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Hypoglycemia Preventive Practice, and Associated Factors Among Diabetic Patients at Adama Medical College Hospital: A Cross-Sectional Study

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Abstract

Background: Hypoglycemia is a complication of diabetes mellitus and is considered a medical emergency. Prolonged hypoglycemia can lead to brain injury and death. Preventive practices for hypoglycemia are crucial for the self-care of diabetic patients. Therefore, this study aimed to explore hypoglycemia preventive practices and the associated factors among diabetic patients.

Methods: A cross-sectional study design was employed from February 3 to March 28, 2023. A systematic random sampling method was used to select 212 diabetic patients from hospital attendants. Data were collected and analyzed using SPSS version 25 to measure the associations of dependent and independent variables. A linear regression model was fitted to determine the predictors of hypoglycemia and preventive practices among diabetic patients.

Result: Among the 212 adult diabetic participants, there was a response rate of 98.6%. The mean age of the participants was 47.21 (±16.3 SD) years, and the mean knowledge score regarding hypoglycemia symptoms was 64.63 (±27.6). The majority of the study participants (120, or 56.6%) reported experiencing hypoglycemia episodes in the past four weeks. The mean score for hypoglycemia preventive practices among respondents was 61.21 (±19.6) and 40% of the study participants uses table sugar in their diet as a preventive measure. Factors associated with hypoglycemia preventive practices included social support (β=9, 95% CI: 4.3, 14), membership in a diabetic association (β=13.8, 95% CI: 8.1, 18), and knowledge of hypoglycemia (β=0.2, 95% CI: 0.07, 0.4).

Conclusion: One-fourth of the participants scored below 50 on their knowledge of hypoglycemia symptoms and 129 participants (60.8%) reported not carrying a diabetic identification card or table sugar while traveling. The Ethiopian Ministry of Health, diabetic associations, and healthcare workers should prioritize promoting patients' knowledge of hypoglycemia symptoms and preventive practices by strengthening information dissemination and diabetic education.

Keywords: Hypoglycemia, symptoms, knowledge, practice, Diabetic patients.

What is already known in this topic?

Self-monitoring on regular blood glucose monitoring can help to identify and manage their blood sugar levels effectively and to have better control over hypoglycemia.

What this study adds?

Assess preventive practice of hypoglycemia; determine the level of awareness, understanding of hypoglycemia and its prevention and identifying influencing factors, and insight into practices.

How this study might affect research practice, or policy?

The study has the potential to shape both the academic understanding of hypoglycemic prevention and the practical approaches used in health care policy and potential education.

1. Introduction

Hypoglycemia is a true medical emergency that requires prompt recognition and treatment to prevent organ and brain damage. The spectrum of symptoms depends on the duration and severity of hypoglycemia, ranging from autonomic activation and behavioral changes to altered cognitive function, seizures, or coma **[1]**. It can occur when blood glucose levels fall below 40–50 mg/dL, which may endanger a patient's life **[2]**.

Short- and long-term complications of hypoglycemia include neurological damage, trauma, cardiovascular events, and even death. Severe untreated hypoglycemia can impose a significant economic and personal burden. It can also be a major barrier to optimal glycemic

control, often exacerbated by iatrogenic hypoglycemia. This can lead to recurrent morbidity in individuals with type 1 diabetes mellitus (T1DM) and advanced type 2 diabetes mellitus (T2DM), as well as a compromise in physiological and behavioral defenses against hypoglycemia. Consequently, this may result in recurrent episodes of hyperglycemia and hinder the maintenance of euglycemia (a normal level of sugar in the blood) **[1, 3]**. Moreover, hypoglycemia can seriously affect an individual's quality of life by altering daily productivity and increasing healthcare costs, making it a significant burden in low-income countries **[4]**.

Research conducted in various African countries indicates a frequent and significant number of hypoglycemia cases among diabetic patients **[5-8]**. In Ethiopia, for example, episodes of hypoglycemia in diabetic patients occur in 70.8% of cases **[9]**. Various studies across African countries, particularly in Nigeria, Sudan (Khartoum), and Ethiopia, demonstrate that more than half of diabetic patients have poor knowledge of hypoglycemia symptoms **[10, 11]**.

