ADDIS ABEBA UNIVERSITY SCHOOL OF MEDICINE

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Self-Identification and management of hypoglycemia symptoms among insulin or sulphonylurea treated diabetic patients holding a valid driving license; a multicentre KAP survey.

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Acronyms

KAP-Knowledge, attitude and practices

DCCT: Diabetes Control and Complications Trial

UKPDS: United Kingdom Prospective Diabetes Study

BMI-Body mass index

IDF-International Diabetes Federation

HbA1c –Hemoglobin A1C

TASH – Tikur Anbessa Specialized hospital

GDM-Gestational Diabetes Mellitus

JAMA-The journal of the American Medical Association

SMBG-Self monitoring of blood glucose

Abstract

Background- Diabetic patients on sulphonylureas and insulin are at higher risk of hypoglycemic events. The body's response to hypoglycemia include neuroglycopenic symptoms which can affect the capacity of the individual to operate motor vehicles. The level of knowledge about the dangers of driving in relation to hypoglycemia and the appropriate way to manage it among diabetic patients in Ethiopia is not known

Objective-This survey aims to investigate the knowledge, attitude and practice of insulin/sulphonylurea treated diabetic patients in relation to identifying and managing symptoms of hypoglycemia

Method-This is a multicenter KAP survey which will use data collected from 100 completed questionnaires from two different centers between September 2020 and March 2021. The result will be analyzed and reported as proportions for each item in the questionnaire and comparison between the groups will be made using the Chi-square test using SPSS version 21.A P value of <0.05 will be used for statistical significance

Results-Among 106 participants, less than half (49%) identified more than half of the hypoglycemia symptoms, with only 6% knowing all of the symptoms listed in the questionnaire. Regarding having experienced hypoglycemia symptoms while driving, 23(22%)said they did, with the majority of these still not carrying glucometer while driving(78%) and never checking blood sugar before driving (81%). An equal percentage said they always carry hypoglycemia treatment in the car when driving and never (48% Vs 41%). Having had previous hypoglycemia while driving was associated with more people carrying some form of treatment in the car (p-<0.01). The majority of participants (65%) said they'd stop, eat some food or have a sugary drink and then rest for at least half an hour before driving again if they experienced hypoglycemia while driving. More than half of the participants (54%)have never received any advice on hypoglycemia and driving despite holding a valid driving license.

Conclusion-There is a wide gap in knowledge and practice when it comes to preventing and treating hypoglycemia among diabetic patients getting care both in private and government hospitals .Frequent and adequate education on the risks associated with hypoglycemia while driving could improve the practices and should be given to all patient attending diabetic clinics. In the future, the motor vehicle driving licensing authority should mandate evidence of awareness of hypoglycemia and effective

measures to mitigate the risk related to driving as a necessary requirement for renewal of licenses. should also mandate evidence that proper education has been received in these patients before renewal of their licenses

1-Background and rationale

Diabetes is becoming a pandemic disease resulting in significant morbidity and mortality as well as increased health care need. In Ethiopia, the prevalence of Diabetes is thought to be 3.2% among adults. (1)

Achieving a target glycemic level is one of the objectives of management of diabetes. Intensification of diabetes control has been given emphasis since the publication of landmark trials such as the Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS). However, one of the common side effects of intensification of therapy is an increment in the incidence of hypoglycemia. (2, 3)

Reduced blood sugar level, or hypoglycemia, is an abnormally low plasma glucose level that leads to symptoms of sympathetic nervous system stimulation and/or central nervous system dysfunction.An article which reviewed 30 studies reported that higher rates of hypoglycemia were observed in real-world settings compared with clinical trial settings (4). In addition, Prospective studies in European, Asian and African countries on self- reported frequencies of hypoglycemic episodes have shown that hypoglycemia was reported by nearly all of the patients (5). A review article on hypoglycemia states that the average patient suffers 2 episodes of symptomatic hypoglycemia per week and thousands of such episodes over a lifetime of diabetes. Hypoglycemia occurs about two to three times more frequently in type 1 diabetes than in type 2 diabetes and its incidence increases with the duration of diabetes(6)

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In a study of hypoglycemia in diabetic patients in Ethiopia, 61.2% had experienced hypoglycemia since their diagnosis and the factors which showed significant association with hypoglycemia were low educational status, female gender and higher body mass index (BMI). (7) Another study, done at Debre -Markos referral Hospital, revealed that 70.8% of diabetic patients had experienced hypoglycemic event since the diagnosis of diabetes. (8)

In general, during hypoglycemia there is an accentuated release of adrenaline from the adrenal glands leading to autonomic symptoms such as diaphoresis, tremors, tachycardia and facial flushing. Beside-these autonomic symptoms, patients could also experience neuroglycopenic symptoms linked to the lack of glucose in the brain such as dizziness, confusion, exhaustion, weakness, headaches, inappropriate behavior, and lack of attention, vision abnormalities, convulsions and coma.

The first symptoms of hypoglycemia usually begin to occur when blood glucose levels fall below 70 mg/dl. Several studies have revealed that hypoglycemia causes impaired visual processing .(9) Certain visual functions like responding to visual stimuli appear to be delayed and the speed as well as accuracy of certain psychomotor performance levels are decreased and may persist for up to 45 -75 minutes after blood glucose has been restored. Hypoglycemia also affects cognitive parameters such as attention, mental flexibility and decision making capacity. (10,11). When it comes to driving, basic skills such as steering, speed control and braking have been found to be impaired during a hypoglycemic episode and the hypoglycemic person may not be aware of the presence of these driving impairments (12,13,14).

