Glycemic control among type 2 diabetes mellitus patients visiting the Emergency department of Gandaki Medical College: A cross-sectional study

Shanti Pokhrel[1]*, Bijaya Gautam[2]

[1]Department of Emergency, [2]Department of Biochemistry,
Gandaki Medical College Teaching Hospital and Research Center, Pokhara, Nepal

ABSTRACT

Introduction: Diabetes mellitus (DM) is a metabolic disorder which is characterized by increased blood glucose level. Glycated hemoglobin (HbA1c) is the most reliable indicator of long-term glycemic control as it accurately reflects an individual's blood glucose levels during the preceding 2 to 3 months. Elevated level of HbA1c has been identified as a significant risk factor for other diseases such as cardiovascular diseases, stroke. This study aimed to evaluate the glycemic control in type 2 DM. **Methods:** After obtaining an ethical clearance, patients with Type 2 DM, confirmed according to American diabetes association criteria, who attended to the Gandaki Medical College Emergency Department were enrolled in this study. After that, HbA1c level was measured, and it was used for categorization as good control <7%, inadequate control 7-8 % and poor control >8%. **Results:** Out of 117 patients, prevalence of poor glycemic control was 33.3% followed by inadequate control was 41.90% and fair control was 24.80%. HbA1c level did not show statistical significance with other risk factor. **Conclusions:** In this study, hypertension, COPD, hyperthyroidism and hypothyroidism were found as comorbidity in (53.0%) each of diabetes patients.

Keywords: Diabetes mellitus, glycated hemoglobin, glycemic control, HbA1c.

***Correspondence:**
Dr. Shanti Pokhrel
Department of Emergency
Gandaki Medical College Teaching Hospital and Research Center, Pokhara, Nepal
Email: shantipokhrel46@yahoo.com
ORCID iD: https://orcid.org/0009-0007-3591-2498

Submitted: August 13, 2025
Accepted: November 20, 2025

To cite: Pokhrel S, Gautam B. Glycemic control among type 2 diabetes mellitus patients visiting the Emergency department of Gandaki Medical College: A cross-sectional study. JGMC-Nepal. 2025;18(2):208-13.

DOI: 10.3126/jgmc-n.v18i2.83093

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder which is characterized by increased blood glucose level with disturbances of carbohydrate, fat and protein metabolism resulting from either loss of insulin producing cells, insufficient insulin action, or both.[1] The burden of DM in terms of prevalence and number has risen dramatically, particularly in low-income and middle-income countries.[2,3] Clinical trials have demonstrated that tight blood glucose control correlates with a reduction in those complications in a patient with type 2 diabetes mellitus, very few have managed to measure the level of glycated hemoglobin (HbA1c) of participants.[4] Furthermore, the frequency of self-monitoring of blood glucose, food and duration of diabetes are linked to the patient's level of glycemic control.[5] Factors affect blood glucose level, reasons for poor glycemic control is multifactorial and complex, like, poor adherence to treatment, diet and exercise affect glycemic control, however, changeable cardiovascular risk factors such as dyslipidemia, obesity and physical inactivity.[6]

HbA1c is now formally endorsed in many countries as a diagnostic test for (type 2) diabetes as well as for monitoring, although some debate still continues regarding its applicability for diagnosis.[7] Firstly, HbA_{1c} gives an indication of chronic. It gives an integrated index of glycaemia over the entire 120-days lifespan of the red blood

cell, but within this period of 120 days, recent glycaemia has the largest influence on the HbA1c value, therefore seems logical that such a test would be appropriate in diagnosing a disease characterized by chronic hyperglycemia and a gradual progression to complications.[8] Many previous studies have assessed glycemic control levels among patients with type 2 diabetes reported a wide range of values, where 45.2% to 73.5% of the participants had poor glycemic control.[9]

Diabetes mellitus created a great health and economic burden because of the direct costs of treatment, man-hours lost due to the debilitating effect the disease on the individual and society at large in the world.[10,11] Many factors like, a delay in the beginning and intensification of insulin unnecessarily, poor adherence to treatment, diet and exercise affect glycemic control.[12,13] Study revealed age and length of time patient lived with DM, receiving monotherapy compared with the combination of insulin and oral antidiabetics were more likely associated with good glycemic control.[14-18]

