

Namaste

Title of the Research

Prevalence and Predictors of Glycemic Control among Diabetic Patients in Lalitpur: A Hospital based Cross-sectional Study

Author's Name and Affiliation

Author's Information

Sanchita Subedi

Principal Investigator

Shruti Regmi
Co- Investigator

Samridhi Chauhan
Co-Investigator

Assistant Professor, Janamaitri Foundation Institute of Health Sciences Hattiban, Lalitpur, Nepal

Background and Objectives

Background

- Diabetes mellitus, has become a global epidemic, affecting 537 million people and causing 6.7 million deaths.
- Prevalence of uncontrolled diabetes varies significantly, ranging from 49% to 78% across different countries.
- In Nepal, two-thirds of Type 2 diabetes patients had poor glycemic control.

Background...

 Glycemic control, is crucial for effective diabetes management, with Glycated Hb(A1c), being a key indicator.

 Poor glycemic control increases risk of hospitalization, progression of complications and cost of diabetes also.

Background...

- Every 1% rise in HbA1c above threshold is associated with 38% increase in macrovascular events, 40% higher risk of microvascular event, and 38% higher risk of death.
- Although maintaining good glycemic control can significantly delay diabetic complications and extend life expectancy, many diabetic patients are unable to achieve it due to various factors.

Objectives of the Study

 To find out the prevalence and predictors of poor glycemic control among diabetic patients

Methodology

- Study design: Quantitative, cross-sectional study
- Study setting: Endocrine OPD of Alka Hospital, Lalitpur
- Study duration: 1 month (1st December 2024 to 30th December 2024)

- **Study Population**: All diabetic patients attending Endocrine OPD of Alka Hospital during data collection period.
- Sampling technique: Non probability purposive sampling technique
- Sample size: A total of 212 participants were selected, accounting for a 10% non-response rate. It was determined by Cochran's formula, considering 14.7% prevalence of uncontrolled diabetes among adults in Nepal.

• Eligibility criteria:

Inclusion Criteria

- diabetic patients aged 18 years or older,
- diagnosed with diabetes for at least 1 year,
- under treatment for >3 months, and
- had HbA1c test within last three months

Exclusion Criteria

- pregnant, and
- mentally incompetent

- Ethical consideration
 - Granted by Nepal Health Research Council (Reg. No. 508_2024)
 - Written permission was taken from the concerned authorities of Alka Hospital.
 - Participants were invited to take part voluntarily, and they had right to refuse or withdraw from the study at any time without any penalty.

Ethical consideration...

- Informed verbal and written consent was obtained from each participants.
- There was no any risks, physical and mental harms to the participants.
- Privacy and confidentiality of the participants was maintained throughout the study.
- All data provided by participants was kept confidential; securely protected throughout the study and used for research purpose only.

- Data collection Instrument
- Semi-structured questionnaire based on WHO Stepwise approach for NCDs surveillance questionnaire
- It was divided into 4 parts:
 - Part I: questions related to socio-demographic characteristics
 - Part II: questions related to health-related information
 - Part III: questions related to behavioural measurement
 - Part IV: physical and biochemical measurements

Data collection Instrument...

- Blood pressure was measured using a standard sphygmomanometer and categorized as controlled and uncontrolled with uncontrolled BP defined as systolic BP≥ 140 and/or diastolic BP≥ 90 mm of Hg.
- The measurement of participants' weight was taken by a digital scale and height was measured by stadiometer.

Data collection Instrument...

 BMI was calculated and categorized according to World Health Organization's definitions;

underweight (BMI <18.5 kg / m2)

normal range (BMI =18.5-24.9 kg/ m2),

overweight (BMI =25-29.9 kg/m2), and

obese (BMI ≥30 kg/ m2).

Data collection Instrument...

 Glycemic control was assessed in terms of HbA1c level. The most recent HbA1c measurements taken from the participants' medical records and categorized according to American Diabetes Association's definitions:

Good glycemic control: HbA1c <7% Poor glycemic control: HbA1c ≥7%

Data collection procedure

- Data collection was done in Endocrine OPD of Alka hospital during the waiting time of the participants.
- Diabetic patients meeting the inclusion criteria were invited to take part voluntarily, and informed verbal and written consent was obtained from each participants.

Data collection procedure...

