

Original Research Article

Study of hypoglycemia in elderly diabetes mellitus

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Abstract

Background: The etiology of diabetes in India is multifactorial and includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration, and lifestyle changes. It is a chronic disease, and as it prolongs it has many serious effects on multiple organs of the body. Keeping a view of the above-said problem, there arises a need for rigorous control of diabetes mellitus. However, rigorous control of diabetes leads to more incidence of hypoglycemia in elderly diabetic patients. Hypoglycemia has serious complications leading to various morbidity and mortality.

Aim and objective: To study the risk factors associated with the development of hypoglycemia in elderly diabetic patients, to study about the symptoms occurring during the hypoglycemic episodes.

Materials and methods: The study included 100 patients: Group –A 50 diabetics and Group B controls. Age and sex-matched diabetic patients >60 years admitted during the same period in RMMCH. Details of the hypoglycemic episode (symptoms, severity, glucose level, risk factors identified, treatment and outcome), comorbidities, polypharmacy, alcohol use and assessment of functional status Assessment of the functional status was done using Katz score.

Results: Functional status of patients were assessed with KATZ index only 10 out of 50 study patients had poor (Katz score=0) functional status. 52% patients had their episodes during night time. 34 patients (68%) had come to the hospital with hypoglycemia and the rest of the patients developed hypoglycemia in-hospital stay. 70% of patients had symptoms and 30% had no symptoms. Neuroglycopenia was predominant in most patients.

Conclusion: Asymptomatic hypoglycemia was common in the elderly diabetics. In symptomatic patients, neuroglycopenic 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.

Key words

Diabetes mellitus, Hypoglycemia, Katz score, Alcoholics.

Introduction

Demographic aging is a global phenomenon. The world's population is aging. By 2025, the world's population is expected to include more than 830 million people above the age of 65 years with the highest percentage of the population in the developed countries, but the absolute number will be higher in developing countries [1]. Recently compiled data show that approximately 150 million people have diabetes mellitus worldwide and that this number may well double by the year 2025. Much of this increase will occur in developing countries and will be due to population growth, aging, unhealthy diets, obesity and sedentary lifestyles [2]. Hypoglycemia is recognized to be a major limitation in achieving good control in type 1 diabetes and in many with type 2 diabetes and is sometimes fatal. It also impairs defenses against subsequent, hypoglycemia [3]. Furthermore, the barrier of hypoglycemia precludes maintenance of euglycemia over a lifetime of diabetes; thus, the full realization of the benefits of glycemic control is rarely achieved. More recent definitions have been provided by the American diabetic association and the Canadian diabetic association. These groups have attempted to define the clinical severity of hypoglycemia, classify the event according to the presence or absence of a plasma glucose test and identify a threshold level for plasma glucose at which hypoglycemia is diagnosed [4]. Each group, has defined a different level for this threshold, ranging from < 3.9 mmol/l down to < 3.0 mmol/l. This lack of consensus makes it difficult to compare studies or quantify the frequency of hypoglycemia in Type 2 diabetes [5]. The threat and incidence of iatrogenic hypoglycemia are increased as one attempts to achieve euglycemia as recommended by current treatment guidelines. These recommendations are based on results

from two landmark studies, the Diabetes Control and Complications Trial (DCCT) and U.K. Prospective Diabetes Study (UKPDS), which demonstrated the benefits of intensive glycemic control in type 1 and type 2 diabetes, respectively [6]. The Diabetes Control and Complications Trial (DCCT), demonstrated that good metabolic control, resulting from intensive insulin therapy, reduced the risk of progression or development of retinopathy, nephropathy, and neuropathy in type 1 diabetes. The United Kingdom Prospective Diabetes Study (UKPDS) showed that intensive glycemic control in type 2 diabetes significantly reduced the risk of development and deterioration of microvascular complications [7].

Materials and methods

The study included 100 patients: Group –A 50 diabetics and Group B controls. Age and sex-matched diabetic patients >60 years admitted during the same period in RMMCH. Details of the hypoglycemic episode (symptoms, severity, glucose level, risk factors identified, treatment and outcome), comorbidities, polypharmacy, alcohol use and assessment of functional status. Assessment of the functional status was done using Katz score. Statistical analysis was conducted using SPSS package. Unpaired 2 tailed t-tests were used to compare means between study and control groups and chi-square analysis to compare frequency of events between groups.

