



## STUDY ON AWARENESS OF HYPOGLYCEMIA IN TYPE 2 DIABETES

P. RajaReddy<sup>1\*</sup> & K. Prabhakara<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Physiology, Sri Devaraj Urs Medical College, Tamaka, Kolar, 563 101.

<sup>2</sup>Professor, Department of Medicine, Sri Devaraj Urs Medical College, Tamaka, Kolar, 563 101.

\* Corresponding Author

### Abstract

Hypoglycemia awareness is important aspect in the treatment of diabetes. A total of 119 type 2 diabetes patients were selected randomly. The mean age of males 56.23±12.66 and females were 50.64±9.83. There was significant difference in the exercise pattern between males and females. Only 22.6% (27) were aware about hypoglycemic symptoms. Males had better awareness than females (25%). Duration of disease, educational status, sex, and exercise were not associated with hypoglycemic awareness among the study group. In the Present study only 22% study subjects were aware of hypoglycemia. However, subjects without awareness expressed similar number of significant neuroglycopenic and sympathetic symptoms. There is a need to identify causes of reduced awareness of hypoglycemia and developed intervention strategies to restore awareness without sacrificing metabolic control. Self-management education is required to recognize hypoglycemia and to support to prevent acute complications and reduce the risk of long term complications.

**Keywords:** Awareness, hypoglycemia, type2diabetes.

### 1. Introduction

Hypoglycemia is the leading limiting factor in the glyceic management of type 1 and insulin treated type 2 diabetes.<sup>1</sup> Mild hypoglycemia may be inconvenient or frightening to patients with diabetes, and more severe hypoglycemia can cause acute harm and was associated with greater risk of dementia.<sup>2</sup> More recently, it has come to the attention of clinicians and researchers that hypoglycemia may also have CV effects,<sup>3,4</sup> and some studies have suggested a link between hypoglycemic excursions and CVD in people with diabetes.<sup>3,5</sup> Hypoglycemia causes a cascade of physiologic effects and may induce oxidative stress,<sup>6</sup> cardiac arrhythmias,<sup>7</sup> contribute to sudden cardiac death,<sup>7</sup> and cause ischemic cerebral damage,<sup>4,8</sup> presenting several potential mechanisms through which acute and chronic episodes of hypoglycemia may increase CVD risk.

The prevalence of hypoglycemia in type 2 diabetes has been under appreciated, as it has long been thought that patients with type 2 diabetes do not experience significant hypoglycemia. Hypoglycemic episodes are classified as mild, which are able to be self-treated, and severe, which require assistance from another individual and or medical treatment.<sup>4</sup> The American Diabetes Association defines hypoglycemia as plasma glucose <60 mg/dl, requiring carbohydrate or glucose ingestion and severe hypoglycemia as low blood sugar requiring the assistance of another person and that cannot be treated with oral carbohydrate.

Reduced awareness of hypoglycemia is a commonly reported phenomenon among patients with long standing diabetes. Up to 50% of diabetes report having lost their ability to perceive autonomic symptoms associated with low blood glucose levels and thus often fail to act to prevent severe hypoglycemia.<sup>9,10</sup> Hence the present study was designed to study the awareness, frequency and severity of hypoglycemia in type 2 diabetes patients.

### 2. Material and Methods

Subjects in this study was recruited from the RL Jalappa Hospital & Research Centre, attending to medicine out patient department who had diabetes for at least 2 years, and with the age between 20 to 55 years were included in the study. Subjects were explained about the study and informed consent was obtained.

Anthropometric, life style and disease management data was collected using prestructured questionnaire. Subjects answered questions concerning personal experiences with hypoglycemia including a history of mild, moderate and severe episodes, and symptoms that are believed to be associated with low blood glucose. Weight was measured (to the nearest 0.5 kg) with the participant standing motionless on a bathroom weighing scale without shoes or any heavy outer garments, and weight equally distributed over each leg. Height was measured(to the nearest 0.1cm) using a standards non-elastic tape measure with the participant standing erect against a wall, without shoes, and the head looking straight. Waist circumference was measured using a standard non-elastic tape measure (to the nearest 0.1cm). The participant was asked to stand with the arms by the sides and to breathe out normally. Standing to the side of the participant, the inferior margin (lowest point) of the last rib and the crest of the ilium (top of the hip bone) will be located and marked with a fine pen. The midpoint between the two was marked and measurement for waist circumference. The hip circumference was measured around the maximum circumference of the hips.

Smoking:<sup>11</sup> an adult who has smoked 100 cigarettes in his or her life time and who currently smokes cigarettes every day or some days and who had quit smoking at the time of interview. Tobacco use:<sup>12</sup> Consumption of any form of tobacco other than smoked in the past 6 months. The type of tobacco consumption considered include oral (tobacco chewed, pan masala, any other form, etc.) and inhaled forms (snuff). Physical activity<sup>13</sup>: A pattern of physical activity is regular if activities are performed most days of the week-5 or more days of the week if moderate-intensity activities (at

least 30 min per day); 3 or more days of the week if vigorous intensity activities (for at least 20 min per session) Alcohol consumption<sup>14</sup>: A person who consumes alcohol on a regular basis (every day) or occasionally (some days).

### 3. Statistical Analysis

Data analysis was done using SPSS version 16. Both descriptive and inferential statistics was used. Mean, standard deviation, student t-test will be used for continuous variables. Chi-square test and Fisher's exact test was used to find association between various factors. Statistical significance was established at a level of  $P < 0.05$ .

