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Knowledge of Hypoglycemia Symptoms Among Type 2 Diabetes Mellitus Patients at NIMSR Kohima

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Abstract

Background: Hypoglycemia symptoms awareness is indispensable for effective management critical to avert serious complications and potentially life-threatening outcomes. The objective of the study was to assess the awareness of hypoglycemia symptoms among patients with Type 2 Diabetes Mellitus. ***Materials and Methods:*** A cross-sectional study was conducted among 204 patients with Type 2 Diabetes Mellitus attending the outpatient department (OPD) and Medicine wards of Department of General Medicine, Nagaland Institute of Medical Sciences and Research (NIMSR), Kohima, Nagaland. The study was done over a period of 2 (two) years from June 2023 to May 2025. ***Results:*** The mean age of the study population was 56.81 ± 12.79 years. The duration of diabetes in 50% patients was less than 5 years. The knowledge of target fasting level and postprandial blood glucose level was known to only 32.8% of the study population. 62.3% patients experienced at least one episode of hypoglycemia symptoms while on medication. Excessive hunger (67.2%), weakness (65.2%) and drowsiness (58.3%) were the most recognised hypoglycemia symptoms. ***Conclusion:*** The detrimental effect of hypoglycemia can be significantly reduced by patient awareness and response intervention to the recognised symptom. The healthcare providers should effectively foster strategies to enhance hypoglycemia awareness among diabetic individuals so as to potentially improve outcomes for those individuals at risk.

Keywords: ***Diabetes mellitus, Glycemic control, Hypoglycemia, Complications, Awareness.***

Introduction

Diabetes mellitus is a complex and chronic disease that poses a significant threat to global health [1]. With a worldwide prevalence of 451 million people in 2017, the disease is projected to affect 693 million individuals by 2045 [2]. In India alone, the International Diabetes Federation (IDF) estimates that approximately 74.2 million people are living with diabetes, with numbers expected to rise to 92.9 million by 2030 [3]. The substantial burden imposed by diabetes mellitus on patients, healthcare systems, and economies underscores the urgent need for effective prevention, diagnosis, and management strategies to mitigate its impact.

Individuals with diabetes require effective self-management to prevent its complications and improve the quality of life. Accurate assessment of self-management practices is crucial to identify areas for improvement and facilitate better glucose control, thereby reducing the complications of diabetes [4]. The American Diabetes Association defined hypoglycemia as 'any abnormally low plasma glucose concentration that exposes the subject to potential harm' and proposes a threshold of < 70 mg/dl [5]. Hypoglycemia symptoms are classified into two main categories, Neuroglycopenic symptoms (e.g., confusion, dizziness, loss of consciousness) and Neurogenic (autonomic) symptoms (e.g., sweating, tremors, palpitations, anxiety) [6].

Intensive glycemic control, a key strategy in diabetes management, is associated with an increased risk of hypoglycemia. This complication of glucose-lowering therapy warrants careful consideration and monitoring to ensure patient safety and optimal treatment outcomes [7].

Hypoglycemia requires effective management critical to avert serious complications and potentially life-threatening outcomes. Recognizing the hypoglycemic symptoms is essential and comprehensive patient education plays a vital role in equipping individuals with the self-management skills necessary to achieve optimal glycemic control to prevent disease complications and improve the quality of life.

Materials and Methods

Study design: A hospital based cross sectional study was conducted among 204 patients with Type 2 Diabetes Mellitus attending the outpatient department (OPD) and Medicine wards of Department of

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General Medicine, Nagaland Institute of Medical Sciences and Research (NIMSR), Kohima, Nagaland. The objective of the study was to assess the awareness of hypoglycemia symptoms among patients with Type 2 Diabetes Mellitus.

Study duration: The study was done over a period of 2 (two) years from June 2023 to May 2025.

Inclusion Criteria

1. Age above 18 years
2. Patients of both gender diagnosed with Type 2 Diabetes Mellitus and on oral hypoglycemic agents, insulin or both
3. Those who gave consent to undergo the study

Exclusion Criteria

1. Age less than 18 years
2. Patients with Type 1 Diabetes, gestational diabetes, malignancy, secondary cause of hypoglycemia, serious illness, etc
3. Those not willing to take part in the study were excluded

Study tools

1. A pre-defined proforma for collecting the socio-demographic characteristics, clinical and disease characteristics
2. The Hypoglycemia Awareness Questionnaire (Hypoglycemia Health Association of Australia for assessing the hypoglycemia awareness

Study procedure: The participants were informed about the nature of the study which was fully explained in the participant information sheet and only those who agreed to undergo the study signed in the informed consent form. Their participation was completely voluntary and right to deny to participate in the study was reserved. Privacy and confidentiality was maintained at all cost for each participant.

