COLLEGE OF MEDICINE AND HEALTH SCIENCE

SCHOOL OF NURSING

KNOWLEDGE AND PRACTICE OF HYPOGLYCEMIA PREVENTION AND ITS ASSOCIATED FACTORS AMONG ADULTS WITH DIABETES IN WEST SHEWA, ETHIOPIA, 2023

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NOVEMBER 2023

HAWASSA, ETHIOPIA

KNOWLEDGE AND PRACTICE OF HYPOGLYCEMIA PREVENTION AND ITS ASSOCIATED FACTORS AMONG ADULTS WITH DIABETES IN WEST SHEWA, ETHIOPIA, 2023

A THESIS TO BE SUBMITTED TO HAWASSA UNIVERSITY, COLLEGE OF MEDICINE AND HEALTH SCIENCE, SCHOOL OF NURSING, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR MASTER OF SCIENCE IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING

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NOVEMBER 2023

HAWASSA, ETHIOPIA

APPROVAL SHEET

Advisors:

This is to certify that the thesis entitled "knowledge and practice of hypoglycemia prevention and its associated factors among adults with diabetes in West Shewa, Ethiopia, 2023" submitted in partial fulfillment of the requirements for the degree of Master in "**EMCCN"** the Graduate Program of the School of Nursing, and has been carried out by "Daba Wogi" under our supervision. Therefore, we recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the department.

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Examiner's Approval Sheet

We, the undersigned, members of the Board of Examiners of the final open defense by "Daba Wogi" have read and evaluated his thesis entitled "knowledge and practice of hypoglycemia prevention and its associated factors among adults with diabetes in West Shewa, Ethiopia, 2023" and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree of Master's in "**Emergency Medicine and Critical Care Nursing"**

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Final approval and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the School of Graduate Studies (SGS) through the Department/School Graduate Committee (DGC/SGC) of the candidate's department.

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ABBREVIATIONS/ACRONYMS

ADA:	American Diabetic Association
AOR:	Adjusted Odd Ratio
BGL:	Blood Glucose Level
CI:	Confidence Interval
COR:	Crude Odd Ratio
DM:	Diabetes Mellitus
EDA	Ethiopian Diabetic Association
EMCCN	Emergency Medicine and Critical Care Nursing
ETB:	Ethiopian Birr
FBS:	Fasting Blood Glucose
GDM:	Gestational Diabetes Mellitus
IDF:	International Diabetic Federation
ICCMH:	Integrated Clinical and Community Mental Health
IV:	Intra Venous
OHA:	Oral Hypoglycemic Agent
Mg/dl:	Milligram per deciliter
SGM:	Self-Monitoring of Blood Glucose
SPSS:	Statistical Package for Social Science
VIF:	Variance Inflation Factors
WHO:	World Health Organization

ABSTRACT

Background: Hypoglycemia is a medical emergency that causes hospital admission and emergency department visit. Knowledge of hypoglycemia prevention is very essential due to the fact knowledgeable patient is more likely to practice hypoglycemia prevention. Despite this fact, the knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes insufficiently studied in Oromia.

Objective: To assess knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes in West Shewa, Ethiopia, 2023

Methods: Institutional based cross-sectional study design conducted from May 01 to June 01, 2023. A systematic random sampling technique used to select 393 participants with proportional allocation. A pre-tested, structured and interviewer administered questionnaire was used to collect data. The data entered using Epi-data version 4.6 and then exported to SPSS software version 25 for further processing. A binary logistic regression model performed to determine the association between dependent and independent variable. Factors with p-value <0.25 on bivariate analysis were taken to multivariate analysis. The strength of association was determined by AOR. The level of significance declared at p-value <0.05 with 95% CI.

Result: Among the total respondents, 273(70.9%) live with Type2 DM and 131(34.0%) used insulin. Generally, 59.7% and 47% of respondents had good knowledge and practice of hypoglycemia prevention respectively. The educational level, using insulin, and monthly income were associated with good knowledge. Whereas educational level, having a glucometer, and knowledge were associated with good practice of hypoglycemia prevention

Conclusion and recommendation: The study shows there is a knowledge and practice gap regarding hypoglycemia prevention. Health care provider should give hypoglycemia-oriented health education.

Key words: Hypoglycemia Prevention, Knowledge, Practice, Patient with Diabetes, Ethiopia

1. INTRODUCTION

1.1. Background

The chronic disease known as diabetes mellitus(DM) is characterized by high BGL (WHO, 2016). Diabetes mellitus can be classified into type 1 DM, type 2 DM, GDM, and DM due to other causes(ADA, 2021). According to the International Diabetes Federation, diabetes is a serious health problem that has grown to alarming proportions. More than 500 million people worldwide currently live with diabetes and predicted to affect 643 million and 783 million people worldwide in 2030 and 2045, respectively. In Africa by the coming 2030 and 2045, the estimated number of patients live with diabetes may rise to 33 million and 55 million respectively (Sun *et al.*, 2022).

Hypoglycemia is an acute complication of DM characterized by an episode of low BGL (<70 mg/dl,) which exposes the patient to the risk of injury. However, hypoglycemia cannot merely determine by BGL only(Anderson *et al.*, 2013, Desouza *et al.*, 2010). Previously hypoglycemia was defined by Whipple's triad which includes symptoms, signs, or both of hypoglycemia, decreased BGL, and resolution of those symptoms and signs after the BGL is raised, (Cryer and Arbeláez, 2017).

American Diabetic Association(ADA) classifies hypoglycemia into: Severe hypoglycemia (when patient requires the support of extra person), documented symptomatic hypoglycemia (presence of signs and symptoms and decreased BGL), asymptomatic hypoglycemia (low BGL without clinical features of hypoglycemia), probable symptomatic hypoglycemia (symptoms of hypoglycemia not accompanied by BGL determination), and pseudo-hypoglycemia (report symptoms of hypoglycemia without dropped BGL) (Seaquist *et al*., 2013).

Hypoglycemia in individual with diabetes can result from various factors, including insulin imbalance and increased glucose needs, dietary changes, infections, missed meals, renal and liver failure, and alcohol intake without food. However, the majority of them may have multiple precipitating factors, (Shafiee *et al.*, 2012, Sendekie *et al.*, 2022, S Oyer, 2013, Seth *et al*., 2018). Insulin excess is the major risk factor for hypoglycemia. Insulin excess occurs when excessive doses, improper timing, incorrect type, reduced exogenous glucose influx,

increased insulin-independent glucose utilization, and increased insulin sensitivity (Kasper *et al.*, 2015).

The signs and symptoms of hypoglycemia are categorized into two. The first one is neurogenic symptoms (caused by a drop in plasma glucose level) which include shakiness, trembling, anxiety, nervousness, palpitations, clamminess, sweating, dry mouth, hunger, pallor, pupil dilation. The second category is neuroglycopenic symptoms (caused by brain neuronal glucose deprivation) which manifested by abnormal mentation, irritability, confusion, difficulty in thinking, difficulty speaking, ataxia, paresthesia, headaches, stupor, seizures, and coma, (Briscoe and Davis, 2006).

The management and prevention of hypoglycemia involves the patients, the healthcare provider, the patient's family, and the community. Hypoglycemia management depends on severity and includes oral glucose/sweetened drink, candies, and sugar for conscious patients, and IV glucose bolus, infusion, and injectable glucagon for unconscious patients. After managing hypoglycemia, changing one's medication regimen, and correcting unhealthy eating, exercise, and alcohol consumption behaviors are extremely important (Health and Sanitation, 2010, Walelgne *et al.*, 2016). This study aims to assess knowledge and practice of hypoglycemia prevention and its associated factors among adults with diabetes in West Shewa, Ethiopia, 2023.

1.2. **Statement of Problem**

According to the International Diabetic Federation report in 2021, 541 million peoples will have impaired glucose tolerance and approximately 6.7 million adults (20–79) estimated to have died because of diabetes, or its complications. The total diabetes-related health expenditure will reach one trillion USD(United States Dollar) by 2030 (Ogurtsova *et al*., 2022, Sun *et al*., 2022). In terms of the number of people with diabetes (20-79 years old) in sub-Saharan Africa, Ethiopia is fourth country (Sun *et al.*, 2022). In Ethiopia diabetes the causes of 104.3 USD(United States Dollar) health expenditure per person with diabetes (20–79 years)(Sun *et al.*, 2022) There are about 2 million people live with diabetes in Ethiopia (FMOH, 2021). Around 11,000 men and 10,000 women die from diabetes and its complications annually (FMOH, 2016).

Hypoglycemia is highly reported in patients with diabetes among acute complications of diabetes mellitus. According to a study done in south India and Nigeria, among study participants 57.44% and 80.4% had reported a history of hypoglycemia respectively, (Samya *et al*., 2019, Olamoyegun *et al.,* 2020). In Ethiopia study conducted at Saint Paul's Hospital and northeast Ethiopia stated that among study participants 94.3% of them had a history of hypoglycemia and it is the second most frequent acute complication of diabetes respectively (Kahsay *et al.*, 2019, Korsa *et al.,* 2019).

Hypoglycemia is a common cause of emergency hospital admission in both type1 and type 2 DM. According to a study conducted in Saudi Arabia on the prevalence of diabetic coma, 70.7% had hypoglycemia. Among these 34.8 % were treated at the emergency department, 6.5% were admitted to a hospital and 58.7% were treated at home (Alenezi *et al*., 2018). A study conducted on diabetic emergencies revealed that among patients using ambulances due to diabetic emergency cases, 69.9% were due to hypoglycemia (Villani *et al.*, 2018). However, the patients die due to the lack of an ambulance and the inability to afford the cost of emergency care at the hospital (Myers *et al*., 2022, Emral *et al*., 2017, Control *et al*., 2014, Samya *et al.*, 2019). Due to the sudden occurrence of hypoglycemia, it's a major challenge for patients with diabetes taking anti-diabetic medication while traveling long distances and working in risk areas like driving, working on hills, working on fire, and others (Kalra *et al.,* 2013).

