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ORIGINAL RESEARCH

Prevalence of Hypoglycemia and Its Determinants Among Diabetes Patients on Insulin Treatment at Tepi General Hospital, Southwest, Ethiopia

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Background: Hypoglycemia occurs when the blood sugar levels are too low. In severe cases, hypoglycemia may give to seizures, coma, and sometimes death. The prevalence of hypoglycemia among patients with diabetes is likely underreported and undocumented.

Methods: An institutional-based cross-sectional study was conducted among 336 study participants at the Tepi General Hospital in Southwest Ethiopia. A binary logistic regression model was used to determine the association between the prevalence of hypoglycemia and the factors associated with it. After a bivariate analysis, variables with a p value of < 0.25 were selected as a candidate for multivariable analysis. An odds ratio with a 95% CI was considered to indicate a significant association.

Results: With 95% CI (52.48–62.25) the prevalence of hypoglycemia was determined as 57.44%. Nearly 11% of the patients encounter severe hypoglycemia. Female patients had three times higher odds of experiencing hypoglycemia (aOR=3, 95% CI: 2.10, 6.39). Those with no formal education had 1.5 times higher odds of experiencing hypoglycemia (aOR = 1.5, 95% CI: 1.08, 5.45). Patients with type 1 diabetes were 3.4 times more likely to experience hypoglycemia (aOR = 3.4, 95% CI: 1.87, 7.50). Those who had been diagnosed before 10 years (aOR = 1.3, 95% CI: 1.02, 3.21) were more likely to have hypoglycemia. Furthermore, patients who consumed alcohol were 3.0 times more likely to have a history of hypoglycemia (aOR = 3.0, 95% CI: 2.03, 6.43).

Conclusion: The magnitude of hypoglycemia among patients with diabetes is determined to be considerable with more than half of the participants encountered hypoglycemia. There is a strong relationship between the occurrence of hypoglycemia and sex, type of diabetes, time since diagnosis, alcohol status, and education status. Therefore, all concerned parties must pay close attention to lessen the prevalence of hypoglycemia and address the problems based on the primary contributing factors.

Keywords: hypoglycemia, diabetes mellitus, insulin, Ethiopia

Background

Hypoglycemia occurs when the blood sugar levels are too low. Glucose serves as the primary energy source for the body, and when it becomes insufficient, one may experience symptoms such as shakiness, weakness, or confusion. In severe cases, hypoglycemia may give to seizures, coma, and sometimes death. It is important to note that the prevalence of hypoglycemia among patients with diabetes is likely underreported and undocumented.[1] Different type of insulin regimens has an important influence on control of serum glucose level and can help to delay the onset of hypoglycemia complications,[2,3] It is challenging to manage patients with no significant risk of hypoglycemia in actual practice. Hypoglycemia occurs due to imbalances in insulin administration, glucose intake, physical activities, and alcohol intakes. Beginning or starting of insulin treatment can be hindered due to the fear for hypoglycemia.[4] It's important to note that hypoglycemia has been associated with adverse outcomes and higher mortality rates.[5]

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Approximately 4% of patients using insulin experience hypoglycemia in type 1 diabetes mellitus (T1DM), while the prevalence in type 2 diabetes mellitus (T2DM) ranges from 1% to 3%. Notably, patients typically seek medical attention only when experiencing severe hypoglycemic events.[6] These estimates primarily emphasize the occurrence of severe hypoglycemia, as patients typically seek medical assistance only when the event reaches a critical stage.[7]

Research on hypoglycemia has revealed its widespread occurrence in diverse populations globally.[8–10] Nevertheless, accurately verifying the incidence of hypoglycemic events in real-world clinical contexts remains challenging. Based on a comprehensive global study, hypoglycemia was observed in approximately 95.3% of individuals diagnosed with type 2 diabetes, and 97.4% of those with type 1 diabetes. This highlights the significant prevalence of hypoglycemic events in both patient groups.[11] Recent studies conducted across European, Asian, and African countries, focusing on self-reported rates of hypoglycemic episodes, consistently reveal that nearly all patients experience hypoglycemia.[11,12] In a study conducted in Debre Markos, the occurrence of hypoglycemia was 64.2% among individuals diagnosed with T1DM and 27.4% among those with T2DM. These findings highlight the varying prevalence of hypoglycemic events in distinct patient groups.[13]

