Assessment of hypoglycemia and associated factors among diabetes mellitus type one patients attending to outpatient clinics of St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.

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This is to certify that the thesis prepared by Halefom Kahsay, entitled: "*Assessment of hypoglycemia and associated factors among diabetes mellitus type one patients attending to outpatient clinics of St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia."* and submitted in partial fulfillment of the requirements for the degree of Master of Pharmacy in Pharmacy Practice complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

Assessment of hypoglycemia and associated factors among diabetes mellitus type one patients attending to outpatient clinics of St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.

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Hypoglycemia is one of the most common acute complications of type one diabetes mellitus(T1DM). It is an often-neglected obstacle of diabetes therapy which has far reaching up to life threatening impact and precipitate major cardiovascular and cerebrovascular events. The knowledge of factors associated with hypoglycemia will help in the prevention and management of hypoglycemia. Therefore, this study was aimed to assess hypoglycemia and its associated factors among type one diabetic patients attended to diabetes outpatient clinics of St. Paul's Hospital Millennium Medical College(SPHMMC). A cross sectional study was conducted from June 01, 2017 to August 01,2017. Data were collected using a structured questionnaire. Multivariate logistic regression model was analyzed to find the association. In this study, among 247 participants 233(94.3%) of them were experienced hypoglycemia since diagnosed. Short duration of diabetes history(<1years) was significantly associated with less experience of hypoglycemia (AOR= 0.09, 95%CI:0.01-0.90). But, blood glucose monitoring at home were found to be significantly associated with more report of hypoglycemia(AOR=5.77,95%CI:1.16-28.66). Nearly two-third (65.2%) of patients perform self-monitoring blood glucose(SMBG) irrespective of frequency while only 68(42.2%) of them preformed three times daily. Being male was significantly associated with less performance of SMBG (AOR=0.43,95%CI:(0.23-0.80)). Whereas, educational level (primary school, AOR=4.29,95%CI:1.24-14.90) and shorter duration with diabetes (<1years and 1-5years), (AOR=4.45,95%CI:2.19-9.05 and AOR=8.85, 95%CI: 3.45-22.73) respectively, were found to be significantly associated with better performance of SMBG. Taking together, the findings indicated that prevalence of hypoglycemia was substantially high and the performance of SMBG was suboptimal, which warrants the need for health care providers engaged in diabetic care to aggressively address the issue.

Key words: *T1DM, Hypoglycemia, SMBG*

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List of Acronyms

ADA	American Diabetic Association
DCCT	Diabetes Control and Complication Trial
DM	Diabetes Mellites
EDA	Ethiopian Diabetes Association
FBG	Fasting Blood Glucose
FMOH	Federal Minister of Health
HbA1	Hemoglobin A1C type
HMO	Health Maintenance Organization
IDDM	Insulin Dependent Diabetes Mullites
IDF	International Diabetes Federation
ISPAD	International Society for Pediatrics and Adolescent Diabetes
SPHMMC	Saint Paul's Hospital Millennium Medical College
SMBG	Self-Monitoring Blood Glucose
T1DM	Type one Diabetes Mellites

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1. INTRODUCTION

1.1. Background

The American Diabetes Association(ADA) and endocrine society workgroup report defines iatrogenic hypoglycemia in patients with diabetes as all episodes of an abnormally low plasma glucose concentration that expose the individual to potential harm(ADA, 2018). Blood glucose values of <3.3–3.9 mmol/L (60–70mg/dl) are generally agreed to place the individual at risk of severe hypoglycemia because values in this range are associated with alterations in the counter regulatory hormones essential to the spontaneous reversal of hypoglycemia. A plasma concentration of ≤3.9 mmol/L (70mg/dl) can be used as the threshold value for identifying and treating hypoglycemia in children with diabetes because of the potential for glucose levels to drop further. On the other hand, hypoglycemia is defined by the development of autonomic symptoms like (trembling. palpitations, sweating, anxiety, hunger, nausea) and tingling or neuroglycopenic symptoms (difficulty concentrating, confusion, weakness, drowsiness, vision changes, difficulty speaking, headache and dizziness)(Trang et al., 2014, Clayton et al., 2013). Hypoglycemic episodes could also categorized based on severity as mild, moderate and severe (Jolene and Pamela, 2012, Cryer and Karl, 2011).

Hypoglycemia is a common problem in children with type 1 diabetes(T1DM) because of the challenges presented by insulin dosing, variable eating patterns, erratic activity, and the limited ability of small children to detect early signs of hypoglycemia. Nonetheless, the combination of understanding the physiological counter regulatory responses induced by hypoglycemia and monitoring glycemic therapy in diabetic population can help reduce the prevalence of iatrogenic hypoglycemia. The infant, young child, and even the adolescent typically exhibits unpredictable feeding, not eating all the anticipated food at a meal and have prolonged periods of fasting overnight that increases the risk of hypoglycemia. Therefore, selecting the correct prandial dose of insulin is often difficult(Seaquist et al., 2013, Allen et al., 2001, Kovatchev et al., 2008, Cryer, 2004).

Patients with type 1 diabetes started using instruments for self-monitoring of blood glucose (SMBG) in the early 1980s.This quickly became the cornerstone in daily blood glucose management in type 1 diabetes, making patients better able to adjust their insulin doses and

monitor for hypoglycemia(Skeie et al., 2009). It is recognized as an important tool that guides glycemic management strategies and has the potential to improve problem-solving and decision-making skills for both the person with diabetes and his or her health care professional to adjust therapy and assess the responses to therapy. Since the prevalence of diabetes increasing, successful management of blood glucose control could be very important. SMBG gives an acceptably accurate reflection of immediate plasma glucose levels which is commonly used currently in diabetic patients (Saudek et al., 2006, Parkin and Davidson, 2009).

To sum up, Individuals who take insulin, which includes all people with type 1 diabetes and some people with type 2 diabetes, are prone to hypoglycemia. Most people with diabetes can recognize symptoms and treat them by quickly eating or drinking something with sugar, such as candy, juice, soft drink, or by taking special glucose tablets or gel, available over the counter in pharmacies. People with diabetes can reduce or prevent episodes of hypoglycemia by monitoring their blood sugar levels frequently and learning to recognize the symptoms of low blood sugar and the situations that can trigger it(Dinsmoor, 2014).

1.2. Statement of the Problem

According to the current international diabetes federation report (IDF) 425 million people have diabetes in the world. If nothing is done, the number of people with diabetes may rise to 693 million in 2045. The estimates of children and adolescents below age 19 with type 1 diabetes has risen to over a million(IDF, 2017). People with T1DM, with proper daily insulin treatment, regular blood glucose monitoring and maintenance of a healthy diet and lifestyle can live a healthy life and delay or avoid many of the complications associated with diabetes(IDF, 2017, ADA, 2018). However, approximately 90% of all patients who received insulin have experienced with unknown incidence of mild and moderate hypoglycemia. Such events occur frequently and quite often unrecognized or underreported which has far-reaching clinical, economical, and social impacts(Trang et al., 2014, Briscoe and Davis, 2006). Mild hypoglycemia reduces quality of life while severe hypoglycemia is life-threatening and can precipitate major cardiovascular and cerebrovascular events. Although most sever hypoglycemic episodes are not fatal, there remain numerous negative sequelae leading to compromised occupational and scholastic functioning, social embarrassment, poor judgment, serious accidents, and possible permanent cognitive dysfunction. The onset of hypoglycemia is usually rapid, and symptoms range from very mild to severe enough to cause brain damage or death(Briscoe and Davis, 2006, Clayton et al., 2013, Cryer, 2004).

Various approaches to assess the risk of hypoglycemia have been tested, including low HbA1c, intensive therapy, inadequate hormonal counter regulation, hypoglycemia unawareness, and long duration of diabetes. However, diabetes care givers as well as diabetic patients or care givers confirm hypoglycemia as expected event. Thus, they considered provision of emphasis on intensive insulin treatment and giving awareness to the patients or caregivers at their visit to the health institution could be a major solution for the treatment of hypoglycemia. Besides, to the best of our knowledge, evidence-based research on prevalence of hypoglycemia and an assessment on performance of SMBG among T1DM patients in Ethiopia is scanty. But, working on individuals associated factors to the patients' hypoglycemia will be worth to tackle the incidence and recurrent episodes of hypoglycemia together with SMBG practice. Diabetes self‐management and minimizing significant health care cost associated with SMBG are encouraged in the hospital. However, relatively little is known about current practice, pattern and barriers associated with SMBG in this environment., Therefore, we were assessed the performance of SMBG as well as

the factors associated with it among T1DM patients attending to the outpatient diabetic specialty clinics in SPHMMC.

Generally, high level of concern should be given to the contributing factors for hypoglycemia and SMBG that leads the patient to additional morbidity. Based on the compelling evidence of the potential harms associated with hypoglycemia, the size of the problem, assessments on prevalence of hypoglycemia with its possible contributing factors, differentiating the type of hypoglycemia and assessing the performance of SMBG that were investigated in the past studies are not enough. Thus, this further research, may dig out a significant outcome management of patients with T1DM regarding hypoglycemia and SMBG practice in the study area. Additionally, it could have an input to initiate further studies on hypoglycemia prevalence and possible associated factors, SMBG activities, advanced home care self-management of hypoglycemia events and educational programs for health care professionals.

1.3. Literature Review

1.3.1. **Prevalence of Hypoglycemia**

Hypoglycemia is one of the most feared complications of diabetes treatment(Briscoe and Davis, 2006).It commonly occurs in clinical practice as approximately 90% of all patients who receive insulin have experienced hypoglycemic episodes(Cryer, 2016). Furthermore, Surveys investigating the prevalence of hypoglycemia have provided some alarming results. The DCCT reported a threefold increase in severe hypoglycemia and coma in intensively treated T1DM patients versus conventionally treated patients (DCCT, 2002). A population based study was conducted in United Kingdom to determine the frequency and predictors of hypoglycemia in type one diabetic patients found that an intensively treated individual with type 1 diabetes can experience up to 10 episodes of symptomatic hypoglycemia per week and severe temporarily disabling hypoglycemia at least once a year(Donnelly et al., 2005). Similarly, a population survey from same country was conducted to determine frequency of severe hypoglycemia found a total of 112 episodes of hypoglycemia in 69 T1DM patients with an incidence rate of 11.5 per 100 patients per year(Leese et al., 2003).In line with this, a systematic review was conducted on hypoglycemia in type 1 diabetes mellitus at Memphis, USA found that sever hypoglycemia occurred in two-third of the patients assigned to the intensive treatment arm as well as an average of two episodes of symptomatic hypoglycemia occur each week during intensive therapy(Dagogo-Jack, 2004). The consecutive five-year prospective survey from different university of diabetes out-patient clinics in Germany reported that moderate hypoglycemia was occurred about 38.6-43.7 in below 5 years, 19.5-29.8 in those age group of 5-7 years and 21.2- 31.5 in those 7-9 years old per 100 patients per years. This report also included an average of severe hypoglycemia was experienced roughly 1.9 -5.2 in those below 5 years old, 2.1-5.4in those 5-7 years and 3.6–4.0 in those age group of 5-9 years per100 patient per year. (Wagner et al., 2008). On the other hand, a recent overall incidence of sever hypoglycemia were found about 9.4 per 100 patients-year at Chieti, Italy (Franchini et al., 2016). Furthermore, a 6 month follow up study was done in 123 insulin treated patients at Shiga University of Medical Science Hospital Otsu, Japan demonstrated that 33.3% patients experienced mild hypoglycemia, and 16.3% experienced severe hypoglycemia(Sonoda et al., 2015).Using the definition of severe hypoglycemia as an episode requiring the help of another person, a large clinical questionnaire from Denmark completed by 411 patients with type 1 diabetes reported a frequency of mild symptomatic episodes of 1.8

episodes per patient per week compared to a frequency of severe episodes of 0.027 episodes per patient per week which equated to around 1.6 attack per year(Frier and Heller, 2012). A cross sectional study done in Tanzania on 81 T1DM patients to determine the acute complication of diabetes found that prevalence of 52% hypoglycemia in 6 months(Mukama et al., 2013). A variety of figures were reported for prevalence of hypoglycemia with similar studies in Taiwan (36.5%)(Ou et al., 2017) Scotland (98%) (Hepburn et al., 1990), south Africa(56%) (Pillay et al., 2016), Nigeria (65%) (Ogbera and Kuku, 2012).