Hypoglycemia is thought to be the cause of death in 6–10% of patient live with type 1 DM (Kasper *et al*., 2015). Hypoglycemia is a medical emergency, which cause atrial fibrillation and

ventricular tachycardia. Rarely severe hypoglycemia causes brain death. Frequent episode of hypoglycemia impair the body's ability to defense against hypoglycemia (Amiel *et al.*, 2019, Cryer and Arbeláez, 2017).

Patients with diabetes should be knowledgeable and conscious to prevent the occurrence of hypoglycemia. Encouraging and educating the patient to individualize target glucose level, appropriate medication, modifying lifestyle and diet, and glucose self-monitoring are proposed solutions to prevent hypoglycemia among patients with diabetes (Evans Kreider et al., 2017a, Evans Kreider et al., 2017b, Bhutani et al., 2015). Measuring blood glucose levels before and after the intervention is the most important steps in mitigating the consequence of hypoglycemia (Seaquist *et al.*, 2013)

The previous study has shown that there is a knowledge and practice gap towards the prevention of hypoglycemia in patients with diabetes. The conducted study in India (36.67%), Saudi Arabia (31.7%), and Sudan (48%) had good knowledge towards hypoglycemia prevention (Thenmozhi *et al.*, 2018, Albarakati *et al.*, 2022, Madani *et al.*, 2019a). Whereas the study conducted in Ethiopia revealed that (Tigray) 65.8%, 77.5%(Gonder), and (Gonder)25.5% had good knowledge of hypoglycemia prevention respectively (Gebremichael and Mariye Zemicheal, 2020, Muche and Mekonen, 2020, Gezie *et al.*, 2015). The other study conducted on practice of hypoglycemia prevention revealed that in Saudi Arabia (68.3%), Tigray (63.2%), and Gondar (93.1%, 21.4%) had good hypoglycemia prevention practice respectively (Albarakati *et al*., 2022, Gebremichael and Mariye Zemicheal, 2020, Muche and Mekonen, 2020, Gezie *et al*., 2015).

In previous study knowledge of hypoglycemia prevention was considered as factor associated with practice of hypoglycemia prevention except a single study done in Gonder (Gezie *et al.*, 2015) but in this study it considered as both dependent and predictors of practice. There is a big difference between the findings of the previously conducted studies. Generally, knowledge and practice of hypoglycemia prevention among adults with diabetes insufficiently studied in Ethiopia, specifically in Oromia Region. The main objective of this study is to assess knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes in west Shewa, Ethiopia.

1.3. Significance of Study

Even if hypoglycemia is a big challenge for patients with diabetes, it can be avoided by educating the patient on how to prevent and treat hypoglycemia. Thus, to prevent hypoglycemia in patients with diabetes, the patient should be knowledgeable and educated about hypoglycemia.

Generally, the main purpose of this study will be, **for the patient:** The research findings will inform the patient about the importance of being knowledgeable and attending diabetic-oriented health education. **For healthcare providers:** Research findings may be used as input for healthcare providers to assess the knowledge and practice of patients with diabetes towards hypoglycemia prevention, identify individuals at risk of developing hypoglycemia, and give special consideration to such patients. **For hospitals:** should help in preparing training and encourage healthcare provider to teach the patients about hypoglycemia prevention. **For Ethiopian Diabetic association**: should inform the association tries to encourage the patients with diabetes to be members of diabetic association. Searching the way patients with diabetes get a glucometer, promote self-monitoring of blood glucose level. **For researcher**: the finding of this study will be used as input to do further research

2. LITERATURE REVIEW

2.1. Knowledge of Hypoglycemia Prevention among Adults with Diabetes

Since hypoglycemia is preventable, knowledge of the patient with diabetes about hypoglycemia is the cornerstone for the prevention of hypoglycemia**.** Patient and family education about the signs and symptoms and precautions for hypoglycemia can significantly lower the risk of life-threatening hypoglycemic episodes (Umpierrez and Korytkowski, 2016). However, different study shows that there is a knowledge gap towards hypoglycemia prevention. Study conducted in Saudi Arabia on hypoglycemia-associated factors and prevention practices among patients with diabetes stated that 68.3% had good knowledge of hypoglycemia prevention (Albarakati *et al*., 2022). The other study conducted in Security Forces Hospital, Saudi Arabia on 386 samples revealed that 61.4% of study participants had good knowledge of hypoglycemia prevention among patients with diabetes (Albaqami, 2018). According to study conducted in Vietnamese revealed that among 148 patients live with diabetes 45.9% of them had good knowledge towards hypoglycemia prevention (Ngo *et al*., 2021) and study conducted in India among 100 samples 76(76%) had good knowledge on hypoglycemia prevention (Cecyli *et al*., 2022).

There was a knowledge gap among patients with diabetes regarding hypoglycemia prevention in Ethiopia. According to a study conducted in Tigray, 65.8% had good knowledge of hypoglycemia prevention(Gebremichael and Mariye Zemicheal, 2020) and the study conducted in Gondar revealed that 77.5% and 25.5 % of study participants had good knowledge of hypoglycemia prevention respectively (Muche and Mekonen, 2020, Gezie *et al*., 2015).

2.2. Practice of Hypoglycemia Prevention among Adults with Diabetes

The most important factor in preventing hypoglycemia and its consequences is the patient's practice to prevent hypoglycemia since it is preventable. A cross-sectional study conducted in Saudi Arabia on hypoglycemia-associated factors and prevention practices among patients with diabetes stated that 61.8% of study participants had good hypoglycemia prevention practices (Albarakati *et al.,* 2022). A study conducted in Vietnamese among 148 outpatients with diabetes revealed that 44.6% of study participants had good practices towards the prevention of hypoglycemia (Ngo *et al*., 2021).

According to a study done in Ethiopia about practice of hypoglycemia prevention among patients with diabetes show that 63.2 %(Tigray), 93.1 %(Gondar), and 21.4 %(Gondar) of study participants had good practice of hypoglycemia prevention respectively (Gebremichael and Mariye Zemicheal, 2020, Muche and Mekonen, 2020, Gezie *et al*., 2015).

2.3. **Factors associated with Knowledge and Practice of Hypoglycemia Prevention.**

2.3.1. Factors Associated with the Knowledge of Hypoglycemia Prevention.

2.3.1.1. Socio-demographic Factors Associated with Knowledge of Hypoglycemia Prevention among Adults Live with Diabetes

Different studies revealed that the knowledge of patients with diabetes was affected by various factors. The study done in India on the assessment of the level of knowledge on hypoglycemia prevention among patients with diabetes mellitus in the rural community stated that the age (30–40) ($p<0.05$) of the patients were more knowledgeable than other age group (Thenmozhi *et al*., 2018). The other study conducted in India revealed that patients with a high class of income ($p= 0.007$) were more knowledgeable than their counterparts (Shriraam *et al.,* 2015).

In Ethiopia study conducted in Gondar stated that, educational status, primary education (AOR=2.14, 95%CI: 1.19, 3.84), secondary education (AOR 3.02, 95% CI: 1.53, 5.98) and completed college and above (AOR=2.35, 95%CI: 1.08, 5.13) were more likely to have good knowledge than respondents who had no formal education (Gezie *et al.*, 2015).

2.3.1.2. Health Related Factors Associated with Knowledge of Hypoglycemia Prevention among Adults Live with Diabetes

Studies conducted in India show that there is a significant association between types of treatment with knowledge of hypoglycemia prevention among patients with diabetes. Patients using insulin were more knowledgeable than those using other medication and patients with family history of diabetes were more knowledgeable than those have no family history of diabetes ($p<0.05$) (Thenmozhi *et al.*, 2018, Cecyli *et al.*, 2022).

The other cross-sectional study conducted in Gondar stated that being a member of the diabetic association (AOR=3.91, 95%CI: 2.26, 6.77) was positively associated with good knowledge of hypoglycemia prevention among patients with diabetes (Gezie *et al.*, 2015).

2.3.2. Factors Affecting Practice of Hypoglycemia Prevention

2.3.2.1. Socio-demographic Factors Associated with the Practice of Hypoglycemia Prevention among Patient Live with Diabetes

The study conducted in India show that, female patients had more good practice as compared to male p<0.05 (Cecyli *et al*., 2022). A study conducted in Jimma Medical College earning monthly income of <1000 ETB (AOR=4.229) were significantly associated with poor practice (Mekonnen *et al*., 2021).

The study conducted in Tigray revealed that being governmental employee (AOR=5.19, 95% CI (1.63, 16.58) were positive predictors of good hypoglycemia prevention practice. However, being divorced (AOR=0.13, 95% CI (0.32, 0.53)) was found negatively associated with good hypoglycemia prevention practice as compared to single (Gebremichael and Mariye Zemicheal, 2020). Other study conducted in Gonder show that educational level was significantly associated with hypoglycemia prevention practice. Participants who attained primary education, secondary and college and above were (AOR=2.20, 95%CI: 1.07, 4.52), (AOR=5.29, 95%CI: 2.43, 11.52), (AOR=8, 95%CI: 3.17, 17.51) more likely to have good practice than those were not formal education respectively (Gezie *et al.*, 2015).

2.3.2.2. Health Related Characteristic Associated with the Practice of Hypoglycemia Prevention among Adults Live with Diabetes

A study conducted in Saudi Arabia revealed that having a glucometer at home is associated with good hypoglycemia prevention practice (p< 0.003) (Albarakati *et al*., 2022).

According to study done in Tigray, having a glucometer at home (AOR: 3.02, 95%CI (1.12-8.12) and having good knowledge of hypoglycemia prevention (AOR = 10.34; 95% CI (5.41, 19.89) was positively associated with good hypoglycemia prevention practice (Gebremichael and Mariye Zemicheal, 2020). Other study conducted in Gonder revealed that being the members of diabetic association (AOR=6 (95%CI: 3.34-11.05) and having good knowledge of hypoglycemia prevention (AOR: 2.87 (1.2–6.8) was associated with good practice of (Gezie et al., 2015, Muche and Mekonen, 2020).

