ORIGINAL ARTICLE

STUDY OF HYPOGLYCEMIA IN ELDERLY DIABETES MELLITUS PATIENTS

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ABSTRACT

Diabetes mellitus is threats to world population. Elderly diabetic patients with hypoglycemia admitted in Raja Muthiah Medical College Chidambaram. Glimipride was the most common sulphonylurea in use. More than 30% of the patients were asymptomatic during the hypoglycemic episode.

Keywords: Diabetes mellitus, Elderly diabetic patients

1.INTRODUCTION

One of the modern day threats to world population is diabetes mellitus. Genetics, environment, modern day food habits and sedentary life style, all these put the people of modern world at an increased risk for diabetes mellitus. Since diabetes has became a serious threat, people started treating Diabetes in a rigorous manner which lead to occurrence of more hypoglycemia.

Objectives

To study the risk factors, incidence and outcome of hypoglycemia in elderly Diabetes mellitus patients.
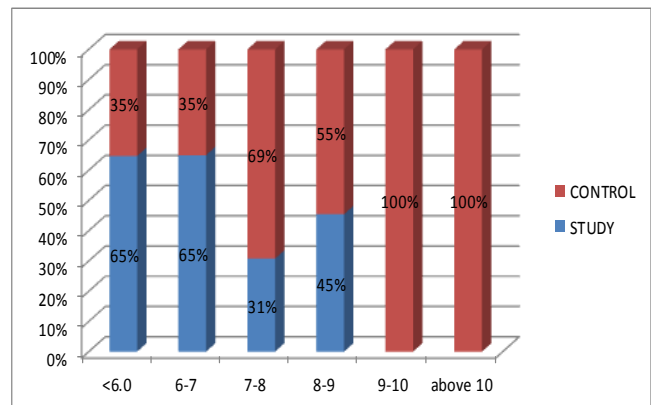
2.METHODS

Elderly diabetic patients with hypoglycemia, admitted to the medical wards of RAJA MUTHIAH MEDICAL COLLEGE HOSPITAL, CHIDAMBARAM,(2013-2015) were studied with the above objectives. Age and sex matched diabetic patients who did not develop hypoglycemia were taken as controls.

3.RESULTS

The mean age of the patients was 69.22 years with most patients being in young -old category. There were 21 females and 29 males in this study. Nearly 96% of patients were staying with their relatives or spouses and 10 patients had a Katz score for independence in activities of daily living of 0. 22 patients were on oral hypoglycemic agents and 28 were on insulin. Glimipride was the most common sulphonylurea in use. More than 30% of the patients were asymptomatic during the hypoglycemic episode. In symptomatic patients, neuroglycopenic symptoms were more common than

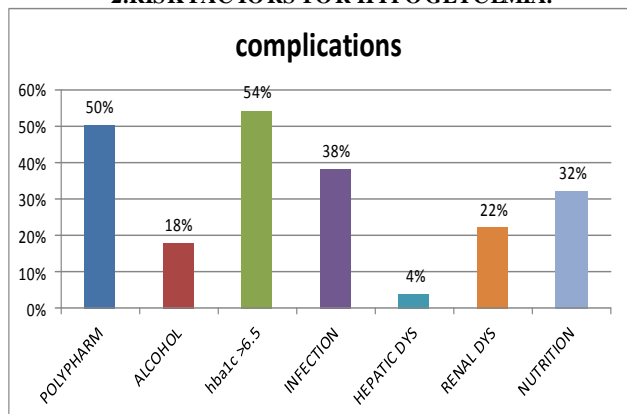*Corresponding author:Dr. SJ.Santhosh, Department of Medicine, Raja Muthiah Medical College Chidambaram*

A.HbA1C OF STUDY AND CONTROL GROUP .

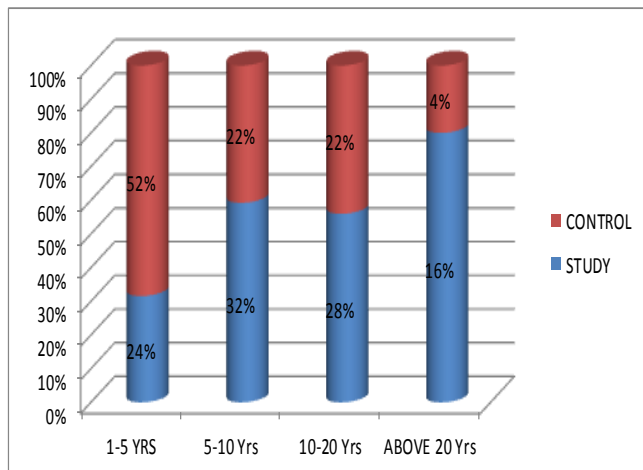**Group Statistics**

GROUP		N	Mean	Std. Deviation	Std. Error Mean
HbA1C	STUDY	50	6.6798	.82023	.11600
	CONTROL	50	7.5420	1.23572	.17476

P<0.001*

2.RISK FACTORS FOR HYPOGLYCEMIA.