METHODS

A cross-sectional study was conducted on patients with Type 2 DM who attended to the Emergency Department, Gandaki Medical College, Pokhara, Nepal from December 2024 to June 2025. Diagnosis of Type 2 diabetes was confirmed according to American diabetes association criteria. After that, was assessed the HBA1C level and defined as good control <7%, in adequate control 7-8% and poor control >8% (According to ADA guideline). The ethical clearance was obtained from the institutional review committee, Gandaki Medical College (Ref. No. 05/081/082-F). A written informed consent was taken from all the participants prior to data collection. A convenience sampling technique was used to enroll the participants in the study. Based on a previous study,[9] prevalence of poor glycemic control was 45.2%, at 95% confidence interval, a sample size 117 was calculated. The data obtained from each participant was recorded in the proforma sheet and the data was be entered into Microsoft Excel sheet and transferred into Statistical Package for Social Science (SPSS) 11.5 version. The analysis of the data was done in SPSS. Descriptive statistics will be completed with frequency, percentage, mean, standard deviation etc. For graphical representation, pie chart was constructed. Chi-square was used to find out association between two categorical variables. Probability of significance was set at 5% level of significance. ($p<0.05$)

RESULTS

Table 1 shows sociodemographic characteristics of diabetic patients. A total of 117 diabetic patients visiting the Emergency department from 2024 December to June 2025 at Gandaki Medical College were included in the study. The patient's mean age (± SD) was 61.40 with a female: male ratio of 1.3:1. Majority were employed 53(45.30%) by occupation, illiterate by education 50(42.70%).

Table 1: Sociodemographic characteristics of diabetic patients (n=117)

Variables	Number (n)	Percentage (%)
Age interval		
18-29	4	3.4%
30-39	7	6.0%
40-49	14	12.0%
50-59	24	20.50%
≥60	68	58.10 %
Gender		
Male	51	43.60%
Female	66	56.40%
Education		
Illiterate	50	42.70%
Primary	38	32.50%
Secondary	29	24.80%
Occupation		
Housemaker	40	34.20%
Employed	53	45.30%
Unemployed	17	14.50%
Students	7	6.0%

Table 2: Comorbidity with diabetic patients (n=62)

Variables	Number (n)	Percentage (%)
Anemia	1	1.6%
CLD, HCC	1	1.6%
COPD	1	1.6%
COPD, HTN	3	5.0%
CVA	1	1.6%
Depression	1	1.6%
DYS	1	1.6%
Heart failure	1	1.6%
HTN	45	72.5%
HTN, CVA	1	1.6%
Hyperthyroidism	1	1.6%
Hypothyroidism	5	8.1%
Total	62	100%

Table 2 shows characteristics of diabetic patients. Among 117 diabetic patients, Hypertension 45(72.5%), Hypothyroidism 5(8.1%), Anemia 1(1.6%), COPD 3(5%), CVA 1(1.6%) were found as a comorbidity where 61(52.10%) were normotensive, 26(22%) were on stage 2. Among them 66(56.4%) were having disease for more than 5 years. 52.10% were normotensive whereas 22% were on stage 2. Among them overweight 76(65%) was most commonly seen in diabetic patient, 70.10% were smoker.

Table 3: Glycemic control level (n=117)

Variables	Number (n)	Percentage (%)
HbA1c		
<7 (Control)	29	24.80%
7-8(inadequate)	48	41.90%
>8(poor)	40	33.30%

Table 3 shows HbA1c level in diabetic patient where poor glycemic control 40(33.30%), followed by inadequate control 48(41.90%) and controlled patient 29(24.80%).

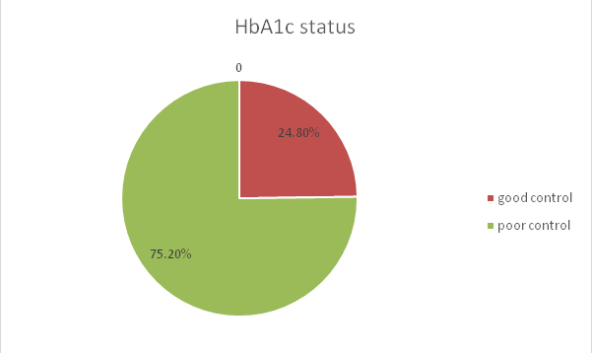

Figure 1: Glycemic control as good/poor (n=117)

Table 4: Relationship between HbA1c with others explanatory variable (n=117)