Nearly all instances of hypoglycemia are managed outside the hospital system by patients, caregivers, or emergency medical services.[14,15] Educating patients about the self-monitoring of blood glucose (SMBG), making dietary adjustments, modifying medications, meticulously tracking glucose levels, and ensuring timely follow-up with clinicians are all effective strategies for reducing the risk of hypoglycemia.[16,17]

The importance of addressing hypoglycemia among patients with diabetes cannot be overstated. However, our current understanding of its prevalence and associated factors remains insufficient, especially in low- and middle-income countries like Ethiopia. This lack of knowledge may result in suboptimal diabetes management, higher healthcare costs, and a reduced quality of life for those affected. It is crucial to bridge this gap through further research and awareness to improve patient outcomes and overall well-being. Although a single study was conducted at the Debre Markos Referral Hospital in Ethiopia, it focused on a specific institution. As the older adult population with diabetes is expected to grow in the coming decades, understanding the clinical trajectory of diabetes in this demographic is crucial for evidence-based clinical guidelines, research prioritization, resource allocation, and health policy development. Notably, certain variables associated with hypoglycemia, such as smoking and chat chewing, were not addressed in previous studies. Therefore, our study aimed to address these gaps by conducting research at Tepi General Hospital in southwestern Ethiopia.

Methods

Study Design

The study design was a hospital based, cross sectional study.

Study Area and Period

This research was done at the Tepi General Hospital between July 25 and August 25, 2023. This hospital, situated in the Sheka Zone of southwestern Ethiopia, specifically in Yeki Woreda, serves as a government hospital in the region. It is located approximately 611 km from the capital city of Ethiopia. It was first developed in 2014. The hospital caters to a population of over six hundred thousand individuals. The hospital is comprised of eight outpatient departments and four specialized wards.

Study Population

All adults aged ≥ 18 years with diabetes attended a chronic outpatient follow-up clinic at Tepi General Hospital for at list one year during the study period.

Inclusion and Exclusion Criteria

Inclusion Criteria

All sampled adults aged 18 years or older with diabetes attending chronic outpatient follow-up at Tepi General Hospital for at least one month during the study period and those who provided consent.

Exclusion Criteria

Patients who were not able to communicate due to mental illness were excluded from the study.

Samples Size Determination and Sampling Procedure

The sample size was determined using a single population proportion formula, considering the following: 95% confidence interval (CI), 0.708 population proportions from a previous study,[13] and a 10% non-response rate.

$$n = \left(Z\frac{\alpha}{2}\right)2 * p(1-p)/(d)2$$

n = the initial sample size

Z $\alpha/2$ = Standardized normal distribution value for the 95% CI = 1.96

P = proportion of hypoglycemia (0.708).[18]

d = margin of error 5%

$$n = \frac{(1.96)2x0.708(1-0.708)}{(0.05)2} = 317.67 \sim 318$$

By considering 10% non-response rate the sample size were 318 + 31.8 = 349.8 ~350.

Except in cases of disease-related emergencies, each patient with diabetes was scheduled for a monthly checkup, and their prescribed medication was collected. A systematic random sampling technique was employed during the data collection process to gather samples for this study. The actual sampling fraction (Kth) was calculated by dividing the total number of patients attending follow-up appointments (1002) by the corrected sample size (350). As a result, three patients were interviewed consistently. To prevent participant duplication, cards were checked and color-coded cards were issued to patients to return during the subsequent study period.

Study Variables

Dependent Variable

Prevalence of hypoglycemia.