Based on these scientific facts, various licensing authorities worldwide impose certain restrictions on issuing and renewal of driving licenses for diabetic patients, especially if they have poor blood glucose control, impaired hypoglycemia awareness or severe recurrent hypoglycemic episodes.(15) However, a survey conducted by the International Diabetes Federation (IDF) in 85 member countries found that no licensing restrictions were imposed on drivers with insulin-treated diabetes in 59 of those countries (69.4%).(16)

In Ethiopia, which was one of the countries included in the survey, no such restrictions exist and whether insulin/sulphonylurea treated diabetic patients who operate motor vehicles are able to identify and manage hypoglycemic symptoms appropriately remains unknown. To the best of our knowledge there are no previous studies conducted in Ethiopia to investigate this important issue.

2-Statement of the problem

The prevalence of diabetes is increasing worldwide, and it is becoming a major public health concern. The alarming increase in the prevalence of obesity among the general population is the main driver behind the rising prevalence of type 2 diabetes. The recent shift in a rising number of younger people being diagnosed with type 2 diabetes is correlated to an increase in the prevalence of childhood and adolescence obesity. The evidence from the landmark DCCT and UKPDS studies revealed that tighter glycemic control helps prevents /delays occurrence of diabetes related microvascular complications when a more stringent approach has been followed to attain a tight glycemic control. While this has proven to be beneficial in delaying/preventing complications, it has also led to more frequent occurrence of hypoglycemia. The rise in the pace of urbanization has resulted in a rapidly increasing level of motor vehicle ownership for personal use or as a means of earning livelihoods. However , although a medical check –up is part of the requirement for obtaining as well as renewing driving licenses , the presence of diabetes and assessment of risk of hypoglycemia while driving is not included as a necessary prerequisite

3-Objectives

3.1 General objectives:

To investigate the knowledge, attitude and practice of insulin/sulphonylurea treated diabetic patients in relation to identifying and managing symptoms of hypoglycemia

3.2-Specific Objectives

This survey tries to investigate whether insulin/sulphonylurea treated diabetic patients who hold a current driving license are

1. able to identify hypoglycemic symptoms
2. able to take the necessary precautionary measures that help prevent hypoglycemia before starting driving
3. able to detect and appropriately manage hypoglycemia during driving

4-Literature review

Impact of hypoglycemia on physiologic functions related to driving motor vehicles

Glucose is the most important fuel for the body, hence hypoglycemia affects many parts of our physiologic function .Since the brain has no way to store energy, it tends to be one of the organs most affected by hypoglycemia, and it's variable manifestations are many . One of the most important brain function that is known to be affected by hypoglycemia is cognitive function. In a study published in Diabetes care in 2001 which aimed to assess which basic brain processes are affected by neuroglycopenia trough acute controlled, insulin-induced hypoglycemia and by assessing its impact on general nonverbal intelligence and various aspects of attention. This study on 20 healthy volunteers demonstrated that during hypoglycemia, attentional flexibility deteriorated and speed of information processing was delayed, while sustained attention was preserved and intelligence scores did not deteriorate.(11)

Another study, published by a team from the University of Chicago in 1989, tried to assess the nature of and threshold for cognitive dysfunction that occurs during insulin-induced hypoglycemia. Using 19 healthy volunteers, they tried measured their reaction time to visual and auditory stimuli both in euglycemic state and with subsequent drop in blood glucose in response to insulin. The researchers found out that cognitive function is impaired when plasma glucose is on average between 40-60 mg/dl on average, that decision-making processes rather than sensory or motor processes appear to be predominantly affected, and that reaction time to both auditory or visual were affected. Another important finding was that recovery of the cognitive dysfunction may lag behind the return of plasma glucose to normal by 45-75 minutes, which implies that the correction of low blood glucose does not necessarily herald the immediate restoration of cognitive function. (10)

The above studies were done to assess overall cognitive dysfunction due to hypoglycemia and not specifically during driving. In a research published on Diabetes care in 2000, Daniel J. Cox and his team studied the impact of progressive hypoglycemia on driving simulation performance .The study protocol had 37 adults with type 1 diabetes drive a simulator during continuous euglycemia and progressive hypoglycemia. During testing, driving performance, EEG, corrective behaviors (drinking a soda or discontinuing driving), symptom perception, and judgment concern impairment were assessed. The results showed that driving performance is significantly disrupted at

relatively mild hypoglycemia(less than 70 mg/dl), yet subjects demonstrated a hesitation to take corrective action and they waited until neuroglycopenic symptoms worsened before taking corrective action. (12)The authors concluded that advising patients to take corrective action sooner is important.

In addition to cognition, vision is another important function needed for driving .A team from State University of New York Upstate Medical University studied the effect of hypoglycemia on retinal function in the human eye. They used 12 volunteers, 5 with no diabetes and 7 with type 1 DM and with a mean age of 28 but with both groups not having any retinal disease. They used multifocal electroretinograms to assess retinal function. Results showed a significant diminution of central retinal function in individuals with and without diabetes during acute hypoglycemia. (9)Showing that not only cognition, but also vision may be affected with hypoglycemia, although the sample size was small