2.4. **Conceptual Framework**

This Conceptual framework was taken by reviewing different literature (Gezie *et al.*, 2015, Gebremichael and Mariye Zemicheal, 2020, Muche and Mekonen, 2020)

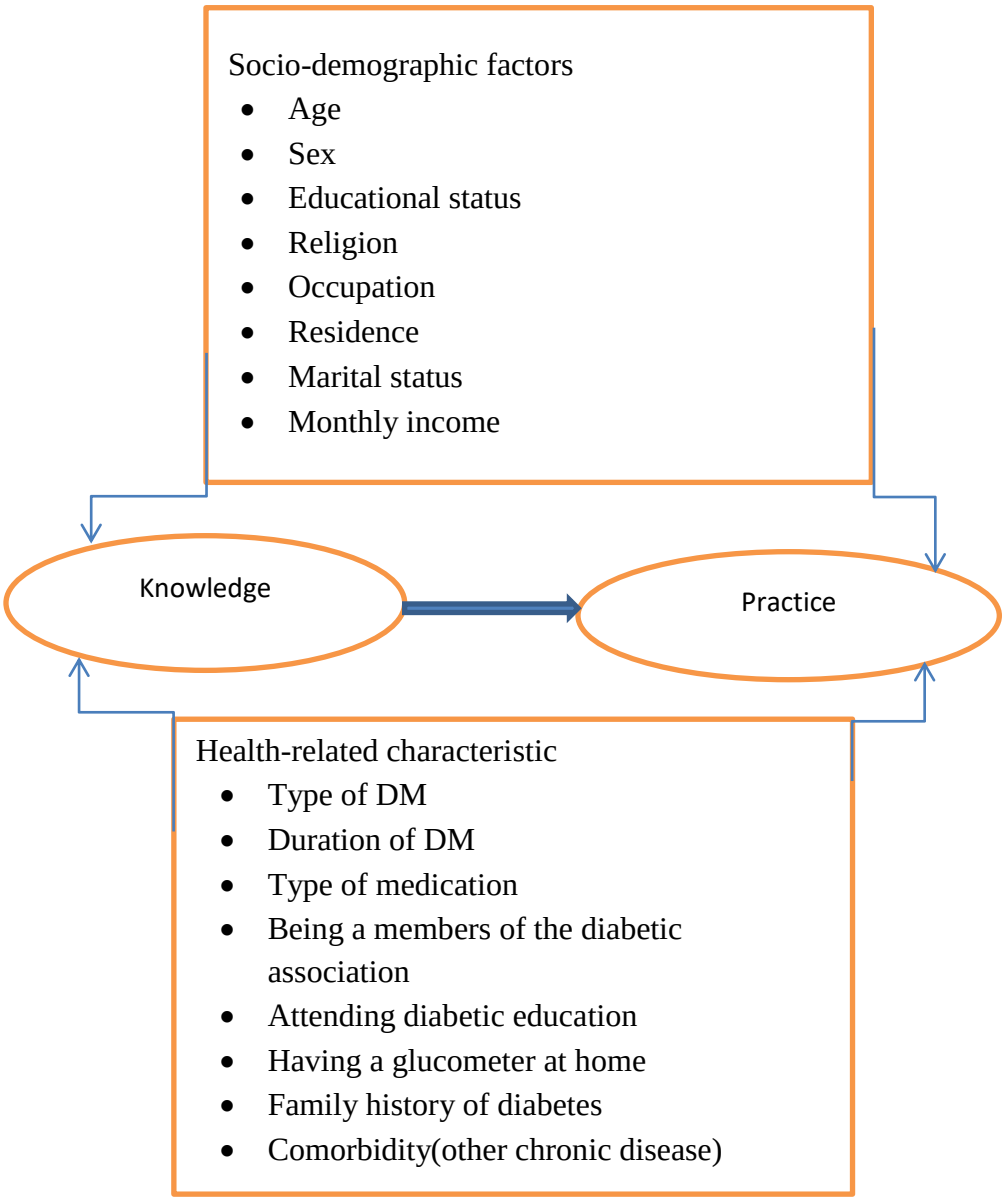

Figure 1: Conceptual Framework to assess knowledge and practice of hypoglycemia prevention among adults with diabetes on follow-up at selected Governmental Hospitals, West Shewa, Ethiopia, 2023 (n=385)

3. OBJECTIVE

3.1. General Objective

- To assess knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes on follow-up at selected governmental Hospitals in west Shewa, Oromia, Ethiopia, 2023

3.2. Specific Objective

- To identify knowledge of hypoglycemia prevention among patients with diabetes
- To determine practice of hypoglycemia prevention among patients with diabetes
- To identify factors associated with knowledge about hypoglycemia prevention among patients with diabetes
- To determine factors associated with practice towards hypoglycemia prevention among patients with diabetes

3.3. Research Questions

- What is the number adult with diabetes having good knowledge of hypoglycemia prevention?
- What is the number of patient with diabetes having good practice towards hypoglycemia prevention?
- What are the factors affecting good knowledge of hypoglycemia prevention among adults with diabetes?
- What are the factors affecting good hypoglycemia prevention practice among adults with diabetes?

4. METHODS AND MATERIALS

4.1. Study Area and Period

West Shewa zone is located in the Oromia region, western Ethiopia. The capital city of the zone is Ambo. It is around 114 kilometer far from Addis Ababa to the West. The total population of the Zone is estimated to be greater than 2.5 million. There were ten governmental hospitals in the west Shewa zone. The Hospitals were Ambo University Referral Hospital, Ambo General Hospital, Gindeberet General Hospital, Bako Primary Hospital, Jaldu Primary Hospital, Inchini Primary Hospital, Gudar Primary Hospital, Gedo General Hospital, Ginci Primary Hospitals, and Holeta Primary Hospital. These hospitals provide internal medicine, chronic illness care, laboratory, radiology, dental, pharmacy, pediatrics, family planning, maternity, gynecologic/obstetric, surgery, emergency, TB, and HIV services to the people in the zone and surrounding the zone. Ambo General Hospital and Ambo University Referral Hospital are located at the center of Ambo town.

The study was conducted from May 01 to June 01, 2023, among patients with diabetes attending their follow-up at selected Governmental Hospitals in West Shewa.

4.2. Study Design

Institutional-based cross-sectional study design was conducted to assess knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes on follow-up at selected Governmental Hospitals in West Shewa Zone.

4.3. Population

4.3.1. Source Population

All patients with diabetes who have follow-up at Governmental Hospitals in the west Shewa Zone

4.3.2. Study Population

All patients with diabetes who have follow up at selected Governmental Hospitals in the west Shewa Zone during data collection period.

4.3.3. Study Unit

An individual with diabetes selected for the interview from the selected hospitals.

4.4. Inclusion and Exclusion Criteria

4.4.1. Inclusion Criteria

- All patients with diabetes who have follow-up at selected Governmental Hospitals in the West Shewa Zone.

4.4.2. Exclusion Criteria

- Patient with gestational DM
- Patients with other non-specific type of DM
- Critically ill patient

4.5. Sample Size Determination

A single proportional formula was computed to calculate the sample size.

$$n: \frac{(Z\alpha/2)^2 P(1-P)}{d^2}$$

Where

n= required sample size

P= proportion of good practice of hypoglycemia prevention

Z== 1.96 (the standard normal distribution value at 95 % CI)

d= margin of error (0.05)

The proportion that gives the large sample, size was selected. Thus, the study conducted in Tigray gives a large sample size, which is 63.2% of the patients had good practice of hypoglycemia prevention (Gebremichael and Mariye Zemicheal, 2020)

$$n=\frac{Z\alpha/2^2 P(1-P)}{d^2} = 1.96^2.0.632(1\text{-}0.632)\ /0.0025 = 357$$

By adding a 10% nonresponse rate, the final sample size was (357+36) = 393.

4.6. Sampling Technique and Procedure

4.6.1. Sampling Technique

Systematic random sampling was used to select 393 study participants. From ten Hospitals in West Shewa, three Hospitals were selected randomly by lottery method.

4.6.2. Sampling procedure

Proportional allocation was computed to each Hospital based on the number of patients on follow-up. This is calculated by dividing the number of patients on follow-up in a single hospital by total patients on follow-up in three hospitals (3530) then multiplying by calculated sample size **(n($\frac{ni}{N}$)).** Where n is calculated sample size, ni is total number of patients on follow-up in a single hospital and N is the sum of patients on follow up in three hospitals.

The sampling intervals were calculated for each selected hospital depends on the number of patients on follow-up respectively (K=Ni/ni). Where K is the interval between respondent, Ni is the number of patients on follow-up in a single hospital, and ni is the number of patients selected from a single hospital (Ambo University Referral Hospital = K1=1394/155=9 Ambo General Hospital, =K2=N2/n2=1525/170=9, and Guder Primary Hospital =K3=N3/n3=611/68=9).

A serial number was given for each medical record number. Lastly, the numbers given for the card was used as the sampling frame to select the study participants. Participants were selected depends on the calculated K^{th} interval from each hospital. However, the first individual was selected from each hospital by lottery method, and the remaining participants were selected by k-interval.

