

Assessing Knowledge of Hypoglycemia Symptoms among Type 2 Diabetic Patients Using Insulin, Khartoum, Sudan

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How to cite this paper: Madani, A.M., Mahmoud, A.N., Abdelrahim, H.M., El-Hadiyah, T.M. and Yousif, A.K. (2019) Assessing Knowledge of Hypoglycemia Symptoms among Type 2 Diabetic Patients Using Insulin, Khartoum, Sudan. *Pharmacology & Pharmacy*, 10, 21-30.

<https://doi.org/10.4236/pp.2019.101003>

Received: November 28, 2018

Accepted: January 14, 2019

Published: January 17, 2019

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Abstract

Background: Hypoglycemia is a traumatic dilemma that has a critical impact on not only the patient's quality of life but also their families and communities. Improving Patient's awareness and knowledge regarding hypoglycemia symptoms is crucial to avoid serious implications like loss of consciousness and even death. **Objective:** This study aimed to assess patients' knowledge of hypoglycemia symptoms and source of diabetes information among insulin users type 2 diabetes. **Methods:** A single centre, hospital-based, analytical, and cross-sectional study was carried out among diabetic patients using insulin attended to Ribat University Hospital Diabetes Clinic (RUHDC), Khartoum State, Sudan during a period of study. A validated questionnaire was used to obtain socio-demographic characteristics of respondents and the patients' knowledge regarding hypoglycemia symptoms was assessed whether good, medium or poor. Data were analyzed, using (SPSS). Descriptive (frequencies) and inferential statistics (association used chi-square) were used at a level of confidence $p \leq 0.05$. **Results:** A majority of patients (52%) had poor knowledge of hypoglycemia symptoms and the common symptoms known to patients were hands tremor (67.2%), blurred vision (52.8%) and sweating (65.6%). No associations were found among hypoglycemia symptoms knowledge, socio-demographic and diabetes duration. Only (25.6%) had regular visiting to educating center and physicians were the major source of diabetes knowledge (74.4%). **Conclusion:** This study proved low patients hypoglycemia symptoms knowledge and physician were the main sources of informa-

tion about diabetes at RUHDC. Further ideas are required in collaboration and integrated approach to filling the gap of patients' awareness and multi-disciplinary team in diabetes management.

Keywords

Hypoglycemia Symptoms, Knowledge, Type 2 Diabetes, Insulin-Users, Sudan

1. Introduction

Hypoglycemia is a true medical emergency [1] and has a critical effect on mortality, morbidity, and quality of life [2]. Hypoglycemia is a major barrier for attaining treatment goals and reduction of long-term complications in diabetes management and therefore it is an important reason for increased costs of medical care [3].

The American Diabetes Association defines the hypoglycemia as “any abnormally low plasma glucose concentration that exposes the subject to potential harm”, and proposes a threshold of <70 mg/dl [4]. The spectrum of symptoms depends on the duration and severity of hypoglycemia and varies from autonomic activation to behavioral changes to altered cognitive function to seizures or coma and even death [5].

Two types of hypoglycemia symptoms are documented. The first one is neuroglycopenia which causes symptoms such as blurred vision, fatigue, concentrating disturbance, confusion and behavioral changes, and may lead to loss of consciousness, seizures, brain damage, and death [6] [7]. The second one is neurogenic symptoms and this occurs by the hormones and neurotransmitters delivered as a result of low brain glucose levels, causing symptoms such as tremor, palpitation, anxiety, sweating, hunger, dizziness and drowsiness [7] [8].

Patient's awareness and knowledge of every hypoglycemia symptoms are very important to be early recognized and to take measures for treatment and avoid risks that may even cause death [7].

Many studies [9] [10] report that younger diabetes patients have high knowledge about diabetes in general and this is because older have a low cognitive function which hinders diabetes education programs, whilst younger ages have higher motivation [11] and adaptability towards disease.

Higher educated patients usually have higher knowledge about diabetes and this is attributed to the fact that educated patients can easily respond to education programs and have the ability to communicate with other sources of knowledge that provides medical programs such as television, radio, and internet [11].