- Anthropometric measurements including height, weight were taken by standardized techniques and calibrated equipment.
- Height and weight was measured with only light clothes and without footwear.

 BMI was calculated as weight in kilograms divided by height in meter squared.

Data collection procedure...

- Blood pressure was measured manually by sphygmomanometer, with an appropriate-size cuff after the participant rested for at least 10 minutes in a sitting position, with the arm maintained at heart level.
- For glycemic level, latest HbA1c measurement was taken from the participants' medical records.
- Face-to-face interview was conducted in separate room, and took approximately 15-20 minutes to complete the data.

Results

Socio-demographic characteristics of the participants

Socio-demographic characteristics of participants(n=212

Characteristics	Frequency (%)
Age (in years)	
Young adults (20-39)	20 (9.4)
Middle adults (40-59)	114 (53.8)
Older adults (60 and above) (Mean \pm SD: 56.31 \pm 11.74)	78 (36.8)
Sex	
Male	102 (48.1)
Female	110 (51.9)
Marital status	
Married	193 (91)
Unmarried / Divorced/ Widowed	19 (9) 26

Socio-demographic characteristics of participants(n=212)

Characteristics	Frequency (%)
Current residence	
Urban	174(82.1)
Rural	38(17.9)
Status of education	
Illiterate	34 (16)
Literate	178 (84)
Employment status	
Employed	179 (84.5)
Unemployed / Retired	33 (15.5)
Family income (in rupees)	
<60,000	92(43.4)
60,000 and above	120(56.6) 27

Health related information of the participants

Health related information of participants (n=212)

Characteristics	Frequency (%)
Family history of Diabetes	
Yes	102(48.1)
No	110(51.9)
Types of Diabetes	
Type 1	13 (6.1)
Type 2	199 (93.9)
Duration of diagnosis	
Less than 10 years	125 (59)
10 years and above	87 (41)
Duration of treatment	
Less than 10 years 10 years and above	129 (60.8) 83 (39.2)

Health related information of participants (n=212)		
Characteristics	Frequency (%)	
Treatment modalities *		
Oral anti-diabetic drugs	211(99.5)	
Insulin	20(9.4)	
Comorbidities with Diabetes		
Yes	142 (67)	
No	70 (33)	
Blood pressure		
Controlled	168 (79.2)	
Uncontrolled	44 (20.8)	

Behavioral characteristics of the participants

Behavioral characteristics

- Among the participants, 7.5%, 11.3% and 20.3% were current user of tobacco, smokeless tobacco and alcohol respectively.
- Likewise, majority of the participants were taking 5 or more servings of fruits and vegetables per day (65.6%), performing physical activities (68.5%) and taking medications daily (78.3%).
- Majority of the participants (74.1%) never received any self-care related education.

Glycemic control of the participants



Figure 1. Glycemic control of the participants

Association of poor glycemic control with different variables

The Chi-square test result showed that current residence (p=0.03), duration of diagnosis (p=0.02), duration of treatment (p=0.02), treatment with insulin therapy (<0.001) and control of blood pressure (p=0.04) were significantly associated with poor glycemic level.

Predictors associated with poor glycemic control					
Characteristics	COR (95% CI)	AOR (95% CI)	P-value		
Residence					
Urban		Ref.			
Rural	2.51 (1.04-6.02)	2.54 (1.04-6.20)	0.04*		
Duration of Diagn	osis				
>10 years		Ref.			
10 years or more	2.02 (1.10-3.71)	1.38 (0.13-14.48)	0.78		
Duration of Treatment					
>10 years		Ref.			
10 years or more	1.99 (1.07-3.69)	1.52 (0.14-16.43)	0.72		
Blood pressure					
Controlled		Ref.			
Uncontrolled	2.21 (0.99-4.92)	2.47 (1.09-5.62)	0.03*		

- To assess the model fit of the logistic regression analysis, Omnibus tests and the Hosmer-Lemeshow goodness-of-fit test were conducted.
- The Omnibus test p-value was 0.005, indicating the model's overall significance.
- The Hosmer-Lemeshow test (p= 0.301), suggesting a good fit between the observed and predicted values.
- Additionally, the Nagelkerke R² value was 9.5%, indicating that the model explained a modest proportion of the variance in poor glycemic level.
- These results suggest that the logistic regression model provides an adequate fit to the data.

