

Predictors of Poor Glycemic Control among Patients with Type 2 Diabetes in Southern Afghanistan: A Multicenter Cross-sectional Study

Najibullah Fazli¹, Muhammad Haroon Stanikzai², S. V. Vinod Kumar³, Omid Dadras⁴

¹Professor, Department of Internal Medicine, Faculty of Medicine, Kandahar University, ²Assistant Professor, Department of Public Health, Faculty of Medicine, Kandahar University, Kandahar, Afghanistan, ³Professor, Department of Public Health, SD Gupta School of Public Health, IIHMR University, Jaipur, India, ⁴Associate Professor, Research Centre for Child Psychiatry, University of Turku, Turku, Finland

Summary

Poor glycemic control is associated with an increased risk of diabetes-related complications, attributable to a wide range of factors. The aim of this study was to determine the prevalence and predictors of poor glycemic control among patients with type 2 diabetes in southern Afghanistan. We conducted a cross-sectional study among diabetes patients randomly recruited from four hospitals in southern Afghanistan during their follow-up visits between August and October 2024. Out of 406 patients, 74.9% (95% confidence interval [CI]: 70.3%–79.1%) had poor glycemic control. Physical inactivity (adjusted odds ratio [AOR] = 1.89, 95% CI: 1.04–3.41), irregular monitoring of blood glucose levels (AOR = 8.80, 95% CI: 4.49–17.2), nonadherence to antidiabetic medications (AOR = 2.69, 95% CI: 1.41–5.13), and presence of depression symptoms (AOR = 2.20, 95% CI: 1.25–3.86) were significant predictors of poor glycemic control. The findings highlight an urgent need for targeted health policies and clinical interventions to address the high prevalence of poor glycemic control in Afghanistan.

Key words: Afghanistan, diabetes mellitus, glycemic control, type 2 diabetes, uncontrolled diabetes

Diabetes mellitus (DM) is a major global health concern.^[1] In 2021, an estimated 529 million people worldwide were living with diabetes.^[1] Projections indicate this number rise to 1.31 billion by 2050,^[1] highlighting an urgent need for enhanced prevention and management strategies. Type 2 diabetes, the most common type of DM, is also widespread in Afghanistan,^[2] with the 2018 WHO STEPS survey reporting a prevalence of 11.7% in adults.^[3,4] Moreover, Afghanistan faces numerous challenges in diabetes care, including high rates of diabetes-related complications,^[3,4] compounded by socioeconomic disparities, limited patient education, and inadequate healthcare infrastructure.^[4] In Afghanistan, a study in Kandahar Province revealed that 50% of type 2 diabetes patients had uncontrolled diabetes based on random or fasting glucose measurements.^[5] However, despite the high burden of diabetes and its complications,^[3,4] research on poor glycemic control in Afghanistan remains scarce.^[6]

Previous studies have identified various sociodemographic, economic, and clinical factors associated with poor glycemic

control. These include age, gender, educational attainment, place of residence, marital status, occupation, household income, body mass index, smoking, family history of diabetes, disease duration, medication adherence, blood glucose monitoring, physical activity, dietary compliance, comorbidities, and symptoms of depression.^[7,8] In the study from Kandahar, Afghanistan, female gender and late diagnosis of disease were associated with uncontrolled diabetes.^[5] However, many potential predictors specific to the Afghan population remain unexplored, underscoring the need for further investigation.

Address for correspondence: Dr. Muhammad Haroon Stanikzai, Department of Public Health, Faculty of Medicine, Kandahar University, District # 10, 3801, Kandahar, Afghanistan.
E-mail: haroonstanikzai1@gmail.com

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Understanding the prevalence and predictors of poor glyceamic control is essential to inform health policy and clinical practice, particularly in resource-limited settings. This study aimed to determine the prevalence of poor glyceamic control and identify its predictors among patients with type 2 diabetes attending follow-up care in healthcare facilities in southern Afghanistan.

Between August 1 and October 31, 2024, a multicenter cross-sectional study was carried out in two provinces (out of five) of southern Afghanistan. This study was done in four healthcare facilities, namely Mirwais Regional Hospital, Momand Hospital, and Kandahar Teaching Hospital in Kandahar Province, as well as Bost Teaching Hospital in Helmand Province.

The study included adult patients (>18 years of age) with type 2 diabetes and a disease duration of at least 1 year who were attending follow-up appointments for diabetes care at the selected hospitals. Pregnant women and those with critical medical conditions were excluded from the study.