Independent Variables

Sociodemographic characteristics (age, sex, marital status, occupation, income level, educational status, and BMI).

Behavioral factors (Smoking status, Alcohol status, Exercise status and BMI).

Diabetes-related characteristics (Type of Diabetes, Duration of diabetes, type of medication, FBS level).

Data Collection Tools

Data collection instruments were adapted from previously published studies.[13] The questionnaire consisted fife parts. Part I consisted of eight socio-demographic related questions 8 items. Part II included behavior-related questions with 05 items. Part III comprised diabetes-related characteristics with four items. Part IV is Frequency of hypoglycemia with nine items, and part IV is diabetes-related complications with seven items. The data abstraction format was used to review the medical records of patients who were prepared to assess the FBG levels of patients in the past appointment, and BMI was measured.

Data Collection Procedures

A structured face-to-face interview questionnaire was used to collect information from the patients, and a medical record review was used to extract data from the documents. Two diploma nurse professionals were used as the data collectors. The collected data were checked daily for consistency and accuracy.

Data Quality Control Measures

The questionnaire was translated into the local language. The quality of the data was assured by conducting a pre-test using 5% of the total sample size at Mizan Aman Hospital, and necessary corrections and amendments were made

accordingly. The tool was reviewed by two experts to ensure reliability and their comments were incorporated. The tool was also considered for Cronbach's alpha test for its internal reliability and got 0.72 as a result. The principal investigator was following the appropriateness of the data collection procedure and process.

Data Processing and Analysis

The data gathered was inputted and prepared for examination using SPSS version 25. Summary statistics were displayed in various forms such as frequency and percentages. The association between dependent and independent variables was identified using binary logistic regression. In the bivariate analysis, variables with a p-value less than 0.25 were considered for further multivariate analysis. In the multivariate analysis, variables with a p-value below 0.05 were deemed statistically significant and were reported with an adjusted odds ratio within a 95% confidence interval.

Result

Socio Demographic Factors

In this study, 336 diabetic patients participated, achieving a response rate of 96%. Of these, 84 (25%) were in the age bracket of 40–50 years, with the median age being 40 years (IQR = 28–57 years). The majority of the respondents, 185 (55%), were male and 278 (82.7%) were married. A total of 68 (20.3%) respondents were engaged in farming. Only a small fraction of the participants, 8 (2.4%), were affiliated with the Ethiopian Diabetic Association (Table 1).

Table 1 Socio-Demographic Characteristics of Diabetic Patients at Tepi General Hospital, Southwest, Ethiopia 2023 (n=336)

Variables	Categories	Frequency	Percentage
Sex	Male Female	185 151	55.0 45.0
Age	Median 40 (IQR = 28–57)		
Educational Background	No formal education Primary education Secondary education University/college	116 103 74 42	34.6 30.8 22.1 12.5
Marital status	Married Not married	278 58	82.7 17.3
Residence	Urban Rural	239 97	71.1 28.9
Occupation	Farmer House wife Merchant Government employee Pensioner Unemployed	67 56 97 89 20 7	20.0 16.7 28.8 26.5 6.0 2.0
Monthly income	Less than 5000 5000–10,000 Above 10,000	174 126 36	51.9 37.5 10.6
Member of Ethiopian Diabetic Association	Yes No	8 328	2.4.0 97.6

Abbreviation: IQR, inter quartile range.

Behavioral Factors

Out of the participants in the study, 26 (10.7%) reported a history of smoking cigarettes. In addition, 100 (29.8%) and 82 (24.4%) of the patients had histories of consuming alcohol and chewing khat, respectively. On the other hand, 68 (20.2%) of the participants reported engaging in regular physical exercise (Table 2).