Understanding the symptoms of hypoglycemia is crucial for effective management and better self-care practices among diabetic patients. Recognizing and identifying these symptoms is essential formanaging diabetic episodes effectively and preventing recurrence **[12,13]**. Additionally, factors associated with hypoglycemia prevention practices are significant for effective management **[14]**.

The primary purpose of patient education for individuals with diabetes is to alleviate problems related to metabolic disorders and improve overall quality of life through self-care practices. Major areas of self-care in diabetes management include dietary regulation, medication adherence, physical activity, and self-monitoring of blood glucose levels at home **[11, 15]**.

This study aims to explore hypoglycemia prevention practices and associated factors among diabetic patients at Adama Public Hospital. The findings may support healthcare professionals, diabetic patients, and hospital managers, as well as policymakers, in focusing their intervention strategies on effective management practices. Furthermore, this study may serve as baseline information for other researchers interested in conducting similar studies.

2. Research Questions/Hypothesis

2.1. How is hypoglycemia preventive practice among diabetic patients?

2.2. What are the factors associated with hypoglycemia in diabetic patients?

3. Methods and Materials

3.1 Study area

Adama Hospital Medical College, formerly known as Hayile Mariam Mamo Memorial Hospital, is located 100 km east of Ethiopia's capital city, Addis Ababa. According to a report from the Central Statistical Agency in 2017 (2007 E.C.) and information from the Adama Town Health Bureau, the town currently has one governmental medical college hospital and seven government health centers. The hospital serves more than six million people residing in the city, surrounding zones, and woredas **[8]**.

3.2. Study design and period

A health care institution-based cross-sectional study was conducted at the diabetic follow-up center of Adama Medical College Hospital from February 3 to March 28, 2023.

3.3 Study Population:

The study population consisted of all adult diabetic mellitus patients enrolled in the follow-up center at Adama Medical College. A sample population was drawn from this group during the data collection period.

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion criteria

All adult diabetic patients who were age > 18 years and attending Diabetic follow-up unit.

3.4.2. Exclusion criteria

Diabetic patients with seriously ill and women with gestational and pediatric diabetic patients were not included in the study.

3.5. Sample size determination and sampling procedures

A single population proportion formula was used to determine the sample size, considering a 95% confidence interval, a 5% margin of error (d), and a 63.2% prevalence (P) of hypoglycemia prevention practices, as reported in a study conducted in the Tigray region **[19]**.

The formula used is: $ni = \frac{(Z\alpha/2)2\ p(1-p)}{d2}$

Where ni =initial sample size

α=level of confidence interval =95%

p=prevalence of good hypoglycemia preventive practice

d= margin of error between the sample and the population=5%

$ni = \frac{(1.96)2\ (0.632)\ (0.368)}{0.0025}$ ni= 357

Since the source population was 430 which is less than 10,000 finite population correction formula was applied.

no = ni/ (1 + n/N) where no= desired sample

no = 357/(1+ 357/430) N= Total population

no = 357/1.83 ni= calculated sample size

no = 196.

By adding 10% (19 participants) for non-response rate the totalsample size equal to 215.

Finally, a systematic random sampling technique was employed to select study participants. The patients' registry logbook served as the sampling frame, and the patients' card numbers were used to select samples from every other patient. The patient registry appointment logbook was used to determine the total number of diabetic patients, which was then divided by the required sample size: K^{th}=N/n=430/215= 2

Thus, study participants were selected from every other patient.

3.6 Variables

3.1.1. Dependent variables: hypoglycemia preventive practice.

3.1.2. Independent Variables:

Socio-demographic factors (age, sex, religion, income, residence, occupation, educational level, and marital status), clinical characteristics (Type of treatment, attending diabetic health education, duration of diabetes mellitus and family history of diabetes) other factors (member of the diabetic association, having glucometer at home),

3.7 Operational definition

Hypoglycemia preventive practice: participants who practice hypoglycemia prevention activities effectively. Participants' practices were measured by 11 measurement questions. The practice variable was the proportion of the total score on these 11 questions. A total practice score ranges from 0 as no practice to -100 full positive practices **[1, 3]**.