Operational definitions

1. *Diabetes mellitus:* It is defined as fasting blood glucose level equal to or more than 126 mg/dl and/or 2 hours post prandial blood glucose level equal to or more than 200 mg/dl
2. *Hypoglycemia:* Blood glucose level less than 70 mg/dl.

Statistical Analysis: The collected data was analysed using SPSS (Statistical Package for Social Sciences software) version 21.0. Microsoft word and Excel were used to generate graphs, tables etc. Descriptive statistics like frequency, percentage, mean, standard deviation and proportions were used. A probability value < 0.05 was considered as statistically significant.

Results

Table 1: Baseline characteristics of the study population

Characteristics	Frequency (%)
Age in years	
31 - 40	24 (11.8)
41 - 50	39 (19.1)
51 - 60	66 (32.4)
61 - 70	42 (20.6)
71 - 80	27 (13.2)
>81	6 (2.9)
Gender	
Male	120 (58.8)
Female	84 (41.2)
Education	
Illiterate	37 (18.1)
Primary	49 (24.0)
High school	52 (25.5)
Higher secondary	42 (20.6)
Degree/diploma	24 (11.8)
Residence	
Rural	58 (28.4)
Urban	146 (71.6)
Duration of diabetes	
<5 years	102 (50)
5-10 years	81 (39.7)
>10 years	21 (10.3)
Treatment received	
Oral hypoglycemic agents	150 (73.5)
Insulin only	15 (7.4)
Both OHA and insulin	39 (19.1)
Dosing schedule	
Once daily	16 (7.8)
Twice daily	188 (92.2)
On regular medication	
Yes	152 (74.5)
No	52 (25.5)
Target fasting and postprandial blood glucose level knowledge	67 (32.8)
Yes	137 (67.2)
No	
Experienced hypoglycemia symptoms	
Yes	127 (62.3)
No	67 (32.8)
Don't know	10 (4.9)
Use of glucometer at home	
Yes	78 (38.2)
No	126 (61.8)

In our study, 204 patients with type 2 diabetes mellitus were included to assess the awareness of hypoglycemia symptoms and its associated factors. The baseline characteristics of the study population is listed in Table 1. The age of the study population ranged from 32 years to 87 years. The mean age of the study population was 56.81 ± 12.79 years. The most common age group of occurrence in the study was 51 to 60 years at 32.4%. In the gender distribution, males at 58.8% were predominant compared to female. In terms of educational status, 18.1% patients were illiterate and 25.5% completed high school studies. The majority of the patients at 71.6% were residents of urban areas.

In our study, 50% patients had duration of diabetes for less than 5 years. In treatment received by the study subjects, 73.5% were on oral hypoglycemic agents which was in majority and 92.2% patients were on twice daily dosing schedule of medication.

In our study, 74.5% patients were on regular medication and 25.5% patients gave account of skipping medications for various reasons. The knowledge of target fasting level of 80-130 mg/dl and postprandial blood glucose level of 130-180 mg/dl was known to only 32.8% of the study population. In the study, 62.3% patients experienced at least one episode of hypoglycemia symptoms while on medication. The monitoring of blood glucose levels at home was done by only 38.2% patients in the study population. (Table 1)

Table 2: Knowledge of symptoms of Hypoglycemia in the study population

Hypoglycemia symptoms	Yes Frequency (%)	No Frequency (%)	Don't know Frequency (%)
Dizziness	83 (40.7)	91 (44.6)	30 (14.7)
Sweating	70 (34.3)	125 (61.3)	9 (4.4)
Weakness	133 (65.2)	59 (28.9)	12 (5.9)
Drowsiness	119 (58.3)	79 (38.7)	6 (3.0)
Irritability	48 (23.5)	132 (64.7)	24 (11.8)
Confusion	67 (32.8)	104 (51.0)	33 (16.2)
Palpitation	50 (24.5)	120 (58.8)	34 (16.7)
Tremors of hand	88 (43.1)	104 (51.0)	12 (5.9)
Excessive hunger	137 (67.2)	62 (30.4)	5 (2.4)
Slurred speech	68 (33.3)	121 (59.3)	15 (7.4)
Blurred vision	78 (38.2)	107 (52.5)	19 (9.3)
Nausea	85 (41.7)	101 (49.5)	18 (8.8)
Headache	46 (22.5)	150(73.5)	8 (4.0)
LOC	69 (33.8)	110 (53.9)	25 (12.3)
Seizure	23 (11.3)	170 (83.3)	11(5.4)

