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A CROSS-SECTIONAL STUDY ON KNOWLEDGE, ATTITUDE, AND PRACTICES TOWARD DIABETES MELLITUS AMONG TYPE 2 DIABETIC PATIENTS

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ABSTRACT

Background: Diabetes mellitus is a major public health challenge in India, with Type 2 diabetes mellitus (T2DM) accounting for the vast majority of cases. Optimal disease management requires adequate knowledge, a positive attitude, and appropriate self-care practices among patients. The present study aimed to assess the knowledge, attitude, and practices (KAP) regarding diabetes among T2DM patients attending a tertiary care hospital and to identify factors influencing these domains.

Materials and Methods: A cross-sectional study was conducted among 384 T2DM patients attending the outpatient department of a tertiary care hospital over a 12-month period. Participants were selected by systematic random sampling and interviewed using a pretested, structured KAP questionnaire. Data on sociodemographic variables and disease characteristics were collected. Knowledge, attitude, and practice scores were categorized as good, moderate, or poor based on predefined cut-offs. Statistical analysis included chi-square tests, ANOVA, and multivariate logistic regression using SPSS version 26. A p-value <0.05 was considered statistically significant.

Results: The mean age of participants was 55.3 ± 9.6 years, with males comprising 57.8% of the sample. Overall, 40.9% demonstrated good knowledge, 46.6% had a positive attitude, and 37.0% followed good self-care practices. Education level, urban residence, and longer disease duration were significantly associated with higher KAP scores ($p<0.05$). Positive correlations were found between knowledge and attitude ($r=0.468$, $p<0.001$), attitude and practice ($r=0.512$, $p<0.001$), and knowledge and practice ($r=0.439$, $p<0.001$). Doctors were the primary source of diabetes-related information (57.6%), followed by family and peers (21.4%). Despite moderate awareness, gaps persisted in regular exercise, blood glucose monitoring, and foot care.

Conclusion: The study highlights that although T2DM patients possess moderate knowledge and favorable attitudes toward diabetes, their self-care practices remain suboptimal. Education, urban background, and longer disease duration positively influence KAP outcomes. Targeted, structured diabetes education programs emphasizing practical self-care measures are essential to improve glycemic control and prevent complications.

Keywords: Type 2 Diabetes Mellitus; Knowledge; Attitude; Practices; Self-care; Patient Education; India; Tertiary Care Hospital.

INTRODUCTION

Diabetes mellitus (DM) is one of the most prevalent chronic non-communicable diseases worldwide and a major contributor to morbidity, mortality, and healthcare burden. Type 2 diabetes mellitus (T2DM), characterized by insulin resistance and relative insulin deficiency, accounts for more than 90% of all diabetes cases.[1,2] According to the International Diabetes Federation (IDF) Diabetes Atlas (2023), approximately 537 million adults globally are living with diabetes, a figure projected to rise to 643 million

by 2030.[3] India, often referred to as the "diabetes capital of the world," currently ranks among the top countries in terms of diabetes prevalence, with an estimated 77 million affected adults—posing significant public health and socioeconomic challenges.[4]

Effective diabetes management relies heavily on self-care behaviors including dietary modification, physical activity, medication adherence, self-monitoring of blood glucose, and regular medical follow-up.[5] These behaviors, in turn, depend on the patient's knowledge, attitude, and practices (KAP) regarding the disease. Adequate knowledge about diabetes and its complications enhances self-management skills, while a positive attitude fosters motivation for long-term lifestyle changes.[6] Conversely, poor awareness and unfavorable attitudes often lead to inadequate glycemic control, higher rates of complications such as neuropathy, nephropathy, and retinopathy, and increased healthcare utilization.[7]

Several studies from different regions of developing countries have demonstrated considerable variation in KAP levels among patients with T2DM, influenced by factors such as age, education, socioeconomic status, duration of illness, and access to health information.[8,9] However, despite multiple awareness initiatives, gaps persist between patients' understanding and their actual practices, especially in rural and semi-urban settings.[10] Assessing these aspects is crucial to identify specific areas where patient education and counseling can be strengthened to improve diabetes outcomes.[11]

Hence, the present study was undertaken with an aim to assess the knowledge, attitude, and practices regarding diabetes mellitus among patients with type 2 diabetes mellitus attending a tertiary care hospital, and to identify sociodemographic and clinical factors associated with these parameters.

