Assessment of knowledge and concern of hypoglycemia among rural diabetes population

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ABSTRACT

Diabeties mellitus now a days is a very common disease in developing countries like India. It is considered as a public health problem globally. International Diabetes Federation states that around 382 million diabetic patients are present worldwide. And it states that most of them belong to low and middle-income countries. Diabetes mellitus is a metabolic disorder characterized by elevated blood glucose levels and disturbances in carbohydrates, fats, and protein metabolism and associated with metabolic complications that can subsequently lead to premature death. The term hypoglycemia means "under-sweet blood." It occurs when the blood glucose falls to <40–50 mg/dl, which may endanger the patient's life as well as other person's lives. It can be caused by too much insulin intake or oral hypoglycemic agents, too little food, or excessive physical activity. Diabetes medications, including insulin and sulfonylureas, are among the most common causes of hypoglycemia in diabetic subjects. We conducted this study to elucidate how much of our rural sector population was aware of hypoglycemia and medication adherence. It is a Prospective, observational study using a validated questionnaire. Our study depicted women and people belonging to low socio-economic status had to be taught individually about the chronicity of diabetes, significant adherence to medication, and especially counselling periodically. We must educate our population in their native language about imminent symptoms of hypoglycemia and way of prevention. Trained diabetes counsellors are also important in our country as thus hold millions of diabetes population, and it should be made available at primary health care itself.

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INTRODUCTION

People with diabetes mellitus nowadays is a widespread disease in developing countries like India. It is considered as a public health problem globally. International Diabetes Federation states that around 382 million diabetic patients are present worldwide. And it states that most of them belong to low and middle-income countries (Unwin et al., 2011). Diabetic Mellitus is an endocrine disorder featuring hyperglycemia due to insulin deficiency or resistance and has a negative influence over carbohydrate, protein and fat metabolism. One

of the most important complications of diabetic patients is hypoglycemia. Hypoglycemia is stated as plasma glucose level < 70 mg/dL (3.9 mmol/L. A decrease in the plasma glucose concentration normally evokes a characteristic hierarchy of responses to avoid the development of hypoglycemia. Initially, at approximately 70 mg/dl, there is an increase in the secretion of counterregulatory hormones [glucagon, epinephrine, GH, and cortisol (ACTH)] and a concomitant increase in the discharge of autonomic nervous system neurotransmitters (norepinephrine and acetylcholine). Suppose these initial responses do not prevent a further decrease in the plasma glucose concentration, by the time the plasma glucose concentration reaches 60 mg/dl. In that case, the magnitude of the released catecholamines and acetylcholine is such that autonomic symptoms (sweating, tremor, hunger, anxiety, and palpitations) occur. Most of the studies done on awareness of people with diabetes state that rural diabetic population lack the awareness of diabetic Mellitus and its complication. So this study is to assess the current concern regarding identifying hypoglycemia and its effects among rural diabetes population and to educate the population to identify the one of the common complication hypoglycemia and thereby preventing it among diabetes population, particularly in a rural setting. Hence this study is undertaken to educate them in identifying common side effects of diabetes treatment, hypoglycemia which is of serious concern in the case of non-recognization and treatment.

Methodology

It is a Prospective, observational study using a validated questionnaire conducted in General Medicine department which is a tertiary care teaching hospital. The study was conducted for two months as per ICMR-STS instructions. All diabetic patients aged above 18 years both male and female on the rural sector and ready to give consent and participate in the study were included in the study. All juvenile diabetic population and all patients admitted diabetes-related complications were excluded from the study.

After obtaining permission from the Institutional Ethics Committee, patients receiving anti-diabetic treatment were invited to take part in our study. The special registry was maintained for the rural setting population; however, study education and counselling were provided to all diabetic patients. The procedure of data collection consists of answering a set of questions, which was put forth by the investigator and patient's answers for the same were noted. Data was collected using a validated questionnaire which included Demographic details (name, age, sex, education, occupation, residence, income, marital status) and history related to their diabetes was noted from the patients. At the end information regarding the significance of adhering to medications was explained and symptoms for recognizing hypoglycemia and simple ways to prevent this was educated to all the diabetic patients.