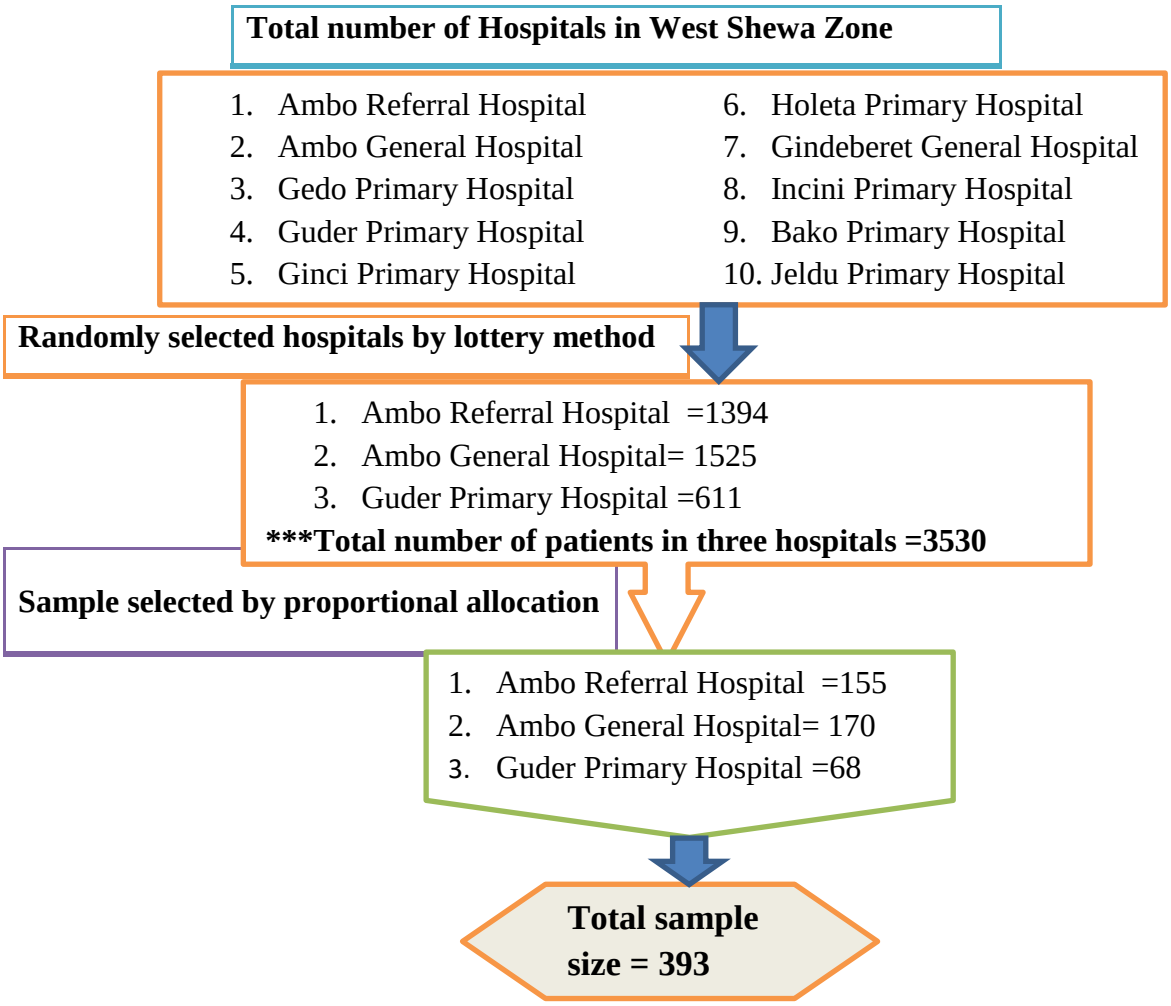

Figure 2: Schematic representation of sampling to assess knowledge and practice of hypoglycemia prevention among adults with diabetes on follow-up at selected Governmental Hospitals, West Shewa, Ethiopia, 2023 (n=385)

4.7. Variable

4.7.1. Dependent Variable

Knowledge of hypoglycemia prevention: good or poor

Practice of hypoglycemia prevention: good or poor

4.7.2. Independent Variable

Socio-demographic factors

- ❖ Age
- ❖ Sex
- ❖ Religion
- ❖ Marital status
- ❖ Educational status
- ❖ Occupation
- ❖ Residence
- ❖ Average monthly income

Health-related factors

- ❖ Type of DM
- ❖ Duration of DM
- ❖ Types of medication
- ❖ Attending diabetic education
- ❖ Being a member of the diabetic association
- ❖ Having a glucometer
- ❖ Family history of diabetes
- ❖ Comorbidity (other chronic disease)

4.8. Data Collection Tool and Procedures

4.8.1. Data Collection Tool

Data was collected through face-to-face interviewer administered structured questionnaire, which was adapted after reviewing different related literature (Al Zahrani *et al.*, 2021, Gebremichael and Mariye Zemicheal, 2020, Gezie *et al.*, 2015, Muche and Mekonen, 2020). The questionnaire contains four parts, which are, socio-demographic data, health-related factors, knowledge, and practice towards hypoglycemia prevention. The socio-demographic part contains eight questions and Health-related factors contain eight questions. The knowledge part contains nine multiple choices and it has only one correct answer. The practice part of the questionnaire contains ten questions. From these four of them were multiple choice with only one correct answer and the left six questions were “Yes” or “No” questions.

4.8.2. Data Collection Procedure

Data was collected from May 01 to June 01, 2023. Five nurses were recruited for data collection with three nurses for supervisors. Two days of training on the purpose, relevance, confidentiality, respondent’s rights, informed consent, and interviewing techniques were provided to supervisors and data collectors.

4.9. Data Quality Control Measures

A pretest was done on 20 patients with diabetes on follow-up at Incini Primary Hospital to check the quality of the questionnaire. Depending on the result obtained from the pretest, ways of

giving training for data collectors and supervisor was determined. Some unclear idea was replaced by easily understandable words. Double check was done for data entry to check the quality and completeness of data. Data has been checked for completeness and any errors before data entry. The questionnaire was prepared in English language then translated into the local language'' Afaan Oromo'' version. Lastly, it was changed to English language to check the consistency of the questionnaire.

4.10. **Data Processing and Analysis Procedure**

Data was analyzed after being exported to SPSS version 25 from Epi data version 4.6. To calculate the over overall proportion of knowledge and practice of hypoglycemia prevention among study participants, the value was given for each question. The choice with "correct answers" and "Yes" coded as one and for the left "wrong answer" and "No," code zero has been given. The outcome variable, poor and good coded as zero and one respectively.

Descriptive analysis was done and the results presented by table, text, and chart depending on the types of data. Before running logistic regression, its assumption was checked. Hosmer and Lemshow test was done to check goodness of model fitness and its value was > 0.05 for both dependent variables. The multicollinearity test was checked to identify the correlation between independent variable by using VIF and it is less than 10 for all variables. Normality was check by using skewness and kurtosis, and it was with normal range. A binary logistic regression model was used for the analysis of the relationship between independent and dependent variables. Bivariate analysis was done and the variables with a p-value < 0.25 were taken to multivariate analysis. Finally, the strength of association between the dependent and independent variables was measured using AOR with 95% CI and statistical significance was declared at p-value < 0.05.

4.11. **Operational Definition**

Good practice: Participants who scored mean and above value from the practice part of questions.

Poor practice: Participants who scored below the mean value from the practice part of questions.

Good knowledge: Participants who scored mean and above value from the knowledge part of questions.

Poor knowledge: Participants who scored less than the mean value from the knowledge part of questions (Gebremichael and Mariye Zemicheal, 2020).

4.12. **Ethical Consideration**

Ethical clearance was obtained from the Institutional Review Board of Hawassa University, College of Health Sciences. Permission was obtained from the medical director of each selected Governmental Hospital and other concerned bodies. The research purpose and the procedures were explained to each respondent. Verbal consent was obtained from each study participant. A participant was allowed to refuse/discontinue participation at any time. Confidentiality was ensured throughout the study.

4.13. **Result Dissemination Plan**

The result will be disseminated to all concerned bodies including Hawassa University College of Medicine and Health Science and School of Nursing. The result of this study will be disseminated to all selected hospitals and zonal health bureaus. Publication will be attempted in reputable journals.

5. RESULT

5.1. Socio-Demographic Characteristics of Study Participants

From the total 393 sample, 385(98%) patients participated. The socio-demographic status of the respondents includes age, sex, marital status, religion, educational level, occupation, residence, and average monthly income. The mean age of study participants was 43.85 (±12.383)(Table 2).

Table 1: Socio-demographic status of patients with diabetes on follow-up at selected Governmental Hospitals, west Shewa, Ethiopia, 2023 (n=385)

Variable	Categories	Frequency	Percent
Age of respondent	18-34	94	24.4%
	35-64	278	72.2%
	≥65	13	3.4%
Gender	Male	229	59.5%
	Female	156	40.5%
Religion	Protestant	186	48.3%
	Orthodox	160	41.6%
	Muslim	24	6.2%
	Wakefata	15	3.9%
The marital status of the respondent	Married	172	44.7%
	Single	80	20.8%
	Divorced	78	20.3%
	Widowed	35	9.1%
	Separated	20	5.2%
Educational level	Unable to read and write	33	8.6%
	Read and write	89	23.1%
	Primary education	115	29.9%
	Secondary education	96	24.9%
	College and above	52	13.5%
Occupation	Farmer	125	32.5%
	Merchant	97	25.2%

	Private employed	90	23.4%
	Government employed	52	13.5%
	Student	21	5.5%
Residence	Urban	275	71.4%
	Rural	110	28.6%
Average monthly income	≤1000	124	32.2%
	1001-2000	99	25.7%
	2001-3000	76	19.7%
	> 3000	86	22.3%

5.2. Health-Related Characteristics of Study Participants

From the total patients, 273(70.9%) live with type 2 DM and 166(43.1%) live with diabetes for 6-10years. Only 123(31.9) and 69(17.9%) attend diabetic education and had a glucometer their home respectively. The mean age of years the patients live with diabetes was 8.7($SD \pm 5.895$). (Table-3)

Table 2: Health-related factors of adults with diabetes on follow-up at selected Governmental Hospitals, West Shewa, Ethiopia, 2023(n=385)

Variables	Categories	Frequency	Percent (%)
Type of DM	Type 1 DM	112	29.1%
	Type 2 DM	273	70.9%
Number of years live with DM	≤5	97	25.2%
	6-10	166	43.1%
	11-15	82	21.3%
	>15	40	10.4%
Type of medication	OHA	220	57.1%
	Insulin	131	34.0%
	OHA and Insulin	34	8.83%
Member of EDA	Yes	101	26.2%
	No	284	73.8%
Attending diabetic education	Yes	123	31.9%

	No	262	68.1%
Having glucometer	Yes	69	17.9%
	No	316	82.1%
Family history of DM	Yes	118	30.6%
	No	197	51.2%
	I don't know	70	18.2%
Having other chronic disease	Yes	91	23.6%
	No	294	76.4%

5.3. The Knowledge of Hypoglycemia Prevention among Adults with Diabetes

The knowledge of the patients was assessed by nine questions. The question contains only one possible answer. The mean score of the knowledge questions in the study was 5.95(±1.704). (Annex1: Table1)

Among the total respondents, 230(59.74%) had good knowledge of hypoglycemia prevention.