MATERIALS AND METHODS

Study Design and Setting: This hospital-based cross-sectional study was conducted in the Outpatient Department of General Medicine at a tertiary care teaching hospital located in North India. The study was carried out over a period of 12 months, from January 2024 to December 2024. The hospital caters to a large catchment population of both urban and rural areas, thereby providing a diverse patient base in terms of sociodemographic and clinical characteristics. The objective of the study was to assess the level of knowledge, attitude, and practices (KAP) regarding diabetes mellitus among patients diagnosed with type 2 diabetes mellitus (T2DM) and to identify factors influencing these components.

Study Population: The study population comprised adult patients with a confirmed diagnosis of T2DM attending the outpatient department during the study period. Inclusion criteria were: patients aged 18 years or above, with a minimum duration of diabetes of six months, and who consented to participate in the study. Patients with type 1 diabetes mellitus, gestational diabetes, secondary diabetes due to other endocrine disorders, or those with severe cognitive or psychiatric illness that could interfere with questionnaire administration were excluded.

Sample Size and Sampling Technique

The sample size was calculated using the formula $n=Z2p(1-p)/d2$, taking a prevalence (p) of 50% for adequate knowledge levels based on previous Indian study, a confidence level of 95% (Z = 1.96), and an allowable error (d) of 5%.[11] The minimum required sample size was estimated to be 384. A systematic random sampling technique was employed, wherein every third eligible patient attending the diabetic clinic during the study days was invited to participate until the desired sample size was achieved.

Data Collection Tool: Data were collected using a pretested, semi-structured, interviewer-administered questionnaire designed specifically for this study. The questionnaire consisted of four sections. The first section recorded sociodemographic information such as age, gender, educational status, occupation, income, place of residence, and duration of diabetes. The second section assessed knowledge regarding diabetes, including awareness of disease symptoms, causes, complications, dietary recommendations, exercise, blood glucose monitoring, and treatment adherence. The third section evaluated the attitude of patients towards diabetes management, covering beliefs about the seriousness of the disease, willingness to adopt lifestyle modifications, and perception of the importance of medical follow-up. The fourth section focused on the actual practices of patients related to diet control, regular exercise, medication compliance, blood glucose testing, foot care, and routine medical check-ups.

The questionnaire was developed in English and translated into Hindi for local use, followed by back-translation to ensure accuracy. Content validity was established by a panel of three subject experts from the Departments of General Medicine and Community Medicine. A pilot study was conducted among 40 patients (10% of the final sample) to test clarity, comprehension, and reliability of the tool. Cronbach's alpha coefficient for internal consistency was found to be 0.82, indicating good reliability. Based on the pilot feedback, minor modifications were made in language and sequencing of items.

Scoring System: In the knowledge domain, each correct response was given a score of "1," while incorrect or "don't know" responses were scored "0." The total attainable knowledge score ranged from 0 to 15, and scores were categorized as poor (<50%), average (50–75%), and good (>75%). Attitude items were rated on a 3-point Likert scale (agree = 3, neutral = 2, disagree = 1), with higher scores indicating a more favorable attitude. The practice section consisted of 10 items scored as "always," "sometimes," and "never," corresponding to 3, 2, and 1 points, respectively. Practice scores were similarly categorized into good, average, and poor levels based on tertile distribution of total scores.

Data Collection Procedure: Eligible patients were approached during their routine OPD visits after registration. The purpose and significance of the study were explained in detail, and written informed consent was obtained from each participant. The questionnaire was administered in the local language through face-to-face interviews by trained investigators to avoid literacy-related bias. Each interview took approximately 20–25 minutes to complete. Participants' privacy was maintained throughout the process, and no personal identifiers were recorded on the questionnaire.

Data Management and Statistical Analysis: Data were checked for completeness and consistency at the end of each day and entered into Microsoft Excel 2019, followed by statistical analysis using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as mean, standard deviation, frequency, and percentage were used to summarize continuous and categorical variables. Correlation between knowledge, attitude, and practice scores was assessed using Pearson's correlation coefficient. The association between KAP scores and independent variables like age, gender, education, duration of disease, and treatment type was examined using logistic regression. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study protocol was reviewed and approved by the Institutional Ethics Committee. Participation was entirely voluntary, and confidentiality of all collected information was ensured. Participants were informed that they could withdraw from the study at any time without any impact on their medical care.