Diabetes Related Characteristics

Among the respondents, 213 (63.4%) were diagnosed with type 1 diabetes mellitus, and the average duration of their diabetes was 6.5 years (SD ± 5.6 years). Approximately one-third (31.8%) of the participants were on a regimen of NPH and Regular insulin, while 167 (49.7%) were taking a combination of insulin and metformin. On the day of their visit for data collection, 22 (5.6%) of the respondents had a fasting blood glucose level of less than 70 mg/dl (Table 3).

Prevalence of Hypoglycemia

Out of all the participants, 207 (61.6%; 95% CI: 56.5–65.4%) had experienced hypoglycemia since their diabetes diagnosis. Among these 207 patients, 126 (81.6%) were type 1 diabetic patients and 81 (62.8%) were type 2 diabetic patients who had experienced hypoglycemia since their diabetes diagnosis.

Of all the participants, 16.9% of those with type 1 diabetes and 21.5% of those with type 2 diabetes had never had a hypoglycemic episode.

Table 2 Behavioral Factors Related Characteristics in Diabetic Patients at Tepi General Hospital, Southwest, Ethiopia 2023 (n=336)

Variables	Categories	Frequency	Percentage
Smoking status	Smoker Former smoker Non-smoker	20 16 300	5.9 4.8 89.3
Alcohol drinking status	Drinker Former Drinker Non- Drinker	71 29 236	21.1 8.7 70.2
Chewing khat	Yes No	82 254	24.4 75.6
Regular physical exercise	Yes No	68 268	20.2 79.8

Table 3 Diabetes Related Characteristics in Diabetic Patients at Tepi General Hospital, Southwest, Ethiopia 2023 (n=336)

Variable	Categories	Frequency	Percentage
Type of diabetes	Type-1 Type-2	213 123	63.4 36.6
Duration of diabetes	< 10 years ≥10 years	220 116	65.5 34.5
Type of medication you took	NPH insulin only NPH and regular NPH and Metformin	62 107 167	18.5 31.8 49.7

Abbreviation: NPH, Isophane insulin.

A total of 157 participants had at least one hypoglycemic episode in the month leading up to the study, with 109 episodes occurring in type 1 diabetes patients and 48 episodes in type 2 diabetes patients.

Among all the participants, 50 (24.2%) had experienced severe hypoglycemia, with 23 (46% of the total participants) reporting more than one episode of severe hypoglycemia in the previous year. Only 29 individuals (8.6%) reported having their blood glucose levels measured before engaging in exercise or strenuous work. One hundred twenty-seven participants (61.3%) had consumed sugar at least once and had taken appropriate measures to correct hypoglycemia (Table 4).

Diabetes Related Complications

Hypertension was recorded in 87 participants, accounting for 25.9% of the total. Retinopathy was detected in 55 participants, which is 16.4% of the total. Other complications and comorbidities were also noted, including neuropathy in 4 (1.2%), cardiac disease in 26 (7.7%), nephropathy in 13 (3.8%), foot ulcers in 18 (5.4%), and sexual dysfunction in 10 (2.9%) of the patients' records (Table 5).

Factors Associated with Hypoglycemia

The bivariate logistic regression analysis revealed that sex, age, place of residence, educational status, type of diabetes, alcohol consumption, hypertension, duration of the disease, and type of medication were all associated with hypoglycemia at a significance level of p-value < 0.25.

Following this, a multivariable logistic regression analysis was conducted, considering all these factors simultaneously. Only five factors - sex, education, type of diabetes, duration of diabetes, and alcohol consumption - remained

Table 4 Frequency of Hypoglycemic Events Among Diabetic Patients at Tepi General Hospital, Southwest, Ethiopia 2023 (N = 336)