Variables		HbA1c		P value
		Good control	Poor control	
Age group	Less than 50	20.0%	80.0%	0.532
	50 and more	26.10%	73.90%	
Gender				
	Male	27.50%	72.50%	0.557
	Female	22.70%	77.30%	
Education	Illiterate	26%	74.0%	0.793
	Literate	23.90%	76.10%	
Occupation	Homemaker	17.50%	82.50%	0.209
	Employed	24.50%	75.50%	
	Unemployed/ Students	37.50%	62.50%	
Body Mass Index	Underweight	40%	60%	0.502
	Normal	30.80%	69.20%	
	Overweight/obese	22.10%	77.90	
Smoking status	No	24.40%	75.60%	0.879
	Yes	25.70%	74.30%	
Co-morbidity				
	Present	19.40%	80.60%	0.149
	Absent	30.90%	69.10%	
Duration				
	Less than 5	27.50%	72.50%	0.557
	5 or more	22.70%	77.30%	

DISCUSSION

The major therapeutic goal for prevention of organ damage is glycemic control and treat its related complications.[19] Target level of HbA1c is below 7% and further recommended adequate glycemic control for pre-prandial capillary glucose 80-130 mg/dl.[20] Early recognizing and managing glycemic control is a challenging task in diabetic patients. Early screening of HbA1c in diabetic patients can control the glucose level by tapering the dose of diabetic drugs which also help to prevent other diabetic complications.[21] So, physicians should consider having such patients evaluate and if necessary, treat for target glucose level. This study provides the outpatient base data on prevalence of glycemic control among patients with diabetes.

In this study, poor rate of glycemic control was found more in diabetic patients and it did not show any significance to its sociodemographic factors. The mean age of presentation and gender in our study was 61.40 years with a female predominance which is comparable with other studies that reported higher prevalence was found in 41 to 50 years of age.[22] Multiple studies from the subcontinent have demonstrated that predominantly younger female more prone to have diabetes.[23]

The findings of this study showed that nearly three quarters (75.20%) of diabetic patients (inadequate 41.80% and control 33.30%) had poor glycemic control. This finding was comparable with earlier studies done in Saudi Arabia (74.9%), USA (69.7%), India (37.5%), Ethiopia (45.2%).[10] However, the finding in the present study appeared to be lower than some studies reported in Nigeria (83.3%) and Kenya (81.6%), and Prevalence of glycemic control ranges from 37.5% to 83.3%.[10,24]

The discrepancy between the present and previous studies conducted may have arises mainly from differences in the types and methods of glucose measurement. It might be due to variability of HbA1c level and its classification (fair, inadequate and poor). The possible reason for this high prevalence of poor glycemic control could be the clinical characteristics of the patient.

The current study showed that most of the diabetic patient who had more than five years longer duration of diabetes (56.40%). This finding is consistent with other studies,[24] the possible explanation for this finding could be due to progression of impairment of insulin secretion over time because of the failure of B cell and increased insulin resistance to control blood sugar.

In our study, the proportion of people with inadequate glycemic control was higher among female (56.40%) who have had the condition for a longer duration which is similar to the finding of previous studies,[25,26] may be female has socioeconomic burden, stress, parenting and many other factors which influence their person life.

This study showed that proportion of people with poor glycemic control is higher among people with low level of education where 42.70% were illiterate, also supported by previous study.[26] This findings may be due to lack of knowledge regarding diabetes.

Almost half of our participants were overweight (65.0%), followed by normal weight (22.0%), obese (8.6%), underweight (4.30%), this is much lower than prevalence determined in Nepal, which reported that raised Body Mass Index and waist circumference were 71. 2% and 86%.[23]

In our study 52.10% were normotensive, according to Khanal et al. prevalence of hypertension was 59% which was quite higher as comparative to our study.[24] In this study, only 22.20% were in stage 2, where 13.70% were in stage 2 and 12% had raised blood pressure.

In our study, (62) people were having comorbidity where 72.5% were hypertensive followed by hypothyroidism, hyperthyroidism, chronic obstructive pulmonary disease, stroke, chronic liver disease ad anemia, it was similar to previous study,[25] having co-morbidity is associated with social burden, affecting the social relationship within the community. Presence of co-morbidity may affect mobility of the diabetic patient which creates barrier in involving social functions and events. Previous study conducted in Mexico and South India found similar result.