Decision to drive by diabetics during hypoglycemia and its impact

In a study published on JAMA in 1999, they tried to examine Type 1 diabetics decision to drive during their daily based perception of blood glucose level compared to measured blood glucose level in patients who measured their blood glucose at least twice a day .A total of 158 patients participated in the study and results showed that 43-44% said they would drive when they estimated their blood glucose to be between 60-70 mg/dl and 38-47% of the time when their actual blood glucose was less than 40.The authors of the study concluded that more counselling of diabetic patients on the need to avoid driving during low blood glucose levels is needed since the results showed that around 50% would drive in blood glucose levels that have shown to impair their driving skills .(13)

In 2003, a study published on Diabetes Care journal investigated whether diabetes is associated with increased risk of driving mishaps .Using a multinational survey that included a total of 1036 participants including Type 1 and Type 2 diabetic patients as well as non-diabetics, they found out that Type 1 diabetic drivers are at increased risk for driving mishaps, but type 2 diabetic drivers, even on insulin, appear not to be at a higher risk than nondiabetic individuals. More frequent hypoglycemia while driving,

method of insulin delivery, and infrequent self-testing before driving were among the risk factors for these mishaps.(17).

Another research published on Diabetes Care in 2007, that included both Type 1 and 2 DM patients, evaluated the decision not to drive during hypoglycemia according to hypoglycemia awareness. The results showed that 43% of Type 1 diabetic patients with impaired hypoglycemia awareness failed to decide not to drive during experimental hypoglycemia compared to 4.2% of those with normal awareness which is understandable considering they were not aware of their low blood glucose. When it comes to Type 2 diabetes patients, the surprising finding was that 25 % said they would drive when they were suspicious or sure that they were hypoglycemic, specially those on oral hypoglycemic medications, which may be because of less education on the dangers of hypoglycemia in these patients as it's assumed that they are at lower risk at developing hypoglycemia compared to patients on insulin (18)

Overall despite many studies having shown that physiologic functions needed for driving could be impaired with hypoglycemia, but that in real life, many with hypoglycemia may decide to drive while their blood glucose is low enough to impair their driving, in part due to hypoglycemic unawareness and mostly due to lack of proper health education.

5-Research methodology

Participants-The survey was conducted at two different outpatient diabetic clinics in Addis Ababa, the diabetic clinic at the Endocrinology and metabolism unit of the Tikur Anbessa Specialized hospital, which is a teaching tertiary referral hospital of the college of health sciences, Addis Ababa University and Yehulshet Higher clinic. The subjects of this survey are diabetic patients aged 18 years and above treated with Insulin or sulphonylureas and holding a valid driver's license obtained from the Federal transport authority of Ethiopia .

Using simple random sampling, one hundred and six patients that fulfill the above criteria were recruited and consented from the two clinics and a pre-tested questionnaire was administered by an appropriately trained professionals between September 2020 and Mach 2021

The questionnaire-Which has been prepared by the 2 endocrinologists and an endocrinology fellow included in this study, was prepared in English and contains 30 questions. It was verbally translated to the study participants that were unable to read and understand English by the trained personnel administered the questionnaire.

It had parts that cover sociodemographic characteristics of the study participants and questions that address knowledge, attitude and practice in relation to hypoglycemia detection and management while driving motor vehicles.

The study protocol-After ethical approval was obtained from the AAU institutional review board, verbal consent was obtained from the participants and the questionnaire was pre-tested and administered by appropriately trained personnel

The result was analyzed and reported as proportions for each item in the questioner and comparison between the groups was made using the Chi-square test using SPSS version 21.A P value of <0.05 was used for statistical significance

5.1 Inclusion and exclusion criteria

Inclusion criteria

→Age greater than or equal to 18

→Diagnosed with Diabetes and on either sulphonylureas or insulin

→Holding a valid driver's license

→ Verbal consent to participate in the study

Exclusion criteria

→Age less than 18

→Not willing to give consent

6- Ethics approval

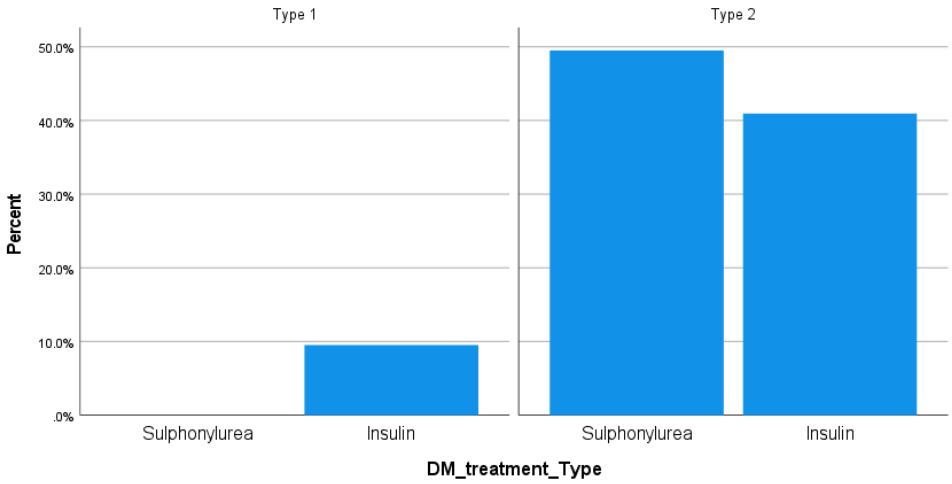
Appropriate ethics approval was sought from the relevant department

7-Results

In this study, a total of 106 Diabetic patients were included, of which 94 (88.7%) were males and 12(11.3%) were females. Overall, 56% of the respondents were from Yehulishet Higher clinic and 43% from TASH, most of the female respondents (83.3%) were from the first. Most of the study participants had either a secondary or tertiary level education with 37% having had a secondary level education and 58.5% have either gone to college or university. Those who were employed worked in various fields with 14(13.3%) mentioning driving as their job.