Regarding reasons for hypoglycemia myriad literatures were available. For example, a study was carried out on a group of 84 children and adolescents with T1DM to determine the rate of occurrence of severe hypoglycemia episodes found that about 27% patients reported at least one severe hypoglycemia in the last 12 months. 47% of the cases of hypoglycemia were caused by the patient's failure to observe the meal timetable, which led to delays in the carbohydrates intake, 19% were due to a high physical effort and 14% by excessive insulin administration(Cosmescu et al., 2008). ADA workgroup and the endocrine society reviewed the evidences for precipitant factors for hypoglycemia confirmed that insulin dosing, variable eating patterns, erratic activity, and the limited ability of small children to detect hypoglycemia were the main challenges in T1DM patients (Seaquist et al., 2013). Similar study in South Africa, revealed that Missed meal (36%) Alcohol (22%) GI upset (20%) and inappropriate insulin treatment (18%) were the leading precipitants for hypoglycemia events (Gill and Huddle, 1993).

1.3.2. **Self-Monitoring of Blood Glucose(SMBG)**

One of the primary goals of diabetes management is to maintain the blood glucose levels because it is well established that frequent monitoring of blood glucose level delays the onset and retards the progression of microvascular and macrovascular complications(Rewers et al., 2014).As such ISPAD (2014) recommended that SMBG at a frequency of usually four to six times a day, to optimize diabetes control, because frequency of SMBG correlates with glycemic control. In addition to this, ADA (2014) suggested that, although individual needs may vary, SMBG testing 6–8 times daily should be considered prior to meals and snacks, occasionally postprandially, at bedtime, prior to exercise, when they suspect low blood glucose, after treating low blood glucose until they are normoglycemic, and prior to critical tasks such as driving.

Practically, one study conducted in a group of 30 voluntaries of T1DM patients at university of Virginia to determine actual frequency of SMBG compared with self-report and physician's recommendation. About 47% of the subjects obtained an average of three or more self-measurements per day, 23% averaged one daily measurement, 20% averaged two daily measurements and very few subjects averaged less than one self-measurement per day (Gonder-Frederick et al., 1988). Furthermore, a cross sectional study was done in 150 T1DM to estimate the association between HbA1c and SMBG-frequency suggested that good diabetes control has achieved in routine diabetes care with a minimum of 4 SMBGs per day(Minder et al., 2013).Another national survey was carried out in France to determine SMBG in T1DM patients showed that 58% of the participates took at least three tests a day(Lecomte et al., 2008).

1.3.3. **Factors Associated with Hypoglycemia and Blood Glucose Monitoring**

Knowledge regarding the different factors that may influence hypoglycemia in T1DM is expanding. Many factors, including socio-demographic and clinical characteristic, disease and treatment related factors have been reported in different literatures. A multicentered study was conducted a five year follow up among T1DM patients in Germany reported that younger age and longer diabetes duration were positively associated with moderate and sever hypoglycemia (Wagner et al., 2008). Additionally, a review done with collaboration of the international hypoglycemia study group concluded that the frequency of hypoglycemia increases with the duration of diabetes as well a slow HbA1C is a risk factor for hypoglycemia during intensive therapy of type one diabetes patients(Cryer, 2015). Jointly, the ISPAD clinical practice consensus guideline on assessment and management of hypoglycemia in children and adolescents with diabetes suggested that younger age, lower HbA1C levels, hypoglycemia unawareness, previous severe hypoglycemia and longer duration of diabetes are the main risk factors for hypoglycemia(Trang et al., 2014).

Furthermore, a population based prospective cohort study was done in Wisconsin, USA to determine risk factors for frequent and severe hypoglycemia in T1DM patients found in their multivariable analysis that lower HbA1C, intensive insulin therapy, and more frequent(3-4 times per day) SMBG were associated with increased risk of frequent (mild and moderate) hypoglycemic reactions whereas only lower HbA1C and older age was associated with severe hypoglycemic

reactions(Allen et al., 2001). On the other hand, a case control study in Republic of Korea revealed that independent risk factors of severe hypoglycemia were associated with a lack of the SMBG and previous episodes of severe hypoglycemia in addition to the positive association report with patients of older age and had history of prolonged duration of hypoglycemia (Jeon et al., 2016). On the other hand, a cross sectional survey were done in Rwanda at Kigali teaching hospital to determine clinical patterns and complications of African diabetic patients given a preliminary data, as duration of diabetes and age of patients were not associated with hypoglycemia (Rudasingwa et al., 2012). A recently published survey in Ethiopia assessed the severity, magnitude and associated factors for hypoglycemia in diabetic patients found that female gender, higher BMI, low educational status and higher FBG were associated with higher reported incident of hypoglycemia(Wako et al., 2017).

Factors associated with self-monitoring of blood glucose level have been supported with different markers. One evidence in Virginia, USA concluded that peoples with higher education and those who had self-adjustment of insulin were associated with frequent SMBG(Gonder-Frederick et al., 1988). Other population based cross sectional study in North California reported that longer time since diagnosis, less intensive therapy, male sex and older age were associated with non-adherence to perform SMBG(Karter et al., 2000). On the other hand, a survey-based cross-sectional study conducted to determine adherence to SMBG among T1DM patients in five diabetes sites, Sweden. This study showed that older age and female gender were significantly associated with frequent (≥4 per day) SMBG(Mostrom et al., 2017). Furthermore, one retrospective cohort study conducted in Germany and seen an association between SMBG and T1DM demographic characteristics revealed that only younger age were associated with frequent (at least 4.4 per day) performance of SMBG(Ziegler et al., 2011). Another cross-sectional study assessed SMBG practice among insulin treated patients in Jos, Nigeria reported that high level of education, high income, long duration of diabetes and male sex were found significantly associated with better performance of SMBG(Edah et al., 2016).

2. OBJECTIVES

2.1. General Objectives

- To assess hypoglycemia and associated factors among ambulatoryT1DM patients attending to diabetic clinics of SPHMMC.

2.2. Specific Objectives

- To determine the prevalence of hypoglycemia
- To assess self-monitoring practice for blood glucose
- To identify factors associated with self-monitoring blood glucose
- To identify factors associated with hypoglycemia

3. METHODOLOGY

3.1. Study Area

The study was conducted in St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia. Although the medical school opened in 2007 the hospital was established in1968. Currently, it is one of the tertiary public hospital in Ethiopia with nearly 400 beds which provides treatment for different categories of ambulatory and admitted patients coming from different corners of the country. The hospital has specialty clinics which provide an out-patient service where patients with specific chronic disease are referred for follow-up. Diabetic clinic is one of the specialty clinics facilitating its service with one pediatric endocrinologist and specialists, residents and nurses. Patients have been followed in two sites. An average of 20 T1DM patients under 18years old are followed every Monday after noon in the pediatric diabetes site. Besides, adults above 19 years' age were attended to the main outpatient room every Wednesday and Thursday working hours with average 10 TDM1 patients each day. An average of 5 T1DM patients were also attended every Friday morning. Both sites provide follow up service and treatment to all types of diabetes mellitus cases in addition to other different types of endocrine disorders.

3.2. Study Design and Period

Institution based cross sectional study design was conducted to assess the prevalence and associated factors for hypoglycemia among T1DM patients coming to hospital out-patient diabetic clinics for regular follow up. Patient interview and retrospective patient chart review for the same patient was conducted from 1st of June to 1st of August 2017.

3.3. Source and Study Population

All diabetes type one patients on follow up at SPHMMC were considered as a source population. On the other hand, study population were selected among all T1DM patients having follow up at the study hospital during the study period who fulfilled the inclusion criteria.

3.4. Study Variables

3.4.1. Dependent Variables

- Hypoglycemia
- Self- monitoring of blood glucose level(SMBG)

3.4.2. Independent variables

- Socio demographic characteristics (age, sex, educational status) and
- Clinical characteristics (duration of diabetes, BMI, FBG, blood glucose monitoring options, type of insulin in use) and EDA membership

3.5. Inclusion and Exclusion Criteria

3.5.1. Inclusion criteria

- Patients diagnosed with T1DM
- Patients with T1DM aged 5years and above

3.5.2. Exclusion criteria

- T1DM patients who were pregnant
- T1DM patients with other chronic comorbidities (Cirrhosis, heart and kidney failure infectious diseases)
- T1DM patients with incomplete/inaccessible medical chart

3.6. Samples size and Sampling Technique

3.6.1. Sample size

The sample size(n) was calculated assuming a 50% proportion (p) of hypoglycemia prevalence, a 5% marginal error (d) and a confidence interval (CI) of 95%. Based on this assumption the sample size was calculated by a single population proportion formula,$n = Z(\frac{\alpha}{2})^2 \frac{P(1-P)}{d^2}$ .This yields a sample size of 384. The expected number of source population in the study period (N), based on the average number of patients coming to the diabetic sites during the diabetic days of the study period were given us 540. It was calculated by the total sum of 12*10,12*10, 12*5 for those who were averagely attend every Wednesday, Thursday working hours and Friday morning respectively. Additionally,12*20 for those who attend every Monday afternoon. The sample size was adjusted and calculated using the following formula:$Corrected\ sampl\ size =$

$\frac{n \times N}{n+N} \sim 225$. 10% contingency was considered, thus final sample size used in this study was 248 T1DM patients.

3.6.2. Sampling Technique

A systematic random sampling technique was used to recruit samples for the study in each day of the data collection process. The actual sampling fraction (k^{th}) was calculated through dividing the total number of source population attending during the study period (540) by the corrected sample size (248). Thus, every other patient was interviewed after physician visit and his/her medical record was reviewed in the same day after the interview until the total sample size was reached.

3.7. Data Collection and Analysis

3.7.1. Data Collector Recruitment and Training

Six nurses who work in outpatient diabetic clinics of SPHMMC were recruited as data collectors. One-day training was given to them about the objective, relevance, confidentiality, respondent's right, informed consent and techniques of interview for the study using the structured questionnaire prior to data collection. Data were collected for three months using interview supported by structured questionnaire which was originally prepared in English then translated to Amharic for the sampled patients. Chart reviews were done to assess the fasting blood glucose(FBG) level of patients recorded in their last three consecutive appointments.