Variables	Categories	Frequency	Percent
Hypoglycemic episode	Yes	207	61.6
	No	129	38.4
Type of symptoms experienced	Sweating	194	57.7
	Dizziness	205	64.4
	Hunger and nausea	100	29.8
	Sleepiness	184	54.8
	Chills and clamminess	42	12.5
	Shakiness	52	15.4
	Behavioral changes	29	8.6
	Seizures	13	3.8
	Coma	3	0.9
Severe hypoglycemic episode	Yes	50	24.2
	No	157	75.8
Discuss with physician	Never	130	38.2
	Sometimes	179	52.6
	Always	27	7.9
Immediate management of hypoglycemia events occur	Taking sugar	127	61.3
	Taking soft drinks	62	30.0
	Taking table sugar	48	23.2
	Taking honey	10	4.8
	Go to nearby health facility	107	51.7
	Eat food	34	16.4
Measure blood glucose level before exercise	Yes	29	8.6
	No	307	91.4

Table 5 Diabetes Related Complications in Diabetic Patients at Tepi General Hospital, Southwest, Ethiopia 2023 (n=336)

Variables	Categories	Frequency	Percentage
Retinopathy	Yes No	55 281	16.4 83.6
Peripheral neuropathy	Yes No	4 332	1.2 98.8
Heart disease	Yes No	26 310	7.7 92.3
Hypertension	Yes No	87 249	25.9 74.1
Nephropathy	Yes No	13 223	3.8 96.2
Foot ulcer	Yes No	18 318	5.4 94.6
Sexual dysfunction	Yes No	10 226	2.9 97.1

significantly and independently associated with hypoglycemia. These factors had a significant overall effect on the outcome variable at the 5% level of significance.

Female diabetic patients had three times higher odds of experiencing hypoglycemia compared to their male counterparts (aOR=3, 95% CI: 2.10, 6.39). Diabetic patients with no formal education had 1.5 times higher odds of experiencing hypoglycemia compared to those with college/university education (aOR = 1.5, 95% CI: 1.08, 5.45). Similarly, diabetic patients with primary education were 30% more likely to experience hypoglycemia than those with college/university education (aOR = 1.3, 95% CI: 1.12, 3.90).

Patients with type 1 diabetes were 3.4 times more likely to experience hypoglycemia than those with type 2 diabetes (aOR = 3.4, 95% CI: 1.87, 7.50). Diabetic patients who had been diagnosed for more than 10 years (aOR = 1.3, 95% CI: 1.02, 3.21) were more likely to have hypoglycemic episodes than those with less than 10 years of diabetes. Furthermore, alcohol consumption showed a statistically significant association with the outcome variables. Patients who consumed alcohol were 3.0 times more likely to have a history of hypoglycemia than those who never drank alcohol (aOR = 3.0, 95% CI: 2.03, 6.43) (Table 6).

Table 6 Factors Associated with Hypoglycemia Among Diabetic Patients at Tepi General Hospital, Southwest, Ethiopia 2023 (n=336)

Variables	History of Hypoglycemia		COR, 95% CI	aOR, 95% CI
	Yes (%)	No (%)		
Sex				
Male	87(47)	98(53)	1	1
Female	120(79.5)	31(20.5)	2.3(1.45, 3.64)	3(2.10, 6.39)*
Age				
<30	32(43.2)	42(56.8)	1	1
30–45	60(54.5)	50(45.5)	1.6(0.12, 1.06)	1.2(0.76, 3.21)
46–60	67(74.4)	23(25.6)	2.4(0.27, 1.47)	2(0.92, 5.87)
>60	48(77.4)	14(22.6)	1.2(−0.58, 0.94)	0.67(0.88, 7.54)

(*Continued*)

Table 6 (Continued).

