

Assessment of Diabetes Literacy among College Students: Insights from a Cross-Sectional Study

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ABSTRACT

Background: Diabetes is a major global health challenge with rising prevalence, particularly in developing countries like India. This study aims to assess diabetes literacy among college students and identify factors associated with their knowledge of diabetes.

Methods: A cross-sectional study was conducted with 118 undergraduate students at St. John's College, Agra, UP, using stratified random sampling. Data were collected via a structured questionnaire assessing knowledge of diabetes risk factors, symptoms, management, and prevention. Responses were scored to categorize knowledge as inadequate, moderately adequate, or adequate. Statistical analyses were performed using SPSS version 26.

Results: The study included an equal distribution of male and female participants, with the majority being Hindu and from nuclear families. Most participants followed a vegetarian diet and engaged in routine exercise. Diabetes knowledge levels were: 55.1% adequate, 14.4% inadequate, and 30.5% moderately adequate. No significant differences were found based on gender, religion, or family type. However, higher monthly income was significantly associated with better diabetes knowledge ($p=0.01$). Routine exercise and physical activity were also significantly correlated with higher diabetes knowledge ($p=0.02$ and $p=0.01$, respectively). A significant association was found between family history of diabetes and knowledge levels ($p=0.02$).

Conclusion: Diabetes literacy among college students was moderate, influenced by socioeconomic status and health behaviors. These findings highlight the need for targeted educational interventions to improve diabetes awareness and prevention among young adults.

Key-words: Diabetes literacy, College students, Cross-sectional study, Health education, Physical activity, Socioeconomic factors

INTRODUCTION

Diabetes, characterised by elevated blood glucose levels, poses a significant public health challenge globally due to its chronic nature and associated complications. According to the American Diabetes Association, diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both ^[1]. There are several types of diabetes, including type 1 diabetes, type 2

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diabetes, and gestational diabetes, each with distinct etiological factors and pathophysiological mechanisms. The prevalence of diabetes has reached alarming levels worldwide, with both developed and developing countries experiencing a steady increase in the number of affected individuals. Recent estimates from the International Diabetes Federation (IDF) indicate that approximately 537 million adults aged 20-79 years were living with diabetes globally in 2021, with this number projected to rise to 643 million by 2030 and 783 million by 2045 [2]. Among adolescents aged 15-19 years, the IDF estimates that around 1 in 6 have impaired glucose tolerance, putting them at increased risk of developing type 2 diabetes later in life [3]. Moreover, the burden of diabetes extends to children, with type 1 diabetes being the most common form diagnosed during childhood and adolescence. Globally, an estimated 1.1 million children and adolescents aged under 20 years are living with type 1 diabetes [4].

In India, the prevalence of diabetes has reached epidemic proportions, fueled by rapid urbanization, sedentary lifestyles, and dietary changes. According to recent national surveys, the prevalence of diabetes among adults in India ranges from 7.3% to 11.6%, with higher rates observed in urban compared to rural areas [5,6]. Furthermore, diabetes is increasingly affecting younger populations in India, with studies reporting a rising prevalence of type 2 diabetes among adolescents and even children [7,8]. The growing burden of diabetes in India not only contributes to significant morbidity and mortality but also exerts a substantial economic burden on healthcare systems and society at large [9].

Despite the increasing prevalence of diabetes globally and in India, there remains a concerning lack of awareness and understanding of the condition among various demographic groups, including college students. Understanding the level of diabetes literacy among college students is crucial for developing effective preventive strategies and promoting early intervention efforts to mitigate the burden of diabetes in this population.

To address these gaps, the present cross-sectional study aims to assess diabetes literacy among college students, identify knowledge gaps, and provide insights into the factors associated with diabetes knowledge and understanding in this demographic group. By elucidating the current state of diabetes literacy among college

students, this study aims to inform the development of targeted educational interventions and public health initiatives to improve diabetes awareness, prevention, and management in this population.

MATERIALS AND METHODS

Study Design- This study employed a cross-sectional research design to assess diabetes literacy among college students of St. John's College, Agra, UP.

Sampling Strategy- The study utilized a stratified random sampling technique to ensure representation from diverse demographic groups within the college student population of St. John's College, Agra, UP. Stratification was based on factors such as gender, academic subjects, and year of study. Random sampling was then performed within each stratum to select participants for inclusion in the study.

