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RISK FACTORS OF HYPOGLYCAEMIA IN ELDERLY DIABETICS A CROSS-SECTIONAL ANALYTICAL STUDY FROM WESTERN RAJASTHAN.

General Medicine

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ABSTRACT

Background: Hypoglycaemia is a side effect of strict diabetes control, especially in the geriatric population above sixty, who constitute approximately 100 million of the Indian population. This study was undertaken to explore the risk factors of hypoglycaemia in elderly in patients.
Materials and Methods: Ninety patients who were found to have hypoglycaemia either at admission or while admitted were enrolled. Their risk factors were compared with Ninety age and sex matched inpatients admitted to medical wards who did not experience hypoglycaemia.
Results: The duration of diabetes was significantly longer (13.4 ± 9.2 vs. 8.1 ± 5.7 years; P = 0.012) in the group which experienced hypoglycaemia. The mean glycated haemoglobin was significantly lower in the group which experienced hypoglycaemia (6.73 ± 1.12 vs. 7.61 ± 1.17; P = 0.002). Out of the 90 patients who developed hypoglycaemia 27 were asymptomatic. Infection and renal failure were significantly higher in the study group. On multivariate analysis, infection was the only significant precipitating factor.
Conclusion: With strict blood glucose control, elderly patients are at high risk of hypoglycaemia. The risk is higher if the patients have renal failure and infection. Diabetic therapy in elderly people should be adjusted in such a way to prevent hypoglycaemia.

KEYWORDS

Geriatrics, hypoglycaemia, old age, type 2 diabetes mellitus

INTRODUCTION:

Hypoglycaemia is a serious adverse effect of strict diabetes control. Elderly patients have reduced physiological responses to hypoglycaemia due to several precipitating factors. Hypoglycaemia can even cause nocturnal death apart from its disastrous effect on brain and heart.[1] Even though, there are guidelines to keep glycated haemoglobin (HbA1c) levels at a flexible range in elderly diabetics; hypoglycaemia still remains the major complication.[2] The aim of our study was to analyse various risk factors predisposing geriatric population with diabetes mellitus to hypoglycaemia, in comparison with age and sex matched controls who did not experience hypoglycaemia.

METHODS:

A descriptive comparative study was conducted at the MDM Hospital, Dr S.N. Medical College Jodhpur Rajasthan. Ninety patients who experienced hypoglycemia formed the study group, and Ninety age and sex matched patients were enrolled for the control group. The inclusion criteria for the study required that patients are of age ≥60 years, are known to have diabetes mellitus and have a blood sugar level of ≤70 mg/dL. The included patients were admitted to the hospital with hypoglycemia or developed hypoglycemia in the hospital. Age and sex matched diabetic patients of age ≥60 years, admitted during the same period were included as controls. Patient data were filled into the prescribed pro forma which included details of age, demographics, duration of diabetes mellitus, details of treatment of diabetes at the time of hypoglycemia, details of the hypoglycaemic episode (symptoms, severity, glucose level, risk factors identified, treatment, and outcome), comorbidities, polypharmacy, and alcohol use. Blood glucose, serum creatinine, HbA1c, and liver function tests were performed at the NABL accredited laboratories of the Department of Biochemistry of the hospital. All emergency blood glucose readings were done using standardized glucometers in the respective medical wards.

STATISTICALANALYSIS:

All statistical analyses were conducted using SPSS statistical software package (Version 16, Unicom Systems), IBM Corporation International Business Machines Corporation, (Armonk, New York, United States). Unpaired two-tailed *t*-tests were used for the comparison of means of study and control groups. Chi-square test was used to compare the frequency of events between the groups. Further, univariate and multivariate logistic regression was utilised to determine the clinical predictors of hypoglycaemia.

RESULTS:

Ninety patients with documented hypoglycaemia (study group) and Ninety age- and sex-matched inpatients who did not develop hypoglycaemia (control group) were studied. There were 40 males and 50 females in both the groups with a mean age of 67 ± 5.02 years. The diabetic history and details regarding the medications among the 2 groups were compared. [Table 1]

Table 1: The diabetic history and medications

Diabetic history	Study (90)	Control (90)	P value
Duration of diabetes (years)	13.4±9.2	8.1±5.7	P= 0.012
HbA1c (%)	6.73±1.12	7.61±1.17	P=0.002
Medications			
OHA	35	21	
Insulin	22	12	
Insulin + OHA	18	39	
Polypharmacy	33	28	

OHA: Oral hypoglycaemic agents, HbA1c: Glycated haemoglobin

Antidiabetic medications in both groups were extensively studied [Table 2]. In the study group, the most commonly used sulfonylurea was glimepiride (29%), followed by gliclazide (17%), glipizide (2%) and glibenclamide (1%). Fifty one patients were brought to the hospital with hypoglycaemia, and Thirty Nine developed hypoglycaemia while in the hospital. Out of the 90 patients, 27 (30%) were asymptomatic and low blood glucose was detected on routine monitoring, 18 (20%) had autonomic symptoms, 15 (16.6%) neurological symptoms, and 17 (18.8%) had both the symptoms at the time of hypoglycaemia and unconsious were 13 (14.4%).