### 4. Results

The study of hypoglycemia awareness among 119 type 2 diabetes mellitus patients mean age of males was  $56.23 \pm 12.66$  and females was  $50.64 \pm 9.83$ . Mean duration of disease was  $8.33 \pm 5.27$  in males and  $7.64 \pm 4.33$  in females. Majority of patients were located in urban area (53%). 28% of females were illiterates whereas 11% of males were illiterates. Smoking (32.5%) and alcohol consumption (24%) was more common among males, were as 13% of females were consuming tobacco compared to 6.25% males. There was significant difference in the exercise pattern between males and females. 14% of males did regular exercise (table 1). Among the 119 diabetic patients only 22.6% (27) were aware about hypoglycemic symptoms. Males had better awareness than females (25%). Duration of disease, educational status, sex, and exercise were not associated with hypoglycemic awareness among the study group. Fatigue was the more common neuroglycopenic symptom noted by the 40% (48) of patients. Interestingly 60% of the patients were not aware of their symptoms. Lethargy, confusion was the other common symptoms noticed in both groups. Polyphagia (hunger) 22% was the most common sympathetic symptom among the patients with awareness followed by anxiety (18.5%), palpitation (18.5%) and sweating (18.5%), whereas 24% patients without awareness expressed tremors, followed by palpitations 21.7%, hunger (14.1%), paresthesia (14.1%) and anxiety (13%) and sweating (13%). The symptoms were weekly noticed by patients with awareness than non-aware group and this difference was statistically significant.

### 5. Discussion

The recognition of hypoglycemia is complex, in the present study only 22% study subjects were aware of hypoglycemia. However, subjects without awareness expressed similar number of significant neuroglycopenic and sympathetic symptoms. Most of the study subjects reported weekly hypoglycemia. Therefore, efforts to improve awareness in these subjects should focus on enhancing symptom detection and educating subjects with regard to symptom interpretation. Previous studies have suggested that hypoglycemia unawareness is associated with long disease duration, improved glucose control and defective glucose counter regulation<sup>15, 16, 17</sup>. Clearly there is a need to identify causes of reduced awareness of hypoglycemia and developed intervention strategies to restore awareness without sacrificing metabolic control. Blood glucose awareness training, behavioral intervention designed to assist subjects in recognizing hyperglycemia and hypoglycemic symptoms, has been shown to improve overall blood glucose estimation accuracy without affecting levels of metabolic control<sup>18, 19</sup>. Such an intervention, focused on improving autonomic and neuroglycopenic symptom detection and predicting and preventing hypoglycemia, could be an important adjunct to restoring awareness of hypoglycemia while preserving glucose control.

### 6. Conclusion

Diabetes is a chronic illness that requires continuing medical care and ongoing patient's self-management education, awareness and training to recognize hypoglycemia and to support to prevent acute complications and reduce the risk of long term complications.

**Table 1: Socioeconomic and life style profile of type 2 Diabetic Patients**

Parameters		Male (n= 80)	Female (n=39)	df	t value	p value
Age	Mean $\pm$ SD	56.23 $\pm$ 12.66	50.64 $\pm$ 9.83	117	2.420	0.017**
Duration of Disease	Mean $\pm$ SD	8.33 $\pm$ 5.27	7.64 $\pm$ 4.33	117	0.702	0.484
				df	X <sup>2</sup>	p value
Locality	Urban	40	23	1	0.848	0.357
	Rural	40	16			
Education	Illiterate	9	11	3	8.194	0.04**
	Primary School	20	13			
	High School	32	9			
	Degree and Professional	19	6			
Income	<5000	30	29	3	14.97	0.0018**
	5000-10000	28	5			
	10000-20000	8	3			
	>20000	14	2			
Smoking	Yes	26	0	1	16.21	0.0001**
	No	54	39			
Alcohol	Yes	19	0	1	11.02	0.001**
	No	61	39			
Tobacco	Yes	5	5	1	1.47	0.225
	No	75	34			
Exercise	Regular	11	0	2	7.48	0.024**
	Sporadic	35	15			
	Never	34	24			

\*\* P value significant at  $<0.05$

**Table 2: Awareness about Hypoglycemia**

Parameters		Awareness		p value
		Yes (27)	No (92)	
Age		58.22 ±11.06	53.27 ± 12.16	0.060
Duration		7.74 ± 4.30	8.21 ± 5.17	0.052
Sex	Male	20	60	0.389
	Female	7	32	
Education	Illiterate	3	17	0.196
	Primary School	8	25	
	High School	13	28	
	Degree and Professional	3	22	
Exercise	Regular	3	8	0.333
	Sporadic	8	42	
	Never	16	42	
Neuroglycopenic symptoms	Confusion	6	30	0.343
	Fatigue	11	37	
	Lethargy	7	22	
	Loss of consciousness	3	3	
Sympathetic symptoms	Anxiety	5	12	0.646
	Hunger	6	13	
	Palpitation	5	20	
	Paresthesia	3	12	
	Sweating	5	13	
	Tremors	3	22	
How often Symptoms	Monthly	8	48	0.039**
	Weekly	19	44	
Source	Doctors	5		
	Friends	12		
	Sisters /Nurse	9		
	TV/Newspaper	1		

\*\* P value significant at <0.05

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