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Original Research Article

Assessment of glycemic control practices among patients with diabetes at Khadimpara Hospital

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ABSTRACT

Background: Diabetes mellitus, a chronic condition characterized by elevated blood glucose levels due to insufficient or ineffective insulin, affects 537 million adults globally. Effective glycemic control is essential for preventing complications in patients with diabetes mellitus. This study aimed to assess glycemic control practices among diabetic patients attending Khadimpara Hospital, Sylhet.
Methods: This quantitative, cross-sectional study was conducted at Khadimpara 31-bed hospital, Sylhet, Bangladesh, from July to December 2024. A total of 221 patients diagnosed with diabetes mellitus (DM), aged 35 years or older, attending Khadimpara Hospital in Sylhet, were included in the study.
Results: The mean age of participants was 54.61±10.89 years, with the majority aged 51-60 years (34.4%). Females slightly outnumbered males (51.1% versus 48.9%). Nearly half (47.5%) had a normal BMI, while 34.8% were underweight. Most participants (73.8%) had a family history of diabetes, and the median duration of diabetes was five years (IQR 3-7). Regarding treatment, 54.3% had been on anti-diabetic medications for 1-5 years, and 86.9% reported diabetes-related complications. The most common management strategy (83.26%) was a combination of drug therapy, diet, and exercise. A statistically significant association was found between management approach and diabetes control (p=0.002), with combined interventions yielding the highest success rate (70.1%).
Conclusions: This study highlighted that most patients effectively manage diabetes mellitus through a combination of drug therapy, physical exercise, and diet control, with significant correlations observed between glycemic control and factors like gender, occupation, and family history.

Keywords: Bangladesh, Diabetes mellitus, Diet, Drug, Glycemic control, Physical exercise

INTRODUCTION

Diabetes is a chronic condition characterized by high blood glucose levels caused by inadequate insulin production or ineffective insulin use, leading to serious complications such as organ damage.[1] It affects approximately 537 million adults worldwide, with increasing prevalence in low- and middle-income countries driven by urbanization and lifestyle changes.[2] Effective self-management, including lifestyle modifications guided by primary care providers, is vital for achieving glycemic control and preventing complications.[2]

Noncommunicable diseases (NCDs), especially chronic conditions like diabetes, are leading causes of global morbidity and mortality.[3] Diabetes Mellitus (DM) is classified into Type I, Type II, and gestational diabetes.[4] South Asia, home to nearly a quarter of the world's population, faces a sharp rise in diabetes prevalence due to aging, genetic predisposition, urbanization, and lifestyle changes.[5] To combat this epidemic, cost-effective interventions and access to affordable treatment are urgently needed.[6] The worldwide number of people with diabetes increased from 200 million in 1990 to 830 million in 2022, with the highest burden and lowest treatment coverage in low- and middle-income countries.[7] Prevention and management strategies, including a healthy diet, exercise, medication adherence, and regular screenings, can significantly reduce the risks of complications such as blindness, cardiovascular disease, and neuropathy.[7,8] In 2022, 14% of adults aged 18 and over had diabetes, and 59% of those aged 30 and older remained untreated.[9] Diabetes directly caused 1.6 million deaths in 2021 and contributed to cardiovascular and kidney diseases, highlighting its growing impact on global health.[10] Bangladesh is experiencing a rapid rise in diabetes prevalence due to socioeconomic transitions, urbanization, and dietary changes.[11] The age-standardized prevalence is 9.2%, with 61.5% of affected individuals unaware of their condition.[12] Diabetes prevalence increased from approximately 5% in 2001 to about 14% in 2017, with projections of 15 million cases by 2045.[13] An estimated 3.8 million people had prediabetes in 2019, presenting a significant public health challenge.[14] Urban residents, older adults, wealthier individuals, and those with higher education levels are disproportionately affected, yet nationwide population-based data remain limited.[14] Type II diabetes mellitus results from insulin resistance and beta-cell dysfunction, often influenced by genetic and environmental factors, leading to chronic hyperglycemia and organ damage.[15] Insulin therapy, along with lifestyle modifications and patient education, is essential for effective disease management, though adherence remains challenging.[16] Diabetes is becoming a major public health and socioeconomic issue, particularly in Asia, which accounts for over 60% of the global diabetic population.[17,18] In Bangladesh, cases increased from 3.2 million in 2000 to an estimated 11.1 million by 2030.[19] Contributing factors include urbanization, sedentary lifestyles, and obesity, while rural areas, especially in the north, still lack sufficient data despite the increasing disease burden.[20,21] Notably, diabetes in Bangladesh often presents earlier and in non-obese individuals, differing from Western patterns.[22] Glycemic control, typically measured by HbA1c, is critical to minimizing diabetes-related complications. However, maintaining optimal control is challenging in resource-limited settings, with poor glycemic control reported in 74% of Ethiopian and 84.3% of Ugandan diabetes patients.[23]

Therefore, this study aimed to assess glycemic control practices among diabetic patients attending Khadimpara Hospital.