Diabetes management is a complex and cost-effective process and requires an integrated multi-disciplinary team consisting of physicians, nurses, dietitians, exercise specialists, pharmacists, dentists, podiatrists, and mental health professionals, however, unless the presence of educated patients who are able to care about themselves. The efforts of this team will not provide effective care. Partic-

ipation of diabetic patients in diabetes self-management education (DSME) is an essential element of diabetes care [12]. Education helps people with diabetes to initiate effective self-management and cope with diabetes when they are first diagnosed. DSME helps patients to optimize metabolic control, prevent and manage complications, and maximize the quality of life in a cost-effective manner [13].

In the past few decades, a great shift has occurred regarding tradition clinical pharmacists role, as medications dispenser, to direct patients' pharmaceutical care such as diabetes management [14] [15] including diabetes patients' education [16].

Knowledge and awareness of symptoms of hypoglycemia in diabetes prevent patients from many risks of diabetes; however, the presence of studies that check patient's knowledge about this important part of diabetes self-management is scarce and fragmented in Sudan.

2. Methods

2.1. Patients Characteristics

All type-2 diabetic patients on at least three-month insulin treatment attended to Ribat University Hospital Diabetes Clinic (RUHDC) during the period of August 2012 to February 2013 were recruited in this study, except those who refused to participate (just two patients).

2.2. Instrument of Data Collection

Self-administered questionnaire constructed from recent literature and validated by a discussion with experts group in diabetes management at Ribat University. Then the questionnaire was piloted randomly to ten diabetic patients. After minor changes, the questionnaire distributed directly to all selected sample, whilst patients' cards were also used to obtain some patients data.

2.3. Hypoglycemia Symptoms Knowledge Assessment

Information including socio-demographic characteristics and the patients' knowledge of hypoglycemia symptoms was assessed by using closed questions (yes or no). Symptoms variables included in the questionnaire were dizziness, weakness, drowsiness, hands tremor, sweating, palpitation, excessive hunger, and blurred vision. Patients able to identify more than four hypoglycemia symptoms in the questionnaire considered having good knowledge, those identified four were medium and those identified less than four had poor knowledge. Patients also were asked about the source of knowledge of diabetes and their regular visiting to diabetes educating team at RUHDC.

2.4. Data Analysis

Data analyzed, using social package for social science (SPSS) version 16, to assess patient's answers. Descriptive (frequencies) and inferential statistics (association

used chi-square) were used at a level of confidence $p \leq 0.05$.

3. Results

A total of 125 respondents recruited in this study, 96 (76.8%) were females. Age of participants between 41 and 60 years were 65 (52%), patients with basic education level were 53 (42.4%) and 80 (64%) had low financial status. Majority of patients, (52%) had poor hypoglycemia symptoms knowledge No associations were found between hypoglycemia symptoms knowledge, socio-demographic and diabetes duration (**Table 1** demonstrated the Association between Socio-Demographic variables and patients' hypoglycemia knowledge). The common symptoms known to patients were hands tremor (67.2%), blurred vision (52.8%) and sweating (65.6%), see **Table 2**. The hypoglycemia symptoms were interpreted to three

Table 1. Association between patients' hypoglycemia knowledge and some variables.

Socio-demographic	Hypoglycemia knowledge			p value
	N = (%)			
	Good	Medium	Poor	
1-Sex				0.737
Male	13 (10.4)	1 (0.8)	15 (12)	
Female	39 (31.2)	7 (5.6)	50 (40)	
2-Age				0.718
20 - 40	4 (3.2)	0 (0.0)	4 (3.2)	
41 - 60	26 (20.8)	6 (4.8)	33 (26.4)	
Above 60	22 (17.6)	2 (1.6)	28 (22.4)	
3-Educational level				0.086
Basic	20 (16)	2 (1.6)	31 (24.8)	
High secondary	9 (7.2)	2 (1.6)	13 (10.4)	
University	11 (8.8)	1 (0.8)	4 (3.2)	
Non-formal	1 (0.8)	1 (0.8)	0.0 (0.0)	
Illiterate	11 (8.8)	2 (1.6)	17 (13.6)	
4-Financial status				0.354
High	20 (16)	1 (0.8)	24 (19.2)	
Low	32 (25.6)	7 (5.6)	41 (32.8)	
5-Diabetes duration				0.263
1 - 5	8 (6.4)	1 (0.8)	8 (6.4)	
6 - 10	7 (5.6)	14 (11.2)	4 (3.2)	
11 - 15	15 (12)	2 (1.6)	20 (16)	
16 - 20	5 (4)	0 (0.0)	8 (6.4)	
21 - 25	2 (1.6)	1 (0.8)	11 (8.8)	
Above 25	8 (6.4)	0 (0.0)	3 (2.4)	