3.7.2. Data Collection Instruments

The questionnaire had included four parts. ***Part I*** was aimed to collect information on basic socio-demographic variables. ***Part II*** has been consisted of questions required to gather information on the prevalence, severity, and reasons of hypoglycemia. and ***Part III*** was included questions important to assess the performance of SMBG and self-management of hypoglycemia among DM1 patients and/or their care givers. ***Part IV*** contained data abstraction format to review the medical record of patients which was prepared to assess FBG level of patients in the preceding three appointments and BMI.

3.7.3. Data Quality Control and Management

The compiled questionnaire was assessed by a physician and expert in the field of endocrinology for clarity and comprehensiveness of contents. Its Amharic version was pretested among13 (5%) randomly selected T1DM patients for clarity, acceptability, and flow among the non-study subjects ahead of the start of the main data collection. The collected data was checked for completeness and consistency on daily basis.

3.7.4. Data Analysis and Interpretation

In the present study, maximum effort had been taken to maintain quality of data through the different steps like data entry, analysis, interpretation and representation. Incomplete questionnaires were excluded while completed were coded and entered in to Epi Data entry version 4.2.0. Then, it was exported to and analyzed by Statistical Package for the Social Sciences(SPSS) version 20.0 package. Descriptive statistics including: frequency, mean and standard deviation was used to summarize patients' baseline socio-demographic data and evaluate distribution of responses. Crude and Adjusted Odds Ratio (COR/ AOR) were calculated and 95%CI was used to determine factors associated with hypoglycemia and SMBG. A p-value of 0.05 or less was considered as statistically significant.

3.8. Ethical Consideration

Ethical clearance and approval of the study protocols was obtained from the ethical review committee of School of Pharmacy of Addis Ababa University and approved by ethical review board of SPHMMC. In addition, the respective heads of the outpatient diabetic clinics permitted the study to be conducted in the clinics. Assent was obtained from the children between 5-18 years of age involved in the research and the consent was obtained from family or care givers. Prior to data collection, informed verbal consent was obtained from the study participants. Each participant was informed about the objective of the study, procedures of selection and assurance of confidentiality. Participants name were not registered to minimize social desirability bias and enhance anonymity. During the data collection one separate room was permitted to facilitate the data collection. Thus, the privacy and confidentiality of any information were kept secured. The collected data was handled and secured with the principal investigator in every data collection day.

3.9. Operational Definitions

Hypoglycemia-defined as the presence of hypoglycemia symptoms and corrected with taking of carbohydrate/ sweetie foods.

Physical exercise/activity- defined as performing any activity which is out of routine daily activity.

Skipped meal – means not taking any food for two hours and above

Mild hypoglycemia -An event with little or no interruption of activities and no treatment assistance needed.

Moderate hypoglycemia- An event with some interruption of activities but no assistance needed to administer the resuscitative actions.

Sever hypoglycemia- An event requiring assistance of another person due to loss of consciousness to actively administer the resuscitative/corrective actions.

Self-monitoring blood glucose-means that testing blood sugar levels of T1DM patients at least three times daily by themselves or their care givers out of appointment. (ADA,2018, ISPAD,2015)

Self-management of hypoglycemia-means the remedy measurements' taken by T1DM patients or providing by their caregivers during the occurrence of hypoglycemia episodes.

4. RESULTS

4.1. Socio Demographic Characteristics

In the present study, a total of 247 T1DM patients were involved. Females comprised 135(54.7%)of the sex category. Majority of the patients were in the age group of 5-15 years, which accounted for 129(52.2%) and 192(77.7%) had formal educational back ground. Regarding the EDA membership, 134(54.3%) have a membership identification card.

Table 1:Socio-demographic characteristic of ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

Variables	Total number of respondents*(N=247)*	
	Frequency	**Percent**
Sex		
Male	112	45.3
Female	135	54.7
Age(Years), Mean ±SD (16± 2.5)		
5-15	129	52.2
16-30	65	26.3
>30	53	21.5
Educational background		
No formal education	55	22.3
Primary (1-8)	140	56.7
Secondary (9-10)	38	15.4
College/Higher education	14	5.7
Marital status		
Single	177	71.7
Married	65	26.3
Divorced	4	1.6
Widowed	1	0.4

EDA membership		
Yes	134	54.3
No	113	45.7

4.2. Health Related Characteristics

Among participants of the study majority (61.5%) had a healthy weight, while only one patient was found with obese BMI. Regarding the duration of diabetes, 54 (21.9%) had insulin treatment history of less than one year, 130 (52.6%) have been laid between one and five years duration**.** Most 168(68%) of the respondents were taking both regular and Lente insulin (NPH) while 75(30.4%) were on Lente insulin (NPH) and 4(1.6%) were taking only regular insulin [Table2].

Table 2:Clinical characteristics of ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

Variables	Frequency	Percent
Body mass index(BMI)*(mean+SD (16±2.8)		
Underweight	51	21.1
Health weight	151	**61.5**
Overweight	43	17.0
Obese	1	0.4
Duration of Diabetes Since Diagnosed (mean± SD (4.8±2.1)		
<1year	54	21.9
1-5years	130	**52.6**
>5years	63	25.5
Types of Insulin Taking		
Regular insulin	4	1.6
NPH	75	30.4
Both (Mix tared)	168	**68.0**

*BMI for respondents of age ≤ 20 years was done based on the WHO BMI category as percentiles adjustment.

4.3. Prevalence and Reasons Contributing for Hypoglycemia

Almost all participants of the study, 233 (94.3%) had a history of hypoglycemia events since diagnosed as T1DM. Among those, 154(66.1%) of them were experienced a total of 403 episodes of hypoglycemia in the last 3 months. Accordingly,182(45.2%),167(41.4%) and 54(13.4%) were mild, moderate and severe respectively. Correspondingly, 3.1 events of mild hypoglycemia, 2.3 events of moderate hypoglycemia and 0.93 episodes of sever hypoglycemia were occurred per patient per year (Table 3).

Table 3:Frequency of hypoglycemia events and its severity distribution in the last three months among ambulatory T1DM patients attending to diabetes clinics of SPHMMC between June 01 to August 01,2017.

Total Number of Respondents (N=233)				
Episodes of hypoglycemia in the last 3 months	**Severity**			**Total**
	Mild (%)	***Moderate (%)***	***Severe (%)***	
One times(n=48)	18(37.5)	30(62.5)	*NH**	48
Two times (n=42)	52(61.9)	27(32.1)	05(6.0)	84
Three times (n=27)	42(51.9)	30(37.0)	9((11.1)	81
Four times (n=21)	38(45.2)	33(39.3)	13(15.5)	84
five and above times(n=16)	32(30.2)	47(44.3)	27(25.5)	106
Total episodes(n=154)	182(45.2)	167(41.4)	54(13.4)	403
Event rate of hypoglycemia episodes per total respondents-year(N=233)	**3.1**	**2.9**	**0.93**	**6.9**

NH: Not Happened

Up on evaluation of the reasons contributing for hypoglycemia among the 233 respondents, majority,217(93.9%) were experienced hypoglycemia due to skipped meal followed by 120 (51.9%), exercise out of food. Drunk alcohol without food was found the least (1.7%)challenging reason for hypoglycemia events(Fig1).

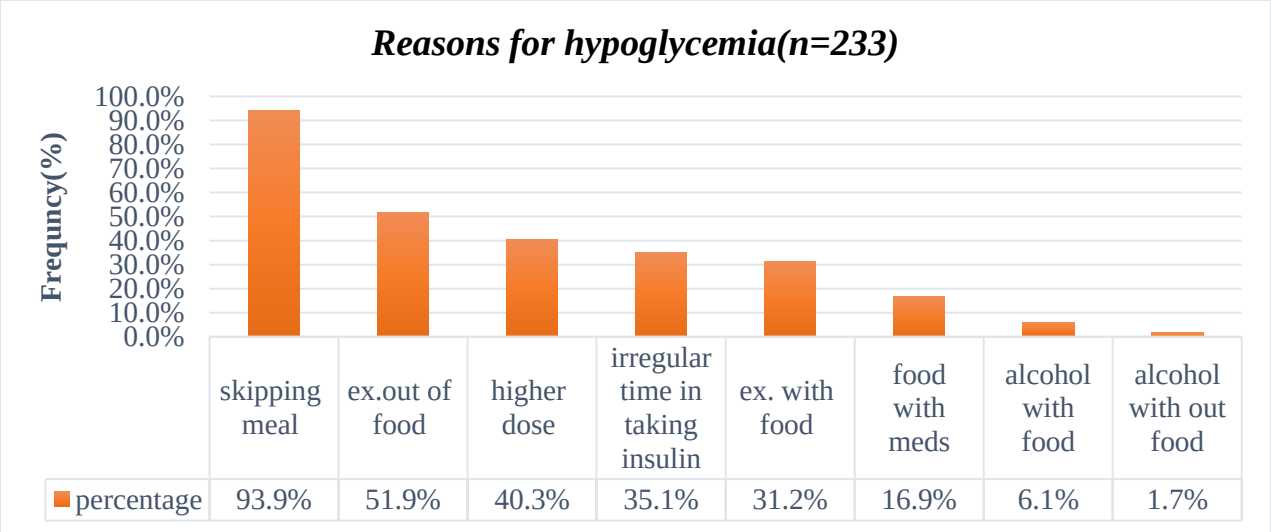

Figure 1: Reasons contributing for hypoglycemia among ambulatory T1DM patients attending to SPHMMC between June 01 to August 01,2017.

4.4. Self-Monitoring of Blood Glucose(SMBG)

Assessment of SMBG level of the respondents revealed that out of the total 247 T1DM patients one hundred sixty-one (65.2%) of them were performed SMBG irrespective of the frequency. Out of those who performed SMBG level, one hundred fifty-two (61.5%) were monitored by themselves/families and nine (3.6%)were monitored with health care professional in addition to their regular follow up. But, about one third (34.8%) were monitored their blood glucose level with regular follow up at diabetic clinics of SPHMMC. Specifically, among the sub-total (161) respondents who had SMBG,68(42.2%) patients were monitored blood glucose level three times daily by themselves/families with their glucometer. Again, among seventy-two (44.7%) patients who had monitored twice daily,70(97.2%)were themselves/families and two (2.8%) respondents were monitored with health care professional. As shown, in figure 2, ninety-two (49.7%) respondents were not monitored their blood glucose level even once weekly.