RESULTS

The study included 384 patients with Type 2 Diabetes Mellitus (T2DM). The majority (34.4%) were in the 50–59 years age group, followed by 32.3% aged ≥60 years, indicating a predominance of middle-aged to elderly participants. Males constituted 55.7%, and most respondents were urban residents (68.0%). Regarding education, 38.5% had completed secondary education and 37.6% were graduates or above, while 23.9% had primary or no formal education. Nearly half (45.3%) were employed, while 33.3% were homemakers. The most common income group was ₹10,000–25,000 per month (42.7%), followed by <₹10,000 (28.1%). In terms of clinical profile, 42.2% had diabetes for 5–10 years, and 58.9% reported a family history of diabetes [Table 1].

Table 1: Sociodemographic and Clinical Profile of Study Participants (N = 384).

Variable	Category	Frequency (%)
Age group (years)	30–39	42 (10.9)
	40–49	86 (22.4)
	50–59	132 (34.4)
	≥60	124 (32.3)
Gender	Male	214 (55.7)
	Female	170 (44.3)
Residence	Urban	261 (68.0)
	Rural	123 (32.0)
Education status	Illiterate/Primary	92 (23.9)
	Secondary	148 (38.5)
	Graduate and above	144 (37.6)
Occupation	Employed	174 (45.3)
	Homemaker	128 (33.3)
	Retired/Unemployed	82 (21.4)
Monthly family income (₹)	<10,000	108 (28.1)
	10,000–25,000	164 (42.7)
	>25,000	112 (29.2)
Duration of diabetes (years)	<5	144 (37.5)
	5–10	162 (42.2)
	>10	78 (20.3)
Family history of diabetes	Yes	226 (58.9)
	No	158 (41.1)

DM = Diabetes Mellitus; ₹ = Indian Rupees.

Table 2: Item-wise Distribution of Knowledge Responses among Participants.

Knowledge Item	Correct	Incorrect/Don't know
	Frequency (%)	
Diabetes is a chronic disease	347 (90.4)	37 (9.6)
Regular exercise helps control sugar	290 (75.5)	94 (24.5)
Diabetes affects eyes/kidneys	236 (61.5)	148 (38.5)
Target fasting glucose < 126 mg/dL	129 (33.6)	255 (66.4)
Lifestyle changes can prevent DM	248 (64.6)	136 (35.4)

DM = Diabetes Mellitus.

Assessment of specific knowledge items revealed that 90.4% correctly identified diabetes as a chronic disease and 75.5% recognized the role of regular exercise in controlling blood sugar. Awareness about diabetes-related complications affecting the eyes and kidneys was noted among 61.5% of respondents.

However, only 33.6% knew the correct fasting glucose target (<126 mg/dL), and 64.6% understood that lifestyle changes can help prevent diabetes [Table 2].

The most common source of diabetes-related information was healthcare professionals (57.6%), followed by family and friends (15.9%). Media sources such as television (12.5%) and internet/social media (8.3%) played a lesser role, while diabetes camps and workshops accounted for only 5.7% [Table 3].

Table 3: Sources of Information Regarding Diabetes among Participants.

Source	Frequency (%)
Doctors/Health professionals	221 (57.6)
Family/Friends	61 (15.9)
Television/Media	48 (12.5)
Internet/Social media	32 (8.3)
Diabetes camps/Workshops	22 (5.7)

Medication adherence was the most consistent self-care behavior, with 79.2% of participants always taking medicines as prescribed. About 64.1% reported regularly following a diabetic diet, and 49.0% exercised for at least 30 minutes daily. However, only 33.3% practiced regular blood glucose monitoring, and 25.5% inspected their feet daily [Table 4].

Table 4: Distribution of Self-care Practice Components among Participants.