categories poor, medium and good (see **Figure 1**). The physicians were the major source of hypoglycemia knowledge for patients (74.4%), see **Figure 2**. Only (25.6%) had regular visiting to educating. center (see **Figure 3**).

4. Discussion

This study was carried out among 125 type 2 diabetes attending RUHDC and more than half of the patients in this study had poor hypoglycemia symptoms knowledge and these findings was less than reported by Almalki *et al.* [17] who reported 85% of patients had sufficient knowledge about the symptoms of hyperglycemia and this high percent is attributed to the fact that more than half of his patients received information about diabetes management from medical

Table 2. Knowledge of symptoms of hypoglycemia among insulin users type 2 DM patients.

Symptoms	Symptoms knowledge of hypoglycemia frequency	Percent (%)
Hands tremor	84	67.2
Blurred vision	66	52.8
Sweating	82	65.6
Drowsiness	53	42.4
Dizziness	50	40
Palpitation	38	30.4
Excessive hunger	10	8
Fatigue	7	5.6

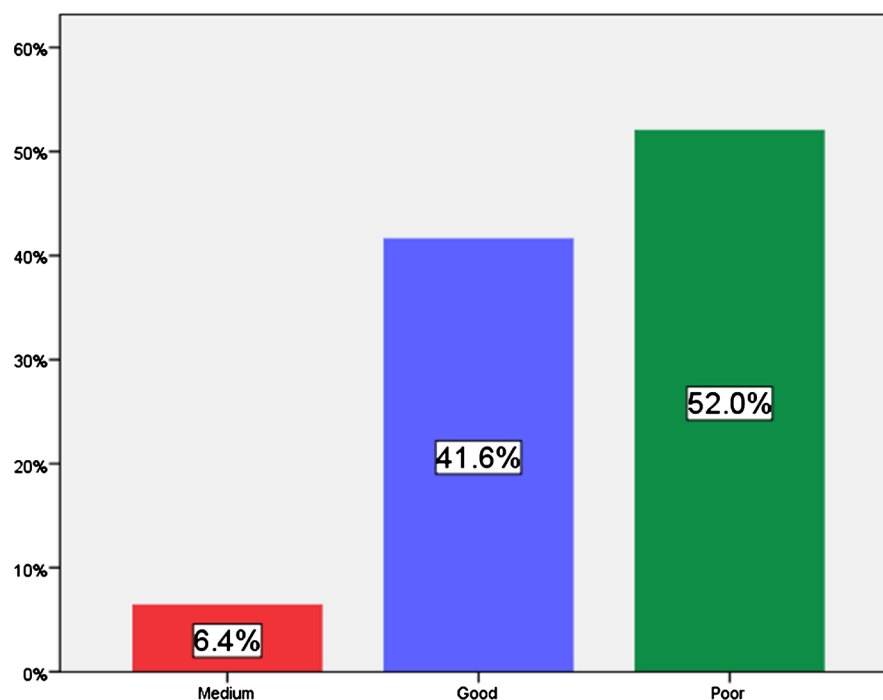


Figure 1. Interpretation of patients knowledge about hypoglycemia symptoms.

