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FREQUENCY OF HYPOGLYCEMIA IN CRITICALLY ILL PATIENTS

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Abstract

Objective:
To determine the frequency of hypoglycemia in critically ill patients admitted in intensive care unit (ICU).

Methods:
This descriptive research involved 395 critically ill patients, including both diabetic and non-diabetic individuals, who were admitted to the intensive care unit between July 2024 and January 2025. Throughout their ICU stay, all patients had their fasting blood sugar levels monitored daily to detect hypoglycemia. A diagnosis of hypoglycemia was assigned to those with fasting blood glucose measurements below 81 mg/dL.

Results:
We included a total of 395 individuals with an average age of 53.6 years (±8.7). Of these, 59.0% were male (233 individuals) and 41.0% were female (162 individuals). Regarding diabetes status, 16.7% (66 individuals) were diabetic, while 83.3% (329 individuals) were non-diabetic. Out of 395, hypoglycemia occurred in 17.2% of patients (68 individuals), while 82.8% (327 individuals) did not experience hypoglycemia.

Conclusion:
Hypoglycemia is common among critically ill patients admitted in intensive care unit (ICU).

INTRODUCTION

Disturbances in metabolism are commonly observed among critically ill patients. Both high blood sugar levels (hyperglycemia) and low blood sugar levels (hypoglycemia) have been identified as significant risk factors for negative outcomes in acutely ill patients.[1, 2] These conditions frequently occur and are well-established predictors of mortality in such patients.[3, 4]

Hyperglycemia during critical illness is commonly referred to as "stress hyperglycemia" and is often viewed as an adaptive, physiological response in critically ill patients. In some cases, a certain level of hyperglycemia is even considered advantageous, as elevated blood glucose levels may help ensure an adequate supply of glucose to peripheral tissues during stress.[5, 6]

Intensive glucose management, specifically aiming to maintain blood sugar levels below 110 mg/dL, did not lead to better patient outcomes in ICU admissions. In fact, it appeared to worsen results, likely partly due to medical interventions (iatrogenic hypoglycemia) causing unintended harm.[7, 8] Hypoglycemia has been linked to negative outcomes and higher mortality rates among critically ill patients. It can lead to various complications, including

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functional brain failure, with the risk of permanent brain damage if hypoglycemia is severe and continuous. Other effects include disturbances in heart rate and rhythm, as well as inadequate glucose delivery to vital organs.[9, 10]

The purpose of this study was to assess how often hypoglycemia occurs in critically ill patients. Although guidelines for glycemic control in hyperglycemic individuals have become more comprehensive, there is a lack of research on how hypoglycemia is managed and its outcomes. Recent studies indicate that hypoglycemia significantly increases the risk of death among hospitalized patients. Consequently, understanding the extent of hypoglycemia in this population is essential for improving monitoring and intervention strategies to manage this condition promptly and effectively in critically ill individuals.

Materials and Methods:

This descriptive research involved 395 critically ill patients, including both diabetic and non-diabetic individuals, who were admitted to the intensive care unit between July 2024 and January 2025. The study excluded patients diagnosed with diabetic ketoacidosis or hyperosmolar hyperglycemic states, as well as those undergoing corticosteroid treatment or who had been admitted to the ICU within the previous three months.

Data on patients' age, gender, and primary diagnosis were recorded for each individual. Throughout their ICU stay, all patients had their fasting blood sugar levels monitored daily to detect hypoglycemia. A diagnosis of hypoglycemia was assigned to those with fasting blood glucose measurements below 81 mg/dL. Blood glucose levels were consistently measured each morning during their ICU admission. Any patient who exhibited at least one fasting blood glucose reading under 81 mg/dL during their stay was classified as having developed hypoglycemia.

SPSS version 23.0 was utilized for the data analysis process. Descriptive statistics, including means and standard deviations, were calculated for continuous variables such as age, the time taken to develop hypoglycemia, and the total length of ICU stay. Categorical variables, including gender, diabetes status, primary diagnosis, and occurrence of hypoglycemia, were summarized using frequencies and percentages.