Only 10(9.5%) of the participants had Type 1 diabetes, while 95(90.5%) had Type 2 diabetes and 1 had GDM. All of the Type 1 DM patients were on insulin compared to, 45.3% of the Type 2 diabetes patients, while rest on sulphonylureas(Figure 1) . The mean age of the participants was 52(SD,12) years. The majority (71.7%) had HbA1c determined within the past 6 months, with the mean being 8.5% (SD ±2.3). Most had HbA1c between 7 and 8.4%, but there were also 15% who had it at < 6.5% and 17.1% who had very poorly controlled diabetes with HbA1C of > 10%. The study showed that there was an association between which health facility they were getting treated and the HbA1c (p-<0.01) with the mean HbA1c among those participants at Yehulishet Higher clinic being 7.5%(SD ± 1,2), while that of those in TASH was 10.6%(SD±2.8)(Figure2).

Figure 1- Distribution of treatment type among participants in TASH and Yehulishet Higher Clinic



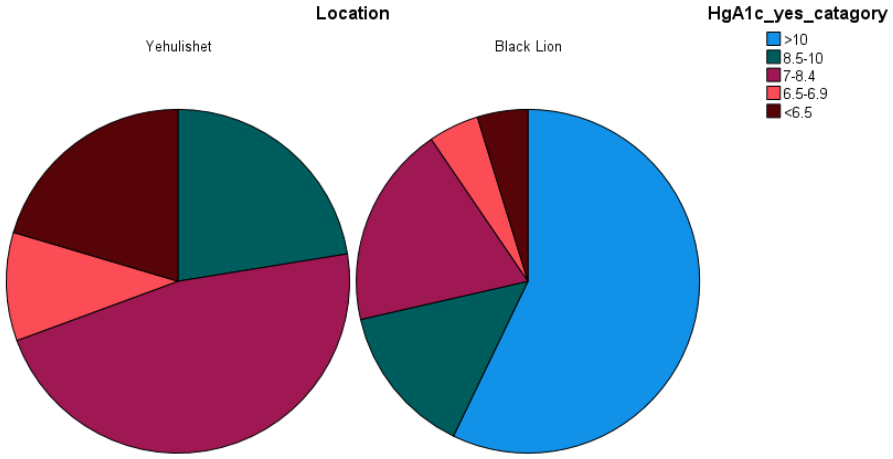


Figure 2 –Blood glucose control assessed with HbA1c among participants in TASH and Yehulishet Higher Clinic

Regarding SMBG, 91(85%)said they measured their blood sugar at home, with only 5 % measuring more than once per day and most(37%) measuring more than once a week but not every day. There was no association between the frequency of home blood glucose measurement and HbA1C level (p- 0.4)

When asked about their knowledge of the symptoms of hypoglycemia, less than half (49%) identified more than half of the hypoglycemia symptoms with only 6% correctly identifying all of the symptoms listed in the questionnaire. The most commonly identified symptom was sweating (80%), followed by hunger (72%) and tremor (70%). Having had advice given on hypoglycemia and driving was not associated with the number of hypoglycemia symptoms they recognized (p-0.21), neither was level of education (p-0.3)

The majority of participants (81%) have had experienced one or more hypoglycemia symptoms at some point in their life time. Among those who had Type 1 DM, all of them had experienced at least one episode of hypoglycemia. Treatment type was found to be significantly associated with previous experience of hypoglycemic symptoms (p-0.013), with more people on insulin experiencing hypoglycemia symptoms. Those who had confirmed hypoglycemia were less than those who had symptoms (52%), of which 35(73%) said they had it less than once a month and 4(8.3%) had it at least once a week but not daily. Most either did not check their blood glucose when they developed symptoms of hypoglycemia (39%) or if they did, found it to be between 40-70 mg/dl (39%). 20% had symptoms at blood glucose levels>70 mg/dl.