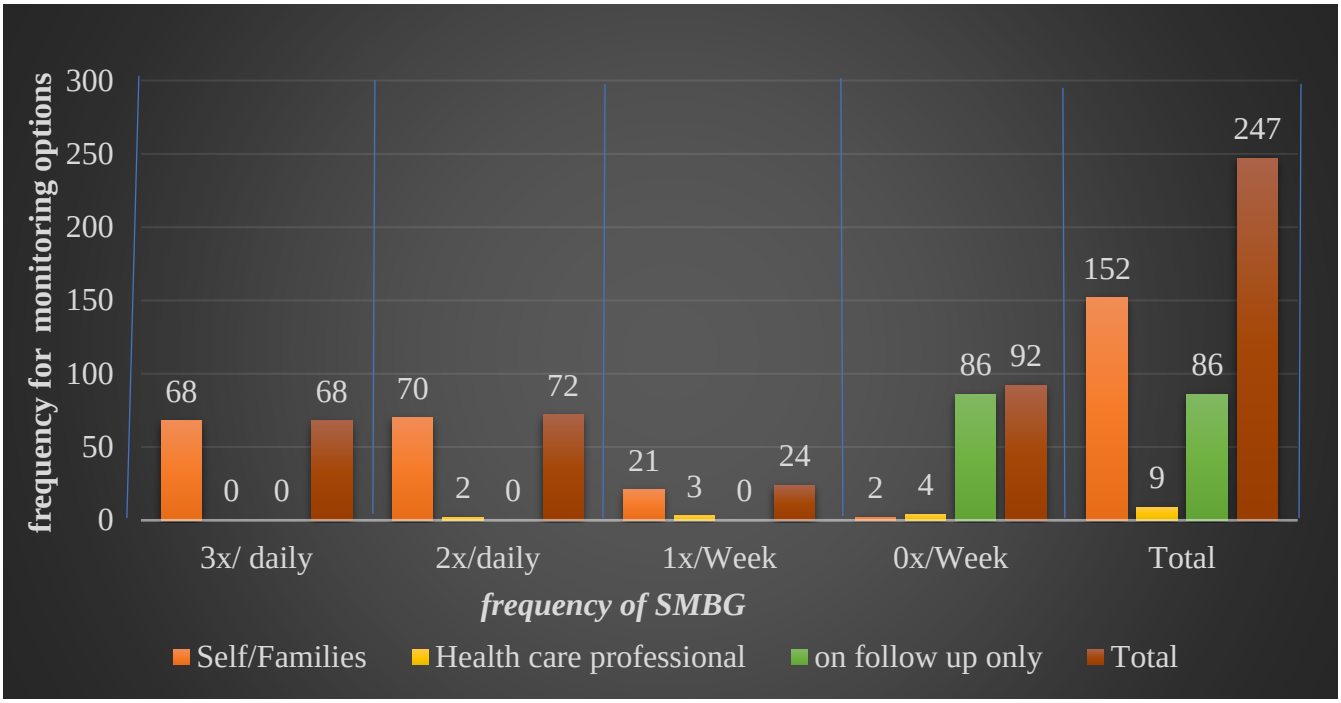

*Figure 2:*Blood glucose monitoring options versus frequency distribution of SMBG level among ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

The last three consecutive results of FBG distribution were reviewed form chart of the study participants. Accordingly, 247 recorded values were found in the most recent visit, 245 values each from last two consecutive records were reported. A total of 61(8.3%) recorded values were found in the hypoglycemia range, 324(44.0%) recorded values with in the normal range and 100(13.6%) recorded values were found in the range of poor controlled FBG values. Explicitly, of the 247 most recent FBG values 14(22.9%) records were distributed in hypoglycemia range, 123(37.9%) recorded values in normal assortment, and only 25(25%) recent FBG recorded value found in the poor category (Fig 3).

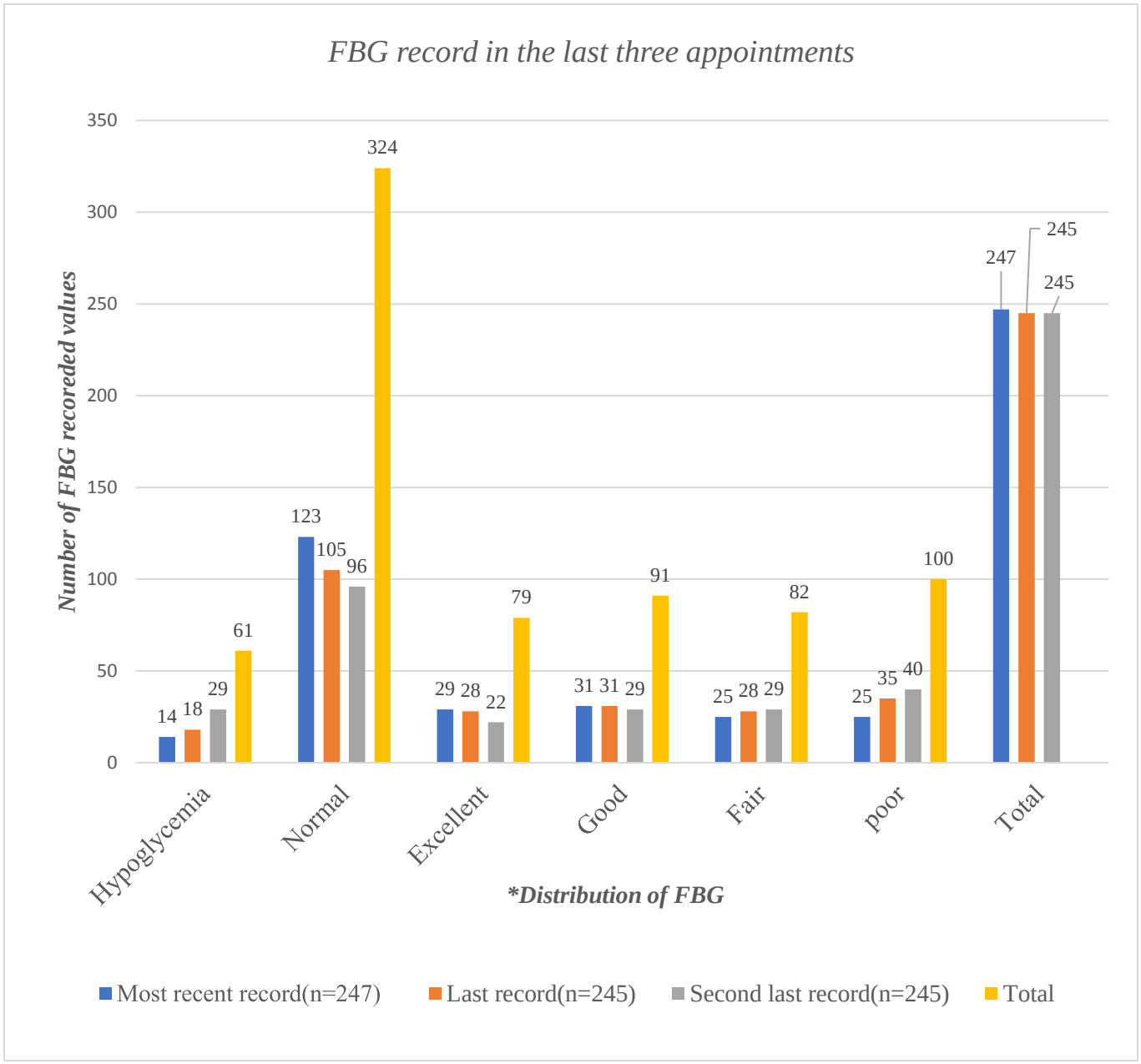

Figure 3: Three consecutive follow up measurements of FBG level among ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

**The FBG level of distribution category is based on DCCT, expressed as Hypoglycemia <70mg/dl, Normal 70- 154mg/dl, Excellent 155-190mg/dl, Good 191-225mg/dl, Fair 226-260mg/dl, Poor >261mg/dl*

4.5. Self-Management of Hypoglycemia

As shown in Figure 4, check-up blood glucose level and meal time adjustment with insulin were the most hypoglycemia prevention mechanism documented in 218 (89%) and 187(76.3%) of patients respectively.

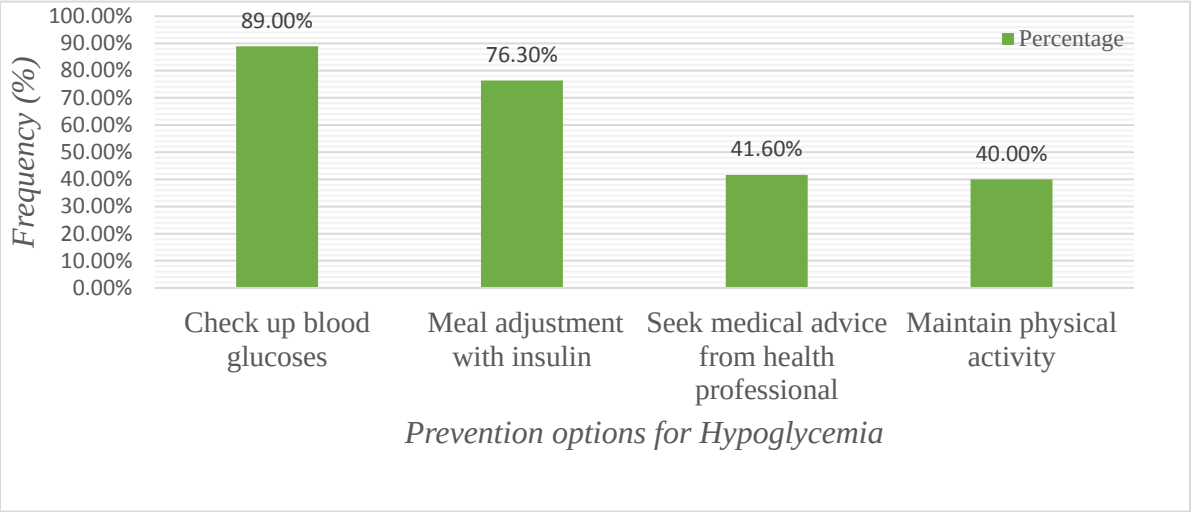

Figure 4: Prevention options of hypoglycemia among ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

The result of multiple response analysis for the immediate measurements taken for resolving hypoglycemia among the total 233 respondents showed that sweet candies (71.4%) and table sugar (70.6%) were nearly the same most taken as immediate measurements for resolving hypoglycemia. Providing honey, went to nearby clinic or called to ambulance were less practiced as immediate measurements by the study participants (fig.5).

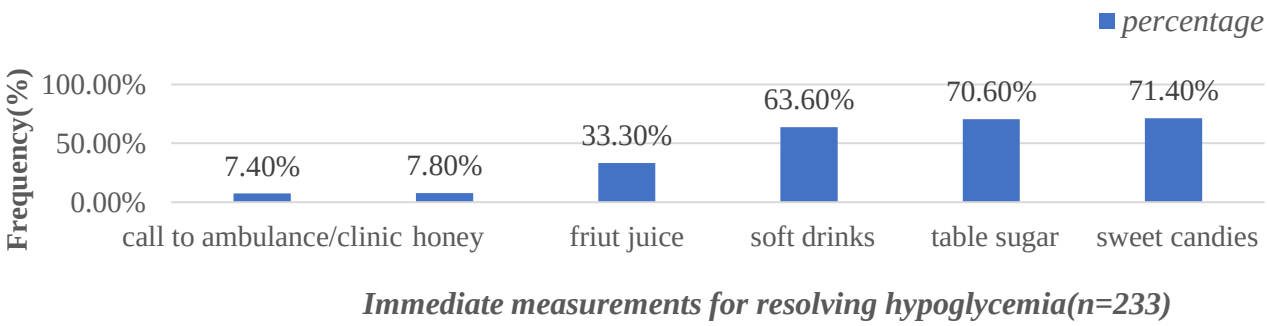

Figure 5: Immediate management of hypoglycemia practices among ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

4.6. Factors Associated with Self-Monitoring Blood Glucose(SMBG)

The multivariate analysis of this study was fitted and showed that gender, educational back ground and duration of DM since diagnosed had significant association with SMBG. Accordingly, male patients were nearly to 0.6 (AOR=0 .43, 95% CI:(0.23-0.80)) times less likely to perform SMBG compared to female patients. On the other hand, patients who had an educational back ground of primary school were about four and quarter (AOR=4.29,95%CI:1.24-14.90) times more likely preformed SMBG compare to those who were at university/college level. Shorter (<1year and 1-5year) duration of diabetes were also about nine (AOR=8.85, 95%CI:3.45-22.73) and four (AOR=4.45,95%CI:2.19-9.05) times, respectively, more likely monitored compared to those longer duration(>5years) (Table 4).