3.DURATION OD DM IN STUDY AND CONTROL GROUPS.

The mean duration of diabetes mellitus in patients who were asymptomatic for hypoglycemia was longer (15.6 years) as compared to symptomatic patients (7.1 years). The risk factors for the development of hypoglycemia which were identified in our patients were infection, renal failure, hepatic dysfunction, poly pharmacy, recent change in dosage of anti-diabetic medication, nutritional discordance, alcohol, drugs, HbA1c<6.5 and recent hospitalization..

The study patients were compared with age and sex matched diabetic patients without hypoglycemia. Lower functional status, HbA1c and BMI were found low in the study patients as compared to the controls. As compared to the controls, mean duration of diabetes was longer in the study patients. By univariate analysis poor functional status, infection and renal failure were predictors of hypoglycemia. Multivariate logistic regression showed that only functional status and infection were associated with a higher risk of hypoglycemia. Nearly 82% of study patients were treated with IV dextrose injection and for others only change in dose of insulin was done. The outcome was good and all study patients recovered fully without sequale.

3.DISCUSSION.

This is a case control study containing 50 study patients and 50 age and sex matched control patients. Main aim of study is to find the incidence, risk factors, symptoms and outcome of hypoglycemia in elderly diabetic patients.

DEMOGRAPHIC DETAILES OF THE STUDY.

Patients were divided into three groups according to age as 1.60-70, 2. 70-80, 3 .> 80.

In our study more patients with hypoglycemia were in 60-70 age groups. This could be due to life expectancy of Indians, which is 62.6 for males and 64.2 for females[1, 4.]

Most of the studies till date shown that women's are more prone for hypoglycemia than males, but in our study there is a slight male predominance.

Since RAJA MUTHIAH MEDICAL COLLEGE is in rural area, most of our patients were from rural area.

Most of the patients had at least primary level of education, while a very few patients had secondary or college level. This can be attributed to the geographical location of our hospital.

Living alone in elderly age group will lead to lot of difficulties like lack of proper food, more work load, improper intake of prescribed medication, and also there won't be anyone to notice the early symptoms of hypoglycemia. But this cannot be statistically proved in this study because nearly 96% of our study patients were living with their relatives.

SYMPTOMS OF HYPOGLYCEMIA.

In our study nearly 70% of study patients presented with symptoms of hypoglycemia with neuro-glycopenia being the most predominant symptom. Only 30% of study patients presented to hospital in hypoglycemia without any symptoms.

In a study done in Singapore out of 45 episodes of hypoglycemia, 40 had symptoms with neuro-glycopenia being the predominant symptom. This could be attributed to impaired cognition, reduced autonomic response and reduced adrenergic sensitivity in old age leading to hypoglycemic unawareness.

DURATION OF DIABETES AND HYPOGLYCEMIC UNAWARENESS

In UKPDS[2] around 50% of patients who had no symptoms of hypoglycemia had longer duration of DM(nearly 25 years).In our study, patients who did not develop any symptoms had longer duration of DM nearly 15.6 years when compared to patients with symptoms(7.1 years), and this has been statistically proved with a p value(0.012).

HYPOGLYCEMIC EPISODES.

Hypoglycemia is divided into mild and severe form. In mild hypoglycemia patients will have initial symptoms of hypoglycemia and they get relieved by taking any oral supplements. But in severe form patients will have altered mental status or even unconsciousness.[8]

The mean glucose level of study patients during hypoglycemic episodes was 42.25 mg/dl .nearly 82% of patients received parentral IV dextrose injection and others recovered with just change of dose.

The time at which hypoglycemia develops in a day depends on many factors like pharmacokinetics of the drug, diet patients are taking and time between adjacent meals. Out of 50 study patients 52% patients developed nocturnal hypoglycemia and 30% patients developed hypoglycemia in evening time.

Previous hypoglycemic episode is a strong predictor of recurrence of hypoglycemia.

RISK FACTORS FOR HYPOGLYCEMIA

Risk factors for development of hypoglycemia in elderly patients include low bmi,HbA1C <6.5,recent increase in dose of insulin, infection, polypharmacy, renal dysfunction.[8,10,12,13.]All these risk factors were found in our study patients. Most of the study patients had more than one precipitating factor for development of hypoglycemia.