RESULTS AND DISCUSSION

The sample size was calculated using simple non-probability sampling. Hypothesis Testing for Single Proportion, Population Proportion Po = .275, Sample Proportion Pa = .20, Power (%) = 80, Alpha Error (%) = 5, Sided = 2 and sample size was arrived as n=161.

The study population was divided into three age groups 18-40 years, 41-60 years and above 60 years. Out of 161, 32(19.9%) belongs to 18-40years, 104(64.6%) belongs to 41-60 years, and 25(15.5%) were above 60 years. Out of 161, 93(57.7%) were males, and 68 (42.3%) were females. Out of the study population, the proportion of male and female was 1.36:1 (Table 1). Mean and standard deviation of the level of knowledge of hypoglycemia are in Table 2. Tables 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 consist of the significance of various age group and gender concerning questions asked in the questionnaire. All of them were pertaining to the rural sector as per standard definition. Statistical significance with respect to gender, education and occupation (p<0.05) was obtained concerning knowledge of hypoglycemia.

This study is first of its kind to report on knowledge of hypoglycemia among rural diabetic population. The "rural sector" means any place as per which meets the following criteria, A population of less than 5,000 or Density of population less than 400 per sq km an or More than "25 per cent of the working population" is engaged in agricultural pursuits. Hypoglycemia is stated as plasma glucose level < 70 mg/dL (3.9 mmol/L). It can be a result of not taking food following anti-diabetic medications. It is one of the most important and common complications of both oral and parental anti-diabetic drug. Since the brain is permanently dependent on glucose, strong counter-regulatory mechanisms exist to quickly increase glucose levels to protect the human body from the negative consequences of hypoglycemia. The common features of hypoglycemia are generally classified into neuroglycopenic and autonomic symptoms. Neuroglycopenic features are loss of consciousness, fatigue, seizure, confusion and death. In comparison, auto-

Table 1: Descriptive analysis of age, gender

Parameters	Summary
Age Group	
18-40 Years	32(19.9%)
41-60 Years	104(64.6%)
Above 60 Years	25(15.5%)
Gender	
Male	93 (57.7%)
Female	68 (42.3%)

Table 2: Mean and standard deviation of level of knowledge of hypoglycemia

Questions	Mean±SD
Heard of term Hypoglycemia	1.58±0.03
Signs and symptoms of hypoglycemia	1.61±0.03
Experienced the hypoglycemia in your life	1.08±0.02
Unresponsive diabetes population should be brought to hospital immediately	1.37±0.03
Know first aid remedy	1.31±0.03
Deleterious adverse effects of hypoglycemia	1.29±0.03
Drug names used daily for your diabetes	1.72±0.03
Skipping meals on antidiabetic medication	1.22±0.03
Not to do over-exertion on taking antidiabetic medicines	1.69±0.03
Ever attended special diabetic education program	1.86±0.02
Do you self monitor your sugar level	1.91±0.02
Ever attended special diabetic counseling in your hospital regarding diabetic care?	1.82±0.02

Table 3: Responses Obtained From The Participants

Question1: Have you been advised about of the term 'Hypoglycemia' [Low blood sugar level]?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	38 (40.86%)	55 (59.14%)	93(57.7%)	0.0516	0.820274
Female	29 (42.65%)	39 (57.35%)	68(42.3%)		
Age Group					
18-40 Years	7 (21.87%)	25(78.13%)	32(19.9%)	9.0928	0.010605
41-60 Years	52 (50%)	52(50%)	104(64.6%)		
Above 60 Years	8(32%)	17(68%)	25(15.5%)		

nomic features are sweating, palpitation, tremors, anxiety, hunger and paresthesia. The simple non-medical measure to control hypoglycemia is to have some chocolates or sugar with them wherever they go.