Inclusion criteria- Encompassed full-time undergraduate students aged 18 years and above, enrolled in accredited different faculties [BCOM, BSC, BA, etc] in the year 2023.

Exclusion criteria- Excluded individuals with a self-reported diagnosis of diabetes or any other chronic medical condition that could significantly impact their diabetes literacy.

Study duration- Ten days from 15 Sep to 25 Sep 2023.

Data Collection- Data collection was conducted using a structured questionnaire designed to assess various domains of diabetes literacy, including knowledge of diabetes risk factors, symptoms, management strategies and preventive measures. The questionnaire was adapted from validated tools used in previous studies on diabetes literacy [2,3]. Trained research assistants administered the questionnaire either in person/online, depending on participants' preferences and feasibility.

Study Variables- The primary outcome variable of interest was diabetes literacy, operationalized as participants' overall knowledge and understanding of diabetes-related concepts. Secondary variables included demographic characteristics (e.g. Age, gender, academic major), health-related behaviors (e.g. Physical activity, dietary habits), and sources of diabetes information (e.g. Healthcare providers, media).

Procedure- The semi-structured questionnaire comprised of 15 questions. For each response made by the participant, one score was given. The overall knowledge score ranged from 0 to 15, with 0 being the lowest and 15 being the highest. Which are then divided into three categories, 0-4: Inadequate, 5-9: Moderate adequate, 10-15- Adequate.

Statistical Analysis- Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic characteristics and diabetes literacy scores. Inferential statistics, such as chi-square, and Fisher's exact tests were employed to examine associations

between demographic variables and diabetes literacy levels. All statistical analyses were conducted using the appropriate software package SPSS version 23.0, with statistical significance set at $p < 0.05$.

Ethical Considerations- The study protocol was approved by the Institutional Review Board (IRB) or Ethics Committee of the respective academic institution(s). Informed consent was obtained from all participants before their inclusion in the study, and measures were taken to ensure the confidentiality and anonymity of participants' responses throughout the data collection process.

RESULTS

A total of 118 college students participated in the study, with an equal distribution of gender, as depicted in Table 1. Fifty percent of the participants identified as female, while the remaining 50% identified as male counterparts. Regarding religious affiliation, the majority of participants identified as Hindu (95.8%), with a smaller proportion identifying as Muslim (4.2%). In terms of

family structure, 44.1% of participants belonged to joint families, while 55.9% belonged to nuclear families. When considering monthly income, the distribution was varied, with 47.5% of participants reporting a monthly income between 10,000 to 20,000 INR, followed by 29.7% reporting an income between 40,000 to 50,000 INR, as outlined (Table 1).

Table 1: Demographic characteristics of participants

Demographic Variables		N	Percent (%)
Gender	Female	59	50
	Male	59	50
Religion	Hindu	113	95.8
	Muslim	5	4.2
Type of family	Joint	52	44.1
	Nuclear	66	55.9
Monthly income	10,000- 20,000	56	47.5
	20,000 -30,000	15	12.7
	30,000- 40,000	12	10.2
	40,000-50,000	35	29.7

Table 2 presents the distribution of health-related behaviors and family history of diabetes among the participants. Regarding dietary patterns, the majority of participants (78%) reported following a vegetarian diet, while 22% reported consuming a mixed diet. In terms of exercise habits, the majority of participants (57.6%) reported engaging in routine exercise, followed by 33.9% reporting occasional exercise, and 8.5% indicating never engaging in exercise.

Similarly, for physical activity, the majority of participants (56.8%) reported engaging in routine physical activity, while 34.7% reported occasional physical activity, and 8.5% reported never engaging in physical activity. Regarding family history of diabetes, 39.8% of participants reported having one family member with diabetes, followed by 39.0% reporting no family history of diabetes, 10.2% reporting two family members with diabetes, and 11% reporting three or

more family members with diabetes. These findings provide insights into the health-related behaviors and familial risk factors for diabetes among the study

participants, which may influence their diabetes literacy levels.

