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Original Research Article

Diabetes Mellitus and the Outcome of Critically Ill Patients: A Record-Based, Observational Study

Anshuman[1], Sushant Satya Priya[2], Narendra Kumar[3]

[1]Senior Resident, Department of Anaesthesiology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India
[2]Senior Resident, Department of Anaesthesiology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India
[3]Associate Professor, Department of Anaesthesiology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India

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Corresponding author: Dr. Anshuman
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Abstract

Introduction: Patients with diabetes who are in critical condition are more likely to have complications. However, it is unknown how diabetes would affect ICU outcomes. Additionally, there is a dearth of information from Indian ICUs. In this study, we sought to determine the association between diabetes mellitus and a particular ICU outcome, including ICU stay time, ICU mortality, and ICU cure rate. The value of the capillary blood glucose level at the time of ICU admission and the length of ICU stay was also attempted to be correlated.

Method: This observational study was based on hospital records. The records of patients who were hospitalized in the ICU of ABC IN XYZ were used to collect anonymous data. The record section was used to gather information about the capillary blood glucose level at the time of ICU admission, the length of ICU stay, and ICU mortality.

Results: 80 patients (34.14%) with diabetes were found among the 240 patients whose data were obtained. The length of time spent in the ICU was discovered to be much longer for diabetics than for non-diabetics. ($p = 0.02$) The amount of time spent in the intensive care unit and the capillary blood glucose level at the time of admission were found to be marginally positively correlated. However, there was no statistically significant difference between the two groups in terms of mortality or ICU cure rates.

Conclusion: We deduced from the current study that the existence of diabetes affects the length of an ICU stay and that there is a positive relationship between the capillary blood glucose level at the time of ICU admission and the length of an ICU stay. Diabetes had no effect on ICU mortality or ICU cure rates.

Keywords: Diabetes Mellitus, ICU, ICU mortality.

Introduction

Hyperglycemia is a symptom of several metabolic diseases collectively referred to as diabetes mellitus (DM). The main endocrine epidemic of the modern era is diabetes mellitus [1]. By 2019, there will be 463 million people worldwide who have diabetes, up from 108 million in 1980. Additionally, from 4.7% in 1980 to 9.3% in 2019 [2, the prevalence of diabetes worldwide increased]. We are more concerned about India's considerable contribution to the global diabetes

epidemic. With 69.2 million diabetic patients and a prevalence of 7.8%, India is home to 16–17% of all diabetics worldwide [3].

On the other hand, 5 million patients in India's hospitals each year require admission to an ICU. A considerable part of these extremely ill patients are discharged with some type of sequelae, and regrettably 18.1% of them do not survive. The high frequency of diabetes among these serious patients exacerbates these alarming findings. As the number of type 2 diabetics increases globally, an increasing number of people with diabetes are being brought to the intensive care unit (ICU). According to a study, 38.73% of Indian ICU patients have hyperglycemia [4].

Diabetes patients who are brought to the ICU are now well-aware of their increased risk of complications. [5-7] Diabetes and ICU bloodstream infections have a well-established significant correlation. [8] This could be a result of the disease-related impaired immune cell functioning. [9-10] Nearly all comorbidities, such as renal, cardiovascular, and neuropathic disorders, are more common in people with diabetes [11]. Additionally, diabetes problems can have a direct impact on how ICU patients fare. It has been disputed, nevertheless, how stand-alone diabetes affects a patient's chance of dying in the intensive care unit. The diagnosis of diabetes in the ICU does not always result in an increase in mortality in the majority of ICU settings, according to a recent meta-analysis of 141 studies by Siegelaar et al. [11]. Another study found that entrance glucose levels and higher HbA1c values were predictive with ICU patient mortality [12].

Therefore, it is clear that additional research of this kind is essential to reaching a particular conclusion. Furthermore, the genetic variety and environmental factors that distinguish the Indian population from that of the west make such research all the more important in India. Unfortunately, the Indian subcontinent is severely lacking in this kind of work.

By collecting information from a tertiary care medical college in ABC IN XYZ, this current study aims to determine the relationship between diabetes and ICU outcomes in terms of length of ICU stay and other relevant parameters like mortality and cure-rate at the time of discharge.

The main goal of this study was to determine how diabetes mellitus affected various ICU outcomes. We specifically sought to determine if there was any correlation between diabetes and ICU mortality, ICU stay time, or ICU cure rate. The determination of an association between the capillary blood glucose level at the time of ICU admission and the length of ICU stay was a secondary goal.

Method

This study used observational, retrospective, and data from records. After receiving approval from ABC IN XYZ's institutional ethics committee, the study was carried out. The institutional ethics committee of ABC granted permission after receiving ethical clearance. The records of patients admitted to the BMC critical care unit between January 2020 and March 2021 were taken into consideration for the study's objectives. Since patients were not directly involved in the trial, all data were collected anonymously. So, the IEC granted a waiver of consent. Patients who had no documentation of their blood glucose levels during their hospitalisation were not included in the study.