From the study, it is well known that knowledge and concern among hypoglycemia are statistically and clinically less when compared to people with dia-betes from the semi-urban and urban population. This attributes that education and occupation of rural diabetic population, which indirectly influence medication adherence and frequent contacts with the physician as it is a chronic metabolic disorder. In our study, rural diabetic population lack knowl-edge on diabetes mellitus similar to study done by M. Deepa et al. (Mohan *et al.*, 2014). Every per-son with diabetes in our country should undoubt-

Table 4: Responses Obtained From The Participants

Question 2: Do you know common signs and symptoms of hypoglycemia?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	34 (36.55%)	59(63.45%)	93(57.7%)	0.3536.	0.552055.
Female	28 (41.17%)	40(58.83%)	68(42.3%)		
Age Group					
18-40 Years	7(21.87%)	25(78.13%)	32(19.9%)	6.1481.	0.046233.
41-60 Years	47(45.2%)	57(54.8%)	104(64.6%)		
Above 60 Years	8(32%)	17(68%)	25(15.5%)		

Table 5: Responses Obtained From The Participants

Question3: Have you ever experienced the hypoglycemia in your life?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	88 (94.62%)	5 (5.38%)	93 (57.7%)	3.0556.	0.080458.
Female	59 (86.76%)	9 (13.24%)	68 (42.3%)		
Age Group					
18-40 Years	30(93.75%)	2(6.25%)	32 (19.9%)	1.8003.	0.406516.
41-60 Years	92(88.46%)	12(11.54%)	104 (64.6%)		
Above 60 Years	24(96%)	1(4%)	25 (15.5%)		

Table 6: Responses Obtained From The Participants

Question4: Do you know unresponsive diabetes population should be brought to hospital immediately?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	61(65.59%)	32(34.41%)	93(57.7%)	1.1329.	0.287164.
Female	39(57.35%)	29(42.65%)	68(42.3%)		
Age Group					
18-40 Years	9(28.13%)	23(71.87%)	32(19.9%)	21.9896.	0.000017.
41-60 Years	70(67.30%)	34(32.7%)	104(64.6%)		
Above 60 Years	21(84%)	4(16%)	25(15.5%)		

Table 7: Responses Obtained From The Participants

Question5: Do you know first aid remedy like carrying simple sugar items or biscuits etc with you and during your travel to prevent hypoglycemia?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	68(73.11%)	25(26.89%)	93(57.7%)	2.3395.	0.126131
Female	42(61.76%)	26(38.24%)	68(42.3%)		
Age Group					
18-40 Years	15(46.88%)	17(53.12%)	32(19.9%)	11.442.	0.003276
41-60 Years	73(70.20%)	31(29.80%)	104(64.6%)		
Above 60 Years	22(88%)	3(12%)	25(15.5%)		

Table 8: Responses Obtained From The Participants

Question6: Do you know low blood sugar level must be avoided as it has more deleterious adverse effects?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	65(69.89%)	28(30.11%)	93(57.7%)	0.0892.	0.765221
Female	49(72.05%)	19(27.95%)	68(42.3%)		
Age Group					
18-40 Years	12(37.5%)	20(62.5%)	32(19.9%)	25.0372.	< 0.00001.
41-60 Years	77(74.03%)	27(25.97%)	104(64.6%)		
Above 60 Years	24(96%)	1(4%)	25(15.5%)		

Table 9: Responses Obtained From The Participants

Question7: Do you know your drug names used daily for your diabetes?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	16(17.20%)	77(82.80%)	93(57.7%)	11.3656.	0.000748.
Female	28(41.17%)	40(58.83%)	68(42.3%)		
Age Group					
18-40 Years	44(12.5%)	28(87.5%)	32(19.9%)	4.5634.	0.10211.
41-60 Years	33(31.73%)	71(68.27%)	104(64.6%)		
Above 60 Years	7(28%)	18(72%)	25(15.5%)		

Table 10: Responses Obtained From The Participants

Question8: Do you know not to skip your meals when you are taking antidiabetic medicines ?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	73(78.49%)	20(21.51%)	93(57.7%)	0.0927.	0.760783.
Female	52(76.47%)	16(23.53%)	68(42.3%)		
Age Group					
18-40 Years	20(62.5%)	12(37.5%)	32(19.9%)	8.9003.	0.011677.
41-60 Years	80(76.92%)	24(23.08%)	104(64.6%)		
Above 60 Years	24(96%)	1(4%)	25(15.5%)		