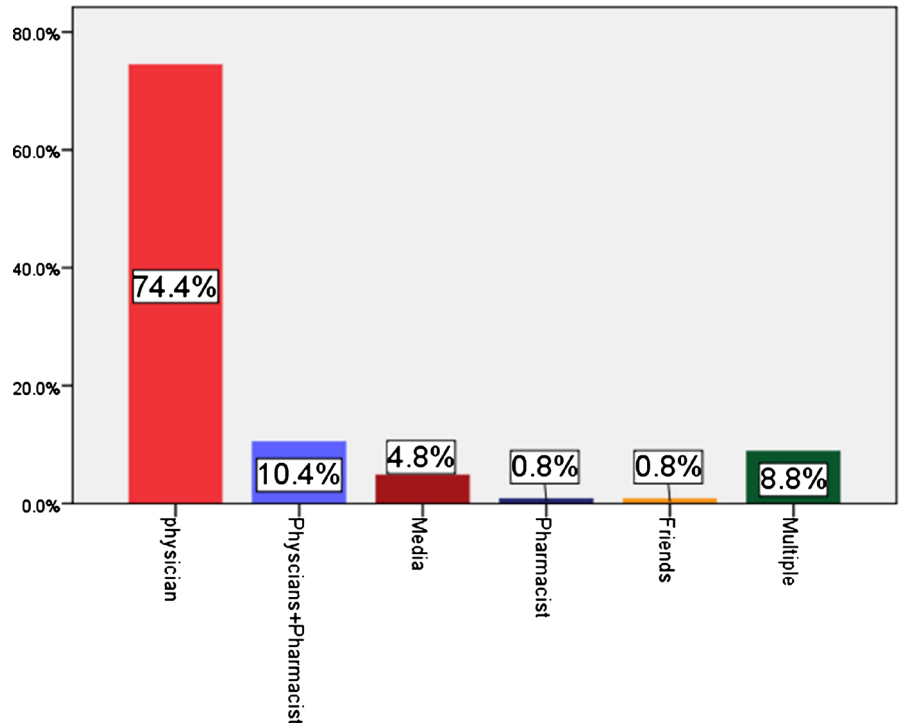


Figure 2. Patients source of information about diabetes.

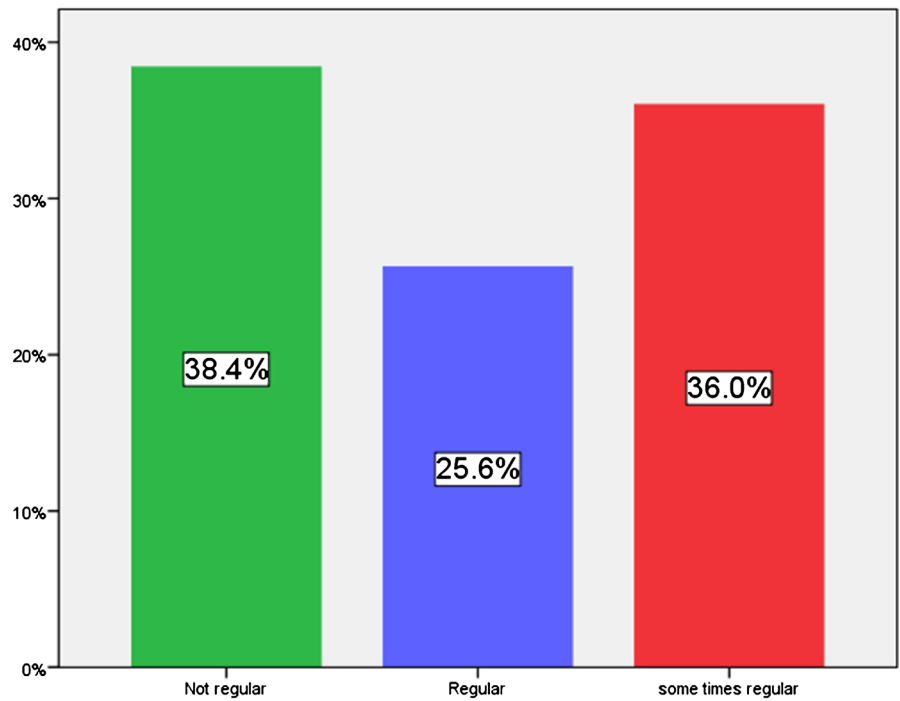


Figure 3. Patients' commitment to regular visit to diabetes educating team.

providers. On the other hand, Kazi and his colleagues [18] reported only 17.2%, whilst El-Khawaga from Egypt reported 48.1% [19].