Table 4:Multivariate logistic regression analysis results of factors associated with SMBG among ambulatory T1DM patients attending to diabetic clinics of SPHMMC between June 01 to August 01,2017.

Variables	**SMBG (N=247)**		**COR (95%CI)**	**AOR (95%CI)**
	Yes (%)	No (%)		
Sex				
Male	65(58.0)	47(42.0)	0.56(0.33-0.95) *	0 .43(0.23-0.80) *
Female	96(71.1)	39(28.9)	1.00	1.00
Educational back ground				
No formal education	37(67.3)	18(32.7)	2.74(0.83-9.09)	3.71(0.99-13.98)
Primary (1-8)	105(75.0)	35(25.0)	4.00(1.30-12.33) *	4.29(1.24-14.90) *
Secondary (9-10)	13(34.2)	25(65.8)	0.69(0.20-2.43)	1.26(0.32-5.01)
College/university	6(42.9)	8(57.1)	1.00	1.00
Duration of DM(year)				
<1	45(83.3)	9(16.7)	10.00(4.12-24.28) *	8.85(3.45-22.73) *
1-5	95(73.1)	35(26.9)	5.43(2.83-10.42) *	4.45(2.19-9.05) *
>5	21(33.3)	42(66.7)	1.00	1.00

- **Statistically significant (p value=<0.05)*

4.7. Factors Associated with Hypoglycemia

After running univariate binary logistic regression analysis; sex, age, duration of DM and blood glucose monitoring options were found to have an association with the event of hypoglycemia. Male patients were about 0.40(COR=0.60, 95% CI:0.20-1.79) times less likely experienced hypoglycemia episodes compared to females. Similarly, patients who fall in the age between sixteen and thirty years were about 0.30(COR=0.72,95%CI:0.16-3.16) times less likely had the events of hypoglycemia related to those above thirty years old. However, patients in the range of five to fifteen years were 1.23(COR=1.23,95%CI:0.30-5.11) times more likely had hypoglycemia events compared to those above 30 years. Furthermore, patients less than one year and one up to five years duration since diagnosed of T1DM were about 0.84(COR=0.16, 95% CI:0.02-1.40) and 0.75(COR=0.25,95%CI:0.03-2.01) times respectively, less likely experienced hypoglycemia events compare to those who were above five-year duration with diabetes. On the other hand, patients who monitored blood glucose level with regular follow up and themselves/families at home were about three (COR=3.01, 95%CI:0.95-9.53) times more likely reported hypoglycemia events compared to those who monitored on follow up only. Though, those who had monitored with health care professional in addition to their regular follow up were about 0.18(COR=0.82,95%CI: 0.09-7.42) times less likely reported hypoglycemia events compared to patients who monitored on follow up only (Table 5).

The present study revealed that duration of diabetes and blood glucose monitoring options were found to be significantly associated with the events of hypoglycemia during a multivariate logistic regression analysis. Accordingly, male patients were roughly 0.35(AOR:0.65, 95%CI:(0.20-2.14) times less likely had the event of hypoglycemia compared to female patients. Regarding the age group, patients who were between five to fifteen years were about 8%(AOR=1.08, 95% CI: (0.12-10.01) times more likely, while patients lied between sixteen and thirty years were 0.2(AOR=0.79,95%CI:(0.16-3.88) times less likely reported hypoglycemia episodes compared to those patients above thirty years old. In the same way, patients with shorter (<1year and 1-5year) duration were 0.91(AOR=0.09, 95%CI:0.01-0.90) and 0.85(AOR=0.15, 95%CI:0.02-1.32) times respectively, less likely experienced hypoglycemia compare to those who had long (>5year) diabetic history (Table 5).

On the other hand, patients who monitored blood glucose level by themselves/families with regular follow up were roughly five and half (AOR=5.77, 95%CI:1.16-28.66) times more likely reported hypoglycemia events compared to those who monitored on follow up only. Likewise, those who had monitored with health care professional in addition to their regular follow up were 0.27(AOR=1.27, 95%CI:0.13-13.02) times more likely reported of hypoglycemia events compared to patients who monitored on follow up only (Table 5).

Table 5:Multivariate logistic regression analysis result of factors associated with hypoglycemia events among ambulatory T1DM patients attending to the diabetic clinics of SPHMMC between June 01 to August 01,2017.

Variables	Hypoglycemia (N=247)		COR (95%CI)	AOR (95%CI)
	Yes (%)	No (%)		
Sex				
Male	104(92.9)	8(7.10)	0.60(0.20-1.79)	0.65(0.20-2.14)
Female	129(95.6)	6(4.4)	1.00	1.00
Age				
5-15years	123(95.3)	6(4.7)	1.23(0.30-5.11)	1.08(0.12-10.01)
16-30years	60(92.3)	5(7.7)	0.72(0.16-3.16)	0.79(0.16-3.88)
>30years	50(94.3)	3(5.7)	1.00	1.00
Duration of DM (year)				
<1	49(90.7)	5(9.3)	0.16(0.02-1.40)	0.09(0.01-0.90) *
1-5	122(93.8)	8(6.2)	0.25(0.03-2.01)	0.15(0.02-1.32)
>5	62(98.4)	1(1.6)	1.00	1.00
Blood glucose monitoring options				
self/family+ RFU£	147(96.7)	5(3.3)	3.01(0.95-9.53)	5.77(1.16-28.66) *
HCP¥ +RFU	8(88.8)	1(8.3)	0.82(0.09-7.42)	1.27(0.13-13.02)
RFU only	78(91.9)	8(8.1)	1.00	1.00

**Statistically significant (p value≤0.05)*

HCP¥: Health care professional

RFU£: regular follow up

5. DISCUSSION

It is almost impossible to eliminate hypoglycemia from the lives of T1DM patients(Cryer et al., 2010). Indeed, our result indicated that only about 94.3% of the respondents were experienced hypoglycemia ever since diagnosed as T1DM. Studies conducted in USA reported a prevalence rate of hypoglycemia in T1DM patents about 90% (Cryer, 2016) and Scotland (98%) (Hepburn et al., 1990) to which the present study was comparable. This could be specified that event of hypoglycemia has been in its high-level independent of time and difference in provision of health care services for patients with diabetes. However, the finding in this study was greater than the result found in Taiwan (36.5%) (Ou et al., 2017), South Africa(56%) (Pillay et al., 2016) and Nigeria (65%) (Ogbera and Kuku, 2012). The possible explanation could be due to neglection and under reported the occurrence of hypoglycemia in relative to other acute complications(Briscoe and Davis, 2006, Trang et al., 2014).On the other hand, our study revealed lower finding compared to evidences in USA (Dagogo-Jack, 2004, Trial–Type and Group, 2002, Pershad et al., 1998) as well as in United Kingdome (Donnelly et al., 2005, Zhong et al., 2017) which reported that event of hypoglycemia were almost hundred percent in T1DM patients. Furthermore, our study supported the report from ADA workgroup on hypoglycemia which suggested that exclusion or inclusion criteria of studies can affect the magnitude of hypoglycemic events (ADA,2005). Taken together, the variation in prevalence of hypoglycemia episode could be due to difference in awareness towards hypoglycemia among participants of the different studies.

Regarding the severity of hypoglycemia, the present study showed that nearly 7 events of mild to severe episodes of hypoglycemia were occurred per patient per year. Specifically, mild hypoglycemia happened almost 3 events per patient a year. Similarly, moderate hypoglycemia occurred 3 events per patient a year. Whereas, severe hypoglycemia reported 0.9 events per patient per year. This finding was consistent with previous studies which reported at least one episodes (DCCT, 1991, Wrobel et al., 2014, Brain, 2009) and in Denmark (0.4episods) (Henriksen et al., 2016) of severe hypoglycemia per patient per year. Moreover, it was comparable to the annual prospective survey conducted in Scotland which found 8 episodes of mild hypoglycemia and 0.98episodes of severe hypoglycemia per patient per year(Leckie et al., 2005). Despite the occurrence of severe hypoglycemia was small fraction of the total hypoglycemic events, estimation of this incident was most reliable since severe hypoglycemia events were better

documented(Gabriely and Shamoon, 2004). It was impossible to prevent all the severe hypoglycemic reactions in diabetic patients. However, encouragement of patients and/or care givers education regarding the severity of hypoglycemia would have been better outcome of responding more adequately to changing circumstances in daily life or to warning signs.

In the present study, several reasons were reported from patients who experienced the recurrence of hypoglycemia events. The most common reasons were found to be skipped/missed meal, exercise without food and inappropriate dose of insulin. Most of the patients have been suffered with frequent hypoglycemia due to failure to observe the meal timetable, which led to delays in the carbohydrates intake which is similar to that reported in other studies (Seaquist et al., 2013, Cosmescu et al., 2008, Gill and Huddle, 1993). However, one study in Ethiopia reported that insulin was the main reason for almost 70% of experienced hypoglycemia which is higher than our result(Gurmu and Teni, 2014). Therefore, this may be countered by temporarily increasing glycemic targets, reducing pre-exercise insulin, and consuming appropriate amounts of carbohydrate. On top of that, education regarding all aspects of diabetes care is important in the prevention and treatment of hypoglycemia. Reducing hypoglycemia will involve patient empowerment and anticipatory guidance by both patients and health care providers(Briscoe and Davis, 2006).

In this study, multivariate logistic regression analysis showed that duration of diabetes and blood glucose monitoring options were found to be significantly associated with events of hypoglycemia. Despites of its significance, the odds of being suffered with the episodes of hypoglycemia was about 35% less likely in male compared to female patients since diagnosed as T1DM. This result was consistence with finding documented in the study done in Ethiopia (Wako et al., 2017). Physiologically, there is a large sexual dimorphism in counterregulatory responses to hypoglycemia. It has been clearly demonstrated that healthy young women with T1DM have reduced neuroendocrine, autonomous nervous system and metabolic (endogenous glucose production) counterregulatory responses compared to age and BMI matched men(Sandoval et al., 2003, Davis et al., 2000).Therefore, the present study share that female patients might be more prone to hypoglycemia episodes due to lower counterregulatory responses to hypoglycemia than male patients.

Age was the other variable that had association with hypoglycemia in the present study. The odds of experiencing hypoglycemia was about 8% more in patients found in the range of five to fifteen years compared to those greater than 30 years. Although it was not significant association, this implies older patients were less likely to be suffered with hypoglycemic episodes compared to younger patients. This is in line with study in UK, showed that an increase in hypoglycemia risk was independently associated with decreasing age (by a factor of 0.5 for a reduction of 1 year in age)(Amin et al., 2003). However, results were observed from studies done among diabetic patients in USA(Allen et al., 2001) and Korea (Jeon et al., 2016) showed that older age were more suffered with hypoglycemia compared to younger patients. Though, our finding would not have made a causal inference on the association of age with events of hypoglycemia, it is possible that younger patients were more susceptible to the adverse effects of neuroglycopenia, anxious parents of younger children may over report episodes and unawareness of hypoglycemia leads them to risk of significant hypoglycemia. Other potential factors at this age include, for example, the irregular and often difficult eating habits of young children, the sporadic nature of their exercise habits, their inability to identify and alert caregivers about hypoglycemic symptoms, and smaller dose of insulin, facilitating relatively large increases when errors in dosage are made(Seaquist et al., 2013).