Variables	History of Hypoglycemia		COR, 95% CI	aOR, 95% CI
	Yes (%)	No (%)		
Residence				
Urban	143(59.8)	96(40.2)	1	1
Rural	64(65.9)	33(30.1)	0.7(−0.75, 0.23)	0.4(0.23, 1.09)
Education				
No formal education	78(67.2)	38(32.8)	1	1
Primary education	66(64)	37(36)	1.5(−0.18, 1.03)	1.3(1.12, 3.90)*
Secondary education	40(57.1)	34(57.1	1.1(−0.73, 0.77)	0.7(0.92, 8.33)
University/college	23(48.9)	20(51.1)	0.97(0.46, 2.07)	0.55(0.22, 5.34)
Type of DM				
Type-2	51(44.7)	72(55.3)	1	1
Type-1	156(81.3)	57(18.7)	3.8(2.41, 6.17)	3.4(1.52, 7.23)*
Alcohol status				
Non- Drinker	124(52.5)	112(47.5)	1	1
Drinker	83(83)	17(17)	4.41(2.46, 7.84)	3(2.03, 6.43)*
Duration with DM				
<10 years	129(58.6)	91(41.4)	1	1
≥10 years	78(67.2)	38(32.8)	1.45(0.90, 2.32)	1.3(1.02, 3.21)*

Abbreviations: COR, crude odds ratio; aOR, adjusted odds ratio; 1, reference category; *, Significant association.

Discussion

Adult patients with diabetes mellitus in the research region were asked about their experiences with hypoglycemia since diagnosis as part of this cross-sectional investigation. Hypoglycemia is a common occurrence in people with T1DM and T2DM, according to the study. It was discovered that 61.6% of the patients with diabetes had previously experienced one or more episodes of hypoglycemia, and 24.2% of the respondents had also experienced a severe hypoglycemic episode.

Hypoglycemia is more common in women than in males. This might be because women are more prone to developing type 2 diabetes than men, or it could be due to hormonal reasons. To lower the risk of hypoglycemia, women with diabetes should collaborate closely with their doctors to create customized treatment plans. This Result is in accordance with a study done in India,[19] Iran,[20] Nigeria,[21] and the US.[22]

In this study, alcohol consumption increased the likelihood of developing hypoglycemia. This outcome is in line with research conducted in Poland.[18] This suggests that alcohol consumption may increase the risk of hypoglycemia by interfering with medication, increasing insulin sensitivity, lowering gluconeogenesis, and impairing the awareness of hypoglycemia.

It seems that there was a larger prevalence of hypoglycemia than previously documented for both mild and severe episodes [8,11], implying that this could be a bigger clinical issue than is currently being recognized. The larger degree of hypoglycemia may have been caused by the fact that most individuals with diabetes in this trial had type 1 diabetes and were receiving insulin. However, the results of this study were not as high as those of previous large prospective studies on the incidence of hypoglycemia in patients with diabetes who reported it to themselves. In other studies, nearly all patients reported experiencing hypoglycemia over the prospective period.[23,24] The higher prevalence of hypoglycemia in studies may be because of recall bias during self-reporting. According to these data, hypoglycemia is common in individuals with diabetes, which calls for proactive monitoring and prophylactic intervention.

The likelihood of hypoglycemia is higher in patients with T1DM than T2DM. Insulin, which aids the body in using glucose for energy, is not produced by individuals with type 1 diabetes, which explains why. Therefore, individuals must

receive insulin shots to regulate their blood sugar levels. However, taking the proper dosage of insulin can be challenging, as too much of it might result in hypoglycemia.

The study also revealed a significant association between hypoglycemic episodes and education. Compared to higher education, informal and primary education are more likely to cause hypoglycemia. There are several possible reasons for this finding. Patients' regular activities may be related to the first explanation. Patient knowledge and education are significantly more preventive and promote tasks that cause hypoglycemia. Their living situation may be a second factor. This conclusion aligns with research conducted at Metu Karl Hospital and Tikur Anbessa Hospital, which found a correlation between lower educational status and the incidence of hypoglycemia.[25,26] The majority of Ethiopian uneducated reside in rural areas with inadequate transportation and infrastructure. Therefore, these patients found it difficult to visit the follow-up clinics. Consequently, patients are likely to have inadequate follow-up care and poor adherence to dietary modifications. Therefore, to reduce the incidence and effects of hypoglycemia, medical practitioners should collaborate with uneducated diabetic individuals. Less educated people living in places with little infrastructure may find alternative care facilities that provide primary healthcare and periodic supervision by senior physicians beneficial. Patients with diabetes can also benefit from diabetes education and experience sharing provided by the Ethiopian Diabetes Association, which can improve their understanding of how to prevent hypoglycemia.