From the patients' charts, the following information was gathered. Age, gender, occupation, date of hospitalisation, length of stay, history of diabetes mellitus at the time of admission, capillary blood glucose level at the time of admission, lipid profiles, all blood glucose measurements taken while in the ICU, date of hospital discharge, or date of death in the ICU. Following this, eligible patients were divided into two groups based on the presence or absence of

diabetes mellitus as determined by the glycemic measurements taken during their ICU stay. The American Diabetic Association's most recent case definition of Diabetes Mellitus was taken into account. All of the gathered information was collated and examined in order to make conclusions.

Statistical Analysis:

To determine whether there is a link between diabetes mellitus and mortality, Fisher's exact test was employed. The same test was also used to examine the link between ICU cure rates for patients with diabetes mellitus. The independent sample t test was used to compare the mean length of stay in the ICU between the two groups in order to assess the link between Diabetes Mellitus and length of stay. It was determined that the 95% Confidence Interval was statistically significant. The statistical analysis plan included getting a scatter plot to see if there was any linear relationship between the capillary blood glucose level at the time of ICU admission and the length of stay and if there was, calculating the Pearson's product-moment correlation coefficient "r" to gauge how strong the relationship was.

Results

240 patients in total met the study's eligibility requirements. 80 of them (34.14%) were found to have diabetes, with the remaining 160 individuals not having the disease. Table 1 describes baseline characters.

Table 1: Baseline characteristics of diabetes and non-diabetics groups.

Characteristics	Diabetics	Non-Diabetics	Total	P-Value
Age	51.28±1.58	55.08±2.41	53.97±1.35	0.312
Gender				
Male	54.6%	46.8%	49.5%	0.05
Female	45.2%	53.0%	51.3%	0.06
Lipid Profile				
Total cholesterol	194.22±2.22	188.34±4.22	190.11±3.11	0.085
Triglyceride	133.07±3.20	128.24±2.21	130.97±2.88	0.127
HDL-C	43.03±3.10	45.04±2.33	44.80±2.08	0.242
LDL- C	89.08±2.02	87.08±2.22	87.97±2.77	0.347

Age, gender, lipid profile, and occupation did not significantly differ between the two groups. The distribution of baseline morbidities, however, varied significantly between the two groups.

It was discovered that 28.52% of diabetic patients did not survive, as opposed to 22.21% of non-diabetics. Despite the fact that the mortality rate among diabetics was greater, Fisher's exact test revealed no statistically significant difference in mortality between the two groups. However, a comparison of the two groups' average length of ICU stays showed that diabetics had statistically significantly longer stays. The existence or absence of sequelae at the time of ICU release was used to determine the ICU cure rate. The absence of sequelae suggested healing. On the basis of the ICU cure rate, there was no statistically significant difference detected between the two groups.

The Pearson product-moment coefficient revealed a somewhat positive connection between the capillary blood glucose level at the time of ICU admission and the length of ICU hospitalization.

Discussion

To determine the impact of diabetes mellitus on various ICU outcomes, we conducted a retrospective, record-based study. The results of our investigation demonstrated a relationship between

diabetes mellitus and the average length of ICU hospitalisation. The amount of capillary blood glucose at the time of ICU admission and the length of ICU stay also happened to be significantly correlated.

Siegelaar SE et al. found no correlation between the existence of stand-alone diabetes mellitus and risk of mortality in a meta-analysis that included 141 trials [12].

Although there was a greater death rate among diabetics in our study, there was no statistically significant difference in mortality between the two groups. It was discovered that 28.52% of diabetic patients did not survive, as opposed to 22.21% of non-diabetics. The comparatively limited sample size may have contributed to the lack of statistical significance.

The comparatively limited sample size may have contributed to the lack of statistical significance. According to Dharmalingam M. et. alstudy, .'s which was represented in this one, 38.73% of ICU patients in India are hyperglycemic. Hospitalized patients' death has been associated to stress-induced hyperglycemia (13,14). It happens as a result of hormones and cytokines that act as counterregulators, increasing gluconeogenesis and insulin resistance [15]. Zaman A study by El Al shown that dysglycemia brought on by intensive care unit admission was linked to an overall lengthier length of stay for all patients. [16] This stress-induced hyperglycemia may have confounded the outcome factors in our study as well. [17]

HbA1c was found to be strongly linked with ICU mortality in patients with previously undetected diabetes mellitus, according to a study by Mahmoodpoor A et al. [13] .The lack of data on glycated haemoglobin continued to be a problem in our investigation.

Conclusion:

Increased mean ICU stay time was linked to diabetes mellitus. Between the value of RBS at the time of ICU admission and the length of ICU hospitalization, a significant linear association also existed. Despite a higher percentage of diabetes patients dying, there was no statistically significant difference in ICU mortality or ICU cure rates between diabetics and non-diabetics. It is suggested that future research involve a bigger study population.

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