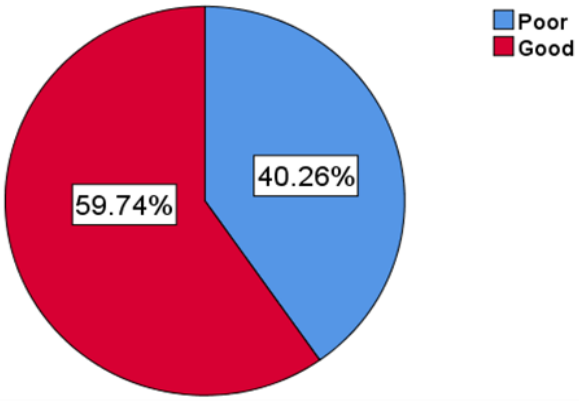

Figure 3: The proportion of knowledge of hypoglycemia prevention among adults with diabetes on follow-up at selected governmental Hospitals, West Shewa (n=385)

5.4. The Practice of Hypoglycemia Prevention among Adults with Diabetes

The practice part of the questionnaire contains ten questions with one possible answer. It include four multiple choices and six "Yes" or "No" questions. The mean score of practice-related questions was 5.584(±1.696) (Annex1:Table2).

Among the total respondents 181(47%) had good practice of hypoglycemia prevention.

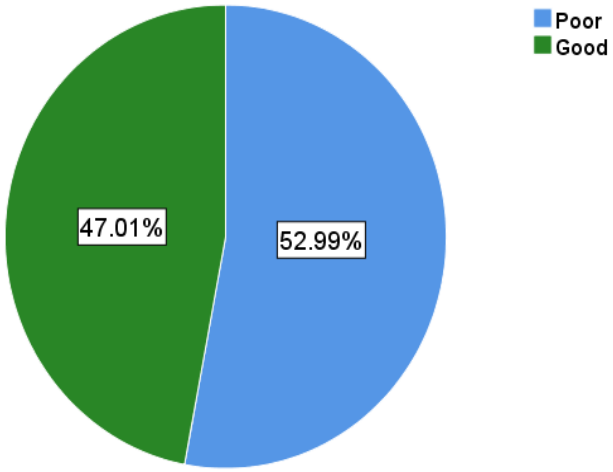

Figure 4: The proportion of practice of hypoglycemia prevention among adults with diabetes on follow-up at selected Governmental Hospitals, West Shewa, Ethiopia (n=385)

5.5. Factors Associated with Knowledge of Hypoglycemia Prevention

According to this study, the knowledge of participants towards prevention of hypoglycemia was affected by age, religion, educational level, occupation, residence, average monthly income, type of DM, year live with diabetes, type of treatment, being a member of diabetic association, attending diabetic education, having glucometer, and comorbidity on Bivariate analysis. However, on Multivariate analysis only educational level, average monthly income, and type of medication were significantly associated with knowledge of hypoglycemia prevention. (Table: 3)

Table 3: Factors affecting the knowledge of hypoglycemia prevention on Bivariate and Multivariate analysis among adults with diabetes on follow-up at selected Governmental Hospital, West Shewa, Ethiopia, 2023 (n=385)

Variables	Category	Knowledge		COR95%(CI)	AOR95%(CI)	p-value
		Good	poor			
Age	18-34	63	31	1		0.03
	35-64	165	113	0.72(0.4-1.2)	1.42(0.54-3.7)	0.48
	≥65	2	11	0.09(0.01-.4)	0.14(0.02-1.1)	0.06
Religion	Protestant	120	66	1		0.57
	Orthodox	91	69	0.73(0.5-1.1)	0.79(0.48-1.3)	0.36
	Muslim	13	11	0.65(0.3-1.5)	0.6(0.23-1.52)	0.27
	Wakefata	6	9	0.37(0.1-1.1)	0.6(0.18-2.07)	0.43
Education level	College and above	47	5	1		0.00
	Read and write	40	49	0.1(0.03-0.2)	0.04(0.01-0.2)	0.00
	Primary education	68	47	0.15(0.1-0.4)	0.1(0.02-0.30)	0.00
	Secondary education	67	29	0.25(0.1-0.7)	0.11(0.03-0.5)	0.03
	Unable to read and write	8	25	0.03(0.01-0.1)	0.02(0.003-0.1)	0.00
Occupation	Merchant	58	39	1		0.72
	Farmer	62	63	0.66(0.4-1.13)	0.88(0.41-1.8)	0.70
	Private employed	54	36	1.01(0.56-1.8)	0.78(0.38-1.6)	0.49
	Governmental employed	42	10	2.82(1.30-6.3)	0.44(0.13-1.5)	0.17
	Student	14	7	1.35(0.5-3.63)	1.03(0.27-3.9)	0.96
Residence	Urban	174	101	1		
	Rural	56	54	0.60(0.38-.94)	1.13(0.57-2.2)	0.72

Average monthly	≤ 1000	57	67	1		0.14
income	1001-2000	64	35	2.15(1.3-3.7)	2.1(1.1-3.86)	0.03
	2001-3000	46	30	1.8(1.01-3.2)	1.24(0.62-2.5)	0.54
	>3000	63	23	3.2(1.78-5.8)	1.17(0.5-2.60)	0.71
Type DM	Type 1	72	40	1	1	
	Type2	158	115	0.76(0.48-1.2)	2.3(0.81-6.35)	0.12
Year live with	≤5	61	36	1		0.79
DM	6-10	104	62	0.99(0.6-1.7)	0.77(0.38-1.5)	0.44
	10-15	46	36	0.75(0.4-1.4)	0.99(0.4-2.36)	0.97
	>15	19	21	0.5(0.3-1.13)	0.76(0.3-2.11)	0.59
Type of treatment	OHA	118	102	1		0.06
	Insulin	91	40	2.0(1.30-3.10)	3.4(1.34-8.6)	0.01
	OHA and Insulin	21	13	1.4(0.70-3.00)	1.53(0.65-3.6)	0.33
Member EDA	Yes	71	30	1		
	No	159	125	0.54(0.33-.90)	0.94(0.48-1.8)	0.86
Attending	Yes	87	36	1		
diabetic education	No	143	119	0.50(0.3-.79)	0.8(0.43-1.46)	0.45
Having	Yes	48	21	1		
glucometer	No	182	134	0.6(0.34-1.0)	0.70(0.34-1.5)	0.35
Comorbidity	Yes	48	43			
	No	182	112	1.5(0.91-2.4)	1.073(0.6-2.1)	0.83

5.6. Factors Associated with Practice of Hypoglycemia Prevention.

On bivariate analysis factors significantly associated with hypoglycemia prevention practice include age, marital status, educational level, occupation, income, type of diabetes, being diabetic association membership, attending diabetic education, having glucometer, and knowledge about hypoglycemia. On the other hand, to control the effect of confounding variables, those variables with a p-value <0.25 were entered into multivariable logistic regression. However, on multivariate analysis only educational status, having a glucometer at

home, and knowledge about hypoglycemia were significantly associated with hypoglycemia prevention practice. (Table-4)

Table 4: Factors associated with hypoglycemia prevention practice on Bivariate and Multivariate analysis among adults with diabetes on follow-up at selected Governmental Hospitals, West Shewa, Ethiopia, 2023 (n=385).

Factors	Categories	Practice		COR 95%(CI)	AOR95%(CI)	P-value
		good	poor			
Age	18-34	50	44	1		0.35
	35-64	125	153	0.72(0.5-1.15)	0.77(0.4-1.6)	0.47
	65 and above	6	7	0.76(0.24-2.4)	2.0(0.42-9.6)	0.38
Marital status	Married	70	102	1		0.87
	Single	42	38	1.6(0.9-2.750)	1.3(0.63-2.66)	0.47
	Divorced	42	36	1.7(0.99-2.92)	1.2(0.62-2.45)	0.55
	Widowed	20	15	1.9(0.93-4.05)	1.30(0.5-3.5)	0.60
	Separated	7	13	0.8(0.30-2.10)	0.72(0.2-2.4)	0.60
Educational level	College and above	45	7	1		0.00
	Read and write	38	51	0.1(0.05-0.30)	0.063(0.02-0.40)	0.00
	Primary education	46	69	0.1(0.04-0.25)	0.037(0.01-0.12)	0.00
	Secondary education	47	49	0.2(0.06-0.36)	0.083(0.02-0.30)	0.01
	Unable to read and write	5	28	0.03(0.01-0.1)	0.023(0.01-0.20)	0.00
Occupation	Merchant	45	52	1		0.33
	Farmer	49	76	0.75(0.41-1.3)	1.48(0.6-3.01)	0.42
	Private employed	38	52	0.8(0.47-1.50)	0.68(0.31-1.5)	0.33
	Government employed	37	15	2.85(1.4-5.86)	0.4(0.089-1.4)	0.13
	Student	12	9	1.5(0.6-3.992)	1.17(0.33-4.8)	0.82
Residence	Urban	139	136	1		
	Rural	42	68	0.6(0.39-0.95)	0.8(0.37-1.56)	0.45
monthly income(ETB)	≤1000	43	81	1		0.45
	1001-2000	45	54	1.6(0.90-2.70)	1.7(0.86-3.34)	0.12

	2001-3000	37	39	1.8(0.998-3.2)	1.6(0.74-3.33)	0.24
	>3000	56	30	3.5(1.97-6.3)	1.57(0.6-3.95)	0.34
Type of DM	Type1	60	52	1	1	
	Type 2	121	152	0.7(0.44-1.07)	1.33(0.46-3.8)	0.60
Member EDA	Yes	56	45	1	1	
	No	125	159	0.6(0.4-0.998)	1.3(0.70-2.40)	0.42
Attending	Yes	89	34	1	1	
diabetic	No	92	170	0.2(0.2-0.331)	0.6(0.32-1.10)	0.10
education						
Having	Yes	60	9	1	1	
glucometer	No	121	195	0.09(0.05-0.2)	0.085(0.04-0.20)	0.00
Knowledge	Poor	48	107	1	1	
	Good	133	97	3.1(2.0-4.696)	2.0(1.15-3.46)	0.01

**1: Reference group

6. DISCUSSION

Hypoglycemia is one of the most feared acute complications of diabetes. Nonetheless, if a person with diabetes is aware of how to avoid hypoglycemia, it can be avoided (Yale *et al*., 2018).This study unravels the information about the knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes on follow-up at selected governmental hospital in West Shewa Zone.