This scenario observed in the present study emphasizes minimizing the impact of hypoglycemia on children with diabetes requires the education and engagement of parents, patients, and other caregivers in the management of the disease. On the other hand, patients in the range of fifteen to thirty years were protective towards occurrences of hypoglycemia. This study reinforced the suggestion of recurrent and severe episodes of hypoglycemia in adolescence cause hypoglycemic fearfulness and emotional morbidity both for patients and their parents, which could act as a limiting factor in achievement of good glycemic control (Shafiee et al., 2012). Furthermore, aging modifies the cognitive, symptomatic, and counter-regulatory hormonal responses to hypoglycemia (Alagiakrishnan and Mereu, 2010). Nevertheless, the effect of aging on increased risk of unawareness or severe episodes of hypoglycemia has also been recognized.

Duration of diabetes was the other variable that had significant association with prevalence of hypoglycemia in the present study. Indeed, Patients who had a prolonged diabetes history were more likely suffered with hypoglycemia compared to those who were short duration. Like other evidences this finding described as history of diabetes and events of hypoglycemia went almost

parallel in patients' life. Previous studies had demonstrated that patients with more than five year diabetes history were more likely experienced hypoglycemia events (Cryer, 2015, Jeon et al., 2016, Wagner et al., 2008, Wako et al., 2017, Trang et al., 2014). Blood glucose monitoring options had also a significant association with the events of hypoglycemia. Our study found that, participants who monitored their blood glucose level at home in addition to their regular follow up were reported almost five and half times experience of hypoglycemia events compared to those monitored on follow up only. This agreed with DCCT, which verified that intensive management of diabetes as testing blood glucose levels four or more times a day significantly associated with hypoglycemia. Although the events of hypoglycemia were less likely reported in patients who had home care health professional compared to those who had monitored by themselves, still they reported more events of hypoglycemia in relative to those on follow up only. Thus, monitoring blood glucose level at home in addition to regular follow up didn't give a guarantee for decreasing the events of hypoglycemia. Merely, it provides a means of identifying daily hypoglycemic events, allowing immediate treatment and/or modification of therapeutic regimens to allow tighter glycemic control(ADA,2018).

In this study, we also attempted to determine how patients with type 1 diabetes had been monitoring their blood glucose level. Thus, our study found that 65.2% of the patients were practiced SMBG in addition to their regular follow up. This is similar to what was found in USA(75% and 66%) (Karter et al., 2000, Adams et al., 2003) respectively, and Norway(70%) (Kjome et al., 2010).This might be due to the free glucometers and strips provided to majority of our study participants which made them comparable to T1DM patients in developed countries. However, SMBG found in this study was higher than what found in some studies in in Nigeria ranging from 11% to 47.8% (Edah et al., 2016, Unachukwu et al., 2011) and in Malaysia where SMBG of 15.3% was reported(Mastura et al., 2007). This could be possible that, our clinics provided optimally better patient education on SMBG compared to the other studies carried out in government owned hospitals. on the other hand, two findings in Australia reported higher values(88.4% and 81.7%) of SMBG performance than what we found(Chubb et al., 2011, Bruce et al., 2003). This could be implies, patients in our studies had lack of motivation and knowledge in monitoring, fear of need and pain, unconducive work place which verified as barriers for self-monitoring by different quantitative and qualitative studies (Snoek et al., 2008, Mastura et al., 2007, Hortensius et al., 2012, Nagelkerk et al., 2006) .

According to the ADA standard of SMBG level our study found less optimal than what is recommended. Almost 57.8% of those who practiced SMBG performed less frequently than what ADA recommended (testing blood glucose three and above times daily). Inadvertently, this finding was in agreement with other studies in Nigeria(Edah et al., 2016, Unachukwu et al., 2011), America (Karter et al., 2000, Harris et al., 1993). However, a France study reported about 42%, and a population based study in USA found only 7% of the participants performed SMBG level less frequently than the ADA recommendation which were better than what we found (Lecomte et al., 2008, Miller et al., 2013). Based on our study, availability of glucometer with its test strips has a direct impact on the frequency of SMBG. Thus, cost of test strips and variance of participants included in donation may be leads to inadequate presentation of SMBG.

Multivariate logistic regression analysis of this study showed that being female gender, participant with primary level of education and shorter (<5 years) duration diabetes were significantly associated with SMBG performance. This was similar with other studies; whereby female gender(Ward et al., 2015, Mostrom et al., 2017) were frequently performed SMBG than males. In fact, our study indicated males were less performance of self-monitoring compared to females (58% verses 71%). This could be suggested that, most male participants were away from home several days in a week. Thus, males had subjected to poor SMBG practice. Taken together, due to fewer studies conducted regarding to gender difference, relationship between gender and SMBG could not be adequately described. However, our results suggest that individual differences, such as gender, should be considered as a targeted outcome of interest for research or a consideration in clinical intervention.

Participants with primary level of education were also found to be another factor significantly associated with good performance of SMBG compared to higher educational level. This could be due to provision of free glucometer donation to this age group. However, good performance of SMBG seems to be achieved in well-educated T1DM patients as it could be easy to understand the process of glucose testing and confident in their ability to carry out glucose testing(Austin, 2013).

Short duration of diabetes history (below 5 years) was also found to be independently associated with SMBG in this study. This could be possible that patients with short duration of diabetes had suffered with frequent hypoglycemia due to inexperience in the prevention and immediate management of hypoglycemia. Therefore, patients with short duration of diabetes history could

able to develop the chance of fear for hypoglycemia and inadequate glycemic control which make them to do there SMBG level regularly. However, other studies reported that performance of SMBG had associated with long duration of diabetic. These evidences suggested that patients with long diabetes duration had develop experience as they educated on SMBG over the years (Mastura et al., 2007, Edah et al., 2016). Thus, these findings highlight the complex experience of engaging in SMBG and barriers to SMBG. Individual patient factors might be extremely important in the experience of SMBG. On the other hand, one survey indicated that socio-demographic variables are poor indicators to show the performance of SMBG. Thus, such variables are an unreliable tool to use in targeting patients for educational intervention in the area of SMBG(Vincze et al., 2004). But, this study provides a clue for further studies to work out on the association of demographic characteristics of T1DM patients with performance of SMBG.

Regulation of FBG is one of the cornerstone for diabetic care by maintain glycemic control(Havas and Donner, 2006). The present study had also assessed a three-month distribution of FBG values in our participants. According to the DCCT, our study found that 8.3% average FBG level of the consecutive three visits were in the range of hypoglycemia. Limited evidences were avail that contradict or support our findings. Thus, this finding could only use as a base line for future investigators. Furthermore, self-management of hypoglycemia were well practiced in our set up. The result showed that almost ninety percent of the participants tried to prevent hypoglycemia events with regular checkup in the diabetic clinics followed by adjusting meal time with insulin, seeking medical advice from health professionals and maintain their physical activity. In line with this one Canadian survey showed that the frequent lifestyle changes were done to prevent hypoglycemia in which modification of insulin dose followed by food adjustment were commonly practiced(Leiter et al., 2005). Another input would be using SMBG measurements at different times on different days. Patients can generate an accurate portrait of day-to-day glycemic excursions while avoiding the need to test many times in a single day(Dailey, 2007). This is supported with many literatures which suggested that prevention of hypoglycemia events would simplify the diabetic care as well as improve the quality of life(Leiter et al., 2005, Grunzweig et al., 2016, Chamberlain et al., 2016, Cryer, 2004).

Patients with diabetes need to be well informed about the symptoms of hypoglycemia, to know about hypoglycemia risk factors, prevention and treatment, and to be concern about monitoring of

blood glucose levels. Therefore, educating the patients of all ages and their relatives about hypoglycemia is a key factor in prevention of this complication(Shafiee et al., 2012). In the present study, the immediate management took for the events of hypoglycemia were also assessed. Sweet candies were dominantly (71.4%) used to relief hypoglycemia events. Patients were treated with other interventions included table sugar, fruit juice and honey from higher to lower frequency respectively. Despite the range of treatment options varied in different reports, hypoglycemia immediate management practice were reported in myriad evidences (Cryer and Childs, 2002, Mensing et al., 2006,Leiter et al., 2005). An ambulance was requested by 7.4% of the patients which was lower than the study reported in Canada(11.5%)(Leiter et al., 2005).This difference might be either due to the higher availability of ambulance accesses in the later study or patients in our set up were well self-treated and get more education.

6. LIMITATION OF THE STUDY

Most importantly, the cross-sectional nature of the study design prevents us from drawing causal inferences about the relationship between the chosen covariates and outcome variables. For example, the association between hypoglycemia and SMBG could suggest either that sicker patients are less likely to practice SMBG or that patients who practice SMBG are more likely to have hypoglycemia episodes. Regarding severity of hypoglycemia, the three-month data was extrapolated to a year which may be unreliable since data were self-reported and subject to recall bias. Similarly, other researchers recognized that interview used for assessing the prevalence of hypoglycemia by its clinical definition may under-estimate or over-estimate hypoglycemia episodes and its severity when compared to other conventional objective methods such as consecutive blood glucose measurement as the events occurred. SMBG rates also might be misjudged. Therefore, further investigation of the reliability and validity of self-reported hypoglycemia and SMBG is needed. The study looked at only a single facility and hence caution should be well-thought-out in extrapolating the results. However, this study gave some useful insight into the magnitude of the hypoglycemia and SMBG approach among the study population and provides useful baseline information for consultative, comparative and future research purposes in the study center.

7. CONCLUSION

It is apparent that hypoglycemia is still a challenge in type 1 diabetes as more than ninety percent of the patients attending to outpatient diabetic clinics of SPHMMC experienced hypoglycemia since diagnosed. Skipping meal, did exercising without food and inappropriate dose of insulin were found to be common reasons for the recurrent episodes of hypoglycemia. Although patients suffered with all types of hypoglycemia events, severe hypoglycemia were infrequently happened. Female sex, younger age, prolonged duration(>5years) with diabetic and those who monitor their blood glucose level frequently were associated with more report of hypoglycemia events. Furthermore, this study has revealed that the performance of SMBG among patients attending to the outpatient diabetic clinics of SPHMMC is suboptimal as at least one third of them were found to be monitor their blood glucose level in follow up only to the clinics. Besides, less than 50% of patients who had practiced SMBG were not committed to perform as frequent as it recommended in ADA. We also found factors associated with better performance of SMBG included female sex, primary level of education, shorter(≤5years) duration of diabetes. Finally, this study has also been highlighted the self-management of hypoglycemia in our patients which found to be comparable with many researches in the prevention and immediate treatment of hypoglycemia events.