Table 11: Responses Obtained From The Participants

Question9: Do you know, not to do over-exertion when you are taking antidiabetic medicines?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	26(27.95%)	67(72.05%)	93(57.7%)	0.6385.	0.424251.
Female	23(33.82%)	45(66.18%)	68 (42.3%)		
Age Group					
18-40 Years	7(21.88%)	25(78.12%)	32(19.9%)	1.6864.	0.430323.
41-60 Years	35(33.65%)	69(66.35%)	104(64.6%)		
Above 60 Years	7(28%)	18(72%)	25(15.5%)		

Table 12: Responses Obtained From The Participants

Question10: Have you ever attended special diabetic education regarding possibility of hypoglycemia in your hospital?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	08(8.60%)	85(91.40%)	93(57.7%)	3.8294.	0.050361.
Female	13(19.11%)	55(80.89%)	68(42.3%)		
Age Group					
18-40 Years	3(9.37%)	29(90.63%)	32(19.9%)	1.4429.	0.486043
41-60 Years	16(15.38%)	88(84.62%)	104(64.6%)		
Above 60 Years	2(8%)	23(92%)	25(15.5%)		

Table 13: Responses Obtained From The Participants

Question11: Have you ever attended special diabetic education to self monitor your sugar level to maintain optimized blood level throughout the day?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	05(5.37%)	88(94.63%)	93(57.7%)	3.0556.	0.080458.
Female	09(13.23%)	59(86.77%)	68(42.3%)		
Age Group					
18-40 Years	1(3.12%)	31(96.88%)	32(19.9%)	1.7296.	0.42114.
41-60 Years	11(10.58%)	93(89.42%)	104(64.6%)		
Above 60 Years	2(8%)	23(92%)	25(15.5%)		

Table 14: Responses Obtained From The Participants

Question12: In general, have you ever attended special diabetic counseling in your hospital regarding diabetic care?					
Gender	Yes	No	Total	Chi Square Value	P Value
Male	13(13.97%)	80(86.03%)	93(57.7%)	1.7851	0.181523.
Female	15(22.05%)	53(77.95%)	68(42.3%)		
Age Group					
18-40 Years	4(12.5%)	28(87.5%)	32(19.9%)	3.0924.	0.213053.
41-60 Years	22(21.15%)	82(78.85%)	104(64.6%)		
Above 60 Years	2(8%)	23(92%)	25(15.5%)		

edly be taught of hypoglycemia; its provocative and preventive factors as low sugar level can be deleterious (Fhärm *et al.*, 2009; Svenningsson *et al.*, 2011; Beverly *et al.*, 2011). One the best solution is the availability of diabetic counselling at the primary care level itself. Trained counsellors are proven to be effective in training diabetic population regarding medication adherence and self-care approach to hypoglycemia.

Self blood glucose monitoring should be more cost-effective and can be taught at every sub-centre level, which can be easily practised. Every patient must be taught to self estimate blood periodically and in cases of emergency to prevent diabetes-related comorbidity (Paterson *et al.*, 1998, 2001).All the patient who took part in this study were taught of symptoms and imminent management of hypoglycemia. All were taught of the importance of routine blood glucose monitoring and the importance of Hba1C. All were insisted on a daily exercise like walking, running, yoga etc. and asked to adhere to the perfect diet plan, as it reduces the complications of diabetes mellitus and leads them to have a healthier life.

CONCLUSIONS

Hypoglycemia is one of the critical complications in diabetic patients. Every physician has to teach

their patients regarding identifications of symptoms of hypoglycemia and simple non-medical measures to tackle it. Nevertheless trained diabetes counsellors and self-blood glucose monitoring is pivotal in management of hypoglycemia. We must educate our population in their native language about imminent symptoms of hypoglycemia and ways to prevent it.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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