

## KNOWLEDGE OF DIABETIC PATIENTS ABOUT SYMPTOMS AND SELF-MANAGEMENT OF NON-SEVERE HYPOGLYCEMIA IN SUDANESE PATIENTS

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### ABSTRACT

Hypoglycemia is the most common acute complication of diabetes and can limit therapeutic efforts to improve glycemic control. This study aimed to evaluate the diabetic patient's knowledge about the symptoms of mild hypoglycemia and their practice in treatment of such symptoms. A total of 200 patients attending the diabetic centers during August 2017 were included. Data was collected by direct interview. About 58% were above 55 years of age. The common symptoms of hypoglycemia known to the study subjects were sweating (48%), dizziness (32%), and shakiness (32%). Generally the study group 151

(75.5%) were regarded to have poor knowledge about non-severe hypoglycemia symptoms, as they failed to recognize less than three symptoms. About 79% recognized a source of sugar to self treat hypoglycemia, but 89% did not know what to do if symptoms of hypoglycemia returned 15 minutes later. Statistical analysis revealed that gender, age, and education level were not associated with knowledge about hypoglycemia. Whereas the duration of disease, and type of treatment were significantly associated with good knowledge about hypoglycemia.

**KEYWORDS:** Hypoglycemia, knowledge about hypoglycemia, self treatment, diabetes mellitus.

### INTRODUCTION

Hypoglycemia is the most common acute complication of diabetes and can limit therapeutic efforts to improve glycemic control in order to protect against long-term complications. The

short term and fatal effect of hypoglycemia is its effect on the heart and myocardial damage that it can cause. Hypoglycemia can affect the heart by causing prolonged QT interval and fatal arrhythmias, so it increases the risk of cardiac events in diabetics.

The Hypoglycemia and Diabetes Work Group of the American Diabetes Association and The Endocrine Society has recommended that a plasma concentration  $\leq 70$  mg/dl should be the cut-off value for defining the upper boundary of hypoglycemia.<sup>[1]</sup>

The declining arterial plasma glucose concentrations below the physiological concentration range of  $\sim 70$ – $110$  mg/dl ( $3.9$ – $6.1$  mmol/l) triggers the secretion of glucagon, epinephrine, growth hormone, and cortisol. Glucagon and epinephrine act within minutes to raise plasma glucose concentrations. Neurogenic adrenergic symptoms of mild hypoglycemia, include tremor, palpitations, and anxiety, and cholinergic neurogenic symptoms include sweating, hunger, and paresthesias.<sup>[2,3,4]</sup>

In severe hypoglycemia as a direct result of glucose deprivation from brain neurons, symptoms like fatigue, a sensation of warmth, difficulty thinking and speaking, and behavioral changes develop. However, prolonged severe hypoglycemia cause seizure, coma, or even death.<sup>[2,4]</sup>

However, on the other hand we also need to consider the occurrence of hypoglycemia unawareness which is directly proportional to the duration of diabetes. It occurs with patients, who have had DM for a long duration and have developed autonomic neuropathy<sup>[3]</sup>; they do not get symptoms of hypoglycemia but enter into the confused state directly.

Non-severe hypoglycemia inadvertently will proceed to severe hypoglycemia if not managed adequately and urgently. It is very important that diabetic patients understand those symptoms and know how to manage them. Patients are advised to carry sweets or sugar containing drinks to take when they get those symptoms.

Non-severe nocturnal hypoglycemic events (NSNHEs), occurring while patients are sleeping<sup>[5]</sup>, create more fear and anxiety for patients than daytime events.<sup>[6]</sup> Furthermore, night-time events disrupt both sleep quality and quantity, resulting in impaired functioning and well-being the following day. It has been found to result in greater work loss and reduced productivity than events that occur at day time.

Hypoglycemia has negative impact on the patient and the healthcare system through reduced treatment satisfaction and adherence, reduced quality of life and serious health consequences, non-severe hypoglycemia has been shown to impair diabetes management, patient functioning and well-being, and result in work loss and reduced productivity.<sup>[7]</sup> Also there is an economic burden for both patients and society as a result of increased blood glucose monitoring, health care resource utilization, reduced work productivity and patient out of pocket expenses.<sup>[8]</sup>

The goal of diabetes therapy is to normalize glucose levels without lowering them excessively. It depends on appropriate education regarding diabetes management and self-care, self-monitoring of blood glucose, awareness of factors that may precipitate hypoglycemia, and an individualized approach to therapy and glycemic control targets.<sup>[9,10]</sup>

Mild hypoglycemia often is considered to be a short-term event, easily dealt with by eating or drinking something that quickly increases blood glucose levels. Continuous medical care and patient self-management education are necessary to prevent acute complications and reduce the risk of long-term complications.<sup>[11]</sup>

## OBJECTIVE

The aim of this study is to evaluate the diabetic patient's knowledge about the symptoms of mild hypoglycemia and their practice when it occurs.