In this study, 59.7%, 95% CI (54.82-64.66) of study participants had good knowledge of hypoglycemia prevention. This finding is consistent with the study conducted in Saudi Arabia, (61.4%) (Albaqami, 2018). This may be due to the similarity in sample size and similarity in study participants specifically by age of the patients.

But it is lower than the study conducted in South India (66.1%) (Shriraam *et al*., 2015), Tigray (65.8%), (Gebremichael and Mariye Zemicheal, 2020), Saudi Arabia (72.3%)(Albarakati *et al.*, 2022), and Gondar (77.5%) (Muche and Mekonen, 2020). This may be due to differences in the sample size of the study, the lifestyle of the patient, the educational level of the respondent, the study participants, and the analyzing technique. A study conducted in Gonder used the mean scores of questions to calculate the level of knowledge but in this study, the overall mean score of the respondent's results were used to calculate the level of knowledge of the participants. The other is the study participants were selected from one Referral Hospital but in this study, participants were collected from three different Hospitals.

Contrary to this the knowledge of study participants on hypoglycemia prevention of this study is higher than the study conducted in Sudan (48%) (Madani *et al*., 2019b) and Gonder (25.5 %) (Gezie *et al.,* 2015). This may be due to differences in the sample size of the study and the time of study. The study conducted in Sudan involves 125 participants using Insulin only, which is different from this study by the number of study participants and the study participants themselves.

The magnitude of good practice towards hypoglycemia prevention in this study is 47%, 95%CI (42.01-52.02). It is higher than the study conducted in Gonder (21.4%) (Gezie *et al.,* 2015). This discrepancy may be due to the duration of the study, sample size, and sampling technique.

But it is lower than the study conducted in Saudi Arabia (61.8%) (Albarakati *et al.,* 2022) and Tigray 63.2% (Gebremichael and Mariye Zemicheal, 2020) and Gonder 93.1% (Muche and Mekonen, 2020). This may be due to differences in the sample size, lifestyle of the patient, and the analysis technique of the study. The sample size of this study is higher and lower than the sample size of the study conducted in Tigray and Saudi Arabia respectively. The lifestyle of people living in Ethiopia may not similar with people living Saudi Arabia.

By multivariate analysis, educational slevel is significantly associated with knowledge of hypoglycemia prevention. Participants with a higher level of education (college and above) demonstrated better knowledge compared to those with lower education levels. The study participants with the educational level of unable to read and write, read and write, primary education, and secondary education were 98%, 96%, 90%, and 89% less likely to have good knowledge than those college and above respectively. This is consistent with the study conducted in Gonder (Gezie *et al*., 2015). This might be due to individual with higher level of education may read different books and other sources that related to the disease. There may be differences in the ability to understand the issue during diabetic education, those with a high level of education may easily understand the advice given by healthcare providers.

Patients with an average monthly income of 1001-2000ETB were 2 times more likely to have good knowledge (AOR=2.057(1.1-3.86) than those who have an average monthly income of less than 1000ETB. This is similar to a study conducted in Saudi Arabia (Al Zahrani *et al.,* 2021) and a study conducted in India (Shriraam *et al.,* 2015). This may be due to the fact, as the economic levels of the respondent increases, the chance to attend diabetic education will also increase. They may not attend diabetic education due to lack of transportation. The previous studies revealed that ability to afford the costs of transportation was directly related to the frequency of attending diabetic follow-up (Myers *et al*., 2022).

Treatments used for diabetes show association with knowledge of hypoglycemia prevention. Individual using Insulin was 3.4 times (AOR 3.4 ((1.34-8.6)) more likely to have good knowledge of hypoglycemia prevention than those using OHA. This is similar to a study conducted in India (Thenmozhi *et al.,* 2018). This may be due to the episode of hypoglycemia being higher in patients using insulin than that of OHA. Due to this fact, they may search information about the hypoglycemia prevention, since they are at risk for hypoglycemia. In

addition, health care professionals may specifically advise them about hypoglycemia prevention since they are highly at risk. According to the Canada Clinical Practice Guidelines, prepared for the prevention of hypoglycemia among patients with diabetes recommend, all people with diabetes currently using insulin and insulin secretagogues and their support persons should be counseled on hypoglycemia prevention (Yale *et al.,* 2018).

Some factors associated with knowledge of hypoglycemia prevention among patients with diabetes in previous studies failed to be associated in this study. According study conducted in Ethiopia at Gondar shows that being a member of a diabetic association was associated with knowledge of hypoglycemia prevention (Gezie *et al.,* 2015). This may be due to differences in sample size, sampling technique, and duration of study.

Patients who were unable to read and write 97.7%, read and write 93.7%**,** primary education 96.3% and secondary education 91.7% less likely to have good practice than college and above respectively. This is similar to the study conducted in Gonder (Gezie *et al.,* 2015). This may be due to people with higher level of education may have good knowledge of hypoglycemia prevention and the individual with good knowledge may have good practice.

Having a glucometer at home is one of the factors associated with good hypoglycemia prevention practices. An individual who had no a glucometer at home was 91.5% less likely to have good practice of hypoglycemia prevention than their counterparts (AOR=0.085(.036-.202). Similarly, studies conducted in Saudi Arabia Makka (Albarakati *et al.,* 2022), and Tigray (Gebremichael and Mariye Zemicheal, 2020) show that having glucometer at home is significantly associated with good hypoglycemia prevention practice among patients living with diabetes. This might be due to individuals using a home glucometer may be able to monitor their blood glucose levels and seek solutions accordingly. One way of mitigating hypoglycemia in patients with diabetes at risk for hypoglycemia is increasing the frequency of self-monitoring of blood glucose levels (Diana Sherifali and Robyn, 2018). A glucometer is a crucial tool for self-monitoring blood glucose levels, aiding in the management of hypoglycemia and its complications, enabling regular adjustments to medication or lifestyle. One main activities of EDA was blood glucose test. Due to the inability of to afford the cost of regular blood glucose monitoring, the measure blood glucose level with minimum cost. This can improved and achieved through empowering the patients, families and community (EDA, 2023)

Having good knowledge of hypoglycemia prevention is another factor associated with good hypoglycemia prevention practice. Individual having good knowledge of hypoglycemia prevention was 2 times (AOR: 2.00 95%CI (1.152-3.46) more likely to have good practice of hypoglycemia prevention than their counterparts. This is similar to a study conducted in Tigray (Gebremichael and Mariye Zemicheal, 2020) and a study conducted in Gonder (Muche and Mekonen, 2020). This may be due to the fact, practices is highly dependent on the knowledge of the patients. One way of reducing the risk of hypoglycemia is patient education and empowerment

However, some factors were significantly associated with good practice of hypoglycemia prevention but failed to associate in this study. According to study conducted in Tigray divorced (AOR: 0.13, 95%CI (0.32-0.53)) and Governmental employee (AOR: 5.19 95%CI(1.63-16.58)) and the other study conducted in Gonder revealed being member of diabetic association (AOR: 6.08 95%CI(3.34-11.05)) were significantly associated with good practice of hypoglycemia prevention respectively (Gebremichael and Mariye Zemicheal, 2020, Gezie *et al.*, 2015). This difference may be due sample size, time of study, sampling technique and difference in number of study participants registered to members of diabetic association.

7. LIMITATION AND STRENGTH OF STUDY

The main strength of this study is the use of interviewer-administered questionnaires in which the patient can ask any unclear ideas. The data collectors and supervisors were trained before data collection. The pretests were done before actual data collection. Three hospitals with different level were included (Primary hospital, General hospital and Referral hospital)

The limitation of this study is, using Cross-sectional study design in which causal modeling cannot be attempted. It includes only individuals with type 1 and type 2 DM with an age greater than 18 years of age. Therefore, the findings may not be generalizable to all DM patients. Future studies with a more representative sample size that includes patients with gestational DM and pediatric patients with DM will be required. The study's other shortcoming is that the participants' attitudes were not evaluated as the required tool was unable to be obtained.

8. CONCLUSIONS AND RECOMMENDATION

8.1. Conclusion

The main finding of this study reveals that, there was a gap in knowledge and practice, concerning hypoglycemia prevention among patients with diabetes. The educational level, average monthly income, and type of treatment were associated with knowledge of hypoglycemia prevention on multivariate analysis. Whereas educational level, having a glucometer at home, and good knowledge of study participants are positively associated with good practices towards hypoglycemia prevention. Generally, these studies show that hypoglycemia oriented health education and identifying the problem of patients on each follow-up is a good step to hinder the hypoglycemia and its consequences.

8.2. Recommendation

To patients:

- Should attending diabetic education on how to use glucometer and interpret the result.
- Should follow the health care advice on how to use medication and precaution required while taking the medication.