The proportion score on knowledge and practice questions is calculated as a total score of each section divided by the ideal maximum score on that section *100 **[3, 5]**.

3.8 Data collection tool and procedures

An interviewer-administered structured questionnaire was used to collect data from the study participants. Validated questionnaires from previous studies were employed to assess hypoglycemia preventive practices **[11, 12]** and social support **[12, 13]**. Formal permission was obtained from the original authors of the relevant literature. The questionnaires were adapted to suit the socio-demographic characteristics of the study population. They were prepared in English and translated into two local languages, “Amharic” and “Affan Oromo,” by experts, with back-translation to English to ensure consistency.

The data collection tool consisted of four components: *General Awareness of Hypoglycemia, Hypoglycemia Management, Preventive Methods, and Hypoglycemia Symptoms*.

The section on hypoglycemia symptoms included 12 questions, with a maximum score of 12 points. Each correct response was scored as 1 point, while each incorrect response received 0 points. The total knowledge score was calculated as the proportion of the total score to the ideal maximum score, multiplied by 100.

The Diabetes Self-Management Questionnaire (DSMQ) was used to assess self-care activities associated with glycemic control. This validated tool demonstrated acceptable consistencies in its subscales: glucose monitoring (0.77), dietary control (0.77), physical activity (0.76), and healthcare use (0.60). The internal consistency (Cronbach’s alpha) for the DSMQ was 0.84. The practice was assessed using 11 questions, with scores similarly calculated as the proportion of the total score to the ideal maximum score, multiplied by 100.

Respondents rated their responses on a four-point Likert scale to avoid neutral responses, with options as follows: Does not apply = 0, Applies to some degree = 1, Applies to a considerable degree = 2, and Applies very much = 3.

The scale scores ranged from 0 to 100 (raw score / theoretical maximum score * 100), with higher values indicating effective self-care practices **[17]**.

Questions regarding social support were assessed using the Duke Social Support and Stress Scale, which contains 12 items that evaluate support from family and non-family members **[18]**.

Data collection was conducted by three BSc nurses through structured face-to-face interviews, supervised by two senior BSc nurses trained in diabetes care. The data collectors underwent one day of training, and a pre-test was conducted on 5% of the actual sample size (10 diabetic patients) to ensure reliability. Reliability was tested using Cronbach’s alpha coefficient and was found to be acceptable. Data collection was conducted with appropriate precautions for COVID-19.

3.9 Data processing and analysis

Data were checked for completeness, cleaned, coded, and entered into EpiData version 4.6, then exported to SPSS version 25. Descriptive statistics were performed and presented in tables and figures. Before running the regression model, multi-categorical variables were converted into dummy variables. To ensure the relationship between the dependent and independent variables was linear, the linearity assumption was tested using scatter plots. Additionally, the assumption was checked with histograms and P-P plots, all of which were satisfied. A linear regression analysis was conducted to assess the association between the outcome variable and each independent variable. Variables that showed an association with the outcome variable at $p \leq 0.25$ were entered into a multiple linear regression analysis to test for independent associations. The multicollinearity test was employed to assess the correlation between the independent variables. The variance inflation factor (VIF) for each independent variable ranged from 1 to 4, with a minimum tolerance value of 0.27 and a maximum value of 0.84. To measure the strength of the association between the outcome and independent variables, crude beta and adjusted beta coefficients, along with a 95% confidence interval (CI), were calculated. P-values below 0.05 were considered statistically significant.

4. Results

4.1. Socio demographic and clinical characteristics of the study participant

A total of 212 adult diabetic patients participated in this study,resulting in a response rate of 98.6%. The majority of the participants were male, accounting for 119 (56%) of the sample. The mean age of the participants was 47.21 years (±16.3 SD).

Regarding religious affiliation, 139 participants (65.6%) identified as Orthodox Christians, while 128 (60.4%) were married. Education levels varied, with 58 participants (27.4%) having completed secondary education and 36 (17%) unable to read or write. As shown in **Table 1**, most participants, 173 (81.6%), lived in urban areas. In terms of occupation, 49 participants (23%) were self-employed, and 79 (37.5%) reported a monthly income of less than 1000 ETB.

Table 1: Socio-demographic features of the participants on hypoglycemia preventive practice among diabetic patients attending diabetic follow-up unit. (n=212).