## METHOD

This study was a cross sectional descriptive study on two diabetic clinics in Khartoum State during August 2017. Patient with diabetes mellitus who are on treatment with either oral hypoglycemic agents or insulin was included. Patients on  $\beta$  blockers and diabetes secondary to other systemic disease were excluded from study.

Sample size was determined according to the following equation:

$$n = \frac{N}{1+(N)(e^2)}$$

n = sample size

N = no of population

e = error =5% (level of confident 95%).

The number of population was calculated according to number of diabetic patients attending the diabetic clinics the last month. The calculated sample was 124 patients from the first clinic (10 patients refused to participate & 14 patients repeated visits to the clinic). And 100 patients were included from the second clinic. Data was collected by a structured questionnaire.

A scale was developed to assess knowledge, if the diabetic patients knew at least three symptoms together, they were considered to have good knowledge on hypoglycemia symptoms.

Those who knew at least one symptom of nocturnal hypoglycemia were considered to have good knowledge on nocturnal hypoglycemia. Also knowing one precipitating factor was enough to consider diabetic patient to have good knowledge about precipitating factors of hypoglycemia. Knowledge about one source of glucose was enough to consider diabetic patient have good knowledge about what should be done during an episode of mild hypoglycemia (self management).

## RESULTS

**Table 1: History of diabetes mellitus.**

Duration of diabetes	Frequency	Percent(%)
Less than 6 months	21	10.5
6 months-2 years	22	11.0
2-5 years	43	21.5
5-10 years	53	26.5
More than 10 years	61	30.5
Total	200	100.0

**Table 2: Drug treatment used by diabetic patients.**

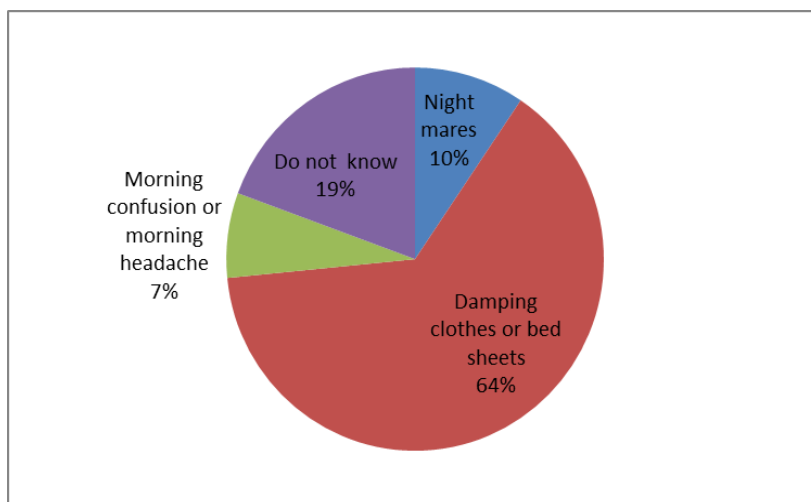
Treatment	Frequency	Percent
Metformin	61	30.5
Thiazolidinediones	1	0.5
Sulphonylureas	44	22
Vildagliptin	3	1.5
Metformin + sulphonylureas	53	26.5
Metformin + Vildagliptin or pioglitazone	4	2
Insulins	34	17

**Table 3: The early hypoglycemia symptoms that diabetic patients know.**

Early hypoglycemia symptoms known	Frequency	Percent
Dizziness	64	32
Nervousness	4	2
Hunger	26	13
Sweating	96	48
Palpitation	37	18.5
Shakiness	64	32
Headache	3	1.5
Others	12	6

**Table 4: Causes of hypoglycemia listed by diabetic patients.**

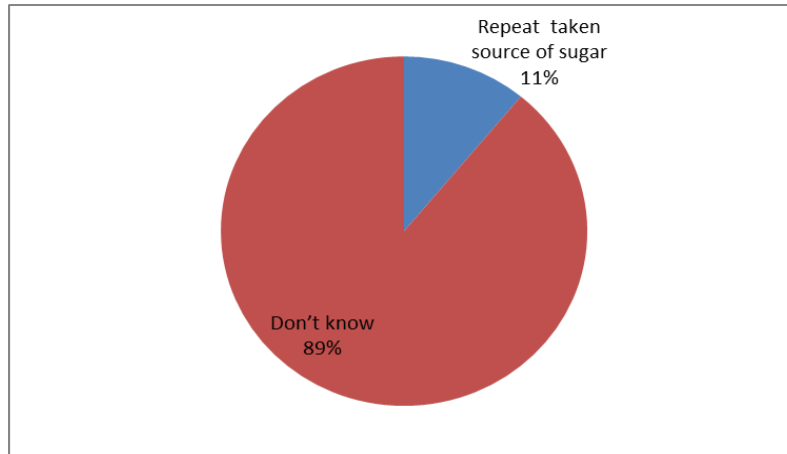
Cause hypoglycemia	Frequency	Percent
Missing or delay meal	110	55
Excessive exercise	39	19.5
Over dose	21	10.5
Don't know	75	37.5