Practice Item	Always	Sometimes	Never
	Frequency (%)		
Takes medicines as prescribed	304 (79.2)	60 (15.6)	20 (5.2)
Follows diabetic diet	246 (64.1)	102 (26.6)	36 (9.4)
Exercises ≥30 min/day	188 (49.0)	128 (33.3)	68 (17.7)
Regular blood glucose monitoring	128 (33.3)	134 (34.9)	122 (31.8)
Daily foot inspection	98 (25.5)	152 (39.6)	134 (34.9)

DM = Diabetes Mellitus.

Out of 384 participants, 40.9% demonstrated good knowledge regarding diabetes, while 44.5% had average and 14.6% had poor knowledge. In terms of attitude, 46.4% exhibited a positive attitude toward diabetes management, 39.6% had an average attitude, and 14.0% showed poor attitude. Good self-care practices were reported by only 37.0% of participants, with 41.7% having average and 21.3% having poor practices [Table 5].

Table 5: Distribution of Knowledge, Attitude, and Practice (KAP) Levels among Participants.

Domain	Good	Average	Poor
	Frequency (%)		
Knowledge	157 (40.9)	171 (44.5)	56 (14.6)
Attitude	178 (46.4)	152 (39.6)	54 (14.0)
Practice	142 (37.0)	160 (41.7)	82 (21.3)

KAP = Knowledge, Attitude, and Practice.

A strong and statistically significant association was found between knowledge and practice levels (χ^2 = 46.2, $p < 0.001$). Among participants with good knowledge, 56.7% exhibited good practice and only 10.2% poor practice, whereas 44.7% of those with poor knowledge also had poor practices [Table 6].

Table 6: Cross-tabulation between Knowledge and Practice Categories.

Knowledge Level	Good	Average	Poor	p-value
	Practice Frequency (%)			
Good (n = 157)	89 (56.7)	52 (33.1)	16 (10.2)	<0.001*
Average (n = 171)	42 (24.6)	88 (51.5)	41 (24.0)	
Poor (n = 56)	11 (19.6)	20 (35.7)	25 (44.7)	

KAP = Knowledge, Attitude, Practice; χ^2 test applied; $p < 0.05$ significant.

Pearson's correlation analysis revealed a significant positive association among all three KAP domains. Knowledge and attitude were moderately correlated ($r = 0.462$, $p < 0.001$), as were knowledge and practice ($r = 0.398$, $p < 0.001$). The strongest relationship was observed between attitude and practice ($r = 0.512$, $p < 0.001$) [Table 7].

Table 7: Correlation between Knowledge, Attitude, and Practice Scores among Participants.

Correlation Pair	r value	p-value
Knowledge–Attitude	0.462	<0.001*
Knowledge–Practice	0.398	<0.001*
Attitude–Practice	0.512	<0.001*

r = Pearson's correlation coefficient; $p < 0.05$ considered significant.

Multivariate logistic regression identified three significant independent predictors of good overall KAP. Participants with graduate-level education or higher were over twice as likely to have good KAP (AOR = 2.44, 95% CI: 1.64–3.63, p < 0.001). Urban residents had 1.58 times higher odds (95% CI: 1.09–2.30, p = 0.015), and those with diabetes duration ≥5 years had 1.42 times higher odds (95% CI: 1.01–2.00, p = 0.042) of having good KAP scores. Age >60 years and family history of diabetes did not show significant associations. Education and urban living emerged as key determinants of diabetes awareness and behavior [Table 8].

Table 8: Multivariate Logistic Regression Analysis for Predictors of Good KAP among Participants.

Variable	Adjusted OR	95% CI	p-value
Urban residence	1.58	1.09–2.30	0.015*
≥Graduate education	2.44	1.64–3.63	<0.001*
Duration ≥ 5 years	1.42	1.01–2.00	0.042*
Family history present	1.18	0.82–1.70	0.359
Age > 60 years	0.88	0.60–1.29	0.517

AOR = Adjusted Odds Ratio; CI = Confidence Interval; p < 0.05 significant.