Variables	**Category**	**Frequency**	**Percentage (%)**
Age	Mean ±SD	47.21 (±16.3SD)	
Sex	Male	119	56.1
	Female	93	43.9
Religion	Orthodox	139	65.6
	Muslim	42	19.8
	Protestant	29	13.7
	Other (Catholic, Jehovah)	2	0.9
Marital Status	Single	41	19.3
	Married	128	60.4
	Divorced	17	8
	Widowed	26	12.3
Educational Level	Unable to read &write	36	17
	Read and write	17	8
	Primary Education (Grade1-8)	57	26.9
	Secondary education (Grade 9-10)	58	27.4
	College and above	44	20.8
Residence	Rural	39	18.4
	Urban	173	81.6
Occupation	House wife	44	20.8
	Retired	43	20.3
	Self-employed	49	23.1
	Government –employed	26	12.3
	Farmer	40	18.9
	Other *	10	4.7
Monthly Income (In ETB*) *n= (205)*	≤999	79	37.3
	1000-1999	40	18.9
	2000-2999	21	9.9
	3000-3999	19	9
	4000-4999	12	5.7
	≥ 5000	34	16

Other (students, jobless and private employed) ***ETB (Ethiopian birr)***

4.2 Clinical characteristic of the participant

Out of the participants, 135 (63.7%) did not know their type of diabetes, while 39 (18.4%) were diagnosed with type 2 diabetes, and the remaining participants had type 1 diabetes. Among them, 84 (39.6%) had a diabetes duration of 10 years or more. At the time of data collection, 140 participants (66%) were being treated with oral hypoglycemic medications, such as Metformin and Glyburide. Approximately 204 (96.2%) reported taking their medication twice a day, while the remaining 64 participants (30%) were on insulin treatment only. Regarding family history, 141 participants (66.5%) reported no family history of diabetes, and 15 (7.1%) were unsure if they had a family history of the condition. As indicated in Table 2, more than half of the participants, 121 (57%), were not members of a

diabetes association, and 137 (64.6%) did not attend diabetes health education sessions. Furthermore, 91 participants (42.9%) owned a glucometer at home, and the majority, 120 (56.6%), reported experiencing hypoglycemia episodes in the past four weeks.

Table 2: Clinical characteristics of the participants on hypoglycemia preventive practice among diabetic patients attending diabetic follow-up unit (n=212).

Variables	Category	Frequency	Percentage
Patient knowledge about the type of diabetes	Type 1	38	17.9
	Type 2	39	18.4
	I don't know	135	63.7
Duration of diabetes	≤ 1 year	18	8.5
	2 years -5 years	69	32.5
	6years -9 years	41	19.3
	≥ 10 years	84	39.6
Type of treatment	Insulin only	64	30.2
	Oral hypoglycemic agent like Metformin, and Glyburide	140	66
	Both insulin & OHA	8	3.8
Frequency of taking medication	Once daily	8	3.8
	Twice daily	204	96.2
Family history of diabetes mellitus	Yes	56	26.4
	No	141	66.5
	Don't know	15	7.1
Member of diabetic association	Yes	91	42.9
	No	121	57.1
Attending diabetic health education	Yes	75	35.4
	No	137	64.6
Having glucometer at home	Yes	91	42.9
	No	121	57.1
Experiencing hypoglycemia episodes for the last 4 weeks	Yes	120	56.6
	No	86	40.6
	I don't know	6	2.8

4.3 Hypoglycemia preventive practice

The mean score for hypoglycemia preventive practices among the respondents was 61.21 (±19.6 SD), with a minimum score of 6 and a maximum score of 100. One hundred twenty-three participants (58%) scored above three-quarters (75%) of the practice questions. As shown in Figure 1, the majority of respondents, 179 (84.4%), reported a high score for the practice of "I keep all doctor's appointments." In contrast, 128 participants (60%) indicated that they did not keep table sugar on hand to treat hypoglycemia while traveling.