Results

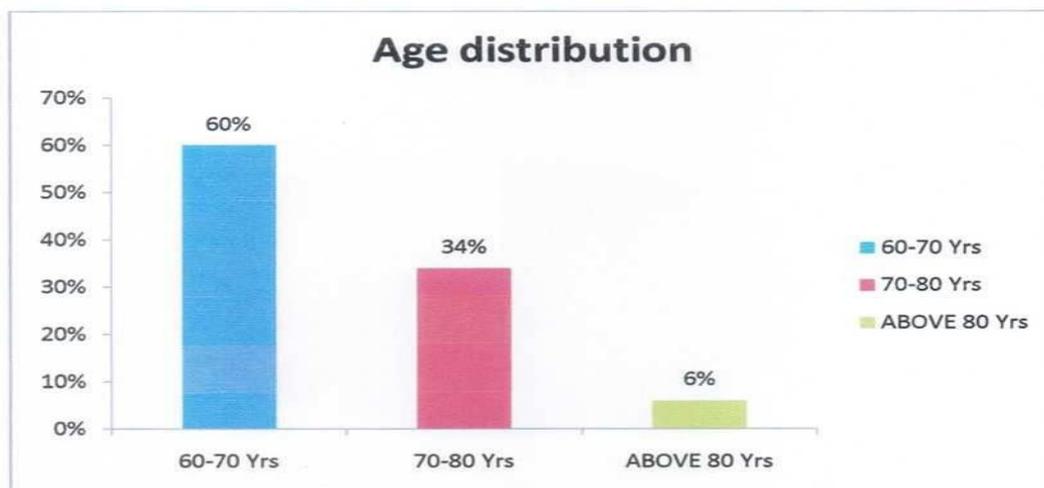
Fifty diabetic patients diagnosed to have hypoglycemia and 50 age and sex matched control diabetic patients without hypoglycemia was studied. Study patients include both patients admitted for a hypoglycemic episode as well as those that developed hypoglycemia after

admission for an intercurrent problem.

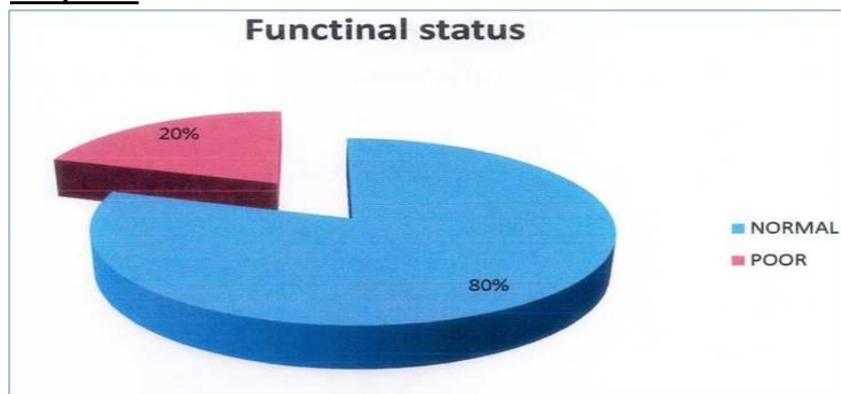
Katz index only 10 out of 50 study patients had poor (Katz score=0) functional status (**Graph – 2**).

Age distribution of patients was as per **Graph – 1**. Functional status of patients was assessed with

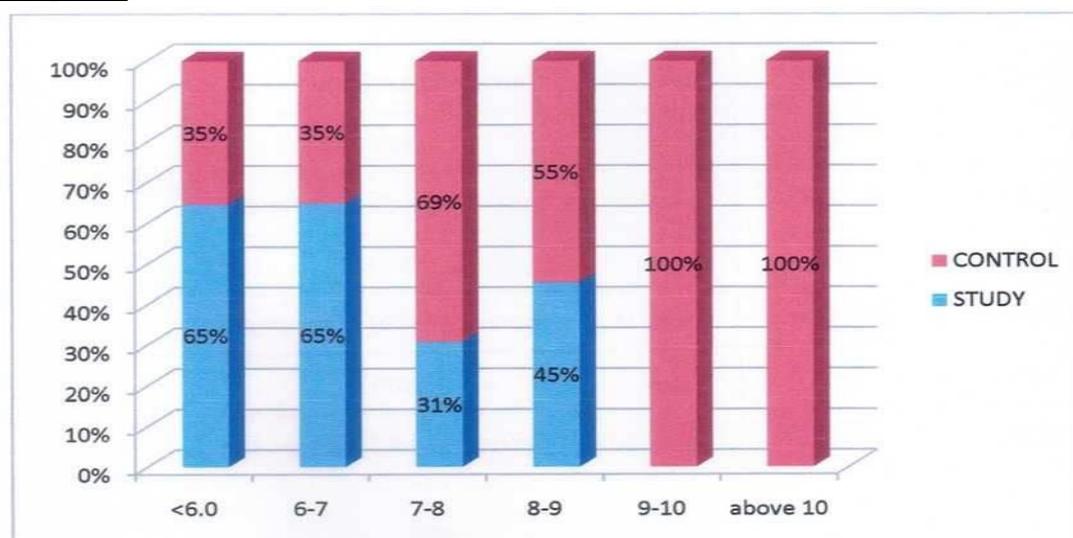
Graph – 1: Age distribution.