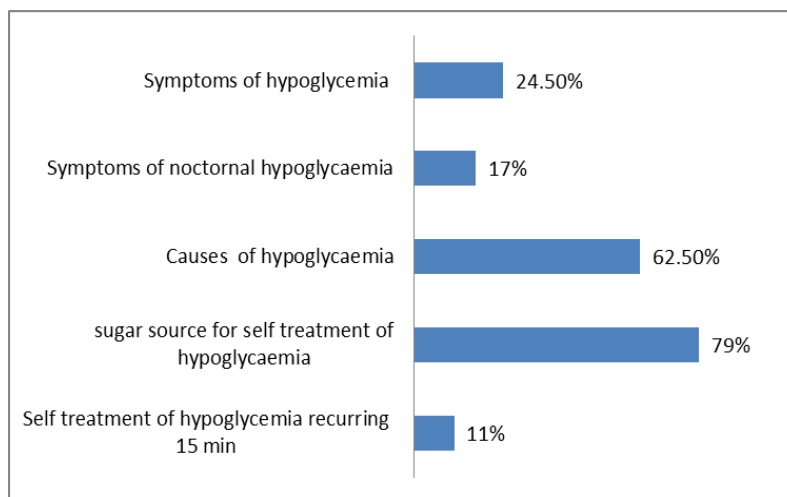
**Fig. 1: The symptoms of nocturnal hypoglycemia listed by patients.**

**Table 5: The response of diabetic patient if hypoglycemia occurs (Self-management).**

Self-management	Frequency	Percent
Eat sweet	100	50
Drink sugary drink	87	43.5
Drink skim milk	2	1
Take table spoon of honey / sugar	24	12
Don't know	42	21



**Fig. 2: Responses when hypoglycemia occurs again after 15 min of treatment.**



**Fig. 2: Assessment of patients' knowledge about symptoms, causes and self treatment of hypoglycemia.**

**DISCUSSION**

The population was 58% females and 42% males. Majority of the patients (58%) were more than 55 years of age, about a third of the patients were illiterate (26%). More than 50% of the studied diabetics had diabetes mellitus for 5 years or more which is enough time to learn about their disease. Only 10% were diagnosed with diabetes for less than 6 months which might justify some lack of knowledge. A significant association between duration of diabetes and knowledge about symptoms of non-sever hypoglycemia was found (p-value=0.00). This was similar to some Indian studies.<sup>[12,13]</sup> Generally the determinant for patient knowledge about diabetes and self management of hypoglycemia were age, level education, history of the disease and hypoglycemic events.<sup>[14,15]</sup>

When the patients were asked if they knew the early symptoms of hypoglycemia; more than two thirds (69%) answered yes. However, our assessment was contrary only 24.5% of them know three or more symptoms. The most common early hypoglycemia symptoms recognized by the population were sweating (48%), dizziness (32%) and shakiness (32%). Very few recognized headache (1.5%) and nervousness (2%) as symptoms of hypoglycemia.

Assessment of the patients knowledge about nocturnal hypoglycemia symptoms showed that 34 (17% of total population) knew at least one symptom of nocturnal hypoglycemia.

The diabetic patients had good knowledge on precipitating factors of hypoglycemia 125(62.5%) of them knew at least one precipitating factor of hypoglycemia. More than half (55%) of the patients knew that hypoglycemia may be precipitated by missing or delaying meals. Exertion as a precipitating factor was known to (19.5%) of patients. It is very important that the patients are well aware of the precipitating factors/causes so that they may take appropriate precautions.<sup>[16]</sup>

The study showed 158 (79%) of patients knew at least one source of glucose to manage themselves when hypoglycemia occurs. They were considered to have good knowledge about self-management. Half stated taking sweet as source to treat non-sever hypoglycemia, (43.5%) of them said sugary drink, 12% nominated sugar or honey, but only(1%) knew skim milk as source of glucose. However 42 (21%) of studied population didn't know how managed themselves when hypoglycemia started.

## CONCLUSION

Generally the overall knowledge of hypoglycemia symptoms was found to be poor; however, the knowledge on the causes and self- management of these episodes was good.

Patient education should be part of the treatment and repeated fairly often to strengthen patients knowledge and hence glycemic control.

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