

HYPOGLYCEMIA AND ITS CLINICOPATHOLOGICAL OUTCOME IN DIABETIC PATIENTS ADMITTED IN DHQ TEACHING HOSPITAL KOHAT

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Abstract: Hypoglycemia is a common and serious complication in patients with diabetes, leading to adverse clinical outcomes. Understanding its frequency and associated clinicopathological outcomes is crucial for improving patient management and outcomes. **Objective:** To assess the frequency of hypoglycemia and its clinicopathological outcomes in admitted diabetic patients. **Methods:** A cross-sectional observational study was conducted at DHQ Teaching Hospital KDA, Kohat, from February 8-2023, to August 8-2023. The study included 110 patients diagnosed with diabetes. Clinicopathological outcomes were assessed, including hospital stay duration, readmissions, and mortality. Statistical analysis was performed to determine the association between hypoglycemia and these outcomes. **Results:** The frequency of hypoglycemia among the patients was 35.5% (39 patients). Hypoglycemia was notably associated with longer hospital stays (> 25 days), increased readmissions, and higher mortality rates. **Conclusion:** Hypoglycemia is a frequent condition observed in diabetic patients, significantly contributing to prolonged hospital stays, increased readmission rates, and mortality. Effective management strategies are necessary to reduce the incidence of hypoglycemia and improve patient outcomes.

Keywords: Cross-Sectional Studies, Diabetes Mellitus, Hypoglycemia, Hospitalization, Mortality, Readmission.

Introduction

Diabetes is a persistent metabolic condition marked by high levels of blood glucose. It is a major global health issue, affecting millions of people worldwide and causing substantial economic and healthcare expenses (1, 2). The disorder, characterized by either inadequate insulin production or inefficient insulin usage by the body, appears in different forms, namely type 1, type 2, and gestational diabetes, each with specific causes and risk factors (3). Type 1 diabetes is caused by the immune system attacking and destroying the beta cells in the pancreas, which leads to a complete lack of insulin (4). On the other hand, type 2 diabetes, which is frequently linked to obesity, a sedentary lifestyle, and hereditary susceptibility, arises from a combination of insulin resistance and deteriorating pancreatic beta cell activity (5). A study conducted on 1447 subjects in Pakistan, in which 58% were females and 42% were males. The major affected age group was 20-29 years with 22.3% subjects. Pre-diabetes was observed in 21.4% patients, and diabetes in 9.52% (6).

Hypoglycemia, a frequently occurring but potentially life-threatening complication of diabetes, arises as a crucial clinical concern, leading to significant clinicopathological consequences in affected persons (7). The occurrence of hypoglycemia within diabetic patients is caused by multiple factors, often resulting from medical treatments that aim to tightly control blood sugar levels, such as insulin treatment or sulfonylurea medications (8). These treatments can cause a discrepancy between the amount of insulin or insulin-stimulating drugs given and the natural changes in glucose levels, leading to a significant drop in blood sugar levels below the normal range (9).

In addition to the immediate clinical effects, recurrent hypoglycemia has negative consequences on the overall

health of patients. These include an increased risk of cardiovascular events, impairments in cognitive function, reduced quality of life, and higher mortality rates (10). Hypoglycemia can typically be managed in an outpatient setting without requiring substantial healthcare expenditures. Hospitalization may be necessary in cases of severe hypoglycemia accompanied by loss of consciousness (11).

The complex relationship hypoglycemia and negative clinical outcomes in diabetic patients highlights the need for personalized approaches to managing diabetes. These approaches should be based on individual risk profiles and include patient education, regular monitoring of blood sugar levels, careful calculation of insulin doses, careful selection of antidiabetic medications, and coordinated care.

Methodology

Our study was a cross sectional observational investigation which was conducted that DHQ teaching hospital KDA, Kohat conducted from 08-February 2023 to 08-August 2023. Patients with diabetes mellitus having age ≥ 18 years of either gender were selected using non probability consecutive technique. Diabetes was diagnosed using American Diabetes Association standard. Hypoglycemia was considered if levels were ≤ 70 mg/dl. Clinicopathological factors such as readmission, mortality and longer stay at the hospital (> 25 days) were taken into account.

Sample was calculated using openepi web based calculator taking previous value of hypoglycemia 7.7% 12, margin of error 5% and confidence interval 95%. One hundred and ten was the sample size.

SPSS 25 was utilized for assessing the data. Chi Square test was deployed for assessing the associations keeping the value of P significant at less than or equal to 0.05.

Results

One hundred and ten patients were admitted to our setup. Mean age was 57.11±8.24 years. Mean BMI was 25.62±2.49 kg/m2. Gender distribution showed that frequency of male patients was higher than female patients (Table 1). Around 35 (31.8%) patients had been previously taking insulin. Socioeconomic status of the patients is presented in table no 1. Figure 1 shows the age distribution

of the patients which shows that higher frequency of patients had age > 55 years. In our study 39 (35.5%) patients had hypoglycemia. Clinicopathological outcomes are shown in table no 2, longer hospital stay was observed in 71.8% hypoglycemic patients which was notably associated with hypoglycemia (P = 0.0001), readmissions were observed in 35.9% hyperglycemic patients (P = 0.004) while mortality was observed in 23.1% of hypoglycemic patients (P = 0.002). We also observed that previous history of insulin intake, lower BMI and increasing age acted as risk factors for hypoglycemia since they were notably associated with it (Table 3).