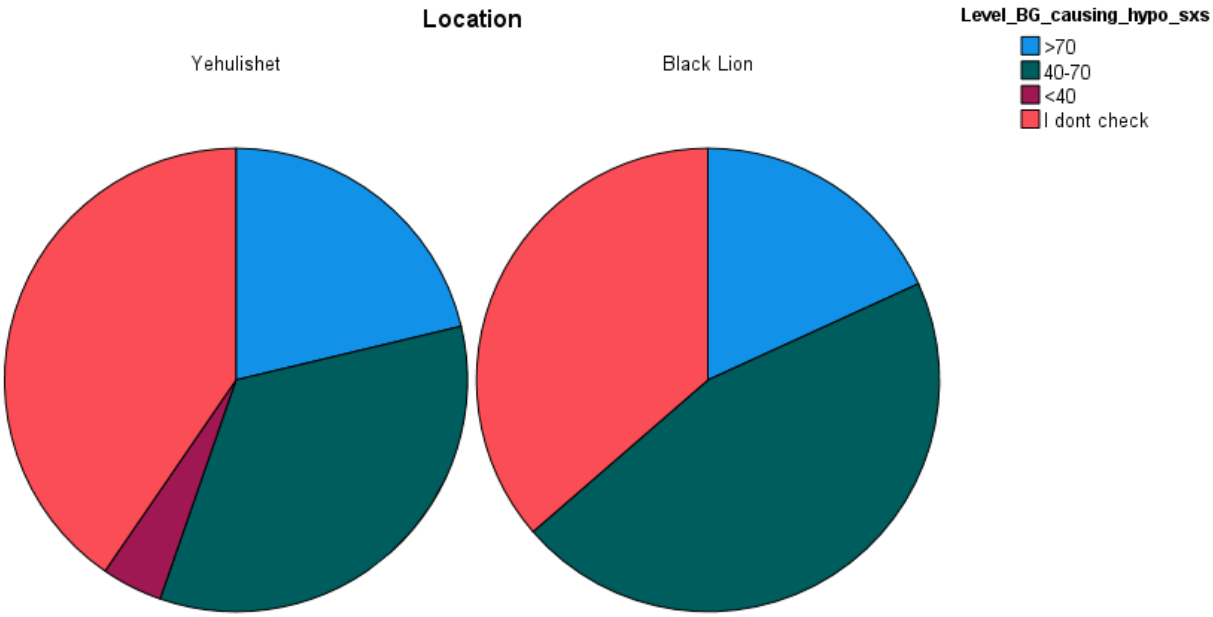


Figure-3 –Level of blood glucose causing hypoglycemia symptoms among patient in TASH and Yehulishet Higher Clinic

Of the 106 participants, 97(92%) drive a motor vehicle after the diagnosis of DM. Of these, more than half (51%) have had confirmed hypoglycemia at some point since their DM diagnosis, although for the majority (72%), it occurred less than once a month. All 4 that said they had hypoglycemia symptoms more than once a week drove. Of those who described their occupation as a driver, 50% have had confirmed hypoglycemia since their diagnosis, but all said they have it less than once a month.

Regarding their practice, 20 (19%) of the participants said they fast while driving. As can be seen in the figure below (Figure 4), 80(75%) of those that do drive, never carry a glucometer with them when they drive. Even among those that said they had confirmed hypoglycemia at least once a week, only 25% said they always carry it with them when they drive. As for testing their blood glucose before driving, yet again, the majority (62%) said they never did.

Regarding having experienced hypoglycemia symptoms while driving, 23(22%)said they did, with the majority of these still not carrying glucometer while driving(78%) and never checking blood sugar before driving (81%). Only 2 had confirmed hypoglycemia.

Most had the episode in the last year (58%).One of the participants who has had hypoglycemia symptoms while driving had driving listed as occupation.

Figure 4 -Practice of carrying glucometer while driving among participants

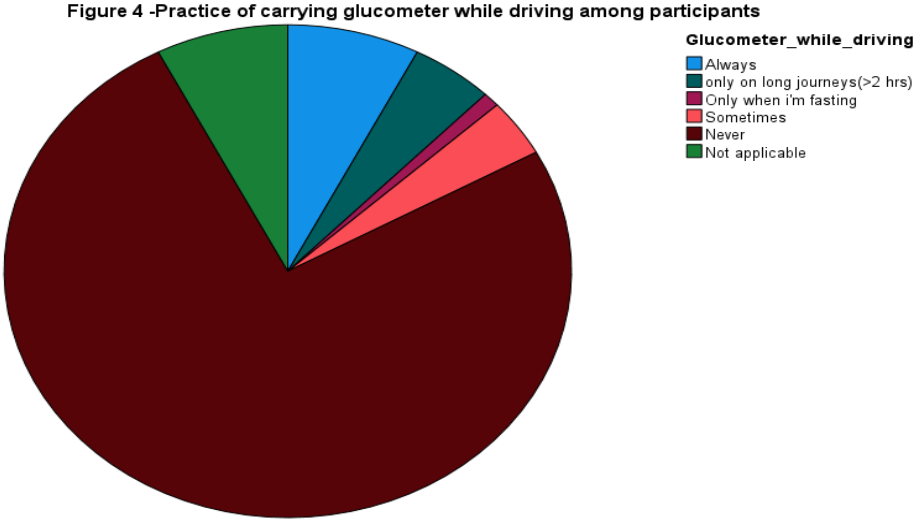
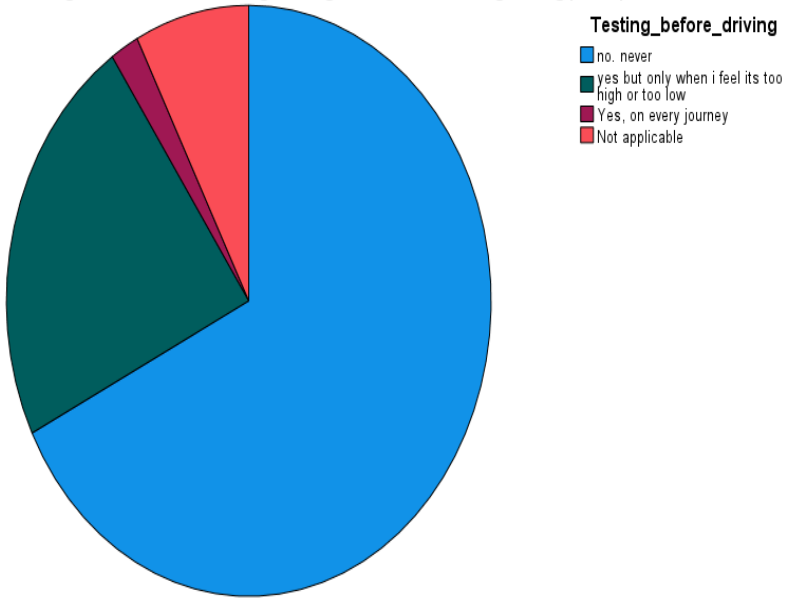


