also represented in the form of decent score for DSMQ's subscale "Glucose management" [6.67(95% CI 6.00-8.00)], DSMQ's sub-scale "Dietary control" [5.83(95% CI 5.00-7.50)], DSMQ's subscale "Physical activity" [6.67 (95% CI 4.44-8.61)] and DSMQ's subscale "Health care use" [6.67(95% CI 5.56-7.78)]. The participants had above average score of diabetes self-management indicating high self-care management practices of T2DM patients.

In a study conducted in Lucknow, India it was observed that about two-third patients avoided physical activity although they knew that it would improve their diabetes goal. About one third patients forgot or skipped their diabetes medication [18]. According to a study from Peshawar, Pakistan, 75% of the participants were not engaging in any type of exercise to regulate their blood sugar levels. A study in Saudi Arabia found that married couples had more self-care management than single patients and that female patients had more self-care practises than male patients, the findings of which are comparable to those of an earlier study in Iran [19]. The findings of the research conducted in Jordan and Taiwan, where self-care management was higher among men, conflict with those from Saudi Arabia and Iran [20, 21].

This study identified a number of patient demographic traits linked to their knowledge of the disease. In keeping with earlier research done in low- and middle-income countries, where diabetes knowledge was linked to patient education levels, the greater level of patients' education was a major predictor for better disease knowledge [22]. Only one-fifth (21.6%) of the respondents who had graduate and postgraduate level of education scored the highest for knowledge about diabetes in relation to the current study.

Exercise and physical activity can improve insulin sensitivity in T2DM patients and help bring their high glucose levels into the normal range [23]. In certain people with diabetes or those at risk for complications, regular exercise may be a therapeutic tool [23]. The level of physical activity and adherence of patients as well as the risk of diabetes-related mortality may be increased by an organised and enjoyable physical activity programme.

According to the American Diabetes Association (ADA), everyone with DM should learn self-care management at the moment of diagnosis. This comment focuses on the specific needs of people with T2DM. The criteria will be the same for those with different types of DM, such as type 1 diabetes, prediabetes, and gestational diabetic mellitus [24]. For both male and female T2DM patients, preventing the progression of T2DM problems in the future is important.

Along with pharmaceutical intervention, bettering PWDs' knowledge and awareness will improve health-related outcomes for them and their families. The results of our study suggest that an educational intervention's content be created with the patients' educational standing in mind, as the

Table 3: Correlation Between Diabetes Knowledge and Self-Management Practices of Type 2 Diabetes Patients

Parameter	Median (IQR)	Correlation(r)	p-value
DSMQ "Sum Scale"	6.25(5.41-7.29)	0.2279	0.0023
Subscale "Glucose Management"	6.67(6.00-8.00)	0.1165	0.1235
Subscale "Dietary Control"	5.83(5.00-7.50)	0.1679	0.0259
Subscale "Physical Activity"	6.67(4.44-8.61)	0.1900	0.0115
Subscale "Health-Care Use"	6.67(5.56-7.78)	0.1640	0.0296

majority of patients with low levels of education had little awareness of their diseases. Additionally, this study urges increased healthcare professional involvement in self-care management strategies, particularly for illiterate T2DM patients in India. In India, for example, public health clinics and hospitals may offer a programme for T2DM patients that will enhance and promote self-care management, with a focus on diet and physical activity. The capacity to implement the advance intervention and knowledge on how to perform the self-care management properly for the patient of T2DM to control glucose and its future complications should be the topmost on list.

Strengths and Limitations

One of the strengths of this study is its use of the DKQ and DSMQ, which were validated for people with diabetes (PWD) in India for the assessment of diabetes knowledge and self-care activities. The study is the first of its kind to evaluate the relationship between diabetes awareness and glycemic management and self-care behaviours in people with diabetes (PWD) residing in urban areas of India. These findings may serve as a baseline for clinical researchers in the future by providing information on how T2DM patients in India manage their own care. If it is practicable, this study may also serve as a benchmark for evaluation of future research.

The cross-sectional design of the current study and the location of the studied population are two of its limitations. Since the majority of the participants were from urban areas of India, the findings may not be generalizable to all residents of rural areas. A further drawback is the potential for self-reporting bias because patients could be reluctant to admit to poor self-care habits and may not always be truthful.

CONCLUSION

In particular for low and middle-income countries like India, peer support systems are recommended by WHO as both effective and cost-efficient approaches in providing continuing assistance to diabetic individuals. Just as our study's findings showed, when compared to those with higher levels of education, the people with diabetes (PWD) with lower level of education had inadequate knowledge. It may be more beneficial to educate diabetes individuals' peers and family members as well. Patients can optimise their lifestyles and lower their risk of complications related to diabetes with the use of better diabetes knowledge and self-care practices. In addition, educating people with diabetes (PWD) family members about their health will help patients make the dietary and other lifestyle changes that are needed. Our results support the idea of developing diabetes education programmes specifically for people with diabetes (PWD) in India. Therefore, healthcare practitioners are more likely to be successful in obtaining targeted therapeutic results when they make educational interventions that are patient-specific and culturally appropriate.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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