We calculated the sample size using the following formula: $(N = Z^2 \times (P) \times (1-P)/d^2)$, where Z is 1.96, d is 0.05, and P is a prevalence of poor glyceamic control which was taken as 50% based on the previous studies in the study area.^[5] After accounting for a 10% nonresponse rate, the final sample size was determined to be 422. The sample was proportionally allocated across the four selected hospitals based on the total number of diabetes patients at each hospital. Participants were then identified using a simple random sampling technique, specifically the lottery method.

The dependent variable was glyceamic control status assessed by glycated hemoglobin (HbA1c) levels. Glyceamic control status was defined as “poor” for patients with HbA1c ≥ 7 and “good” for those with HbA1c < 7 .^[4]

The independent variables encompassed sociodemographic characteristics, clinical factors, and psychological symptoms.

Adherence to antidiabetic medications was assessed by the Hill-Bone Medication Adherence Scale (HB-MAS). The 9-item HB-MAS was developed by Johns Hopkins University in 1999 to assess the degree of adherence to medication in various chronic diseases and conditions. The HB-MAS has been previously used in Afghanistan.^[9] In addition, we used the Patient Health Questionnaire (PHQ-9) to assess depression symptoms in our sample. The PHQ-9 records the severity of depression symptoms with nine items. In the current study, diabetes patients with a total score of at least 10 were considered to have comorbid depression. Earlier studies have used the Pashtu version of PHQ-9.^[10]

We employed descriptive statistics, including frequencies and percentages, to describe independent variables in our sample. Bivariate and multivariable logistic regression models were conducted to probe significant predictors (among independent variables) of poor glyceamic control (dependent variable). IBM SPSS version 25 (IBM Corp., Armonk, NY) was employed to perform the analysis.

Ethical approval was obtained from the Research and Ethics Committee, Faculty of Medicine, Kandahar University (Letter # 171; Dated on June 2024). The ethics committee also approved the use of either written or verbal consent in the study since many of the patients could neither read nor write. Informed consent was obtained from all participants before their inclusion in the study. Moreover, this study strictly adhered to the ethical principles outlined in the Declaration of Helsinki.

A total of 406 patients with type 2 diabetes participated in this study, with a mean age of 56.3 years (standard deviation ± 11.2). The majority of the patients, 366 (90.2%), 236 (58.1%), 264 (65.0%), and 293 (72.2%) were aged > 40 years, males, urban residents, and married, respectively. Most patients had no formal education (78.8%) and lived in families with more than five members (94.8%).

Table 1: Clinical profile of the study participants (n=406)

Variables	Frequency (%)
Duration of diabetes (years)	
1–5	107 (26.4)
>5	299 (73.6)
Family history of diabetes	
Yes	224 (55.2)
No	182 (44.8)
Health education on diabetes	
Yes	95 (23.4)
No	311 (76.6)
Comorbid medical disease	
Yes	273 (67.2)
No	133 (32.8)
Antidiabetic medications	
Oral	376 (92.6)
Insulin	11 (2.7)
Both	19 (4.7)
Adherence to antidiabetic medications (HB-MAS)	
Good adherence	71 (17.5)
Poor adherence	335 (82.5)
Dietary adherence	
Yes	208 (51.2)
No	198 (48.8)
Currently smoking	
Yes	62 (15.3)
No	344 (84.7)
Physical activity	
Yes	255 (62.8)
No	151 (37.2)
Monitoring of blood glucose	
Regular	60 (14.8)
Irregular	346 (85.2)
Depression symptoms	
None/minimal	31 (7.6)
Mild depression	112 (27.6)
Moderate depression	159 (39.2)
Severe depression	78 (19.2)
Extremely severe depression	26 (6.4)

HB-MAS: Hill-Bone Medication Adherence Scale

More than half (52.2%) of the patients reported a monthly household income of <10,000 Afghani (150 USD). Of all the patients, 186 (45.8%) and 87 (21.4%) were overweight and obese, respectively.

Table 1 presents the clinical and other related characteristics of the patients. The majority (72.9%) of patients had diabetes for more than 5 years, 224 (55.2%) had a family history of diabetes, and 273 (67.2%) had a comorbid medical condition. A large percentage (92.6%) were on oral antidiabetic agents. Overall, 255 (62.8%) were physically active, 62 (15.2%) were current smokers, and about 14.8% were regularly monitoring their blood glucose levels. Regarding adherence to antidiabetic medications, most (82.5%) patients had poor adherence. A majority of patients had depression symptoms (92.4%).

Out of 406 patients with diabetes, 74.9% (95% confidence interval [CI]: 70.3%–79.1%) had poor glycaemic control.