CONCLUSIONS

The present study hints general physician to screen HbA1c level for early identification and proper counseling regarding good glycemic control that may help to improve their quality of life. Our study showed diabetes was more prevalent aged 20 years and above. The prevalence of inadequate (41.90%) and poor (33.30%) glycemic control, prevalence of fair/good glycemic control was 24.80%. Most of the diabetes patients were employed, illiterate, smoker. In this study, hypertension, COPD, hyperthyroidism and hypothyroidism were found as comorbidity in (53.0%) each of diabetes patients. In our study most of the patient were normotensive (52.10%) and overweight (65.60%) where 40% were having diabetes for more than five years.

ACKNOWLEDGEMENT

We are privileged to have this opportunity to express my sincere gratitude to all the people, without whose help, completion of this research work wouldn't have been possible.

CONFLICTS OF INTEREST: None declared

SOURCE OF FUNDING: None

AUTHORS' CONTRIBUTIONS

SP designed the research, collected data, performed statistical analysis, and prepared the first draft of the manuscript, BG explained and interpreted the data and contributed to preparing the final draft of the final draft of the manuscript. All authors read and approved the manuscript.

REFERENCES

1. Alberti KG, Zimme PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Diabetic Medicine. 1998;15(7):539-53. DOI: 10.1002/(SICI)1096-9136(199807)15:7<539::AID-DIA668>3.0.CO;2-S PMID: 9686693.
2. Turner R, Holman R, Cull C. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes. Lancet. 1998;352:837–53
3. Habteyohans BD, Hailu BS, Meseret F, Mohammed A, Berhanu Y, Alemu A, et al. Poor glycemic control and its associated factors among children with type 1 diabetes mellitus in Harar, eastern Ethiopia: A cross-sectional study. BMC Endocrine Disorder. 2023;23(1):208. DOI: 10.1186/s12902-023-01453-9. PMID: 37759193.
4. Mamo Y, Bekele F, Nigussie T, Zewudie A. Determinants of poor glycemic control among adult patients with type 2 diabetes mellitus in Jimma University Medical Center, Jimma zone, south west Ethiopia: A case control study. BMC Endocrine Disorder.2019;19(1):91. DOI: 10.1186/s12902-019-0421-0 PMID:31464602.
5. Tahara Y, Shima K. Kinetics of HbA1c, glycated albumin, and fructosamine and analysis of their weight functions against preceding plasma glucose level. Diabetes Care. 1995;18(4):440-7 DOI: 10.2337/diacare.18.4.440 PMID: 7497851.
6. Goblan AI, Alfi AL, Khan MZ. Mechanism linking diabetes mellitus and obesity. Diabetes Metabolic Syndrome and obesity: targets and therapy. 2014;7:587-91. DOI: 10.2147/DMSO.S67400 PMID: 25506234.

7. Mohan V, Seedat YK, Pradeepa R. The rising burden of diabetes and hypertension in southeast asian and african regions: need for effective strategies for prevention and control in primary health care settings. International journal of hypertension. 2013:409083. DOI: 10.1155/2013/409083 PMID: 23573413.

8. Davies M. The reality of glycaemic control in insulin treated diabetes: defining the clinical challenges. International Journal of Obesity Related Metabolic Disorder. 2004;28 Suppl 2:S14-22. DOI: 10.1038/sj.ijo.0802745. PMID: 15306833.

9. Chan JC, Gagliardino JJ, Baik SH, Chantelot JM, Ferreira SR, Hancu N, et al. Multifaceted determinants for achieving glycemic control. The International Diabetes Management Practice Study (IDMPS). 2009;32(2):227-33. DOI: 10.2337/dc08-0435 PMID: 19033410.

10. Ahmad NS, Islahudin F, Paraidathathu T. Factors associated with good glycemic control among patients with type 2 diabetes mellitus. Journal Diabetes Investigation. 2014;5(5):563-9. DOI: 10.1111/jdi.12175 PMID: 25411625.

11. Eticha T, AbrahaleyMulu HG, GetuKahsay DA, Rajeshwar Y. Factors associated with poor glycemic control in type 2 diabetic patients investigated at Ayder referral hospital, Mekelle, Ethiopia. International journal of pharmacy and pharmaceutical research. 2016;6(3):160–71.