To Hospitals

- Preparing the easy way of getting glucometer for the patient
- Preparing training for health care professional about hypoglycemia prevention
- Preparing hypoglycemia-oriented health education for all patient with diabetes

To health care professionals:

- Try to teach how to use a glucometers and strips for patients
- Counsel all patients on anti-diabetes medications including those taking OHA about self-management and prevention of hypoglycemia

To Ethiopian diabetic association

- Try to provide glucometers to patients with diabetes
- Try to increase the member diabetic association and prepare awareness creation program about the association.

To researchers:

- Further cohort or interventional studies should be considered

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ANNEXES

Annex: 1

Knowledge of hypoglycemia prevention among patients with diabetes on follow-up at selected governmental hospitals, West Shewa, Ethiopia, 2023 (n=385)

Variable	Categories	
	Correct	Incorrect
The definition of hypoglycemia depends on BGL	292(75.8%)	93(24.2%)
Normal Fasting blood glucose level	284(73.8%)	101(26.2%)
Main symptoms of hypoglycemia	291(75.6%)	94(24.4%)
Risk factors for hypoglycemia	265(68.8%)	120(31.2%)
Ways of preventing hypoglycemia	289(75.1%)	96(24.9 %)
Ways of preventing night-time hypoglycemia	212(55.1%)	173(44.9%)
Effect of weight lifting exercise on patients with diabetes	232(60.3%)	153(39.7%)
Symptoms of night-time hypoglycemia	225(58.4%)	160(41.6%)
Time to retest BGL after treatment of hypoglycemia	201(52.2%)	184(47.8%)

The practice of hypoglycemia prevention among patients with diabetes on follow-up at selected Governmental Hospitals, West Shewa, Ethiopia, 2023 (n=385)

List of practice questions	Categories	Frequency and percentage
Precautions required to avoid hypoglycemia while traveling	Correct	276(71.7%)
	Incorrect	109(28.3%)
Self-management of hypoglycemia	Correct	268(69.6%)
	Incorrect	117(30.4%)
Measuring your glucose levels when you think you are hypoglycemic	Yes	98(25.5%)
	No	287(74.5%)
Safe and beneficial exercise for patients with diabetes	Correct	261(67.8%)
	Incorrect	124(32.2%)
Duration of exercise for patients with diabetes per day	Correct	259(67.3%)
	Incorrect	126(32.7%)
Taking snacks between meals	Yes	270(70.1%)
	No	115(29.9%)
Self-monitoring of your blood glucose at home	Yes	74(19.2%)
	No	311(80.8%)
Attending diabetic clinic on regular appointments	Yes	298(77.4%)
	No	87(22.6%)
Reporting episode of low blood sugar level to healthcare provider	Yes	291(75.6%)
	No	94(24.4%)
Measuring your blood glucose levels before exercise or heavy work	Yes	55(14.3%)
	No	330(85.7%)

Annex2: English version questionnaires

Consent Explanation

Hello, My name is _____ and I am a data collector of the study conducted by Daba Wogi, a postgraduate student at **Hawassa University College of Medicine and Health Sciences,** conducting this research for partial fulfillment of master's degree in **Emergency Medicine and critical care nursing**. Dear participant, he intends to carry out a study on "knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes in West Shewa, Ethiopia, 2023." Participation has no risk or monetary benefit. Your participation is voluntary and will not result in any physical or psychological harm. You will have the right to withdraw at any time without any penalty. We will require you to answer a questionnaire that will take 20- 30 minutes. You are free to ask questions about the study at any time. Study findings will be used to develop strategies on how to improve patient with diabetes' knowledge and practice of hypoglycemia prevention. The information you provide will be kept confidential. Your participation will be highly appreciated. At this time, do you want to ask me anything about the survey?

May I begin the interview now?

1. Yes
2. No

In case of any questions or clarifications, feel free to contact the principal investigator on mobile number 0910143014 or email dabawagi8@gmail.com.

THANK YOU!!!

Daba Wogi (principal investigator)

Annex2.1. Informed Consent

I have heard the consent explanation and understood it. I have been allowed to discuss all my concerns with the data collector. Therefore I agree voluntarily to participate in the study on knowledge and practice of hypoglycemia prevention and its associated factors among patients with diabetes on follow-up at selected Governmental Hospitals in West Shewa zone, Oromia, Ethiopia 2023.

Signature of researcher_____ Date_____

PART ONE: SOCIO-DEMOGRAPHIC STATUS OF STUDY PARTICIPANTS		
01	How old are you?	
02	Gender	1) Male 2) Female
03	What is your religion?	1. Protestant 2. Orthodox 3. Muslim 4. Others _____
04	What is your marital status?	1. Married 2. Single 3. Divorced 4. Widowed 5. Separated
05	What is your educational level?	1. Unable to write and read 2. Read and write 3. Primary education 4. Secondary education 5. College and above
06	What is your occupation?	1) Farmer 2) merchant 3) Private employed 4) Government employee 5) Other _____
07	Where do you live?	1. Urban 2. Rural
08	What is your average monthly income?	

PART TWO: HEALTH-RELATED FACTORS OF STUDY PARTICIPANTS.		
001	What type of diabetes do you have?	1. Type 1DM 2. Type 2DM
002	How many years do you live with diabetes?	_____
003	What type of treatment do you use?	_____
004	Are you a member of the diabetic association?	1. Yes

		2. No
005	Do you attend diabetic education?	1. Yes 2. No
006	Do you have a glucometer at your home?	1. Yes 2. No
007	Do you have a family history of DM?	1. Yes 2. No 3. I don't know
008	Do you have any comorbidity?	1. Yes 2. No

PART THREE: KNOWLEDGE OF HYPOGLYCEMIA PREVENTION.		
101	What is hypoglycemia depending on blood sugar level?	1. Less than 110 mg/dl 2. Less than 150mg/dl 3. Less than 200 mg/dl 4. Less than 70 mg/dl
102	What is the normal fasting blood sugar level depending on blood sugar level?	1. 70-110 mg/dl 2. Less than 70 mg/dl 3. 120-150 mg/dl 4. 150 -300 mg/dl
103	What are the main signs and symptoms of hypoglycemia?	1. Frequent thirst, frequent urination, and frequent intake of water 2. Excessive perspiration, weakness, and body shaking 3. Body pain, breathlessness, and stomach pain 4. Decreased pulse rate, diarrhea, and vomiting
104	Which t is the risk factor for hypoglycemia in diabetes?	1. Usage of high dosages of anti-diabetic drugs 2. Taking drugs with food 3. Intake of more fluids 4. Intake of more sugar-content foods
105	Which is the way to prevent hypoglycemia?	1. Avoiding snacks in between meals 2. Avoiding snacks in between exercises 3. Avoiding drinking water 4. Avoid starving for more than 4-5 hours
106	What is the way to prevent nighttime hypoglycemia?	1. Taking extra glucose-containing snacks before going to bed 2. Starve before going to bed 3. Drinking more amount of water 4. Drinking milk before bedtime
107	What is the effect of weightlifting exercise on patients with diabetes?	1. Lowers the blood sugar level 2. Maintains the blood sugar level 3. Increase the blood cholesterol level 4. Increases the blood sugar level

108	What is the symptom of nighttime hypoglycemia?	1. Frequent urination 2. Body pain 3. Excessive urination 4. Sleepiness
109	When should we retest blood sugar lev els after the treatment of hypoglycemia ?	1. After 5 minutes 2. After 15 minutes 3. After 10 minutes 4. After 20 minutes

PART FOUR: PRACTICE OF HYPOGLYCEMIA PREVENTION AMONG PATIENTS WITH DI ABETES.		
201	Which one is used as a precaution yo u should take to avoid hypoglycemia while traveling?	1. Carrying sugar or sugar candy 2. Carrying a glass of milk 3. Carrying water 4. Carrying biscuits
202	Which of the following is the self-man agement for hypoglycemia?	1. Taking 15 gms of sugar 2. Fruits like papaya in between meals 3. Taking 500 ml of water 4. Taking cheese and butter
203	Do you measure your glucose levels w hen you think you are hypoglycemic?	1. Yes 2. No
204	Which type of exercise is safe and beneficial for diabetic patients?	1. Walking 2. Weight lifting 3. Running 4. Jumping
205	How long the patients with diabetes sh ould do exercise per day?	1. At least 30 minutes 2. Up to 15 minutes 3. 1:00 hour to 1:30hour 4. Up to 2:00 hours
206	Do you take snacks between meals?	1. Yes 2. No
207	Do you self-monitor your blood gluco se at home?	1. Yes 2. No
208	Do you coming to your regular appoin tments?	1. Yes 2. No
209	Do you Report the episode of low bloo d sugar to your doctor?	1. Yes 2. No
2010	Do you measure your blood glucose le vel before exercise or heavy work?	1. Yes 2. No

Annex3: "AFAAN OROMOO VERSION"

Ani maqaan koo_____jedhama. Barataa dhaabaa wagiifan odeeffannoo funaanaa jira. Barataa dhaabaan Yunivarsiitii Hawaasaa Koollejjii saayinsii fayyaatti, barataa digirii lamaffaa, Muummee Nursing, sagantaa **"Narsii kunuunsa hatattamaa fi dhukuba cimaati"** barata. Kabajamaa hirmaataa barataan kun qorannoo mata-dureen isaa" beekumsaa fi shaakala ittisa hir'ina sukkaaraa fi sababoota isaa waliin walqabatan dhukkubsattoota dhukkuba sukkaaraa irratti Shawa Lixaa, Itiyoophiyaa, 2023, irratti kan xiyyeeffateedha. Qorannoon kun faayidaa qaamaas ta'e maallaqaa hin qabu. Hirmaannaan keessan fedhii keessaniin waan ta'eef miidhaa qaamaa ykn sammuu kamiyyuu hin fidu. Yeroo barbaaddanitti adabbii tokko malee hirmaannaa keessan addaan kutuu dandeessu. Gaaffii daqiiqaa 20-30 kan fudhatu akka deebistan isin gaafanna. Yeroo barbaaddetti waa'ee qorannichaa gaaffii gaafachuuf mirga qabdu. Argannoon qorannoo kanaa tooftaalee akkaataa beekumsaa fi shaakala dhukkubsattoota dhukkuba sukkaaraa karaa ittisa hir'ina qabiyyee sukkaaraa dhiiga keessa jiru (xannee??) fooyyessuu danda'an qopheessuuf kan oolu ta'a. Odeeffannoon isin kennitan iccitii ta'ee kan eegamuudha. Hirmaannaa keessaniif guddaa galatoomaa.