Clinical Presentation of Hypoglycaemia:

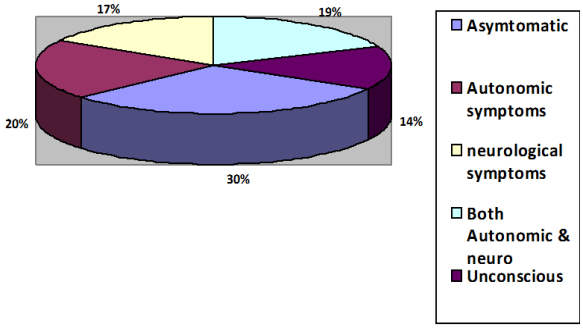

Table 2: Antidiabetic drugs

Treatment	Study group (n=90), n (%)	Control group (n=90), n (%)
Sulphonylureas	14	12
Metformin	09	18
Sulphonylureas + metformin	13	27
Insulin	24	09
Insulin + metformin	21	14
Insulin + sulphonylureas	18	20
Sulphonylureas + metformin + pioglitazone	10	0

Seventy four patients (82.22%) were treated with intravenous dextrose and ten (11.1%) with oral glucose. Six patients (6.66%) needed the only adjustment in dosage of medications. All of the patients recovered without any observable sequelae. Precipitating factors of hypoglycaemia were also studied [Table 3]. Infection and renal failure were statistically significant precipitating factors. Multiple logistic regression analysis showed infection as more significant precipitating factor.

Table 3: Comparison of precipitating of hypoglycaemia

Precipitating factors	Case	Control	P
Infection	45	9	0.002
Hepatic dysfunction	8	0	0.356
Renal dysfunction	27	6	0.013
Nutritional discordance	36	0	-
Increased dose of insulin	44	0	-

DISCUSSION:

Hypoglycaemia in the elderly is rather under recognised. Our aim was to focus on 90 elderly diabetic patients who developed hypoglycaemia and compare them with their control. Their mean age was identical. Mean HbA1c was lower in patients who experienced hypoglycaemia (6.73% in the study group versus 7.61% in the control group, P = 0.002) and correlates with the major clinical trials, such as ACCORD, ADVANCE, VADT and SDIS, where they have demonstrated up to 3-fold increase in patients on intensive glucose control.[3-6]

In our study, duration of diabetes was noted to be significantly higher in the study group, compared to that of the control group. Association between asymptomatic hypoglycaemic episodes and duration of diabetes has been observed in the UK Hypoglycaemia Study.[7] Autonomic symptoms were experienced in only 18 of the 90 patients (20%) who developed hypoglycaemia. 27 (30%) were asymptomatic. Fifteen (16.6%) had only neurological symptoms. Hypoglycaemia-associated autonomic failure occurs in type 1 as well as type 2 diabetes mellitus.[8]

Nocturnal hypoglycaemia (occurring between 8 pm and 8 am) is often associated with hypoglycaemic seizures, coma, and various cognitive dysfunctions even after recovery.[9] Our patients did not have seizures and coma sequelae. They showed a near complete recovery. Cognitive function tests and neuroimaging are required for a better assessment of the sequelae. Drug interactions often result in hazardous consequences, and in this study, polypharmacy was higher in the study group. Antihypertensive drugs, such as angiotensin-converting enzyme inhibitors may cause hypoglycaemia. Beta-blockers cause hypoglycaemic unawareness.

In our study, infection emerged as a major risk factor for hypoglycaemia. This is important as infections in the elderly may not manifest with florid features as in a younger adult. Hence, tight glycaemic control and precipitating factors may result in low blood glucose levels in the geriatric population irrespective of the drug regime. Urinary tract infections were common in our study group. They were treated with antibiotics based on urine culture and sensitivity reports. *Escherichia coli* was the most common organism involved. Nitrofurantoin and piperacillin-tazobactam were the antibiotics used for the management of urinary tract infections. Renal functions were normal in these patients with urinary tract infections. Insulin therapy was initiated in all patients with urinary tract infections.

CONCLUSION:

Hypoglycaemia in the elderly is multifactorial. Awareness of the risk factors of hypoglycaemia in the geriatric population among medical professionals and caregivers is the cornerstone in the management of diabetes in elderly. Overtreatment of diabetes is a major risk factor of hypoglycaemia in the elderly. Hence, physicians should decide the dosage of Antidiabetic judiciously.

HbA1c target levels in the geriatric population should be set as modified by the American Diabetes Association, based on the patient compliance without compromising the quality of life. In our study, it was observed that the above recommendations were not followed in the elderly who developed low blood glucose levels (study group). Regulations are needed as far as polypharmacy is considered. Early anticipation and prompt treatment of infections can prevent hypoglycaemia in elderly diabetics.

Conflicts of interest:

There are no conflicts of interest

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