Table 2: Health-related behaviours and family history of diabetes

Variables		N	Percent (%)
Dietary pattern	Mixed	26	22
	Veg	92	78
Exercise	Never	10	8.5
	Occasional	40	33.9
	Routine	68	57.6
Physical activity	Never	10	8.5
	Occasional	41	34.7
	Routine	67	56.8
Family history of diabetes	0	46	39
	1	47	39.8
	2	12	10.2
	3 and above	13	11

Table 3 displays the association between demographic variables and diabetes knowledge scores among the study participants. There was no significant difference in diabetes knowledge scores between male and female participants ($p=0.47$). Similarly, no significant difference in diabetes knowledge scores was observed between participants of Hindu and Muslim religious affiliations ($p=0.55$). The type of family (joint or nuclear) also did not significantly influence diabetes knowledge scores among participants ($p=0.81$). However, there was a significant

association between monthly income and diabetes knowledge scores ($p=0.01$). Participants with a monthly income between 40,000 to 50,000 INR demonstrated higher rates of adequate diabetes knowledge compared to other income groups. These findings suggest that while certain demographic variables such as gender, religion, and type of family may not influence diabetes knowledge levels among college students, socioeconomic factors such as monthly income may play a role in shaping diabetes literacy.

Table 3: Association Between Demographic Variables and Diabetes Knowledge

Demographic variables		Knowledge Score				p-value
		Adequate	Inadequate	Moderate Adequate	Total	
		Frequency(%)	Frequency(%)	Frequency(%)		
Gender	Female	29(49.2)	10(16.9)	20(33.9)	59	0.47#
	Male	36(61)	7(11.9)	16(27.1)		
Religion	Hindu	63(55.8)	16(14.2)	34(30.1)	113	0.55
	Muslim	2(40)	1(20)	2(40)		
Type of family	Joint	30(57.7)	8(15.4)	14(26.9)	52	0.81#
	Nuclear	35(53)	9(13.6)	22(33.3)		
Monthly income	10,000-20,000	26(46.4)	15(26.8)	15(26.8)	56	0.01*

	20,000-30,000	9(60)	0(0)	6(40)	15
	30,000-40,000	6(50)	0(0)	6(50)	12
	40,000-50,000	24(68.6)	2(5.7)	9(25.7)	35

*Significant, Fisher's exact test, #-Chi-Square test

Table 4 presents the association between health-related behaviors, family history of diabetes, and diabetes knowledge scores among the study participants. There was no significant association was found between dietary patterns (mixed or vegetarian) and diabetes knowledge scores (p=0.61). There was a significant association between exercise habits and diabetes knowledge scores (p=0.02). Participants who engaged in routine exercise demonstrated higher rates of adequate diabetes knowledge compared to those who reported occasional or no exercise. Physical Activity: Similarly, a significant association was observed between physical activity levels and diabetes knowledge scores (p=0.01). Participants who engaged in routine physical activity

exhibited higher rates of adequate diabetes knowledge compared to those who reported occasional or no physical activity. Family History of Diabetes: There was a significant association between family history of diabetes and diabetes knowledge scores (p=0.02). Participants with three or more family members with diabetes demonstrated higher rates of adequate diabetes knowledge compared to those with fewer or no family history of diabetes. These findings suggest that certain health-related behaviors such as exercise and physical activity, as well as a family history of diabetes, may influence diabetes knowledge levels among college students, independent of demographic factors.

Table 4: Association Between Health-Related Behaviors, Family History of Diabetes, and Diabetes Knowledge

Variables		Knowledge Score				p-value
		Adequate	Inadequate	Moderate Adequate	Total	
		Frequency(%)	Frequency(%)	Frequency(%)		
Dietary pattern	Mixed	16(61.5)	4(15.4)	6(23.1)	26	0.61*
	Veg	49(53.3)	13(14.1)	30(32.6)	92	
Exercise	Never	1(10)	2(20.0)	7(70)	10	0.02*
	Occasional	22(55)	5(12.5)	13(32.5)	40	
	Routine	42(61.8)	10(14.7)	16(23.5)	68	
Physical activity	Never	1(10.0)	5(50)	4(40)	10	0.01*
	Occasional	23(56.1)	5(12.2)	13(31.7)	41	
	Routine	41(61.2)	7(10.4)	19(28.4)	67	
Family history of diabetes	0	17(37)	10(21.7)	19(41.3)	46	0.02*
	1	29(61.7)	6(12.8)	12(25.5)	47	
	2	7(58.3)	1(8.3)	4(33.3)	12	
	3 and Above	12(92.3)	0(0.0)	1(7.7)	13	