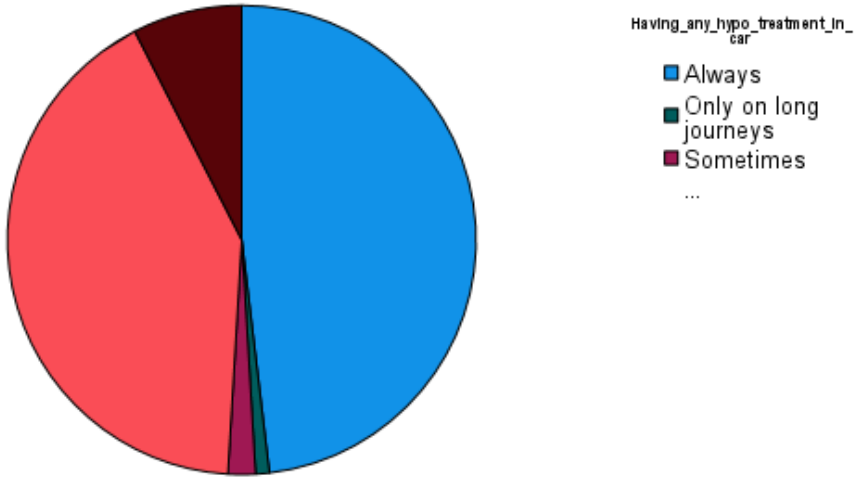
Figure 5 -Practice of testing blood glucose before driving among participants



As can be seen in Figure 6, nearly an equal percentage said they always carry hypoglycemia treatment in the car when driving and never (48% Vs 41%). Having received any form of advice on hypoglycemia and driving was not associated with the practice of having hypoglycemia treatment in the car (p-0.4), on the other hand, having

had previous hypoglycemia while driving was associated with more people carrying some form of treatment in the car (p-<0.01)

Figure 6 -Practice of having hypoglycemia treatment in the car during driving among participants



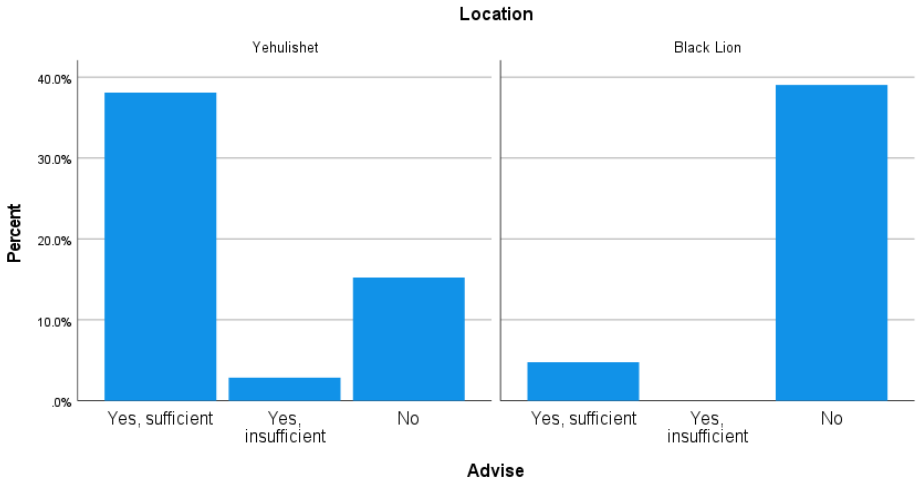
The majority of participants (65%) said they'd stop, eat some food or have a sugary drink and then rest for at least half an hour before driving again if they experienced hypoglycemia while driving and less than 1 % said they'd carry on driving. Nearly two thirds (63%) of the participants responded that they would not check their blood glucose level after treating a hypoglycemia even if they carried a glucometer in the car.

Around a third (34%) said they believed blood glucose less than 70mg/dl was unsafe to drive, 7% said less than 65mg/dl, and the rest mentioned values above 70mg/dl.

More than half of the participants (54%) have never received any advice on hypoglycemia and driving despite holding a valid driving license. Those that did mostly received the advice from a doctor (49%) or family member (19%) .The health facility where they received care was associated with the provision of advice (p-<0.01) with 89% of those at Yehulishet Higher Clinic having received sufficient advice while only 11% did at TASH. Getting advice did not affect rates of hypoglycemia while driving (p-0.93), fasting and driving (p-0.053), carrying treatment in the car(p-0.14), testing before driving (p-0.34), or response to experiencing hypoglycemia symptoms while driving (p-0.29). It is associated with more participants saying they'd check blood

glucose after taking corrective measures if they experienced hypoglycemia while driving (p-0.011)though.

Figure 7- Practice of advising patients on hypoglycemia and driving among participants in TASH and Yehulishet Higher Clinic



8-Discussion

One the most important goals of diabetes education is the prevention and management of acute complications such as hypoglycemia. Hypoglycemia not only causes danger to the individual but when it occurs while they're operating a motor vehicle, it can also cause a danger to others.

The ability to appropriately identify hypoglycemia symptoms as well as taking appropriate precautionary and corrective measures is essential to avoid the consequences of low blood glucose.

As can be seen from our study, less than half of the participants (49%) were able to identify more than half of the symptoms of hypoglycemia, and this, combined with the fact that the vast majority (78%) don't carry glucometers while driving could lead to both under-detection and delay in taking measures to correct hypoglycemia. Even among those that reported having hypoglycemia symptoms at least once a week, only 25% said they carry a glucometer while driving. We've seen from other studies that low blood glucose can impair basic driving skills such as steering, braking, and speed control as well as visual impairments and a delay in taking corrective measures could potentially predispose to accidents.

