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CLINICAL PROFILE OF DIABETICS PRESENTING WITH HYPOGLYCEMIA AT THE EMERGENCY ROOM (ER) IN A TERTIARY CARE HOSPITAL: A PROSPECTIVE STUDY

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ABSTRACT

BACKGROUND: The term hypoglycemia refers to a clinical condition resulting from an abnormally low plasma glucose level of <54 mg/dl (ADA recommendation). Clinically, it is characterized by varying degree of neurological dysfunction and is responsive to the administration of glucose. Hypoglycemia is most commonly caused by drugs used to treat diabetes mellitus.

OBJECTIVE: To study the clinical profile and precipitating factors in the patients of hypoglycemia.

MATERIAL AND METHODS: This hospital based 2 years prospective study was conducted in the patients presenting in the Emergency Room (ER) of Hi-tech Medical College and Hospital, Rourkela. Clinical profiles of 134 diabetic patients on OAD's or Insulin treatment with the diagnosis of hypoglycemia were analyzed.

RESULTS: Out of 134 patients, 41 (31%) patients were of type 1 diabetes mellitus and 93 (69%) patients of type 2 diabetes mellitus. The male:female ratio was 1:1.4. The most common precipitating factor was found to be delaying or skipping meals (48%) followed by insulin overdose (20%), alcohol intake (15%), excess OAD dose (8%), deficient meals (5%) and increased activity (4%). The most common autonomic symptom was sweating (90%) followed by palpitation (76%). Majority of hypoglycemic patients (57%) had blood glucose in the range 31-40 mg/dl. 66 patients (49%) were on only insulin therapy and 28 (21%) patients were on OAD's. 40 (30%) patients were on combination (insulin+OAD's) therapy. Maximum incidence of hypoglycemia was reported among patients who were on combination of short acting plus intermediate acting (i.e Premix – 30/70) Insulin. However, within the set of patients developing hypoglycaemia due to OAD's, the frequency was much higher (62.5%) with a combination therapy of OAD's as compared to monotherapy (37.5%). Present study did not show any mortality due to hypoglycemia.

CONCLUSION: Hypoglycemia is the most common acute metabolic complication of diabetes mellitus on treatment. Elderly diabetics, patients with chronic kidney disease and patients on long acting insulin/sulfonylureas (used either alone or in combination) are more prone to develop hypoglycemia. Diabetic patients should be familiar with hypoglycemia symptom profile so that they can perceive the early onset of hypoglycemia and an appropriate action can be taken immediately.

KEYWORDS : Hypoglycemia, Blood sugar, OAD's (Oral Antidiabetic Drugs)

INTRODUCTION:

Hypoglycemia is the most common endocrine emergency faced by physicians. It is defined arbitrarily as a blood glucose of less than 54mg/dl with neuroglycopenic symptoms or less than 40 mg/dl in the absence of symptoms.[1] Hypoglycemia impedes safe achievement of optimal glycemia. Severe hypoglycemia – that requires the assistance of another person – is a clinical red flag. [1] Hypoglycemia remains the most common and serious iatrogenic cause of morbidity in diabetic patients.[2]Large trials such as Veterans affairs diabetes trial and Action to control cardiovascular risk in diabetes trial have shown that there was a higher mortality in the group that had been treated intensively to achieve glycemic control .[3],[4] Hence, the American Diabetes Association (ADA) guidelines emphasized on individualizing targets and reducing risk of hypoglycemia in patients with long duration of diabetes and co-morbidities.[5] Targeted HbA1c levels in patients with Type 1 Diabetes and Type 2 Diabetes should be tailored to the individual, balancing the micro vascular complication with risk of hypoglycaemia. [6-9] The American Diabetes Association's most recent guidelines still recommended HbA1C goal for most adults to be less than 7 %, but also recognizes that less stringent goals (such as <8%) may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced complications and co morbid conditions. [10]

MATERIAL AND METHODS:

The study was conducted on patients attended in the ER (Emergency Room) of Hi-tech Medical College and Hospital, Rourkela, Odisha during a span of 2 years (June, 2016- May, 2108). A total of 134 diabetic patients (diabetes diagnosed as per American Diabetes Association criteria) with hypoglycemia (as per inclusion criteria) were selected for the study. The detailed history, clinical examinations and relevant laboratory investigations done for all the patients were evaluated and analyzed in detail. (Using Accu-Chek Nano Glucose meter and by Siemens Autoanalyzer in the Dept of Biochemistry.