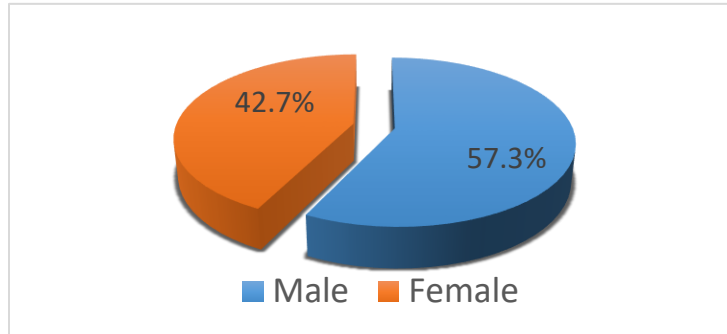


Figure 1 Gender distribution

Table 1 Demographics

Demographics		N	%
Previous Hx of insulin intake	Yes	35	31.8%
	No	75	68.2%
Socioeconomic status	Lower class	37	33.6%
	Middle class	60	54.5%
	Upper class	13	11.8%
Education status	Literate	59	53.6%
	Illiterate	51	46.4%
Age distribution (Years)	40 to 55	48	43.6%
	> 55	62	56.4%

Table 2 Association of clinicopathological outcomes with hypoglycemia

Clinicopathological outcomes		Hypoglycemia				P value
		Yes		No		
		(N)	%	(N)	%	
Longer hospital stay (> 25 days)	Yes	28	71.8%	13	18.3%	0.0001
	No	11	28.2%	58	81.7%	
Readmission	Yes	14	35.9%	9	12.7%	0.004
	No	25	64.1%	62	87.3%	
Mortality	Yes	9	23.1%	3	4.2%	0.002
	No	30	76.9%	68	95.8%	

Table 3 Association of risk factors with hypoglycemia

Risk factors		Hypoglycemia				P value
		Yes		No		
		(N)	%	(N)	%	
Previous Hx of insulin intake	Yes	19	48.7%	16	22.5%	0.005
	No	20	51.3%	55	77.5%	
BMI (Kg/m2)	18 to 24.9	30	76.9%	24	33.8%	0.0001
	25 to 29.9	9	23.1%	47	66.2%	
Age distribution (Years)	40 to 55	12	30.8%	36	50.7%	0.04
	> 55	27	69.2%	35	49.3%	

Discussion

In the context of the economic challenges that are linked to an aging population, the length of stay (LOS) for hospital hospitalized patients has become a significant clinical and political problem. This is because we continue to work toward improving patient outcomes (12). Compared to the general population, people with diabetes account for up to one in six of the hospital inpatient population. This is a significant disparity between the two groups. When it comes to people with diabetes who are being administered insulin or sulphonylurea, the chance of hypoglycemia is frequently a significant issue in preventing adequate glycemic control and managing hyperglycemia. Hypoglycemia is unquestionably a significant issue in hospital inpatients on account of the fact that inadequate care of concurrent diabetes might have a significant influence on the fate of the patient.(13) During their stay in England, around twenty percent of inpatients with diabetes encounter at least a single case of mild biochemical hypoglycemia (>3.0 to <4.0 mmol/l). Furthermore, nine percent of these inpatients experience severe biochemical hypoglycemia (<3.0 mmol/l) during their stay. This information was confirmed by the United Kingdom National Diabetes Inpatient Audit.(14) In Scotland, mild hypoglycemia was connected with 26.2% of all admissions that involved the patient. As a result, this indicates the significant prevalence of hypoglycemia among the inpatient population as well as the potential significance of the condition. In light of the fact that hypoglycemia could have a potentially significant and preventable impact on length of stay (LOS), it is essential that an exact quantification of any link be clarified (15). Studies that have been conducted to far to investigate the connection between hypoglycemia and length of stay have demonstrated a notable increase in the length of hospitalization; however, these studies have not taken into consideration the possibility of confounding influence of the number of CBG measures.(16)

We selected 110 patients for our study, these patients had diabetes, mean age of these patients was 57.11 ± 8.24 years, to our observation frequency of male patients was higher than female patients. A study (12) showed that the mean age of their patients was 63.6 ± 15.1 years which is slightly higher than our study, they also reported higher frequency of female patients rather than male patients, these disparities were most possibly due to our smaller sample of patients. We found the frequency of hypoglycemia 35.5% which is quite higher than the frequency reported in other studies.(15, 17) This is due to the fact that these studies were comparative in nature including both diabetic and non-diabetic subjects. However another study reported that the frequency of hypoglycemia in their diabetic admitted patients was 47.5%.(18) Another study showed frequency of hypoglycemia. We found that common clinicopathological factors in our study which were associated with hypoglycemia notably were longer stay at the hospital, readmissions and mortality. The aforementioned study reported similar observations stating that in their study patients with hypoglycemia exhibited longer stay at the hospital, they reported higher frequency of mortality in hypoglycemic patients while readmission were frequently reported in these patients.(18)

In our study we also infer from our results that increasing age, lower BMI and previous history of taking insulin were

notably linked with hypoglycemia, since studies have shown that lower figures of glycemic index can cause BMI to decrease while increasing age and long term intake of insulin an also lead to lower glycemic index.(12, 14, 18).

Conclusion

In conclusion, hypoglycemia is a frequent condition observed in diabetic patients which can lead to longer stay at the hospital, readmissions of the patients and mortality. We suggest strict glycemic control in diabetic patients by their physicians to avoid adverse outcome of admission of diabetic patients.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

Approved by the department Concerned. (IRBEC/944-22-12-22)

Consent for publication

Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

MUHAMMAD USMAN

Final Approval of version & Concept & Design of Study

FAHIM SHAH (Professor)

Revisiting Critically, Data Analysis & Drafting

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