Nearly 36% of patient developed hypoglycemia due to recent change in dose of insulin. These patients develop hypoglycemia due to improper intake of nutrition after the insulin doses.

Few studies say that taking of drugs like ACE inhibitors and beta blockers leads to increased development of hypoglycemia. But in our study group only 6% of patients were taking these drugs, so it cannot be stratified statistically.

Underlying infection was found to be one of the major risk factor for development of hypoglycemia. In our study 38% of study patients had infection. Nutritional discordance due to poor appetite, nausea and vomiting is added cause along with infection.

Most of the anti diabetic medications are metabolized and excreted in kidney. In a patient with renal impairment, these drugs would not be eliminated properly leading to prolonged action of these drugs. This will cause hypoglycemia unless necessary dose adjustment being made.[11] In our study 22% of patients had renal dysfunction and also it has been proved statistically that renal dysfunction causes hypoglycemia.

Poor functional status will lead to difficulty in carrying out their daily living activity like eating. These kinds of patients are more prone for development of hypoglycemia.

OUTCOME OF HYPOGLYCEMIA IN STUDY PATIENTS

Major morbidity in hypoglycemia patients include neurological deficit, stroke, myocardial infarction, ventricular arrhythmias and falls causing fractures.[3,5,6,7] But there was no significant morbidity in our study. All the fifty study patients were treated appropriately and recovered completely without any sequale.

COMPARISION OF STUDY AND CONTROL PATIENTS.

By comparing the study and control patients, on various aspects, few risk factors for development of hypoglycemia have been found out.

Functional status of patients was calculated using KATZ score. A score of zero indicates poor functional status, and the patient has to be dependent on their relatives for doing their daily activities. By comparison poor functional status has been found to be a risk factor for development of hypoglycemia.

Recent hospitalization was also found to be one of the risk factor hypoglycemia. This could be attributed to low nutritional intake, change in dose of the drug, introduction of new drugs causing drug interactions.[4]

BMI also has been compared between study and control patients. Study patients had a lower BMI when compared to control patients. This is similar to other studies in litreture.[8]

DURATION OF DIABETES AND HYPOGLYCEMIA.

Comparatively study patients had longer duration of diabetes than the control patients.[15,8] This is due to decreased counter regulatory medications due to autonomic dysfunction in longer duration of DM.

ANTI DIABETIC MEDICATION.

Patients in the study and control group were taking OHA's, insulin or combination of OHA's and insulin.

There is no significant difference in the mode of treatment and development of hypoglycemia. But comparatively insulin's and sulphonylureas were more among the study group and use of metformin were more in the control group. Among the sulphonylureas, glimipride was the most common drug taken by the study patients. In elderly with renal dysfunction and infection even metformin alone can cause hypoglycemia[14].

COMPARISION OF HbA1C.

HbA1C was lower in the study group when compared to control group. This has been statistically proved that lower levels increase the risk of hypoglycemia.[8,11,12]

POLYPHARMACY AMONG STUDY AND CONTROL PATIENTS.

In many literatures it has been quoted that poly pharmacy is one of the strong predictor for development of hypoglycemia.[4,10] In our study, comparatively the use of polypharmacy was slightly higher in study group but the difference did not reach statistical significance.

ALCOHOL AND HYPOGLYCEMIA.

Alcohol is known to mask the response of hypoglycemia in a patient.[9] But in this study the number of patients consuming alcohol were very negligible and also more or less equal between study and control group.

SMBG IN STUDY AND CONTROL GROUPS.

SMBG helps in finding out low sugar levels at an early stage leading to decrease in number of hypoglycemic episodes. SMBG was comparatively more in control group than the study group. Also has a statistical significance<0.005.

By comparing the various risk factors between study and control patients it was found that infection, renal failure, change in dose of medication, low HbA1C and nutritional discordance has proved to be major risk factor in precipitating hypoglycemia in elderly diabetic patients.

LIMITATIONS OF STUDY.

This ia a hospital based study. Many patients and relatives who are aware of hypoglycemic symptoms take corrective measures at home even without coming to hospital. Since it is easy treat and patient get complete recovery, most of the patients are sent home from emergency department without getting admitted. Having in mind the above points, this study does not completely reflect the entire patients who are going for hypoglycemia. These are the few shortcomings of the study.

CONCLUSIONS

Fifty diabetic patients with hypoglycemia & 50 age & sex matched controls were studied for risk factors for hypoglycemia, symptoms of hypoglycemia & the outcome.
Sixty four percent were in the young old category (60 – 70 years), thirty two percent were in the old- old category (70-80) and four percent were in the oldest old category (> 80).