12. Pokhrel S, Shrestha S, Timilsina A, Sapkota M, Bhatt MP, Pardhe BD. Self-Care Adherence And Barriers To Good Glycaemic Control In Nepalese Type 2 Diabetes Mellitus Patients: A Hospital-Based Cross-Sectional Study. Journal of Multidisciplinary Healthcare. 2019;12:817-826. DOI: 10.2147/JMDH.s216842

13. Yahaya JJ, Doya IF, Morgan ED, Ngaiza AI, Bintabara D. Poor glycemic control and associated factors among patients with type 2 diabetes mellitus: a cross-sectional study. Scientific Reports. 2023;13(1):9673. DOI: 10.1038/s41598-023-36675-3 PMID: 37316565.

14. Shamshirgaran SM, Mamaghanian A, Aliasgarzadeh A, Aiminisani N, Iranparvar-Alamdari M, Ataie J. Age differences in diabetes-related complications and glycemic control. BMC Endocrine Disorder. 2017;17(1):25. DOI: 10.1186/s12902-017-0175-5 PMID: 28472985.

15. Khattab M, Khader YS, Al-Khawaldeh A, Ajlouni K. Factors associated with poor glycemic control among patients with type 2 diabetes. Journal of Diabetes and its Complications. 2010;24(2):84-9. DOI: 10.1016/j.jdiacomp.2008.12.008 PMID: 19282203.

16. Tomic D, Shaw JE, Magliano DJ. The burden and risks of emerging complications of diabetes mellitus. Nature Review Endocrinology. 2022;18(9):525-539. DOI: 10.1038/s41574-022-00690-7 PMID: 35668219.

17. Sherwani SI, Khan HA, Ekhzaimy A, Masood A, Sakharkar MK. Significance of HbA1c Test in Diagnosis and Prognosis of Diabetic Patients. Biomark Insights. 2016;11:95-104. DOI: 10.4137/BMI.S38440 PMID: 27398023.

18. Scott DA, Fisher AM. The insulin and the zinc content of normal and diabetic pancreas. Journal of Clinical Investigation. 1938;17(6):725-8. DOI: 10.1172/JCI101000 PMID: 16694619.

19. Shrestha N, Karki K, Poudyal A, Aryal KK, Mahato NK, Gautam N, et al. Prevalence of diabetes mellitus and associated risk factors in Nepal: findings from a nationwide population-based survey. BMJ Open. 2022;12(2):e060750. DOI: 10.1136/bmjopen-2022-060750 PMID: 35193925.

20. Pan T, Dasgupta A, Suman S, Paul B. Assessment of glycaemic control in patients with type 2 diabetes: a clinic-based study in a slum of Kolkata. International Journal Of Community Medicine And Public Health. 2018:5(11):47684772. DOI: 10.18203/2394-6040

21. Dawite F, Girma M, Shibiru T, Kefelew E, Hailu T, Temesgen R, et al. Factors associated with poor glycemic control among adult patients with type 2 diabetes mellitus in Gamo and Gofa zone public hospitals, Southern Ethiopia: A case-control study. PLoS One. 2023;18(3):e0276678. DOI: 10.1371/journal.pone.0276678 PMID: 36897872.

22. Badedi M, Solan Y, Darraj H, Sabai A, Mahfouz M, Alamodi S. Factors Associated with Long-Term Control of Type 2 Diabetes Mellitus. Journal of diabetes research. 2019:8756138. DOI: 10.1155/2019/8756138 PMID: 28090538.

23. Khanal MK, Bhandari P, Dhungana RR, Gurung Y, Rawal LB, Pandey G, et al. Poor glycemic control, cardiovascular disease risk factors and their clustering among patients with type 2 diabetes mellitus: A cross-sectional study from Nepal. PLoS One. 2022;17(7):e0271888. DOI:

10.1371/journal.pone.0271888

24. Thapa S, Pyakurel P, Baral DD, Jha N. Health-related quality of life among people living with type 2 diabetes: a community based cross-sectional study in rural Nepal. BMC Public Health. 2019;19(1):1171. DOI: 10.1186/s12889-019-7506-6 PMID: 31455280.

25. Lopez- Carmona JM, Rodriguez- Moctezuma R. Adaptation and validation of quality of life instrument Diabetes 39 for Mexican patients with type 2 diabetes mellitus. Salud Publica de Mexico. 2006:48(3):200-11. DOI: 10.1590/s0036-36342006000300004 PMID: 16813128.