8. RECOMMENDATION

- Further studies should provide a special consideration to cease the prevalence of hypoglycemia in T1DM patients as it has been substantially high including in this study.
- Health providers who are engaged in diabetic care as well as patients and/or care givers should be urged to educate and sharing experience concerning hypoglycemia as well as empower them to have their home care health professionals.
- Majority of T1DM patients in SPHMMC did not follow guidelines of SMBG ≥3 times per day, despite glucose meters and strips being generally available at no cost to most of them. So, this study endorses the necessity of further support in performing SMBG and increased availability of other tools for glucose monitoring. We also advocate the inclusion of blood glucose meters, blood glucose test strips in health insurance program in Ethiopia to ease the burden of self-monitoring in diabetic patients.
- This study encouraged the corporative contribution of diabetic care providers of the hospital in monitoring blood glucose level incessantly. Because keeping the FBS level in the euglycemic state would not be succeed without the limitless effort of diabetic care providers in addition to the commitment of the patients and their relatives. On top of that, Providers should urge patients to wear potentially lifesaving diabetes alert identification.
- Diabetes care providers should be workout still on patient education regarding prevention and immediate management of hypoglycemia.
- Longitudinal studies are required to look the association between hypoglycemia and SMBG in the study area.

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ANNEXES

Annex I: Consent Form and Structural Questionnaire

Hello dear participant!

My name is----------, who is part of this research project entitled with "***Assessment of hypoglycemia and associated factors among ambulatory type one diabetes multiuse patients attending to Saint Paul's Hospital Millennium Medical College, diabetic sites***." The objective of the research is assessing these issues in type 1 diabetic patients like you thereby major contributing factors for hypoglycemia will be identified and accordingly the way of minimizing the occurrence of hypoglycemia episodes will be recommended. Hence, patients or care givers will improve the self-management and prevention of hypoglycemia at home. To accomplish this study and attain the set specific research objectives, the research project team found important that patient interview and simultaneously chart review must be conducted.

This questionnaire has five parts and takes a maximum of 30 munities for complete. It is only through chance that you became part of the study like others; otherwise, if you do not want to be part of the study, you can refuse to participate. In doing so, you will not be going to lose any service that you are getting from the hospital. Once after you decided to be part of the study and in case you don't want to continue, you still have the right to get out from the study at any time you want. In taking part to this study, you are not going to be compensated too, rather the findings from this study will enable us, we hope, to improve diabetes care outcomes in general, and hence you will be benefited then.

I will be very grateful if you are going to be willing to participate in this study and hence we, together can do something positive towards reducing the occurrence hypoglycemic episodes and minimization of complicated outcomes. Finally, it is my great pleasure to forward you deepest gratitude in advance for your kind cooperation you are going to have during the interview by giving your time with genuine information to me. Once again, I am assuring you, by any means, your confidentially will not be broken and be kept secret and the data generated will be used for this research only.

I am voluntary to participate, signature: _____

Thank you!

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CHAPTER ONE: INTERVIEW

Part I: Socio Demography Characteristics (mark X)

1.01.Sex:	
1.01.1. Male ☐	1.01.2. Female ☐
1.02.Age (in years): _____	
1.03 Educational background:	
1.03.1 no formal education ☐	1.03.3 secondary education ☐
1.03.2 primary education ☐	1.03.4. university/college ☐
1.04 Marital status	
1.04.1 Married ☐	1.05.3 Separated/Divorced ☐
1.04.2 Not married ☐	1.05.4 Widowed ☐

Part II: Assessment on the prevalence of hypoglycemia

2.01. Are you aware (is your relative aware) of the symptoms caused by low blood glucose sugar (such as sweeting, hunger, feeling tired, dizziness, Trembling, fasten heart beat?

2.01.1 Yes ☐ 2.01.2 No ☐

2.02. if yes in Q2.01, have you/your relative ever experienced with symptoms of hypoglycemia and got treated with carbohydrate contained foods?

2.02.1 Yes ☐ 2.02.2 No ☐

2.03 If say 'yes' in Q2.02 ***part II,*** how frequented had been occurred in the last three months

2.03.1 Once ☐ 2.03.3 Three times ☐ 2.03.5 Five and above times ☐

2.03.2 twice ☐ 2.03.4 Four times ☐ 2.03.6 Never happened ☐

2.04. Based on Q2.03, How do you/your relative solve the events happened in the last three months (fill the box in number) and in more the one box is possible.

2.04.1 No treatment assistance needed ☐

2.04.2 Taking rest but no assistance needed ☐

2.04.3 Treatment with assistance of a third party needed ☐

2.05.Now you are coming to diabetic clinic for_____?

2.05.1 Follow up to diabetes mellites ☐

2.05.2 Other personal issue ☐

2.06. If you come for follow up, the Duration of diabetes_____ Years?

2.06.1. Less than 1 year ☐

2.06.2. 1-5 year ☐ 2.05.4. >5 year ☐

2.07.. Would you take your prescribed medication since you diagnosed as DM1?

2.07.1 Yes ☐ 2.07.2 No ☐

2.08 If say 'yes' in Q3.03, which type of medication you (your relative) were took?

2.08.1 Regular insulin (the clear one in color) ☐

2.08.2 NPH insulin (the cloudy one in color) ☐

2.08.3 Both ☐

2.08.4 Other additional medications specify_____

2.09 Who is responsible to administer the medication for you?

2.09.1 My self ☐

2.09.2 Family ☐ (educational background specify_____)

2.09.3 Other ☐ (educational background specify_____)

2.10 If say 'yes' in Q2.01. ***Part II,*** when dose these symptoms happened?

S. No	Reasons for hypoglycemia	Answer (Mark X)		Remarks
2.10.1	**Insulin Administration**	Yes	No	
	2.10.1.1 Not taking in regular time			
	2.10.1.2 Taking Higher dose			
2.10.2	**Food consumption**			
	2.10.2.1 Missed/hungry			
	2.10.2.2 With medication			
	2.10.2.3 Physical activity with food			
	2.10.2.3 Physical activity out of food			

	2.10.2.4 Alcohol consumption with food			
	2.10.2.5 Alcohol consumption without food			
2.10.3	When you feel ill with other disease in addition to DM			

2.11 Are you a member of Ethiopian Diabetic Association(EDA)?

2.11.1 Yes ☐ 3.07.2 No ☐

Part III: <u>Assessment on Self-monitoring of blood glucose (SMBG) and management of hypoglycemia</u>

3.01Have you monitor your (your relative) blood glucose level at home?

3.01.1 Yes ☐ 3.01.2 No ☐

3.02How do you monitor you blood glucose level?

3.02.1 using my glucometer ☐

3.02.2 follow up to my clinic ☐

3.02.3 Home care doctor/ nurse ☐

3.03 If 'yes' to Q3.08.1, how frequently do you perform SMBG per week? _____times

3.04 How do you prevent your(relative) occurrence of hypoglycemia? (***more than one answer is possible***)

3.04.1 checking my/his/her blood glucoses ☐

3.04.2 adjusting my/his/her regular meal/snack ☐

3.04.3 maintain my/his/her physical activity ☐

3.04.4 seeking medical advice from health professional ☐

3.04.5 Other----------

3.05 Which one of the following possibilities you/your partner use as the immediate management of hypoglycemia events occur? ***(more than one answer is possible)***

3.05.1 Taking/give fruit juic ☐

3.05.2 Taking/give soft drinks ☐

3.05.3 Taking/give table sugar ☐

3.05.4 Taking/give honey ☐

3.05.5 Taking/give sweet candies ☐

3.05.6 Call to ambulance/go to nearby clinic ☐

3.05.7 Other----------

Thank you once again!!

Annex II: Data Abstraction Format

CHAPTER TWO: CHART REVIEW

4.01 Fasting blood glucose value (mg/dl)

4.01.1 Recent _____

4.01.2 On immediate previous appointment _____

4.01.3 On second previous appointment (immediately before the previous appointment) _____

4.01.4 Average of the total previous three appointments: _____ (***put by the data collector)***

4.02 BMI(weight(Kg)/height(m^2)_____

<u>በቃለ - መጠይቅ ለመሳተፍ የፈቃደኝነት ቃል መቀበያ ቅጽ</u>

ውድ የቃለ-መጠይቁ ተሳታፊ፤

ስሜ _____ ይባላል፡፡ **“በቅዱስ ጳውሎስ ሆስፒታል ሚሊንዬም ሜዲካል ኮሌጅ *የሚታከሙ አንደኛው ዓይነት የስኳር ህመምተኞች ላይ ለሚከሰተው በደም ውስጥ የስኳር መቀነስ ሁኔታ እና ለስኳሩ ማነስ የሚያጋለጡ ተያያዥ ነገሮች መገምገም* ”** የተሰኘ የድህረ ምረቃ የጥናት ስራ አባል ነኝ፡፡ ይህ የጥናት ስራ አላማ በዚህ ሆስፒታል በተመላላሽ ህክምና የአንደኛ ዓይነት የስኳር ህመምተኞች የደማቸው ስኳር መጠን ማነስ ምን ያህል እንደተስፋፋ እና ለዚህ የሚያጋልጣቸው ዋና ዋና ምክንያቶች እና ተያያዥ ነገሮች ይለያል፤ በብዛት የሚያጋጥም የደም ስኳሩ ዓይነት ይዳስሳል፤ እንዲሁም ሲያጋጥም ህመምተኛው ወይም ዘመደቹ እንዴት መቆጣጠር እንዳለባቸው ያብራራል። በ መሆኑም ህመምተኞች የ ህክምና ሁኔታቸውን እንዲያሻሽሉ እና የደም ስኳር ማነስ የመከላከል ዘዴዎች ያመለክታል ተብሎ ይጠበቃል። የጥናቱን ስራ ለማካሄድና የተቀመጡ አላማዎችን ለማሳካት ይቻል ዘንድ ህመምተኞችን ቃለ መጠየቅ ማድረግና የግል የህክምና ማህደራቸውን ማየት በማስፈለጉ እርስዎ (የእርስዎ ዘመድ) እና ሌሎች እንደእርሶ/ሱ/ሳ ያሉ ህመምተኞችን ለማሳተፍ ችለናል፡፡

ይህ የጥያቄ ቅፅ በአምስት የተከፈለ ሲሆን የሁሉንም ምላሽ ለመስጠት ቢበዛ 30 ደቂቃ ይፈጅብዎታ። እርስዎ የዚህ ጥናት አካል የሆኑትም በእድል ወይም በዕጣ ብቻ ነው፡፡ በጥናቱ መሳተፍ ካልፈለጉ ያለመሳተፍ መብት አለዎት፡፡ ባለመሳተፍዎም በዚህ ሆስፒታል የሚያገኙትን ማንኛውንም የህክምና አገልግሎት አያሳጣዎትም፡፡ ስምምነትዎን ገልፀው በጥናቱ መሳተፍ ከጀመሩም በኋላ መቀጠል ባይፈልጉ በማንኛውም ጊዜ ከጥናት አካልነትዎ የመውጣት መብትዎ የተጠበቀ ነው፡፡ በዚህ ጥናት በመሳተፍዎ በ ቀጥታ የሚያገኙት ጥቅም ባይኖርም ከጥናቱ በሚገኙ ግኝቶች የ ስኳር ህመም ህክምና ውጤትን በተወሰነ መልኩ ለማሻሻል እንደሚቻል በመገመት፤ የዚያን ጊዜ እርስዎም የጥቅሙ ተቋዳሽ ይሆናሉ ብለን እናምናለን ::