Older patients with type 2 diabetes have a higher risk of developing a severe episode of hypoglycemia due to low cognitive function [20]. Comprehensive

evaluations for this group of patients, including assessment of their knowledge about symptoms of hypoglycemia, can help in preventing the risk of hypoglycemia. This study did not reveal an association between age and knowledge about hypoglycemia symptoms and this finding contradicted with that reported by Thomson and his colleagues [9].

No association was found between hypoglycemia symptoms knowledge and sex in this study and this consistent with Herath and his colleagues who revealed no significant relationship between sex and diabetes knowledge [21]. On the other hand, this result reflects another picture that different from Awad study who reported that Sudanese female usually cope less well with diabetes, this may be due to equality in the chance of education between male and female in Sudan during last decades [22].

Usually, diabetic patients with high education level have good knowledge score about diabetes [23], diabetes risk factors [24] and diabetes self-management however education level showed no effect on hypoglycemia symptoms knowledge in this study. This result was consistent with Chinnappan and his colleagues who revealed no relationship between education level and patients diabetes knowledge [25].

Although high relation between patients' diabetes self-management knowledge and diabetes duration was found [26], however, no significant relationship was found between diabetes duration and hypoglycemia symptoms knowledge in this study and this consistent with that reported by Shriraam study [7].

Regarding hypoglycemia symptoms knowledge, sweating, tremor of hand and blurred vision were the most symptoms identified by our patients in this study, whilst Shriraam [7] reported that most common symptoms known to his patients were dizziness (81.4%), weakness (73.8%), and drowsiness (72.1%).

Diabetes treatment is complex and multidisciplinary team expert in diabetes management can provide effective health care service, including diabetes self-management knowledge. The ideal team may consist of physicians, nurse practitioners, physician assistants, nurses, dietitians, exercise specialists, pharmacists, dentists, podiatrists, and mental health professionals [27].

Almost three-quarter of patients in this study revealed that physicians were the main source of diabetes knowledge, whilst pharmacist reported only minor role. This finding consisted with Al-Maskari [28] who reported 2.1% for pharmacist as a source of diabetes knowledge. This weak role of the pharmacist in addition to the poor commitment of patient to a regular visit to diabetes educating team gave justification for low percent of hypoglycemia symptoms knowledge in this study.

5. Conclusion

This study proved low patients hypoglycemia symptoms knowledge and the physicians were the main source of information about diabetes at RUHDC, and this subsequently increased the burden on physicians and decrease the effective-

ness of diabetes management. Great efforts are required as collaboration and integrated multidisciplinary team, including effective participation of the clinical pharmacist, to fill the gap of the patients' awareness of complex diabetes management.

Limitation

Although RUHDC is one of the largest centers in Sudan, conducting this study in a single centre will not give the complete picture about patients' knowledge of hypoglycemia symptoms and source of diabetes information among insulin users type 2 diabetes in Sudan as a whole, so generalized study funded by considerable organization or research institute is strongly recommended.

Ethics Approval and Consent to Participate

Ethical approval to the study from Higher Graduated Studies, University of Ribat was issued. All participants were informed verbally about the aims of the study and gave chance to participate or refuse.

Authors' Contributions

The first Author planned, collected, analyzed data, findings and wrote the paper. While the others were deeply involved in all steps as supervisors to the study from proposal up to writing manuscript, revising and approval of the final version.

Acknowledgements

The Authors appreciated the RUHDC workers, doctors and patients for their kind participation, response, and patience during the period of the study.

Funding

This study was not funded by a grant from any organization. It is original work of the First Author as Research for M Sc Degree in clinical pharmacy.

Conflicts of Interest

The authors declare that they have no competing interests.

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