METHODS

This quantitative, cross-sectional study was conducted at Khadimpara 31-bed hospital by the department of public health, Leading University, Sylhet, Bangladesh, from July to December 2024. A total of 221 patients diagnosed with diabetes mellitus (DM), aged 35 years or older, attending Khadimpara Hospital in Sylhet, were included in the study.

These were the following criteria for eligibility as study participants:

Inclusion criteria

Participants were aged between 35 to 65 years old, both male and female, patients who were willing to participate.

Exclusion criteria

Known cases of uncontrolled diabetes, other associated diseases beyond simple diabetes-related complications, pre-existing critical health conditions or injury.

Data collection procedure

Data were collected using a structured questionnaire that included both interviewer-administered and record-based components. The questionnaire captured socio-demographic data (age, gender), clinical characteristics (BMI, family history of diabetes, duration of diabetes, and medication use), and methods of diabetes management (drug therapy, diet control, physical exercise). Diabetes-related complications and self-reported glycemic control status were also recorded. Anthropometric measurements were taken using standard procedures to calculate body mass index (BMI), which was categorized according to WHO guidelines. Participants also reported the presence of diabetes-related complications such as diabetic foot, hypertension, neuropathy, and sexual or visual disturbances.

Statistical analysis

All data were recorded systematically in a pre-formatted data collection form. Quantitative data were expressed as mean and standard deviation, and qualitative data were expressed as frequency distribution and percentage. For non-parametric continuous data, the median and interquartile range were used, depending on the nature of the data. Chi-square test analysis was employed to identify associations between variables. A p value <0.05 was considered significant. Statistical analysis was performed by using SPSS 23 (Statistical Package for Social Sciences) for Windows version 10. This study was ethically approved by the ethical review committee of leading university, Sylhet, Bangladesh, approved the research.

RESULTS

Table 1 shows that the study included a total of 221 diabetic patients, with ages ranging from 25 to 90 years.

The mean age was 54.61 years (SD ±10.89). The largest proportion of participants (34.4%) were aged 51-60 years, followed by those aged 41-50 years (29.4%). A smaller proportion (4.1%) were between 71-80 years, and only 2.7% were over 80 years of age.

Table 1: Age distribution among diabetes mellitus patients.

Variable	Sub-category	Overall	
		Frequency	Percentage
Age in years (Mean± SD)		54.61±10.89	
Age category (years)	25-40	29	13.1
	41-50	65	29.4
	51-60	76	34.4
	61-70	36	16.3
	71-80	09	4.1
	81-90	06	2.7

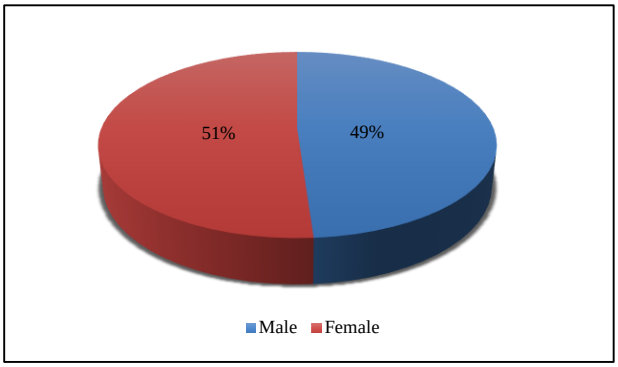

Figure 1: Gender distribution among diabetes mellitus patients.

The pie chart illustrates that females comprised a slightly larger portion of the sample at 51.1%, while males accounted for 48.9%, resulting in a male-to-female ratio of approximately 1:1.04 in this study.

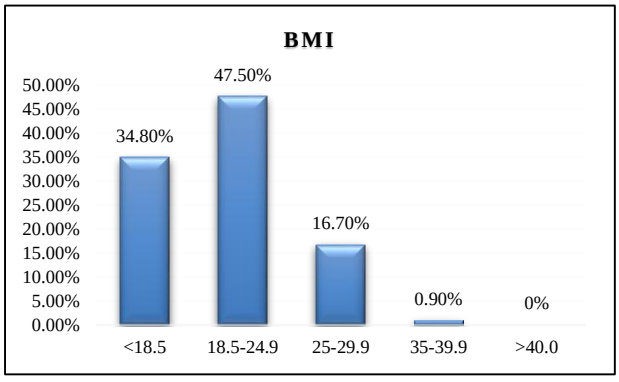

Figure 2: BMI distribution among study participants.

Figure 2 shows the body mass index (BMI) distribution among participants. Nearly half of the patients (47.5%) had a normal BMI (18.5-24.9). However, a substantial proportion (34.8%) were underweight (BMI<18.5). Additionally, 16.7% were classified as overweight (BMI 25-29.9), and 0.9% had a BMI in the obese class II range (35-39.9).