Some good practices are seen ,however, with most of our participants saying they wouldn't fast and drive which is one predisposing factor to hypoglycemia, but the

absence of fasting would not preclude hypoglycemia which is why simple carbohydrates should always be available in the car. Unfortunately, only 48% said they carry some form of simple carbohydrate in the car with an alarming 41% saying they never do. One factor that seemed to affect this behavior is having had a previous episode of hypoglycemia while driving. Overall, 22% of the participants said they have had a prior episode of hypoglycemia while driving and among these, significantly more people said they carried treatment for the hypoglycemia in the car.

Another positive finding is that the majority knew what measures to take once hypoglycemia occurred. Nearly two thirds of the participants said they would not only stop driving and take a corrective treatment but they would also wait at least half an hour before driving again. Since studies have shown that there is a delay in psychomotor and visual function returning to normal even after blood glucose has been corrected, it's good that most said they'd wait at least half an hour before driving again. Most of the participants were not aware of the need to recheck their blood glucose after treating hypoglycemia which puts them at risk for recurrent hypoglycemia and the dangers associated with driving. This cannot be blamed on financial constraints, since the participants were asked to assume they had glucometers in the car, so it points towards a knowledge gap

When it came to testing before driving, many expert committees, such as the Diabetes Canada Clinical Practice Guidelines Expert Committee, recommend that blood glucose should be checked before driving at all times. In our study, 62% of the participants said they never check their blood glucose level before driving. Although the financial constraints limiting the availability of glucometer strips may have contributed to this number, a knowledge gap about the impact of hypoglycemia on safe driving also plays a role.

Blood glucose less than 70 is said to be unsafe to drive with most authorities choosing that cutoff to recommend against driving but most of the participants picked various ranges above 7% which may discourage the practice of checking before driving.

The knowledge gap may be attributed to the lack of education partly because the majority(54%) of the participants said they have never received any advice on hypoglycemia and driving, although, from those that said they have had sufficient advice, the only practice that was significantly altered was that more said they'd check

their blood glucose after taking corrective measures .significantly more people in the private clinic received advise compared to TASH which may point towards the less favorable health care provider to patient ratio at TASH being a factor in not giving adequate education, although knowledge gap even among the health care providers may also be at play here. The fact that getting advice did not lead to a significant change in practice in most aspects should lead us to reconsider the intensity, duration, and frequency that we give education on the matter to our patients

One important limitation in this study was that the number of female patients that fulfilled the inclusion criteria was significantly smaller than the male, the other is the small number of study participants.

9-Conclusion

There is a gap in knowledge and practice when it comes to preventing and treating hypoglycemia among Diabetic patients getting care both in private and government hospitals .Frequent and adequate education on the matter could improve the practices and should be given to all patient attending diabetic clinics. In the future, the licensing body should also mandate evidence that proper education has been received in these patients before renewal of their licenses.

10-Acknowledgment

I am incredibly grateful for Addis Abeba University, college of health sciences for allowing me to conduct this study and specially the internal medicine department who made every attempt possible to simplify the process of approval. The endocrinology and metabolism unit has also been immensely helpful in guiding me in the right direction and providing support when needed and specially Dr.Yared Demissie who started off the momentum for the study

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Friends and family have always been a source of inspiration and support and I am thankful to all

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12- ANNEX

12-1 Questionnaire

Date card number-

DEMOGRAPHICS

1)Sex-Male/Female (Please circle)

2)Age ------yrs

3)Occupation –----------

4) Educational status

a) no formal education b)primary school

c)secondary school d) College or University education

DIABETES RELATED INFORMATION

5) Type of Diabetes Type 1 Type 2 other

6) Type of treatment

a) Sulphonylureas (alone or with other oral agents)

b) Insulin (Alone or with other oral agents)

7) HbA1c tested in the last 6 months? yes no

8.)If yes to No 7,How much was it?A) ……% b)I don't remember

9) Do you measure your blood sugar at home

a) Yes b) No

10) If yes to No 9 , how frequently do you test your blood sugar in a typical week

More than once per day

Once per day

More than one day per week

Once per week

Less than once per week

Only when feeling unwell

HYPOGLYCEMIA HISTORY

11) Which of the following symptoms do you think can occur due to hypoglycemia (Circle all that apply)

a)Shaky hands(Tremor)

b) Pounding heart beat

c) Anxiety

d)Sweating

e) Hunger

f)Numbness or tingling sensations

g) Trouble walking or feeling weak

h)Trouble seeing clearly

i) Confusion or Abnormal behavior

j) Passing out or having a seizure

k) Others, specify……

12) Have you ever experienced any of the above symptoms of hypoglycemia? Yes------ No-----

13)Was the low blood glucose confirmed by blood glucose measurements? Yes---- No----

14) If you've answered yes to Question 13- how often do you have a confirmed hypoglycemia(With blood glucose measurement< 70gm/dl) that can be treated by yourself(i.e-mild hyperglycemia)

a)Less than 1 per month

b) more than 1 per month but not weekly

c) at least 1 per but not daily

d) at least once a day

15) If you've answered yes to Question 12- how often do you have symptoms of hypoglycemia (both with confirmed low blood glucose and just symptoms) that needed another person's help for treatment because you were not able to treat yourself (i.e-severe hypoglycemia)

a)Less than 1 per month

b) More than 1 per month but not weekly

c)At least 1 per week but not daily

d) At least once a day

16) To what level does your blood glucose fall often before you have symptoms of hypoglycemia?