RESULTS:

The baseline characteristics of the study population included a total of 395 individuals with an average age of 53.6 years (±8.7). Of these, 59.0% were male (233 individuals) and 41.0% were female (162 individuals). Regarding diabetes status, 16.7% (66 individuals) were diabetic, while 83.3% (329 individuals) were non-diabetic. The primary diagnoses among the participants were sepsis in 37.2% (147 individuals), thoracic or respiratory diseases in 40.0% (158 individuals), and renal dysfunction in 48 individuals (Table 1).

The study outcomes showed that hypoglycemia occurred in 17.2% of patients (68 individuals), while 82.8% (327 individuals) did not experience hypoglycemia. The average duration to develop hypoglycemia was 35.3 hours with a standard deviation of 12.8 hours. Additionally, the mean total stay in the ICU was 3.4 days, with a standard deviation of 1.6 days (Table 2).

Table 1. Baseline Characteristics (N=395).

Age (Years)	53.6±8.7
Gender (%)	
Male	233 (59.0%)
Female	162 (41.0%)
Diabetes Status (%)	
Diabetic	66 (16.7%)
Non-diabetic	329 (83.3%)
Primary Diagnosis (%)	
Sepsis	147 (37.2%)
Thoracic/Respiratory Disease	158 (40.0%)

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Renal Dysfunction	48 (12.2%)
Gastrointestinal Disease	42 (10.6%)

Table 2. Study Outcomes.

Hypoglycemia (%)	
Yes	68 (17.2%)
No	327 (82.8%)
Duration to develop hypoglycemia (hours)	35.3±12.8
Total Stay in ICU (Days)	3.4±1.6

DISCUSSION:

Dysglycemia includes conditions such as high blood sugar, low blood sugar, and fluctuations in glucose levels. It acts as an indicator of how severe a disease is and is linked to a higher risk of death among critically ill individuals. Patients with diabetes are more susceptible to developing dysglycemia. Attention has been particularly drawn to hypoglycemia because of its connection to intensive insulin therapy, which aims for precise blood sugar management. However, this approach increases the likelihood of hypoglycemia and is associated with greater mortality.[11] Notably, hypoglycemia can occur even without insulin administration in critically ill patients. Those with serious health issues like malnutrition, liver cirrhosis, kidney failure, adrenal insufficiency, or hypothyroidism are at an elevated risk of experiencing these blood sugar disturbances.[12, 13]

The exact pathway linking hypoglycemia to increased mortality rates remains uncertain. Prior research suggests that repeated episodes of low blood sugar may worsen brain ischemic injury, potentially leading to hormonal imbalances and adverse systemic consequences. Additionally, hypoglycemia could cause cellular death and damage to various organs, resulting in serious clinical outcomes. A deeper understanding of the fundamental mechanisms of hypoglycemia and its effects on organ health and patient prognosis is necessary to advance knowledge in this area.[14, 15]

Currently, there is limited data on how common hypoglycemia is among critically ill patients in real-world intensive care units. A retrospective study by Krinsley J.S. et al. at a university-affiliated community hospital found that severe hypoglycemia, defined as blood glucose below 40 mg/dL, occurred in 7.8% of patients.[16] Another study by Egi M. et al., conducted across two Australian hospitals, reported that 22.4% of ICU patients experienced hypoglycemia, with blood glucose levels under 81 mg/dL.[17] Wernly et al. conducted a study on frequency and outcomes of hypoglycemia and hyperglycemia in critical ill patients and reported hypoglycemia in 7.7% patients during the hospital stay.[6] While a study by Lou et al. reported hypoglycemia in 16.8% critically ill patients.[18] Another study by Shea et al. on frequency of hypoglycemia in critically ill patients reported hypoglycemia in 3.78% to 6.15% non-diabetic patients and in 7.23% to 13.14% diabetic patients during hospital stay.[19]

Our research was conducted at a single institution, which may limit the ability to apply the results broadly to other healthcare settings or hospitals. Concerning diabetes diagnosis, we lacked HbA1c and oral glucose tolerance test data, relying solely on medical history. Patients received treatment based on individual physicians' decisions in accordance with international standards, but there was no standardized protocol for managing glucose levels. The increased frequency of laboratory tests in more severely ill patients could introduce selection bias into our analysis. Additionally, we do not have information on specific hypoglycemic symptoms, nor data on enteral or parenteral nutritional intake or insulin therapy.

CONCLUSION:

Hypoglycemia is common among critically ill patients admitted in intensive care unit (ICU).

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