Table 2 shows that a majority (73.8%) reported a family history of diabetes mellitus, while 26.2% did not. The median duration of diabetes was five years, with an interquartile range (IQR) of 3 to 7 years. Regarding anti-diabetic medication use, 54.3% of participants had been taking medications for 1 to 5 years. A smaller proportion (26.7%) had been on treatment for 6 to 10 years, and 10.9% were recently diagnosed and had been taking medication for less than one year. Only 8.1% had been on medication for more than 10 years. Diabetes-related complications were reported by 86.9% of the participants, whereas 13.1% had not experienced significant complications. Despite this, the majority (79.6%) reported having their diabetes under control, while 20.4%.

Table 2: Clinical information of diabetes mellitus (DM) patients.

Variable	Sub-category	Overall	
		N	%
Family History of DM	Yes	163	73.8
	No	58	26.2
Duration of DM in years [median (IQR)]		5.00	(3.00, 7.00)
Taking anti DM drug duration (years)	<1	24	10.9
	1-5	120	54.3
	6-10	59	26.7
	11-15	12	5.4
	>15	06	2.7
Problem with DM	Yes	192	86.9
	No	29	13.1
DM control	Yes	176	79.6
	No	45	20.4

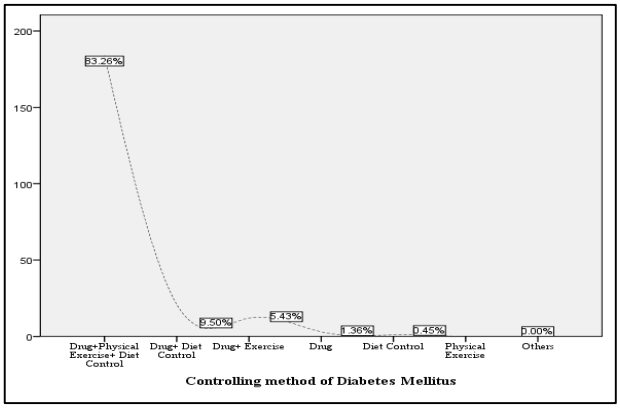

Figure 3: Distribution of study patients by controlling method of diabetes mellitus.

Figure 3 illustrates the methods used by patients to manage diabetes. The majority (83.26%) employed a combination of drug therapy, physical exercise, and diet control, making it the most commonly used and potentially most

effective approach. Smaller proportions relied on drug therapy with diet control (9.5%) or drug therapy with physical exercise (5.43%). Only a few patients managed their condition using drugs alone (1.36%), diet control alone (0.45%), or physical exercise alone (0.45%).

Table 3: Association between diabetes control and methods of managing diabetes mellitus.

Variables			Control of DM		Total	Chi-square value	P value
			Yes	No			
Controlling method of DM	Drug+ physical exercise+ diet control	Frequency	155	29	184	17.197	0.002
		Percentage	70.1	13.1	83.3		
	Drug+ diet control	Frequency	13	8	21		
		Percentage	5.9	3.6	9.5		
	Drug+ exercise	Frequency	6	6	12		
		Percentage	2.7	2.7	5.4		
	Drug	Frequency	1	2	3		
		Percentage	0.5	0.9	1.4		
	Diet control	Frequency	1	0	1		
		Percentage	0.5	0.0	0.5		

Table 3 presents the results of the chi-square analysis, which revealed a statistically significant association between diabetes control and the methods used to manage the condition (p=0.002). Among patients who successfully controlled their diabetes, 70.1% reported using a combination of drug therapy, physical exercise, and diet control. In contrast, those relying solely on drug therapy, exercise, or diet control showed much lower rates of successful management. Only 5.9% achieved control through a combination of drugs and diet, and 2.7% through drugs and exercise. Minimal success (0.5%) was observed among patients who relied solely on diet control or drugs without incorporating additional interventions.

DISCUSSION

This cross-sectional study, conducted among 221 diabetic patients in Sylhet, aimed to assess glycemic control practices and associated demographic and clinical characteristics. The age of participants ranged from 25 to 90 years, with a mean age of 54.61 years (SD =10.89), which is comparable to the findings of Yao et al. (2023), who reported a mean age at diagnosis of 52.91 years (SD =10.25).[24] However, Kos et al documented a higher mean age of 63 years (SD =13), indicating possible variations in diabetes onset and care patterns across.[25] In our study, the majority of participants fell within the 51-60-year age group (34.4%), followed by the 41-50-year group (29.4%). These figures highlight a trend of midlife onset in this population. In contrast, Caballero reported that over one-fourth of diabetic patients in their cohort were aged 65 and above, suggesting a potentially later onset in other demographic settings.[26]