a)>70 mg/dl b) 40-70 C)<40 mg/dl d) I don't check it

DRIVING SPECIFICS

17) A)Do you drive in the past or currently after diagnosed with diabetes ? Yes------ No------

B) If you fast(Not eating > 8 hours atleast) , do you drive while fasting? Yes---- No---- Not applicable-----

BLOOD GLUCOSE MONITORING WHILE DRIVING

18) Do you (or did you) carry your blood glucose testing kit with you while driving?

a)Always
b) Only on long journeys (>2 hours)
c)Only when i'm fasting
d)Sometimes
e)Never
f)Not applicable

19) Do (or did you) you test your blood glucose level before driving?

a)No, never

b)Yes, but only if I think it may be too high or too low or felt unwell

c)Yes, only when i'm fasting

d) Yes , but only if journey is > 2 hrs

e)Yes, on every journey

f)not applicable

DRIVING AND HYPOGLYCAEMIA

20) Have you ever experienced hypoglycemia while driving? Yes __ No __

21) If you answered yes to Question 18, have you experienced hypoglycemia while driving in the last year? Yes __ No __

22) If you have experienced hypoglycemia while driving, do you remember the lowest sugar level you had?

Yes,---------- mg/dl No, not measured/do not remember----------

23)If you answered yes to Question 18, have you ever had an episode with symptoms of hypoglycemia in the last year while driving that required assistance from another person?

Yes---No----

24)Did you ever have an episode of hypoglycemia while driving resulting in an accident? (Includes any accident when you were hypoglycemic whether you thought you were responsible or not and whether there were damages or not)

Yes ---- No-----

ACTION TAKEN IF HYPOGLYCAEMIA IS SUSPECTED WHILE DRIVING

25) Do you carry sugar, sugar containing carbohydrates such as sweet candies, sodas (soft drinks), sugar containing fruit juice or a snack in the car for the treatment of a hypo?

A)ALWAYS B) ONLY ON LONG JOURNEYS (>2 HOURS) C) ONLY WHEN I'M FASTING

D)SOMETIMES E)NEVER F)NOT APPLICABLE

26) What would you do if you thought you were becoming hypoglycemic while driving?

a)Carry on driving

b)Continue driving but with increased care

c) Drink some water and continue driving

d)Stop driving, eat some food or have a sugary drink or other sources of sugar, then carry on driving

e) Stop driving, eat some food or have a sugary drink or other sources of sugar and then rest for at least half an hour before driving again

27) Assuming you are carrying your blood glucose testing kit, would you measure your blood glucose after treating the hypo?

A)ALWAYS B)ONLY IF SEVERE(NEEDING A 3RD PARTY HELP FOR TREATMENT)

C) SOMETIMES D)NEVER

28)What level of blood glucose would you consider as unsafe to drive? ___ mg/dl

29)In your opinion, Have you ever received advice about driving and diabetes from your health care provider (Doctors, Nurses etc) or other?

a) Yes, sufficient advise b) yes, but not sufficient c)No, no one advised me

30)If yes, from what source?

a)doctors b)Family/Friends

c)nurses/dieticians d)Internet

e)Pharmacists

f)Locally (Ethiopia) prepared patient education print or/and digital materials

g)Broadcast media (Television, Radio)

h)Newspaper/magazine

i)Other------

12-2 **የመረጃ ቅፅ**

የጥናቱ ርዕስ:ኢንሱሊን ወይም የስካር ኪኒን በሚወስዱ ሕጋዊ የመንጃ ፈቃድ ባላቸዉ የስካር ህሙማን ዘንድ

የሚከሰተዉን የስካር ማነስ ምልክቶችን እና የሚሰጠዉን ሕክምና ማወቅን ይመለከታል ::

ጥናቱን የሚያካሂዱት

ዶ/ር : ተድላ ከበደ

ዶ/ር : ያሬድ ንጉሴ

ዶ/ር : ጌታሁን ታረቀኝ

ዶ/ር : ቃልኪዳን አላቸው

ዶ/ር: አማረ ጉልላት

እኔ ስሜ ሲ/ር. ..... የተባልኩ ከላይ የተገለፀውን ጥናት አስመልክቶ መረጃ ሰብሳቢ ስሆን በጥናቱ ውስጥ

ስለ ስካር ማነስ እና ሊደርግ የሚችለው ሕክምና ሕጋዊ መንጃ ፈቃድ ባላቸዉ ህሙማን እንዴት እንደሚተገበር

ለማወቅ ነው::በዚህ ጥናት መሳተፍ በሙሉ ፈቃደኛነት የተመሰረተ ሲሆን በጥናቱ ላይ ላለመሳተፍ ከፈለጉ በማንኛውም

ጊዜ መውጣት የሚችሉ ሲሆን በጥናቱ የሚሰጡት ምላሽ ሚስጥራዊነቱ የተጠበቀ ነው ::

<u>የጥናቱ መተማመኛ ቅፅ</u>

እኔ አቶ/ወ/ሮ/ወ/ሬት.....የተባልኩ

ከላይ በርእሱ የተጠቀሰውን ጥናት አላማ:ሂደት እና ጥቅም በቃልና በፅሁፍ የተብራራልኝ ስለሆነ

በጥናቱ ለመሳተፍ መስማማቴን በፊርማዬ

አረጋግጣለሁ ::

ፊርማ.....

ቀን.....