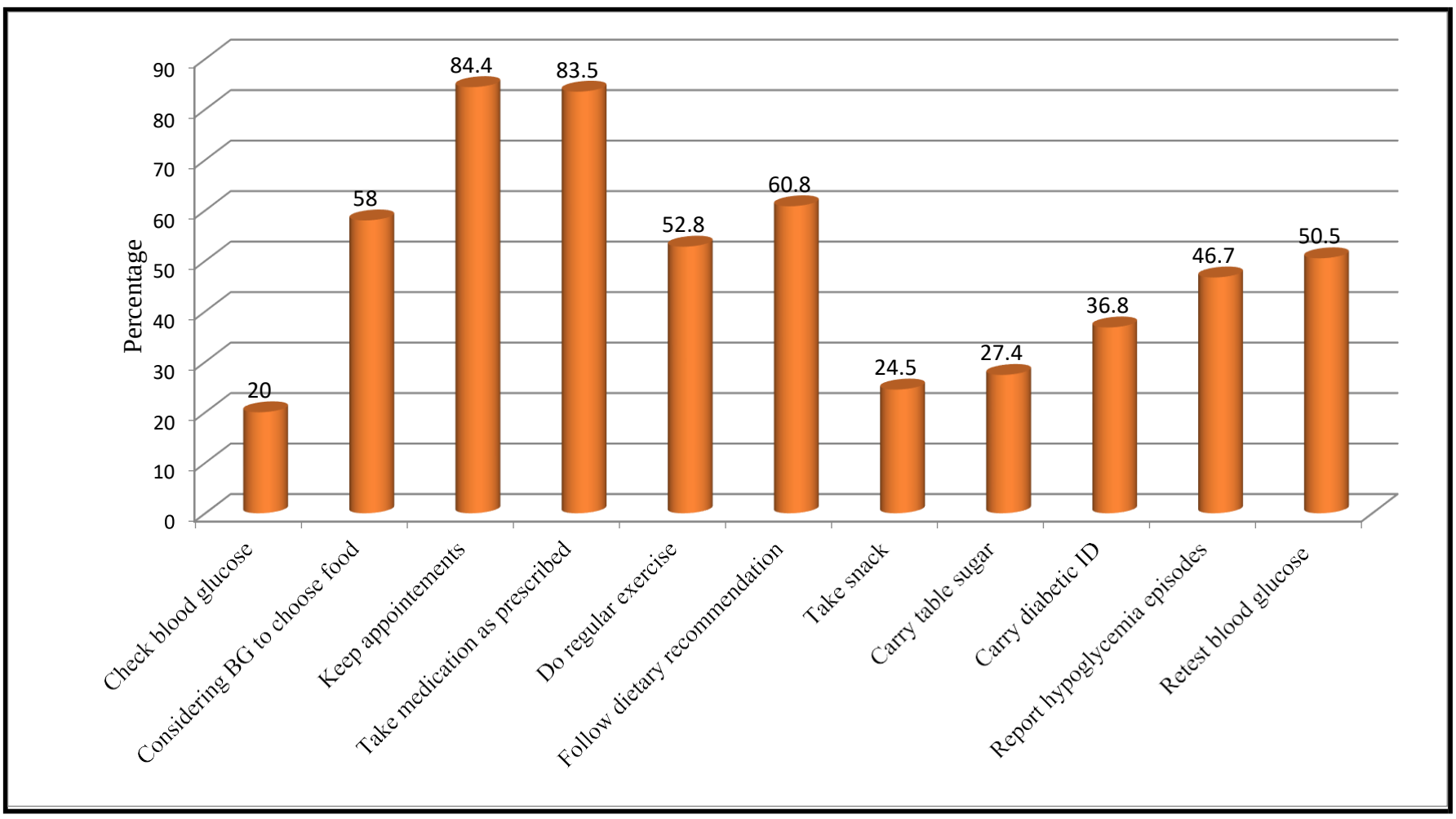

Figure 1: Percentage of respondents on the hypoglycemia preventive practice among diabetic patients attending diabetic follow-up unit (n=212).