The prevalence of type 1 diabetes in this study was higher than what has been reported in other research. This could be due to several reasons: 1) the study was conducted in a semi-urban area where most patients were poor farmers who had been diagnosed with diabetes since childhood; 2) the possibility of viral infections during childhood; and 3) the low incidence of obesity in the area where the study was conducted. The study also found that patients with type 1 diabetes are more prone to hypoglycemia compared to those with type 2 diabetes. This could be attributed to the fact that all type 1 diabetes patients are treated with insulin therapy, which has a higher risk of causing iatrogenic hypoglycemia.[4] A study from Austria found that individuals with type 1 diabetes reported experiencing hypoglycemia at a rate that was four times higher than those with type 2 diabetes [30]. Indeed, it has been observed in various research that patients with type 1 diabetes tend to experience hypoglycemia more frequently than those with type 2 diabetes, even when they are undergoing similar treatment regimens. This underscores the complexity of managing type 1 diabetes and the need for personalized treatment strategies[13,23,24].

Indeed, the association between hypoglycemia and insulin therapy is well-documented. This finding aligns with previous studies conducted not only in Austria but also in other European countries and Africa. These studies collectively highlight the global nature of this issue and the importance of effective diabetes management strategies.[20,22,23] Insulin therapy is one of the most common causes of iatrogenic hypoglycemia.[7,14] Therefore, patients receiving insulin therapy require a closer follow-up of their glycemic control.

Indeed, this study found that hypoglycemia was more prevalent among patients who had been living with diabetes for a longer period. This aligns with a study conducted by a workgroup from the Endocrine Society and the American Diabetes Association, which found that the longer a person has diabetes, the higher the incidence of iatrogenic hypoglycemia. This suggests that the duration of diabetes is a significant factor in the occurrence of hypoglycemia.[4] It has been well-documented in various research that the risk of hypoglycemia tends to increase as the duration of diabetes extends.[7,8,11] The duration of diabetes plays a significant role in the likelihood of experiencing hypoglycemia. As time passes, the body's cells may become less sensitive to insulin, making blood sugar control more challenging and increasing the risk of hypoglycemia. Therefore, healthcare professionals should closely monitor patients who have been living with diabetes for an extended period. This underscores the importance of long-term management strategies in diabetes care.

This study was conducted in a single hospital with a possibility of the same community and with limited number of experienced health care providers including specialist physicians. As a result, generalizability of the results might be difficult. We recommend future researchers to conduct their study in multiple health facilities and identify the disparities among the health facilities.

Conclusion

The magnitude of hypoglycemia among patients with diabetes in the study area is determined to be considerable with more than half of the participants encountered hypoglycemia. It is revealed that there is a strong relationship between the

occurrence of hypoglycemia and sex, type of diabetes, time since diagnosis, alcohol status, and education status. Therefore, health-related governmental agencies and healthcare practitioners must pay close attention to lessen the prevalence of hypoglycemia and address the problems based on the primary contributing factors.

Data Sharing Statement

Raw data are available from the hands of the corresponding author. This cannot be shared for confidentiality reasons unless there are reasonable requests.

Ethical Approval and Consent to Participate

This research was conducted in accordance with the ethical principles outlined in the *declaration of Helsinki*. The research protocol was reviewed and approved by the research committee of School of Pharmacy, Mizan Tepi University (reference number SOP/0055/2023). Due to the literacy challenges and cultural concerns about signing contracts, written consent was waived after thorough Discussion with the research committee. Hence, verbal informed consent was obtained from each participant before data collection. All participants' rights, dignity, privacy, and confidentiality were respected throughout the research process. No personal identifiers were used for data analysis.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare no conflicts of interest for this work.

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