Conclusion

Conclusion

- This study found that two thirds of participants had poor glycemic control. The significant predictors of poor glycemic control were rural residents and uncontrolled blood pressure.
- This highlight the need for targeted interventions to improve long-term glycemic control and reduce the risk of diabetes-related complications particularly for rural residents and individuals with uncontrolled blood pressure.
- In addition, strengthening diabetes monitoring programs and promoting regular follow-ups, are crucial steps toward better management.



References

- 1. International Diabetes Federation. IDF Diabetes Atlas 2021[Internet]. International Diabetes Federation; 2021 [cited 2023 Dec 6]. Available from: https://diabetesatlas.org/atlas/tenth-edition/
- Almalki ZS, Ahmed NJ, Alahmari AK, Alshehri AM, Alyahya SA, Alqahtani A, et al. Identifying the Risk Factors and the Prevalence of Poor Glycemic Control among Diabetic Outpatients in a Rural Region in Saudi Arabia. J Pharm Res Int. [Internet]. 2021 Apr 16[cited 2023 Dec 11];15–23. Available from: doi: 10.9734/JPRI/2021/v33i24A31427
- Chirombe M, Ngara B, Chibvongodze R, Charuka V, Zhou DT. Glucose Control in Diabetic Patients Attending Parirenyatwa Group of Hospitals in Zimbabwe. Open Clin Biochem J [Internet]. 2018 Nov 16 [cited 2023 Dec 12];8(1). Available from: https://benthamopen.com/FULLTEXT/TOCCHEMJ-8-12
- 4. De P, Banu S, Muthukumar D. Predictors of poor glycemic control in type 2 diabetic patients in South Indian population. Int J Res Med Sci. [Internet]. 2018 Jan 24[cited 2023 Dec 10];6(2):545–50. Available from: https://doi.org/10.18203/2320-6012.ijrms20180295
- 5. Haghighatpanah M, Nejad ASM, Haghighatpanah M, Thunga G, Mallayasamy S. Factors that Correlate with Poor Glycemic Control in Type 2 Diabetes Mellitus Patients with Complications. Osong Public Health Res Perspect. [Internet]. 2018 Aug [cited 2023 Dec 12];9(4):167–74. Available from: doi: 10.24171/j.phrp.2018.9.4.05

- 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 [Internet]. 2022 July 25 [cited 2023 Dec 15]; 17(7): e0271888. Available from: https:// doi.org/10.1371/journal.pone.0271888.
- Schneider ALC, Kalyani RR, Golden S, Stearns SC, Wruck L, Yeh HC, et al. Diabetes and Prediabetes and Risk of Hospitalization: The Atherosclerosis Risk in Communities (ARIC) Study. Diabetes Care. [Internet]. 2016 May [cited 2023 Dec 18];39(5):772–9. Available from: doi: 10.2337/dc15-1335. Epub 2016 Mar 7.
- Kim S. Burden of hospitalizations primarily due to uncontrolled diabetes: implications of inadequate primary health care in the United States. Diabetes Care. [Internet]. 2007 May[cited 2023 Dec 15];30(5):1281–2. Available from: doi: 10.2337/dc06-2070.
- Zoungas S, Chalmers J, Ninomiya T, Li Q, Cooper ME, Colagiuri S, et al. Association of HbA1c levels with vascular complications and death in patients with type 2 diabetes: evidence of glycaemic thresholds. Diabetologia. [Internet]. 2012 Mar [cited 2023 Dec 15];55(3):636–43. Available from: doi: 10.1007/s00125-011-2404-1.
- Dhimal M, Bista B, Bhattarai S, Dixit LP, Hyder MKA, Agrawal N, et al. Report of Non Communicable Disease Risk Factors: STEPS Survey Nepal 2019 [Internet]. Kathmandu: Nepal Health Research Council; [cited 2023 Dec 10]. Available from: https://nhrc.gov.np/wp-content/uploads/2020/04/NEPAL%E2%80%93Noncommunicabledisease-risk-factors-STEPS-Survey-2019-%E2%80%93-Tobacco-Factsheet.pdf



Photo and Bio

- Sanchita Subedi, MSc. Nursing, RN
- Specialized in Medical-Surgical Nursing, with over 13 years of experience in both clinical and academic field.
- She has published articles in different journals and currently works as an Assistant Professor at Janamaitri Foundation Institute of Health Sciences, Hattiban, Lalitpur.