4.4 Factors associated with Knowledge of hypoglycemia symptoms

The mean knowledge score among participants was 64.63 (±27.6 SD). Of the participants, 144 (68%) were aware of more than half of the symptoms of hypoglycemia. Among these, 38 participants (17.9%) scored 100, while four participants (2%) did not know any symptoms of hypoglycemia. The most commonly identified symptom was excessive hunger, reported by 168 participants (79.2%), and followed by sweating (165 participants, 77.8%) and tremors of the hands (155 participants, 73.1%). Additionally, awareness of other symptomssuch as nausea, palpitations, and headaches was low, with only27.4%, 21.2%, and 20.3% of participants recognizing these symptoms, respectively.

In simple linear regression, factors such as educational level, occupation, duration of diabetes mellitus, experience of hypoglycemia episodes, attendance in diabetic health education, and type of treatment were associated with familiarity with hypoglycemia symptoms.

Multiple linear regressions were conducted to control for potential confounding effects. The analysis showed that experiencing hypoglycemia episodes and type of treatment were significantly associated with awareness of hypoglycemia symptoms at a p-value < 0.05. Diabetic patients who experienced hypoglycemia episodes were, on average, 19 times more knowledgeable about symptoms than those who had not experienced episodes, while keeping other variables in the model constant (beta = 19, 95% CI: 12, 26.9). After adjusting for other variables, patients receiving treatment with both oral hypoglycemic agents (OHA) and insulin had, on average, 22.6 times higher hypoglycemia knowledge scores compared to those treated with OHA alone (beta = 22.6, 95% CI: 4, 41).

4.5 Factors associated with the hypoglycemia prevention practice

Controlling for potential confounding variables in the multiple linear regression analysis, several factors were found to be statistically significant in association with hypoglycemia preventive practices at a p-value < 0.05, as depicted in **Table 3**. Diabetic patients who received support from family and non-family members were, onaverage, 9 times more likely to have better hypoglycemia preventive practice scores than those who did not receive support (beta = 9, 95%CI: 4.3, 14), while keeping other variables in the model constant.

After adjusting for additional variables, patients who were members of a diabetic association had, on average, 13.8 times higher hypoglycemia preventive practice scores compared to those who were not members (beta = 13.8, 95% CI: 8.1, 18). Furthermore, for each one-unit increase in knowledge of hypoglycemia score, the hypoglycemia preventive practice score increased by 0.2 units (beta = 0.2, 95% CI: 0.07, 0.4).

Table 3: Factors associated with hypoglycemia preventive practice among diabetic patients attending diabetic follow-up unit (n=212)

Variable		**Simple linear Regression**		**Multiple linear Regression**
		β^a (95% CI)	**P value**	**β^b (95% CI)**
Age	18-27	1		
	28-37	4.9 (-4.7,14.6)		
	38-47	3.5 (-5.7,12.7)		
	≥ 48	7.9 (-0.5,15.8)	0.052	
Educational status	Unable to read & write	1		
	Read and write	7.8 (-3.4,19)		
	Primary Education	1.7 (-6.4,9.9)		
	Secondary education	4.5 (-3.6,12.7)		
	College and above	8.8 (0.17,17.4)	0.046	
Residence	Rural	1		
	Urban	9.4 (2.7,16.2)		
Occupation	Farmer	1		
	House wife	8.9 (0.9,16.8)	0.029	
	Retired	2 (-5.9,10)		
	Self-employed	2.6 (-5,10.4)		
	Government - employed	7(-2.1,16.4)		
Type of diabetes	Type 1	2.3 (-4.6,9.3)		
	Type 2	10.5 (3.6,17.4)	0.003	
Duration of DM	≤ 1 year	1		
	2 years -5 years	6.6 (-3.6,16.8)	0.2	
	6 years -9 years	4.9 (-5.9,15.9)		
	≥ 10 years	5.5 (-4.5,15.6)		
Frequency of taking medication	Once daily	17.9 (4.2,31.7)	0.011	
	Twice daily	1		
Family history of DM	No	1		
	Yes	4.4 (-1.6,10.5)	0.133	
	I don’t know	-1.3 (-11,9.1)		
Member of diabetic association	No	1		
	Yes	16.6 (11.8,21.5)	<0.001	**13.8 (8.1,18) ****
Attending diabetic health education	No	1		
	Yes	9.8 (4.4,15.2)	<0.001	
Having glucometer at home	No	1		
	Yes	5.8 (0.5,11.1)	0.031	
Experiencing hypoglycemia episodes	No	1		
	Yes	5.1 (-0.2,10.6)	0.06	
	Don’t know	-7.4 (-23.6,8.7)		
Social support	Non-Supported	1		
	Supported	13.4(8.4,18.4)	<0.001	**9 (4.3,14) ****
Total score of hypoglycemia knowledge		0.4 (0.2,0.5)	0.005	**0.2 (0.07,0.4) ***