*Fisher's exact test

Table 5 illustrates the association between academic stream/faculty and diabetes knowledge scores among the study participants. There was no significant association found between the academic stream/faculty of B.Com and diabetes knowledge scores ($p=0.61$). Similarly, no significant association was observed between the academic stream/faculty of B.Sc and diabetes knowledge scores. However, there was a notable trend observed among participants from the B.A.

faculty, with 73.3% demonstrating adequate diabetes knowledge compared to other faculties. Participants from other faculties also exhibited a relatively higher rate of adequate diabetes knowledge (50%), although the difference was not statistically significant. These findings suggest that while there may be variations in diabetes knowledge scores across different academic streams/faculties, these differences do not reach statistical significance in this study.

Table 5: Association Between Academic Stream/Faculty and Diabetes Knowledge

Stream/Faculty	Knowledge Score				p-value
	Adequate	Inadequate	Moderate Adequate	Total	
	Frequency(%)	Frequency(%)	Frequency(%)		
B.Com	7(41.2)	2(11.8)	8(47.1)	17	0.611*
B.Sc	34(56.7)	9(15.0)	17(28.3)	60	
B.A.	11(73.3)	1(6.7)	3(20.0)	15	
Other's#	13(50.0)	5(19.2)	8(30.8)	26	

*Fisher's exact test; # BBA, BCA

DISCUSSION

In this study, we explored the relationship between demographic characteristics and diabetes knowledge among college students [10]. Contrary to expectations, gender, religion, and type of family did not significantly influence diabetes knowledge levels among students. These findings align with previous research indicating that demographic factors may not be strong determinants of health literacy, including diabetes knowledge, among young adults [1,2]. However, socioeconomic factors such as monthly income demonstrated a significant association with diabetes knowledge scores [11]. Participants with higher monthly incomes exhibited greater diabetes knowledge, suggesting a possible link between socioeconomic status and health literacy [3,4].

Our study revealed significant associations between health-related behaviors and diabetes knowledge among college students. Participants who engaged in routine exercise and physical activity demonstrated higher rates of adequate diabetes knowledge compared to those with occasional or no exercise. These findings are consistent with previous research highlighting the role of physical activity in promoting health literacy and disease

prevention [5,6]. Similarly, participants with a family history of diabetes exhibited higher levels of diabetes knowledge, particularly those with three or more affected family members. A family history of diabetes has been identified as a strong risk factor for the development of the disease and may serve as a motivator for individuals to seek information and adopt healthy behaviors [7,8].

Analysis of diabetes knowledge across different academic streams/faculties revealed interesting trends. While no significant associations were observed between specific academic streams/faculties and diabetes knowledge scores, participants from the B.A. faculty demonstrated the highest rate of adequate diabetes knowledge [12]. This finding suggests potential differences in health education curriculum or exposure to diabetes-related information among students from different academic backgrounds. Further research is warranted to explore the influence of academic disciplines on health literacy and disease knowledge among college students [13].

CONCLUSIONS

In conclusion, our study provides important insights into the factors influencing diabetes knowledge among

college students. While demographic characteristics may not significantly impact diabetes literacy, health-related behaviors such as exercise, physical activity, and family history of diabetes play crucial roles in shaping diabetes knowledge levels. Addressing these factors through targeted health education interventions and public health initiatives can help improve diabetes literacy and promote healthier lifestyles among college students.

RECOMMENDATION

Based on the research, integrating comprehensive health education programs, promoting physical activity, launching targeted health campaigns, and integrating diabetes screening can collectively enhance diabetes awareness, prevention, and management among college students.

LIMITATION

Despite the valuable insights gained from this study, several limitations should be acknowledged. First, the cross-sectional nature of the study limits our ability to establish causality between demographic factors, health-related behaviors and diabetes knowledge. Additionally, the study was conducted among college students from a specific geographic area, which may limit the generalizability of the findings to other populations. Future research should aim to replicate these findings in diverse settings and populations to enhance the external validity of the results.

CONTRIBUTION OF AUTHORS

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