Table 2 shows the likelihood of poor glycaemic control among patients with diabetes. Physical inactivity (adjusted odds ratio [AOR] = 1.89, 95% CI: 1.04–3.41), irregular monitoring of blood glucose levels (AOR = 8.80, 95% CI: 4.49–17.2), nonadherence to antidiabetic medications (AOR = 2.69, 95% CI: 1.41–5.13), and presence of depression symptoms (AOR = 2.20, 95% CI: 1.25–3.86) were significant predictors for poor glycaemic control.

In this study, more than two-thirds (74.9%) of patients with type 2 diabetes had poor glycaemic control. Furthermore, several factors were found to be significantly associated with poor glycaemic control, including physical inactivity, nonadherence

to anti-diabetic medications, irregular monitoring of blood glucose levels, and the presence of depression symptoms.

The prevalence of poor glycaemic control in this study (74.9%) is substantially higher than the previously reported rate of 50.0% in Afghanistan.^[5] It also exceeds the prevalence reported in many low- and middle-income countries, such as 61.1% in Ethiopia^[7] and 37.0% in Iran.^[8] The high prevalence of poor glycaemic control in the current study reflects significant challenges in diabetes management in Afghanistan. These challenges stem from persistent socioeconomic disparities, low levels of patient education, and fragile healthcare systems that engulf the country.^[3,4] The high prevalence of poor glycaemic control remains a pressing concern, emphasizing the need for targeted efforts to improve glycaemic control status in Afghanistan.

We also found that several factors were associated with poor glycaemic control including physical inactivity, nonadherence to antidiabetic medications, irregular monitoring of blood glucose levels, and the presence of depression symptoms. These findings align with earlier studies from other developing countries.^[7,8] Therefore, these factors should be considered in the design of future policy efforts and interventions.

This is the first study in Afghanistan to evaluate glycaemic control status using HbA1C levels, a more reliable and precise method for assessing glycaemic control in patients with diabetes. However, this study has some limitations. First, this study was carried out in hospital settings, which may not fully represent the prevalence of poor glycaemic control among diabetic patients in the community, especially those without access to healthcare facilities. Second, sociodemographic characteristics and clinical history were self-reported and are

Table 2: Logistic regression analysis results on predictors of poor glycaemic among Afghan diabetic patients; crude and adjusted odds ratios with 95% confidence intervals

Covariates	Categories	Glycaemic control		COR (95% CI)	P	AOR (95% CI)	P
		Poor	Good				
Gender	Male	189	47	1.92 (1.62–3.02)	0.004	-	-
	Female	115	55	Reference			
Physical activity	Yes	178	77	Reference	0.002	Reference	0.034
	No	126	25	2.18 (1.31–3.61)		1.89 (1.04–3.41)	
Time since diagnosis (years)	1–5	73	34	Reference	0.064	-	-
	>5	231	68	1.58 (0.97–2.57)			
Currently smoking	Yes	51	11	1.66 (0.83–3.33)	0.145	-	-
	No	253	91	Reference			
Medical comorbidity	Yes	218	55	2.16 (1.36–3.40)	0.001	-	-
	No	86	47	Reference			
Monitoring of blood glucose	Regular	19	41	Reference	<0.001	Reference	<0.001
	Irregular	285	61	10.1 (5.47–18.5)		8.80 (4.49–17.2)	
Dietary adherence	Yes	137	71	Reference	<0.001	-	-
	No	167	31	2.79 (1.73–4.50)			
Medication adherence	Yes	39	32	Reference	<0.001	Reference	0.003
	No	265	70	3.10 (1.81–5.31)		2.69 (1.41–5.13)	
Depressive symptoms	Yes	288	87	3.10 (1.47–6.53)	0.002	2.20 (1.25–3.86)	0.006
	No	16	15	Reference		Reference	

COR: Crude odds ratio, AOR: Adjusted odds ratio, CI: Confidence interval

therefore subject to information and recall biases. Third, the type and number of comorbidities were not evaluated as factors influencing glyceic control. Finally, the cross-sectional nature of the study could not allow us to establish a temporal relationship between the predictors and poor glyceic control.

This study highlights the alarmingly high prevalence of poor glyceic control (74.9%) among patients with type 2 diabetes in southern Afghanistan. Key factors associated with poor glyceic control included physical inactivity, nonadherence to anti-diabetic medications, irregular monitoring of blood glucose levels, and the presence of depression symptoms. These findings should be considered by policymakers and healthcare professionals in developing specific interventions aiming at improving glyceic control among patients with diabetes in Afghanistan.

Data availability statement

The primary data used to support the findings of this study are available from the corresponding author upon request.

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Conflicts of interest

There are no conflicts of interest.

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