β^a: Crude regression coefficient β^b: Adjusted regression coefficient CI: confidence interval **DM:** Diabetes Mellitus ***statistically significant at p <0.05 **statistically significant at p <0. 001**

5. Discussion

Standard hypoglycemia preventive practices are vital for enhancing the quality of care for diabetic patients, minimizing risks associated with low blood sugar, and improving overall management to reduce the incidence of hypoglycemia among diabetic patients **[1]**. Conversely, inappropriate management of hypoglycemia can lead to serious brain and organ damage and may even result in death if severe and prolonged **[2]**.

The current study revealed that the mean knowledge score of hypoglycemia symptoms was 64.63 (±27.6 SD). Factors such as experiencing hypoglycemia episodes and being treated with both insulin and oral hypoglycemic agents (OHA) were significantly associated with knowledge scores. Additionally, knowledge of hypoglycemia, membership in a diabetic association, and social support were significantly correlated with improved hypoglycemia preventive practices.

In this study, 4 participants (2%) did not know any symptoms of hypoglycemia. This result is relatively smaller compared to studies conducted in India and South Africa, where a significant number of participants were unaware of any clinical symptoms of hypoglycemia **[13, 19]**. This discrepancy may be attributed to the smaller sample size and the time gap between studies, which likely increased awareness of hypoglycemia symptoms over time.

The study indicates that diabetic patients treated with oral hypoglycemic agents, such as Metformin and Glyburide, were more likely to recognize hypoglycemia symptoms compared to those treated with insulin. This finding is consistent with studies conducted in Sudan and South India **[14, 20]**, which may reflect similar socio-demographic characteristics of the study populations.

Excessive hunger was the most commonly identified symptom of hypoglycemia, recognized by 168 participants (79.2%). In contrast, studies in Nigeria, South India, and Saudi Arabia found that dizziness and fatigue were the most recognized symptoms **[11, 13, 21]**. This difference may arise from varying personal experiences of hypoglycemia symptoms or a lack of awareness regarding dizziness and fatigue as symptoms.

Additionally, the mean hypoglycemia preventive practice score among respondents was 61.21 (±19.6 SD), with only 42 participants (19.8%) checking their blood glucose levels daily. This finding is higher than that of a study conducted in Gondar, where only 32 (7.7%) of respondents monitored their blood glucose levels daily **[22]**. This improvement may be due to increased diabetic education and national health promotion programs focused on non-communicable diseases, which enhance patient awareness of the importance of monitoring blood glucose levels. Furthermore, having a glucometer at home encourages patients to measure their blood glucose levels and make necessary treatment adjustments.

The study also revealed that 81 participants (38.2%) did not have the practice of taking snacks to prevent hypoglycemia, which is a lower percentage than the 67.5% reported in Gondar **[12]**. This inconsistency may stem from the smaller sample size of the current study.

One hundred twenty-two participants (52.8%) reported practicing regular and moderate exercise daily, which aligns with findings from studies in Dire Dawa and Addis Ababa, where 53.8% and 51.3% of respondents engaged in daily physical activity, respectively **[23, 24]**. This similarity may be due to comparable demographic characteristics.

Diabetic patients who were members of a diabetic association had 16 times higher hypoglycemia preventive practice scores than those who were not members. This finding is supported by studies conducted in South Gondar and Addis Ababa **[22, 24]**. Membership in a diabetic association provides opportunities for acquiring knowledge about hypoglycemia preventive practices through education, discussions, and the distribution of informational materials. These associations also facilitate access to medications and blood glucose testing for lower-income individuals, thus enhancing self-care practices.