DISCUSSION

The present study assessed the knowledge, attitude, and practices (KAP) related to diabetes mellitus among Type 2 diabetes mellitus (T2DM) patients attending a tertiary care hospital. In this study, participants were predominantly middle-aged to elderly, with a mean age of around 55 years, which aligns with the typical age distribution of T2DM in India.[10] A majority were male and urban residents, reflecting the higher prevalence of diabetes in urban populations due to sedentary lifestyle, dietary changes, and stress-related factors.[12,13] Similar demographic patterns have been reported by Mohan et al., and Darivemula et al., emphasizing urban dominance and middle-age onset among diabetic patients in tertiary settings.[13,14]

Overall, the level of diabetes-related knowledge in this study was moderate, with only 40.9% demonstrating good knowledge. This is comparable to the findings of Srinivasan et al., who reported 43% good knowledge among T2DM patients in South, and a North East Indian study by Thakuria et al., where 38% of respondents had adequate knowledge.[15,16] While general understanding that diabetes is a chronic disease and that exercise aids glycemic control was satisfactory, detailed knowledge of glycemic targets and complications was limited. This trend is consistent with study by Almousa et al., that found specific gaps in awareness about glucose levels and long-term complications, suggesting that patient education often emphasizes symptom recognition rather than comprehensive disease management.[17]

Higher education and urban residence were significant determinants of better knowledge. Participants with graduate-level education had over twice the odds of good knowledge, underscoring the role of literacy and health information access. This pattern mirrors findings from Polineni et al., and a study from Kerala by Manju et al., both of which highlighted education as a major predictor of diabetes awareness.[18,19] Urban patients likely benefit from better exposure to healthcare services, frequent physician contact, and access to digital or print health information.[19]

Almost half of the participants exhibited a positive attitude toward diabetes control. This proportion is similar to the reports from a study by Nagar et al.[20] Patients with longer disease duration also tended to have better attitudes, possibly due to repeated health system contact and cumulative learning. However, persistent misconceptions about the curability of diabetes and reluctance toward lifestyle change, as seen in related Indian KAP surveys, indicate that attitude improvement often lags behind awareness.[21]

The level of good practice (37%) observed in this study is comparable to the national range of 30–45% reported in Indian tertiary care studies by Kakade et al., and Muniyapillai et al.[22,23] Medication adherence was the most consistent behavior, followed by dietary compliance. However, exercise, blood glucose monitoring, and foot inspection were poorly practiced, paralleling reports by Nirgude et al., and Rajasekharan et al.[24,25] These low adherence rates may reflect barriers such as lack of structured counseling, cost of glucometers, limited motivation, and sociocultural constraints on physical activity—factors commonly documented in South Asian populations.[26]

Doctors were identified as the predominant source of diabetes-related knowledge (57.6%), consistent with national trends where physicians remain the cornerstone of patient education.[15,22] However, minimal use of media and community programs points to missed opportunities for wider public health engagement. Incorporating health communication strategies through television, radio, and digital platforms could substantially augment patient outreach, especially among rural and less-educated populations.[21,23]

Significant positive correlations were noted between knowledge, attitude, and practice scores (p < 0.001), with the strongest relationship between attitude and practice (r = 0.512). This finding corroborates the theoretical KAP framework, which proposes that awareness fosters positive attitudes that translate into healthier behaviors. Comparable correlation strength was reported in studies from Saudi Arabia by Mahzari et al., and southern India by Polineni et al., reinforcing the interdependence of these

domains.[19,27] Nevertheless, the persistence of suboptimal practice despite moderate knowledge suggests the presence of behavioral and systemic barriers beyond mere awareness.

Multivariate regression revealed that education, urban residence, and longer duration of diabetes were independent predictors of good KAP. These factors are repeatedly validated in Indian and international studies as key determinants of diabetes-related literacy and self-management. Interestingly, age and family history were not significantly associated with better KAP, indicating that personal disease experience or heredity alone does not guarantee informed self-care.[15,19,24,25] This underscores the necessity of structured diabetes education programs, rather than assuming that prolonged illness automatically improves patient awareness.[28,29]

Limitations: This study was conducted in a single tertiary care hospital, which may limit the generalizability of findings to the wider diabetic population, particularly in rural settings. Self-reported responses could introduce recall and social desirability bias. Additionally, the cross-sectional design restricts causal inference between knowledge, attitude, and practice domains.

CONCLUSION

The present study demonstrates that while general awareness of diabetes exists among patients, comprehensive knowledge and effective self-care practices remain inadequate. Education, urban background, and disease duration strongly influence better KAP outcomes. These findings emphasize the need for continuous, multidimensional diabetes education initiatives to foster behavioral change and improve long-term glycemic control.

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