INCLUSION CRITERIA:

Plasma glucose <54 mg/dl with documented history of diabetes

EXCLUSION CRITERIA:

1. Plasma glucose 55-70 mg/dl with symptoms of hypoglycemia.
2. Diabetic patients with malignancy

RESULTS:

Out of 134 patients of diabetes (under treatment) included in study, 41 (31%) patients were suffering from type 1 diabetes mellitus and 93 (69%) patients from type 2 diabetes mellitus (Fig.2). The male: female ratio was 1:1.4 (Fig. 2). The maximum number of patients (38%) was in age group of 41 to 60 years (Fig. 3). Majority of hypoglycemic patients (n=77, 57%) had blood glucose in the range 31-40 mg/dl and 21 (16%) had blood glucose between 21-30 mg/dl. Only 6 (4%) patients had blood glucose <20 mg/dl (Fig. 4). The most common symptom was sweating (90%) followed by palpitation (76%), incoordination (70%) and altered sensorium (56%). 60% of patients had tremors. Hunger and speech difficulty were reported in 50% and 68% of patients respectively. Visual disturbance and headache were present in 30% and 40% of patients respectively. 10% of patients had nausea. 4 % patients of hypoglycemia presented with hemiplegia but it recovered completely on treatment. (Figure. 5) The most common precipitating factor was found to be delaying or skipping meals (48%). In 28% patients, precipitating factor for hypoglycemia was increase in insulin or dose of oral hypoglycemic agent (Table 1). Out of 134 patients, 66 (49%) were on only insulin therapy and 28 (21%) patients were on oral hypoglycemic agents. 40 (30%) patients were on combination (insulin+OHA) therapy (Table 2). Out of 66 patients who were on insulin therapy alone, 46 (69.7%) were on mixture of short acting and intermediate acting insulin (i.e. Premix Insulin 30/70) and 20 (30.3%) patients were on short acting (regular insulin). Out of 21 patients who were on oral hypoglycemic agents alone, 8 (38%) patients were on Sulfonylureas (Glibenclamide, Glimepride, Glyclazide) and other 13 (62%) patients were on various combinations of oral hypoglycemic agents. None of the patients was on biguanide monotherapy. All hypoglycemia patients recovered fully following treatment without any residual neurological deficit.

Figure 1: Gender ratio

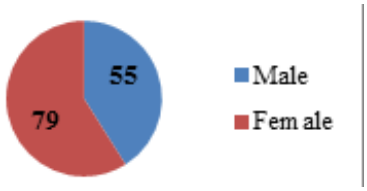

Figure 2: Patients with Type I/ Type II DM

Figure 3: Number of patients in different age groups

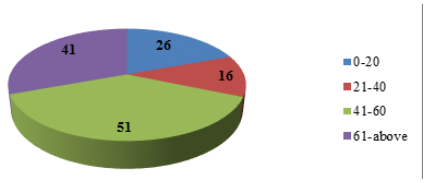

Figure 4: Number of patients in different glycemic range

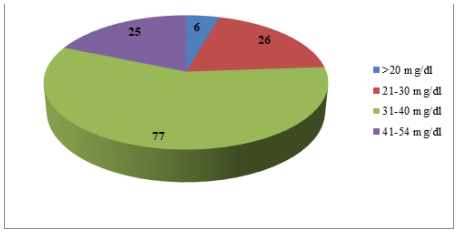

Figure 5: Symptoms in patients with hypoglycemia (Percentage)

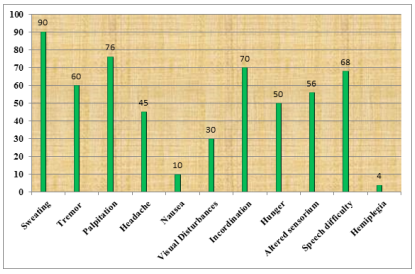

Table 1: Precipitating causes of hypoglycemia	No. of patients	%
Taking too much insulin	27	20
Excess dose of oral antidiabetic drugs	11	8
Not eating enough (due to illness, etc)	7	5
Skipping meals (due to fasting, etc)	64	48
Increased exercise or physical activity without eating or adjusting meals	5	4
Alcohol intake	5	4
Decrease insulin requirement (Age, Nephropathy, etc)	15	11

Table 2: Medications causing hypoglycemia	Number of patients	%
Insulin	66	49
Oral anti diabetic drugs	28	21
Insulin with OAD's	40	30

DISCUSSION:

Iatrogenic hypoglycemia is the limiting factor in the glycemic management of diabetes mellitus. [5] It causes recurrent symptomatic and sometimes (at least temporarily) disabling episodes in most patients with type 1 diabetes as well as in those with advanced type 2 diabetes, and is sometimes fatal.[11] Drug induced hypoglycemia occurs more frequently in older patients with underlying hepatic or renal dysfunction.[12] Present study showed that 69% hypoglycemic patients had Type 2 diabetes as compared to 31% patients with type 1 diabetes. In conformity with our observations, Heller [13] has reported that risks of hypoglycemia are less in type 2 diabetes mellitus patients, but are higher during insulin treatment. Hepburn et al. [14] in their study found that when matched for duration of insulin therapy (mean duration 12 years) and HbA1C, the frequency of severe hypoglycemia is similar in type 1 and type 2 diabetes mellitus patients. The mean age of patients in this study was 57.68 years. Although, any age group is prone to hypoglycemia on treatment, however elderly patients on long acting preparations are more susceptible to hypoglycemic episodes. Independent risk factors for severe hypoglycemia include recent hospitalization, advanced age and polypharmacy. Delaying or skipping meals was observed as the most important precipitating factor for hypoglycemia (48% of patients). Decreased carbohydrate intake as a causative factor was found in 5% of patients. These patients were eating less as compared to their regular diet during sick days or had anorexia due to their primary illness. Increase in insulin or OHA dosage to achieve good glycemic control was the precipitating cause for hypoglycemia in 28% of patients. Decrease in insulin requirement was found in 11% of patients. This decrease was due to clearance of the primary infection like treatment of diabetic foot or delayed insulin clearance due to progression to Chronic kidney disease. Symptom profile provoked by hypoglycemia is idiosyncratic and varies in character, pattern and intensity between individuals.[14] Symptoms of hypoglycemia vary depending on the age of the individual but the symptoms appear to be similar whether induced by sulfonylureas, insulin analogues, animal or human insulin.[15] Although, no single symptom is present consistently during hypoglycemia in all patients with diabetes, some symptoms are more common than other.[16] In the present study sweating was the most common autonomic symptom (90%) followed by palpitation and inco-ordination (76%), altered sensorium (56%), tremors (60%), hunger and speech difficulty (50-68%), visual disturbances and headache (30-45%). Consistent to our results, McAulay et al [17] have reported similar prevalence of symptoms in their study with sweating in 80% of patients, palpitation (55%), incoordination (75%), altered sensorium (40%). Hunger and slurred speech were present in 60% and 40% of patients respectively. Visual disturbance in 20% and headache in 30% of patients. There is no single symptom that is exclusive to hypoglycemia alone. However, hypoglycemia unawareness is a major clinical problem in the management of Diabetic patients on Insulin therapy. The risk of severe episode of hypoglycemia increases 6-7 folds in these patients.[18] Moreover, in a study by Pennebakeretal[19] has found that no single symptom correlate significantly with a specific blood glucose concentration in humans. Hence, it is important that diabetic patient on treatment should be familiar with their own symptom profile, so that they can perceive the early onset of hypoglycemia and know what appropriate action has to be taken. Our study showed insulin therapy was the most common cause of hypoglycemia accounting for 79% (either alone or in combination with OAD) of diabetic patients. Carroll et al [3] also found that insulin treatment of diabetes is the most common cause of severe hypoglycemia in adults. United Kingdom Prospective Diabetes Study (UKPDS) [20] reported severe hypoglycaemia in 11.2% of patients treated with insulin.[21] In the present study, the majority of hypoglycaemia cases were receiving combination of OHA's rather than monotherapy. And the most common monotheraupeutic offending agent was sulfonylurea. United Kingdom Prospective Diabetes Study (UKPDS) [20] has reported severe hypoglycemia due to sulfonylureas in 3.3% of patients and 2.4% of those treated with bigunanides. Jennings et al.[22] have found, that hypoglycemia in patients receiving sulfonylurea treatment vary widely but were reported to be as high as 20% over a 6 month treatment period. Shorret al. [23] described a crude rate of serious hypoglycemia (hospitalization, emergency department admission or death) of 1.23 per 100 person-years in users of sulfonylureas aged 65 years or older. All hypoglycemic patients recovered fully following treatment without any neurological sequelae and no mortality was seen in this study. Usually, death from cerebral edema caused by hypoglycemia is extremely rare. [16] However, hypoglycemia had been implicated in "dead-in-bed" syndrome and in chronic cognitive impairment. [24] Klatt et al.[25] found 0.2% of death due to hypoglycemiccoma. Macleod et al[26] found "dead-in-bed" syndrome may account for 6% of deaths in diabetic patients under the age of 40. Sartor[27] reported the greatest incidence of mortality in childhood onset insulin dependent diabetes between 15-19 years of age. In our study, 100% recovery rate may be attributed to the fact that all patients with hypoglycemia received immediate intensive treatment in the hospital, so early detection and effective treatment was given.

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