Furthermore, diabetic patients who received support from family and non-family members were 9 times more likely to have higher hypoglycemia preventive practice scores compared to those without support. This finding is comparable to a study conducted in Addis Ababa, which indicated that social support is associated with improved self-care practices **[25]**. The difference in knowledge about hypoglycemia and the encouragement received from family, friends, neighbors, and coworkers may motivate individuals to adopt better self-care practices.

Participants with higher knowledge scores of hypoglycemia were also more likely to demonstrate better hypoglycemia preventive practices. This finding is consistent with research conducted in Addis Ababa, Gondar, Tigray, and Benishangul Gumuz, which indicates that knowledge of diabetes and hypoglycemia correlates with good self-care practices **[12, 14, 24, & 25]**. This highlights the importance of education and knowledge in preventing hypoglycemia.

6. Strength and limitation of the study

6.1. Strength of the study

The study utilized a comprehensive and well-structured instrument that was pretested to ensure clarity and relevance. Appropriate modifications were made based on the pretest results before data collection, enhancing the reliability and validity of the findings.

6.2. Limitation of the study

The cross-sectional study design limits the ability to establish cause-and-effect relationships between the dependent and independent variables. Additionally, participants were recruited from a single governmental health care institution, excluding other private health care facilities. As a result, the findings of this small-scale study may

not be generalizable to all individuals with diabetes mellitus. Future research should involve larger-scale studies with more representative sample sizes, including pediatric patients with diabetes mellitus and those with gestational diabetes.

7. Conclusion and Recommendations

Diabetic patient education is a crucial component of healthcare interventions aimed at improving metabolic activities, preventing acute and chronic complications, and enhancing overall quality of life. Effective self-care practices in diabetes management—including dietary regulation, medication adherence, and physical activity—are essential for optimal health outcomes. The study revealed that one-fourth of the participants scored below 50 on their knowledge of hypoglycemia symptoms, with four participants unaware of any symptoms at all. Additionally, 129 participants (60.8%) reported not carrying a diabetic identification card or table sugar while traveling. Factors associated with knowledge of hypoglycemia symptoms and preventive practices included having social support, being a member of a diabetic association, and achieving a higher total knowledge score regarding hypoglycemia.

To address these gaps, the Ethiopian Ministry of Health, diabetic associations, and healthcare workers should prioritize enhancing patients' knowledge of hypoglycemia symptoms and preventive practices. This can be accomplished by strengthening information dissemination and expanding diabetic education initiatives.

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Abbreviations

BSc -Bachelor of Sciences

CI -Confidence Interval

DM-Diabetes Mellitus

EC-Ethiopian Calendar

ETB-Ethiopian Birr

GC-Gregorian Calendar

OHA -Oral Hypoglycemic Agents.

Declarations

Ethics approval and consent to participate

Written ethical clearance was obtained with ref. number CHS/NGS/00157 from the Institutional Review Board (IRB) of Addis Ababa University (AAU), College of Health Sciences, School of Nursing and Midwifery, and written permission was obtained from Adama Hospital Medical College. After a detailed explanation of the aim, procedure, potential risk, benefits, and rights of the participants were given to the participants, written consent from the participants was obtained. To respect the participants' dignity and to keep appropriate precautions against covid 19 the interview was taken in to ventilated, lighted, clean, and quiet room attached to the unit. Confidentiality of information was maintained; no unauthorized person had access to the information and names or other identifiers were not recorded. Methods were carried out in accordance with Helsinki guidelines and regulations.

Availability of data and materials

All relevant data are included within the manuscript document. If it is necessary, it is possible to contact the corresponding author to get additional materials.

Competing interests

This thesis is submitted in partial fulfilment of the requirement for the MSc degree from the School of Postgraduate Studies at Addis Ababa University, School of Nursing and Midwifery. The thesis is deposited in the Library of Addis Ababa University and is made available to the user under the rules of the library. The authors do not have any competing interests.

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Authors' Contributions

This study is the result of joint research, and the contribution of each author is comparable to the others. The roles of each author are as follows:

Conceptualization: Teshome Habte, and Hussen Mekonnen.

Data curation: Teshome Habte, and Kenean Tadesse.

Formal analysis: Kenean Tadesse.

Investigation: Teshome Habte, and Kenean Tadesse.

Methodology: Hussen Mekonnen, and Teshome Habte.

Project administration: Kenean Tadesse.

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