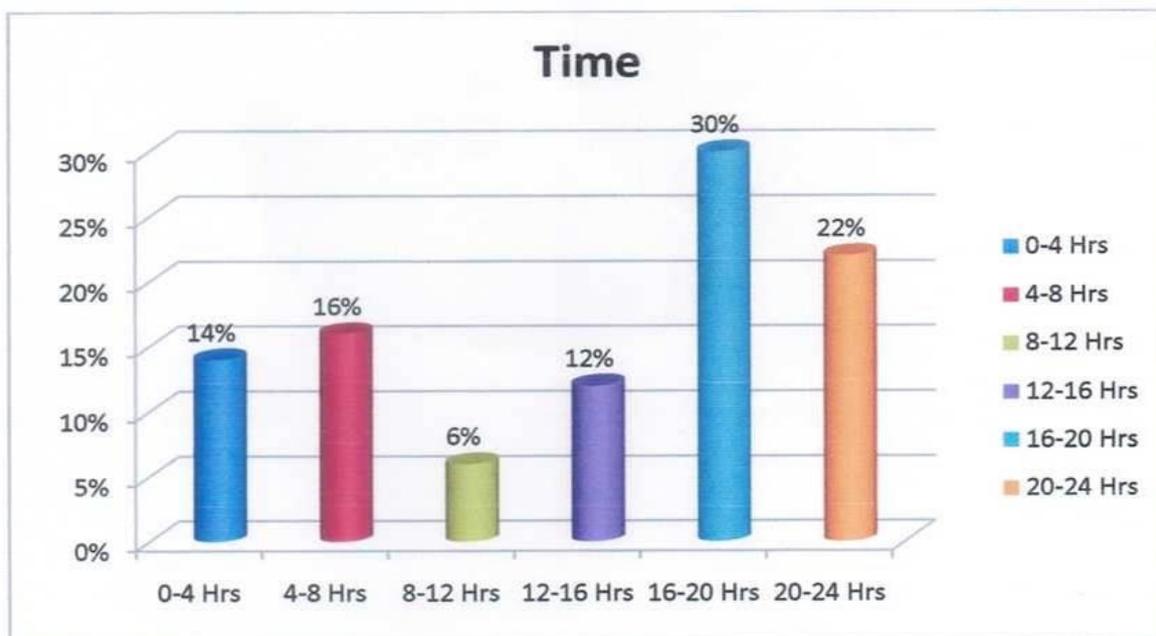
Graph – 2: The functional status.



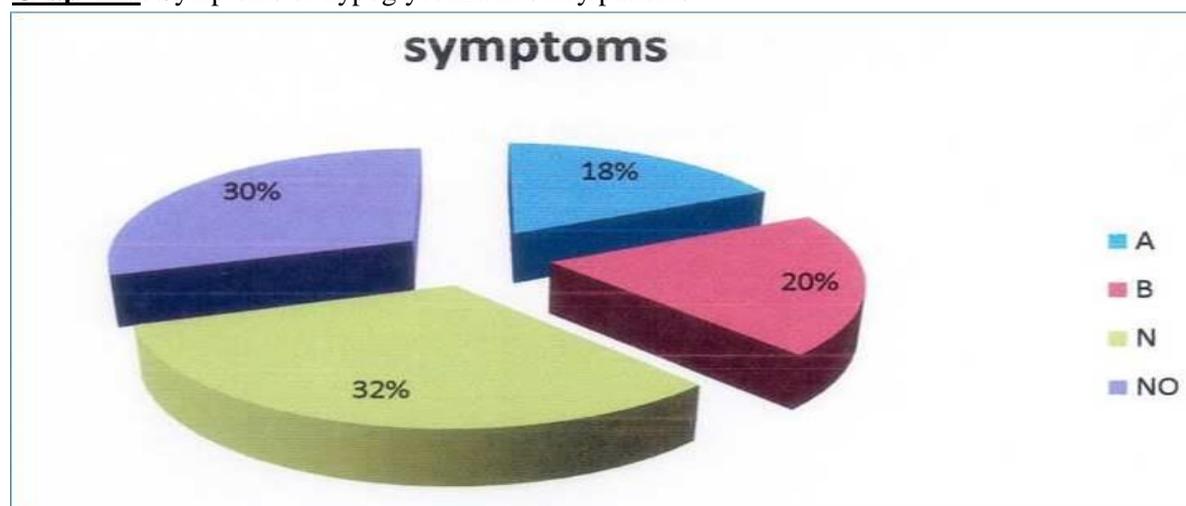
Graph – 3: HbA1C levels.