Sixty eight percent of the patients presented to the hospital with hypoglycemia whereas thirty two percent of the patients developed hypoglycemia in the hospital during their admission for an inter-current problem.

The mean duration of diabetes was longer in the study group (11.98years) than in the control group (7.8years), though the difference did not reach statistical significance (p = 0.02).
The commonest risk factors for developing hypoglycemia in our study patients was infection (38%), nutritional discordance (32%), polypharmacy (56%), recent change in the dose of medications (36%) and $HbA_{1c} < 6.5$ (50%).

BMI were significantly lower in the study group than in the control group (p = 0.001).

Asymptomatic hypoglycemia was common in the elderly diabetics. In symptomatic patients, neuro-glycopenic symptoms were more commonly encountered than autonomic symptoms.

The mean duration of diabetes mellitus was longer in the group of study patients with no symptoms of hypoglycemia as compared to patients who were symptomatic for hypoglycemia.

Infection was found to be a significant precipitating factor for hypoglycemia (p <0.005).

Poor functional status was another significant risk factor for hypoglycemia (p = 0.014) in our patients.

Renal failure was found to be a significant precipitating factor for hypoglycemia (p <0.05.

Hypoglycemia was found in patients taking OHA alone, insulin alone and both OHA and insulin. The mode of treatment was not a significant risk factor for hypoglycemia. Eighty two percent of the patients were treated with intravenous dextrose. All our patients recovered without any sequelae.

5.REFERENCES.

1. Situational analysis of elderly in India, June 2011,government of India.
2. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet 1998;352: 837–53.
3. Cryer PE. Current concepts: Diverse causes of hypoglycemia-associated autonomic failure in diabetes. N Engl J Med2004;350: 2272–2279.
4. Shorr RI, RayWA, Daugherty JR, Griffin MR.Incidence and Risk Factors for Serious Hypoglycemia in Older Persons Using Insulin or Sulfonylureas..Arch Intern Med 1997;157(15):1681-1686.
5. Teo SK, Ee CH. Hypoglycaemia in the elderly. Singapore Med J. 1997 Oct;38 (10):432-4.
6. Ben-Ami H, Nagachandran P, MendelsonA, Edoute Y. Drug-induced hypoglycemic coma in 102 diabetic patients.Arch Intern Med 1999;159:281–284.
7. Zammit NN, Frier BM .Hypoglycemia in Type 2 Diabetes Pathophysiology, frequency, and effects of different treatment modalities. Diabetes Care dec 2005; volume 28 (no 12):2948 -2961.
8. Miller CD, Philips LS, Ziemer DC, Gallina DL, Cook CB et al .Hypoglycemia in patients with type 2 diabetes mellitus. Arch Intern Med 2001; 161:1653–1659.
9. Avogaro A, Beltramello P, Gnudi L, et al. Alcohol intake impairs glucose counterregulation during acute insulin-induced hypoglycemia in IDDM patients. Diabetes. 1993;42:1626-1634.
10. Chelliah A.Hypoglycaemia in elderly patients with diabetes mellitus: causes and strategies for prevention.Drugs Aging 01-JAN-2004; 21(8): 511-30
11. Chan JY, Leyk M, Frier BM, et al. Relationship between HbA1c and hypoglycaemia in patients with type 2 diabetes treated with different insulin regimens in combination with metformin Diabetes Metab Res Rev 2009 Mar; 25(3) :224-31.
12. Sotiropoulos, E.A. Skliros, C. Tountas, U. Apostolou, T.A. Peppas et al. Risk factors for severe hypoglycaemia in type 2 diabetic patients admitted to hospital in Piraeus, Greece Eastern Mediterranean Health Journal 2005 ;Vol. 11, No. 3 .
13. Maynard GA, Huynh MP,Renvall M. Iatrogenic Inpatient Hypoglycemia: Risk Factors,Treatment, and Prevention. Diabetes Spectrum 2008 ;Volume 21(Number 4) : 241-247
14. Garber AJ, Duncan TG, Goodman AM, Mills DJ, Rohlf JL. Efficacy of metformin in type II diabetes: results of a double-blind, placebo-controlled, dose-response trial. Am J Med 1997 Dec;103(6):491-7.
15. Stahl M, Berger W. Higher incidence of severe hypoglycaemia leading to hospital admission in type 2 diabetic patients treated with long-acting versus shortacting sulphonylureas. Diabet Med 1999; 16:586 –590

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