In the assessment of knowledge of hypoglycemia symptoms, excessive hunger (67.2%), followed by weakness (65.2%) and drowsiness (58.3%) were the most recognised symptom of hypoglycemia in the study population. These symptoms were recognised by more than half of the study population (Table 2). The least recognised symptom of hypoglycemia in the study population were seizure (11.3%), headache (22.5%) and Irritability (23.5%). Thereby suggesting the need for increased awareness about these potential indicators of hypoglycemia.

Discussion

Hypoglycemia causes consequential impact on the quality of life in an individual with diabetes. The incidence is rare in non-diabetics as endogenous insulin secretion is inhibited when glucose levels are below normal measures.

The mean age of our study population is 56.81 ± 12.79 years. The elderly individuals with diabetes aged ≥65 years are at a significantly higher risk of experiencing asymptomatic hypoglycemia, with a four-fold increased occurrence compared to their younger counterparts [8]. The heightened vulnerability can be attributed to age-related physiological changes, comorbidities and medication regimen.

The various treatment guidelines and approaches have accentuated the need to balance effective glycemic control with the risk of hypoglycemia [9]. In our study, the treatment received by 73.5% patients of the study population was oral hypoglycemic agents (OHA) which was in majority and 19.1% patients on were on both OHA and insulin. Hypoglycemia remains a complication of diabetes treatment particularly in those on insulin secretagogues such as sulfonylureas and insulin therapy [10].

Diabetic individuals encounter hypoglycemia associated autonomic or neurological symptoms. The recurrent episodes results in a defective counter-regulatory hormone response, leading to reduced awareness of hypoglycemia [11].

In our study, 62.3% patients experienced hypoglycemia symptoms while on diabetes medication. The patients treated with insulin can develop impaired hypoglycemic awareness resulting in increased episodes of asymptomatic, non-severe hypoglycemic events, contributing to a higher incidence of severe episodes when corrective measures are not taken promptly [12,13].

In our study of assessment of knowledge of hypoglycemia symptoms, excessive hunger (67.2%), weakness (65.2%) and drowsiness (58.3%) were recognised by more than half of the study population. Shriraam V *et al.*[14] in their study reported that 66.1% of diabetic patients had knowledge of at least three symptoms of hypoglycemia [14]. In a similar study, Gezie GN *et al.*[15] reported that 48.8% patients could identify the hypoglycemia symptoms [15]. The most prevalent causes of hypoglycemia are inadequate food intake, physical exertion, incorrect insulin dosage and lack of awareness of hypoglycemia symptoms [16].

The monitoring of blood glucose levels at home by use of glucometer was done by only 38.2% patients in our study population. The American Diabetes Association (ADA) highlights the significance of blood glucose testing, advocating for a personalized approach to testing frequency for individuals with diabetes [17].

In our study of educational status, 18.1% patients were illiterate and the rest majority had various level of formal education. The studies have noted that diabetic patients from lower socioeconomic backgrounds tends to experience poorer glycemic control [18]. A significant association exist between the diabetes self-management and education status of the patients as those with higher education had better glycemic control [19]. This can be attributed to the awareness of complications of diabetes and motivation towards diet, physical activity and medication adherence in the educated patients resulting in better self-care management [20].

Conclusion

Our study highlights the need for targeted education and awareness among individuals with Type 2 Diabetes Mellitus and caregivers to improve the recognition of hypoglycaemia symptoms. The detrimental effect of hypoglycemia can be significantly reduced by patient awareness and response intervention to the recognised symptom. The healthcare providers should effectively foster strategies to enhance hypoglycemia awareness among diabetic individuals so as to potentially improve outcomes for those individuals at risk.

Declarations

Conflict of Interest

None declared

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Nil

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