Graph – 4: Time of hypoglycemic episodes.



Graph – 5: Symptoms of hypoglycemia in study patients.



Comparatively, study patients have low HbA1C than the control group. A number of patients with value <6.5 were more in the study group. Low levels of HbA1C was one of the main risk factors for hypoglycemia and it found to be statistically significant with p value<0.001 (**Graph – 3**).

52% patients had their episodes during night time. 34 patients (68%) had come to the hospital with hypoglycemia and the rest of the patients developed hypoglycemia in-hospital stay (**Graph – 4**). Symptoms of hypoglycaemia were as per **Graph – 5**.

Discussion

In our study, nearly 70% of the study patients presented with symptoms of hypoglycemia with neuroglycopenia being the most predominant symptom. Only 30% of study patients presented to the hospital in hypoglycemia but without any symptoms [8]. In a study done in Singapore out of 45 episodes of hypoglycemia, 40 had symptoms with neuroglycopenia being the predominant symptom. In UKPDS around 50% of patients who had no symptoms of hypoglycemia had a longer duration of DM (nearly 25 years) [9]. In our study, patients who did not develop any symptoms had a 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). Hypoglycemia is divided into mild and severe form [10]. 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 an altered mental status or even unconsciousness [11]. The mean glucose level of study patients during hypoglycemic episodes was 42.25 mg/dl. Nearly 82% of patients received parenteral IV dextrose injection and others recovered with just a 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% of patients developed nocturnal hypoglycemia and 30% patients developed hypoglycemia in the evening time [12]. Previous hypoglycemic episode is a strong predictor of recurrence of hypoglycemia. Nearly 36% of patient developed hypoglycemia due to a recent change in dose of insulin. These patients developed hypoglycemia due to the improper intake of nutrition after the insulin doses. Few studies say that taking of drugs like ACE inhibitors and beta blockers leads to the increased development of hypoglycaemia [13]. 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 factors for the development of hypoglycemia. In our study, 38% of study patients had an infection. Nutritional discordance due to poor appetite, nausea, and vomiting is added cause along with infection [14]. Most of the antidiabetic medications are metabolized and excreted in the kidney. In a patient with renal impairment, these drugs won't be eliminated properly leading to prolonged action of these drugs [15]. This will cause hypoglycemia unless necessary dose adjustment is being made. In our study, 22% of patients had renal dysfunction and also it has been proved statistically that renal dysfunction causes hypoglycemia [16]. Poor functional status will lead to difficulty in carrying out their daily living

activity like eating. These kind of patients are more prone to for development of hypoglycemia. Major morbidity in hypoglycemia patients includes neurological deficit, stroke, myocardial infarction, ventricular arrhythmia and falls causing fractures. but there was no significant morbidity in our study all the fifty study patients were treated appropriately and recovered completely without any sequel [17]. By comparing the study and control patients, on various aspects, few risk factors for the development of hypoglycemia have been found out. Functional status of patients was calculated using the 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 the development of hypoglycemia [18]. Patients in the study and control group were taking OHA's, insulin or a combination of OHA's and insulin. There is no significant difference in the mode of treatment and development of hypoglycemia. But comparatively insulins and sulfonylureas were more among the study group and use of metformin was more in the control group [19]. Among the sulfonylureas, glimepiride was the most common drug taken by the study patients. In elderly with renal dysfunction and infection even metformin alone can cause hypoglycemia. HbA1C was lower in the study group when compared to control group. This has been statistically proved that lower levels increase the risk of hypoglycaemia [20].

Conclusion

Asymptomatic hypoglycemia was common in the elderly diabetics. In symptomatic patients, neuroglycopenic 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. 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.

Limitations

This is a hospital-based study. Many patients and relatives who are aware of hypoglycemic symptoms take corrective measures at home even without coming to the hospital. Since it is easy to treat and the patient gets complete recovery, most of the patients were sent home from the 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.

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