Gaaffii kana akkan isin gaafadhuuf naaf eeyyamtanittuu?

1. Eeyyee
2. Lakkii

Gaaffii ykn yaada yoo qabaattan qoraataa muummee lakkoofsa moobaayilaa 0910143014 ykn email dhabawagi8@gmail.com irratti bilisaan qunnamuu dandeessu.

KUTAA TOKKOFFAA: HAALA HAWAAS-DIMOOGIRAAFII HIRMAATTOTA QORANNICHAA		
01	Umuriin kee meeqa ?	_____
02.	Saala	1. Dhiira 2. Dhalaa
03.	Amantiin kee maali yookin amantii isa kam hordofta?	1. Pirootestaantii 2. Ortodoksii 3. Muslima 4. Kan biroo(_____) .
04 .?	Haalli gaa'ela keessanii maali	1. Fuudheera ykn heerumeera 2. Qeenxee (kan hin heerumne yookin hin fuune) 3. Hiikera. 4. Dubartii abbaan manaa irraa du'e/dhiira haati manaa jalaa duute 5. Iddoo adda addaa kan jiraatan
05.	Sadarkaan barnootaa keessan maali?	1. Barreessuu fi dubbisuu hin danda'u . 2. Dubbisuu fi barreessuu nan danda'a . 3. Barnoota sadarkaa tokkoffaa(1-8) .

		4. Barnoota sadarkaa lammaffaa.(9-12) 5. Kolleejjii fi isaa ol
06.	Hojiin kee maali?	1. Qonnaan bulaa 2. Daldalaa 3. Dhaabbata mit-mootummaan keessan hojjadha. 4. Hojjataa mootummaa 5. Kan biroo(_____) .
07.	Eessa jiraatta?	1. Magaalaa 2. Baadiyyaa
08.	Galiin giddu galaan galiin ji'aan argattu meeqa?	_____

KUTAA LAMMAFFAA: DHIMMOOTA FAYYAA WALIIN WALQABATAN.		
001.	Dhukkuba sukkaaraa gosa kam dhukkubsatta?	1. Gosa 1DM . 2. Gosa 2DM
002.	Dhukkuba sukkaaraa wajjin waggaa meeqa jiraatte?	_____ .
003.	Qoricha gosa akkamii fayyadamta?	_____
004.	Ati miseensa waldaa dhukkuba sukkaaraati?	1. Eeyyee 2. Lakkii
005.	Barnoota dhukkuba sukkaaraan wal qabatuun kennamu irratti ni hirmaattaa?	1. Eeyyee 2. Lakkii
006.	Gilukoomeetira (meesha qabiyyee sukkaaraa dhiiga keessa jiruu ittiin safaran) mana keessanii qabduu?	1. Eeyyee 2. Lakkii
007.	Maatii/ firaa keessan keessaa namni dhukkuba sukkaaraa dhukkubsatu jiraa?	1. Eeyyee 2. Lakkii 3. Hin beeku
008.	Dhukkuba biraa qabdaa yookin dhukkubni biraa ati hordoffii gootuf jiraa ?	1. Eeyyee 2. Lakkii

KUTAA SADAFFAA: BEEKUMSA ITTISA DHIBEE HAMMI SUKKAARAA DHIIGA KEESSA JIRUU GADI BU'UU.		
101.	Sadarkaa hamma sukkaara dhiigaa irratti hundaa'uun hir'inni sukkaaraa (sukkaarri dhiiga keessaa gad buhe) kan jedhamu yoomi?	1. 110 mg/dl gadi ta'uu 2. 150mg/dl gadi ta'uu 3. 200 mg/dl gadi ta'uu 4. 70 mg/dl gadi ta'uu
102.	Nyaata osoo hin nyaatin sa'aa saddeetif turre (ganama ciree osoo hin nyaatin) hamma qabiyyee sukkaaraa dhiiga keessa jiru yeroo safarru inni sirriin meeqaa hanga meeqati?	1. 70-110 mg/dl 2. 70 mg/dl gadi 3. 120-150 mg/dl 4. 150 -300 mg/dl
103.	Mallattoolee gurguddoon dhibee hammi sukkaara dhiiga keessaa hir'achuu maal fa'a?	1. Yeroo baay'ee dheebochuu, yeroo baay'ee fincaa'uu fi yeroo baay'ee bishaan dhuguu

		2. Garmalee dafqisiisuu, dadhabbii qaamaa fi urgufsiisuu 3. Dhukkubbii qaamaa, hafuura kutuu fi dhukkubbii garaachaa 4. Saffisni dha'annaa onnee dabaluu, garaa kaasaa fi hooqqisiisuu
104.	Dhukkuba sukkaaraa keessatti sababni hammi sukkaaraa, dhiigaa keessaa akka hir'atuu godhu maali?	1. Qoricha farra dhukkuba sukkaaraa amma ajajamee ol fudhachuu 2. Nyaata waliin qoricha fudhachuu 3. Dhangala'oo baay'ee fudhachuu 4. Nyaata qabiyyee sukkaara qabu baay'ee fudhachuu
106.	Karaan halkan(yeroo hirriibaatti) hammi sukkaaraa dhiiga keenyaa akka gad hin buune ittiin ittisuu dandeenyu kami?	1. Ciisuu(rafuun) dura nyaata salphaa gilukoosii of keessaa qabu dabalataa fudhachuu 2. Osoo hin ciisin(rafin) beela'uu 3. Bishaan baay'ee dhuguu 4. Yeroo ciisichaa dura aannan dhuguu
107.	Sochii qaamaa waan ulfaatina qabu kaasuu, dhukkubsattoota dhukkuba sukkaaraa qaban irratti dhiibbaa akkamii qaba?	1. Qabiyyee sukkaara dhiigaa gadi buusa 2. Qabiyyee sukkaara dhiigaa ni eega 3. Hamma kolestroolii dhiigaa ni dabala 4. Qabiyyee sukkaara dhiigaa ni dabala
108	Mallattoon hammi sukkaaraa dhiiga keessa jiru halkan(yeroo rafnu) gadi bu'uu maali?	1. Garaa kaasaa 2. Dhukkubbii qaamaa 3. Amma amma fincoofsisuu 4. Hirriba dhabuu
109.	Hammi sukkaara dhiiga gad-buhee, erga wal'aansa argannee booda, daqiiqaa meeqa booda irra deebinee, hamma sukkaara dhiiga keenyaa safaruu(laalamuu) kan qabna?	1. Daqiiqaa 5 booda 2. Daqiiqaa 15 booda 3. Daqiiqaa 10 booda 4. Daqiiqaa 20 booda

KUTAA ARFAFFAA: DHUKKUBSATAA DHUKKUBA SUKKAARAA QABU IRRATTI ITTISA SUKKAARA GADI BU'UU ILAALCHISEE SHAAKALA.		
201.	Yeroo imalaatti qabiyyeen sukkaara dhiiga keenya yoo gad buheef, of eeggannoo akkamii gochuu qabna? .	1. Sukkaara ykn karameellaa baatanii deemuu 2. Aannan koochoo tokko baatanii deemuu 3. Bishaan baatanii deemuu 4. Biskutii baatanii deemuu
202.	Kanneen armaan gadii keessaa sukkaarri dhiiga keessa yeroo gad buhe sirreessuf kan fayyadu kami?	1. Sukkaara 15 gms fudhachuu 2. Fuduraalee akka paapaayaa nyaata gidduutti nyaachuu 3. Bishaan leetira walakkaa fudhachuu 4. Daabboo fi dhadhaa nyaachuu
203	Yeroo sukkaara dhiigaa gadi bu'e jettee	1. Eeyyee

	yeroo yaaddu hamma guluukoosii(sukkaara dhiiga kee keesa jiruu) ni safartaa?	2. Lakki
204 .	Dhukkubsatan dhukkuba sukkaaraa qabuuf, gosti sochii qaamaa siirrii fi naga-qabeessi kami?	1. Miillaan ariifatanii deemuu 2. Ulfaatina qaamaa kaasuu 3. Fiigicha 4. Utaaluu
205.	Dhukkubsattoonni dhukkuba sukkaaraa sochii qaamaa guyyaatti hangamiif gochuu qabu?	1. Yoo xiqqaate daqiiqaa 30f. 2. Daqiiqaa 15f 3. Sa'aatii 1 hanga sa'aatii 1:30f 4. Hanga sa'aatii 2:00f
206	Nyaata gidduutti nyaata salphaa(oolchaa) ni fudhattaa?	1. Eeyyee 2. Lakki
207	Gilukoosii(hamma sukkaara dhiiga keessan keessa jiruu) mana keessanitti ni ilaallatu (safarattuu)?	1. Eeyyee 2. Lakki
208.	Beellama idileen(hordoffii) dhukkuba sukkaaraf qabdu irratti, yeroo siin jedhametti ni argamtaa ?	1. Eeyyee 2. Lakki
209	Yeroo hammi sukkaara dhiigaa gadi buhu yookin akka mallattoon isaa si mudate ogeessa fayyaa (doktara) keetti ni himattaa?	1. Eeyyee 2. Lakki
2010	Sochii qaamaa ykn hojii ulfaataa hojjechuun dura hamma guluukoosii(sukkaara) dhiiga keetii ni ilaallatta (safartaa)?	1. Eeyyee 2. Lakki

Annex: three

Declaration

I hereby declare that this my MSc thesis entitled as "knowledge and practice of hypoglycemia prevention and its and associated factors among patients with diabetes on follow up at selected Governmental Hospital in west Shewa, Ethiopia, 2023" is my original work. It has not been presented for a degree in any other university, and all sources of material used for this thesis have been duly acknowledged

Name: _____Signature: _____