Gender distribution in our study showed a slight predominance of females (51.1%) over males (48.9%). This differs from the findings of Ali et al, who observed a higher proportion of males (52.5%) in their study. Such discrepancies may be attributed to variations in health-seeking behaviour or regional demographic profiles.[27]

BMI analysis revealed that 47.5% of participants had a normal BMI (18.5-24.9), while a significant proportion (34.8%) were underweight (BMI<18.5), pointing toward a considerable burden of malnutrition among the diabetic population. This contrasts with global trends showing increased obesity-related diabetes. For instance, Shen et al reported that individuals with an adolescent BMI≥35 kg/m^2 had nearly a 40% chance of developing diabetes by middle age, compared to less than 10% for those with a BMI<18.5 kg/m^2.[28] Similarly, Lontchi-Yimagou et al highlighted a higher prevalence of diabetes among individuals with a BMI≥35, reinforcing obesity as a significant risk factor.[29]

A notable 73.8% of participants reported a family history of diabetes, consistent with findings from Bener, who observed a similar rate of 72.9%.[30] The median duration of diabetes in our cohort was five years (IQR 3-7), indicating relatively recent diagnoses. This contrasts with Yan et al, who found a median duration of 10 years, suggesting potential differences in disease progression and patient engagement across populations.[31]

In terms of treatment duration, over half (54.3%) of the participants had been using anti-diabetic medications for 1 to 5 years, while 26.7% had done so for 6 to 10 years. Only 10.9% had initiated treatment within the past year, a figure lower than the 59.66% reported by Jha et al for newly medicated patients.[32] Additionally, only 8.1% had been on medication for over 10 years, reflecting a relatively low prevalence of long-term management in this sample. Jha et al also reported that 38.7% of patients used both insulin and oral drugs, while 61.3% relied solely on oral medications, emphasizing the diversity of pharmacological approaches.[32]

Diabetes-related complications were prevalent, with 86.9% of patients reporting one or more associated conditions. The most common complications included diabetic foot (51.5%), hypertension (35.4%), neuropathy

(29.2%), hypoactive sexual arousal (25.4%), and issues involving the eyes, heart, and kidneys. These findings align with the work of Chamine et al, who also documented a wide range of comorbidities among diabetic patients.[33]

Management strategies in this cohort leaned heavily on a multi-faceted approach: 83.26% of patients combined drug therapy, physical activity, and dietary control to manage their condition. This reinforces the notion that integrated strategies are more effective. Kirwan et al similarly emphasized the synergistic role of diet, behavior, and exercise in diabetes management.[34] While 9.5% of patients used drugs and diet, and 5.43% combined drugs with exercise, only 1.36% used drugs alone, and even fewer relied solely on diet (0.45%) or exercise (0.45%). These results are consistent with Colberg et al, who noted that while exercise can significantly improve glycemic control, its effects are most pronounced when part of a broader intervention.[35] Likewise, Moghetti et al concluded that multimodal approaches are superior to single-modality strategies.[36]

Furthermore, a statistically significant association was found between the method of diabetes management and glycemic control (p=0.002). Patients who combined drug therapy, diet, and exercise were more likely to maintain glycemic control, echoing findings by ElSayed et al, who reported that standard combined approaches were highly effective in controlling hyperglycemia.[37] Conversely, those depending solely on drug therapy, diet, or exercise had lower success rates. Only 5.9% achieved control with drugs and diet, and 2.7% with drugs and exercise. Minimal control was observed in patients using a single intervention. These observations reinforce findings by Alfaifi and Yeh et al, who emphasized the importance of integrative methods in achieving optimal glycemic outcomes.[38,39]

This study has several limitations. A key limitation was the inability to identify predictive factors for diabetes mellitus. Additionally, using non-probability sampling limits the generalizability of the findings. The study also could not establish links between individuals with and without diabetes mellitus. Moreover, participants did not share consistent sociodemographic characteristics, which may have influenced the comparability of the results.

CONCLUSION

This study highlights the multifaceted nature of glycemic control among diabetic patients in Sylhet. A combination of drug therapy, physical exercise, and diet control emerged as the most effective management approach, underscoring the importance of integrated strategies. While middle-aged individuals predominated, older age groups were underrepresented, reflecting potential disparities in healthcare access or population demographics. Family history and socioeconomic status significantly influenced diabetes management practices, with higher income and familial predisposition associated with more comprehensive approaches. Despite the prevalence of diabetes-related complications, a substantial portion of participants reported controlled diabetes. However, reliance on singular management methods yielded less favorable outcomes. These findings underscore the necessity for personalized and holistic management plans to optimize glycemic control and improve health outcomes in diabetes care, while addressing regional and individual variability.

Recommendations

Further research using a prospective, longitudinal study design with a larger sample size is necessary to validate the findings of our study.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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