በ ጥናቱ ፈቃደኛ ሆነው በመሳተፍ በጋራ ሆነን አንዲትም ብትሆን አዎንታዊ ነገር ለስኳር ህመም ህክምና ውጤት የበኩላችንን ብናበረክት ደስተኛ ነኝ፡፡ አላማውን ተረድተውና ጊዜዎትን ሰውተው ለዚህ ቃለ - መጠይቅ ለመሳተፍና እውነተኛ መረጃ ለመስጠት ፈቃደኛ በመሆንዎ በቅድሚያ እያመሰገንሁ ማንኛውም የሚሰጡት መረጃ ለምርምሩ ዓላማ ብቻ የሚውልና ሚስ ጥራዊነቱም የሚጠበቅ መሆኑን ላረጋግጥልዎት እወዳለሁ፡፡

ለመሳተፍ ፈቃደኛ ከሆኑ፤ ፊርማ፡_____ **አመሰግናለሁ!!**

<u>ተመሳሳይነት</u>

ሓለፎም ካሕሳይ ሃይለ

በአዲስ አባባ ዩኒቨርሲቲ፣የጤና ሳይንስ ኮሌጅ፣ ፋርማሲ ት/ት ክፍል፣ የክሊኒካል ፋርማሲ ድህረ ምረቃ ተማሪ

ኢ.ሜል፡ <u>heleka94@gmail.com</u>

ምዕራፍ አንድ

ቃለ- መጠይቅ

ክፍል 1: አጠቃላይ መግለጫዎች---መልስ(√)

የማህደርዎ ካርድ ቁጥር፡_____ 1.01 ***ፆታ*** 1.01.1 ወንድ ☐ 1.01.2 ሴት ☐
1.02 ***እደሜ(በ ዓመት)*** ☐
1.03. **የትምህርት ሁኔታ** 1.03.1 መደበኛ ት/ት ያልተማረ/ች ☐ 1.03.2. አንደኛ ደረጃ (1-8) ☐ 1.03.3. ሁለተኛ ደረጃ (9-12) ☐ 1.03.4. ቴክኒክና ሙያ/ኮሌጅ/ዩኒቨርሲቲ ☐
1.04. **የጋብቻ ሁኔታ** 1.04.1. ያላገባ ☐ 1.04.2. ያገባ/ች ☐ 1.04.3. የፈታ/ች ☐ 1.04.4 ባል የሞተባት /ሚስት የሞተችበት/ ☐

ክፍል 2፡ ***<u>በህመምቶኞት የሚከሰት የደም ሰኳር ማነስ የመሰራጨት መጠን መገምገምያ ጥያቄዎች</u>***

2.01 በራሰዎ ወይም በዚህ ዘመድዎ የሚያጋጥም በደም ውስጥ የስኳር ማነስ የሚያሳያቸው ምልክቶች ያውቃሉ ለምሳሌ እንደ የሰውነት መላብ፤መንቀጥቀጥ፤የድካም ስሜት፤የረሃብ ስሜት፤የልብ ምት መጨመር የመሳሰሉት?

2.01.1. አዎ ☐ 2.01.2. አላውቅም ☐

2.02 በጥያቄ ቁጥር 2.01 ምላሽዎ አዎ ከሆን የስኳር ጎመምተኛ መሆንዎ ካወቁ ጀምሮ ምልክቶቹ ኣጋጥምዎት ጣፋጭ ነገሮች በመውሰድ ተቆጣጥርዎት ያውቃል? 2.02.1. አዎ ☐ 2.02.2. አላውቅም ☐

2.03. በባለፈው ሶስት ወር ውስጥ ምን ያህል ጊዜ የስኳር ማነስ ችግር ኣጋጠምዎት/ኣጋጠማት/ኣጋጠመው?

2.03.1 ኣንዴ ☐ 2.03.3. ሦስቴ ☐ 2.03.5. ኣምስት ጊዜ ና ከዛ በላይ ☐

2.03.2 ሁለቴ ☐ 2.03.4. ኣራቴ ☐ 2.03.6 ምንም ኣላጋጠመኝም/ማትም/ውም ☐

2.04 ከጥያቄ 2.03 ላይ በመመርኮስ በባለፈው ሶስት ወር ውስጥ ያጋጠምዎት/ ያጋጠማት/ያጋጠመው የስኳር ማነስ ችግር እንዴት ፈቱት? በቁጥር ይቀመጥ

2.04.1 ምንም እርዳታ ሳያስፈልገኝ/ው/ጋት በራሱ ይተወኛል/ዋል/ታል ☐

2.04.2 እረፍት እወስዳሉ/ዳል/ች ተጨማሪ እርዳታ ግን አያስፈልገኝም ☐

2.04.3 ከ ሶዎስተኛ ወገን እርዳታ በመፈለግ ☐

2.05. አሁን በቅዱስ ጳዉሎስ ሆስፒታል ምን ሊያረጉ መጡ?

2.05.1 ለስኳር ህክምና ክትትል ☐ 2.05.1. የግል ጉዳይ አለኝ ☐

2.06. የስኳር ህመምተኛ ከሆኑ/ነ/ች ምን ያህል ጊዜ ሆነዎት/ነው/ናት?

2.06.1 < 1 ዓመት ☐ 2.06.3. >5 ዓመት ☐

2.06.2 1-5 ዓመት ☐

2.07. የስኳር ህመምተኛ መሆንዎን ካወቁ ቀን ጀምሮ መድሃኒትዎን/ቱ በትክክል ይወስዳሉ/ል/ች?

2.07.1 አዎ ☐ 2.07.2. አልወስድም ☐

2.08. በቁጥር 3.03 ምላሽዎ 'አዎ' ከሆነ የትኛው መድሃኒት ይወስዳሉ/ል/ች? (ዓይነቶቹን በተግባር በማየት ይለዩ)

2.08.1 የጠራ/ንፁ ዉሃ ምትመስለዋ(Regular insulin) ☐

2.08.2 የደፈረሰችዋ(NPH) ☐

2.08.3 የሁለቱም ቅልቅል(Mixstared) ☐

2.08.4 ሌላ (others) ☐

2.09 መድሃኒቱ ማን ነው ሚወጋዎት?

2.09.1 በራሴን ☐ 2.09.2. በዘመዴ ☐ (የ ት/ት ደረጃ ይገለፅ_____)

2.09.3 ሌላ ሰው ☐ (የ ት/ት ደረጃ ይገለፅ_____)

2.10. በ ክፍል 2 ጥያቄ 2.01. ምላሽዎ **'አዎ'** ከሆነ ምልክቶቹ መች ይከሰትቦታል?

ተ.ቁ	ለስኳር ማነስ የሚጋለጡ ምክንያቶች	መልስ(√)		ማብራርያ
		አዎ	አይደለም	
2.10.1	*ከመድሃኒቱ አወሳሰድ የተያያዘ*			
	2.10.1.1 መድሃኒቱ በሰዓቱ ሳልወስድ ስቀር			
	2.10.1.2 የመድሃኒቱ መጠን አበዝቼ/ቶ/ታ ሰወስድ			
2.10.2	*ከምግብ አወሳሰድ የተያያዘ*			
	2.10.2.1. ምግብ ሳለወስድ ስቀር/ሲርበኝ			
	2.10.2.2. ምግብ እና መድሃኒት አንድ ላይ ስወስድ			
	2.10.2.3.ምግብ ሳለወስድ የአካል ብቃት እንቅስቃሴማድረግ			
	2.10.2.4. ምግብ ወስጄ የአካል ብቃት እንቅስቃሴ ሳደርግ			
	2.10.2.5. አልኮል መጠጥ ከምግብ ጋር ስወስድ*			
	2.10.2.6. አልኮል መጠጥ ከምግብ ውጭ ስወስድ*			
2.10.3	ከስኳር ህመምዎ በተጨማሪ ሌላ በሽታ ሲታመሙ			

2.11. የኢትዮጵያ የስኳር ህመምተኞች ማህበር አባል ነዎት/ናት/ነው?

2.11.1 አዎ ☐ 2.11.2 አደለሁም/ችም//ም ☐

**ከ2 (ለወንዶች) ወይም ከ1 (ለሴቶች) መጠጥ በላይ (አንድ መጠጥ ማለት 340.8 ሚ.ሊትር ቢራ፣ 142 ሚ.ሊትር ወይን፣ 42.6 ሚ.ሊትር አረቂ፣ ስኮች፣ ጂን፣ተኪላ፣ ቮድካ)*

ክፍል 3፡ *ስለ የደምዎ ሰኳር ቁጥጥር እና መከላከያ ዘዴዎችን የሚገመግሙ ጥያቄዎች*

3.01 በቤትዎ የደምዎ ስኳር ለክትው ያውቃሉ?

3.01.1 አዎ ☐ 3.01.2 ኣላውቅም ☐

3.02 ምላሽዎ አዎ ከሆነ እንዲት ይቆጣጠሩታል

3.02.1 የሥኳር መለኪያ በመጠቀ ☐

3.02.2 በክትትል ብቻ ☐

3.02.3 የራሴ ሃኪም/ነርስ አለኝ ☐

3.03 ምላሽዎ አዎ ከሆነ በሳምንት ስንት ግዜ ይለካሉ/ታል/ይለኩታል?_____

3.04 የደም ስኳር ማነስ እንዳይከሰትብዎ/ት እንዴት ይከላከሉታል? (ከአንድ ምላሽ በላይ መስጠት ይቻላል)

3.04.1 የደም ስኳሬን/ሩ/ዋ በመከታተል ☐

3.04.2 የምግቤን አወሳሰድ ሰዓት ከመድሃኒቱ በመስተካከል ☐

3.04.3 የአካል ቢቃት አንቅስቃሴ ባለማረግ ☐

3.04.4 ከጤና ባለሞያ ምክር በመቀበል ☐

3.04.5 ሌላ ተጨማሪ ሜላ ካለ ይገለፅ_____

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_____.

3.05 ለደምዎ ስኳር ማነስ እንደግዚያዊ መፍትሄ የትኛው ይጠቀማሉ? (ከአንድ ምላሽ በላይ መስጠት ይቻላል)

3.05.1 የፍራፍሬ ጭማቂ በመውሰድ/በመስጠት ☐

3.05.2 የስላሳ መጠጦቸ በመውሰድ/በመስጠት ☐

3.05.3 ስኳር በመውሰድ/በመስጠት ☐

3.05.4 ማር በመውሰድ/በመስጠት ☐

3.05.5 ጣፋጭ ከረሜላ በመውሰድ/በመስጠት ☐

3.05.6 አሙቡላንስ መጥራት/ወደአቅራብያ ክሊኒክ በመሄድ/በመውሰድ ☐

3.05.7 ሌላ ተጨማሪ እንደ መፍትሄ ካለ ይገለፅ_____

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በድጋሜ አመሰግናለሁ!!

ምዕራፍ ሁለት

ክፍል 4፡ <u>የህመምተኞች ማህደር መገምገሚያ ቅፅ</u>

4.01. ምግብ ሳይበሉ የደመዎ ስኳር መጠን(ሚ.ግ/ዴ.ሊ)
4.01.1 የአሁኑ_____
4.01.2. የባለፈው ቀጠሮ መጠን_____
4.01.3. ሁለተኛ የባለፈው ቀጠሮ መጠን_____
4.01.4 የሶስቱ ቀጠሮች አማካይ_____(በ ጠያቂው ይሞላል)
4.02. የአሁኑ የክብደትዎ እና ቁምትዎ የመመጣጠን ሁኔታ(BMI)_____