RESEARCH ARTICLE

CLINICAL PROFILE OF HYPERGLYCEMIA IN MEDICAL ICU: AN OBSERVATIONAL STUDY AT A RURAL TERTIARY CARE CENTRE

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ARTICLE INFO

ABSTRACT

Background and aim: Hyperglycemia in ICU is associated with increased risk of mortality. This study determined hyperglycemia in critically ill patients. Methods: It was a hospital-based observational study conducted in the department of medicine of Dr. Rajendra Prasad Government Medical College and Hospital, Kangra (at Tanda) a tertiary care referral hospital. All patients above the age of 18 years with hyperglycemia during hospital stay in Medical ICU setting and willing to participate in this study were included. In hospital hyperglycemia was defined as any glucose value >7.8 mmol/l (140 mg/dl).Patients were labeled on the basis of their glycemic status on admissionto Medicine ICU as admission hyperglycemia or having any RBS value>140mg/dl during ICU stay. Results: Mean age of the patients was 60.33 ± 15.2 years. Sixty-two percent of the patients aged above 60 years. 50.5% were males. 37.14% were smokers, 36.19% were alcoholics, and 9.5% were vegetarian**.** 53 patients (50.4%) were known diabetics and 52 patients(49.53%) had no prior history of diabetes and had presented with new hyperglycemia. 75 patients had ECG changes, majority of which were ST elevation (22%) followed by sinus bradycardia/ tachycardia (22%) and ST depression (17%). 11 patients(10%) had LVH while 7 patients (7%) had BBB/CHB. 3 patients (3%) had evidence of arrhythmia. Conclusion: Hypoglycemia is more common in elderly and had a higher risk of ACS.

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INTRODUCTION

Hyperglycemia is a common co-morbidity of critical illness. Hyperglycemia (blood glucose $\geq$140 mg/dl [7.8 mmol/L] is a common finding in hospitalized patients and may be due to previously diagnosed diabetes, undiagnosed diabetes, medications, or stress-induced hyperglycemia (Dhatariya, 2020). It is an adaptive immune-neurohormonal response to physiological stress in an attempt to increase metabolic substrates to struggling organs during a time of crisis. However, this acute hyperglycemia is also responsible for a number of detrimental effects implying that treatment is necessary. Hyperglycemia in the critical care setting is associated with poor prognosis inpatients with no history of DM. This association is well documented for both admissions and the mean glucose level during the hospital stay (Dungan, 2009; Inzucchi, 2006). Diabetic patients do not share the same mortality with hyperglycemia as non diabetic patients, and that these diabetic patients may benefit from higher glycemic ranges to reduce the risk of hypoglycemia and glycemic variability (Egi, 2008). The present study determined the clinical profile of hyperglycemia in ICU.

PATIENTS AND METHODS

It was a hospital-based observational study conducted in the department of medicine of Dr. Rajendra Prasad Government Medical College and Hospital, Kangra (at Tanda) a tertiary care referral hospital. All patients above the age of 18 years with hyperglycemia during hospital stay in Medical ICU setting and willing to participate in this study were included. Patients with hemoglobinopathies, on hemodialysis, blood transfusions andiron deficiency anaemia or Chronic Kidney disease, and/or who did not consent to be the part of this study were excluded. In hospital hyperglycemia was defined as any glucose value >7.8 mmol/l (140 mg/dl).Patients were labeled on the basis of their glycemic status on admission to Medicine ICU as admission hyperglycemia or having any RBS value>140mg/dl during ICU stay.

Patients were further categorized as follows on the basis of diabetic status andHbA1c levels :

If patient was a known diabetic

- Well controlled diabetic if HbA1c $\leq$7%

- Uncontrolled diabetic if HbA1c >7%

If patient had no prior history of diabetes mellitus:

- Stress-induced hyperglycemia if HbA1c <6.5%
- Newly diagnosed diabetes mellitus if HbA1c >6.5%

Patients with Pre-Diabetes

- HbA1c 5.7 to 6.4%

**Data analysis:** Data were presented as frequency, and percentage

RESULTS

General characteristics: Table 1 shows general characteristics. A total of 105 patients were included in this study. Mean age of the patients was 60.33 ± 15.2 years. Sixty-two percent of the patients aged above 60 years. 50.5% were males. 37.14% were smokers, 36.19% were alcoholics, and 9.5% were vegetarian.

Table 1. General characteristics

|	Frequency	Percentage
Age (Years)		
≤40	*10*	*9.52%*
41-50	*16*	*15.24%*
51-60	*15*	*14.29%*
61-70	*41*	*39.05%*
>70	*23*	*21.90%*
Gender		
Male	53	50.5%
Female	52	49.5%
Smokers	39	37.14%
Alcoholics	38	36.19%
Diet		
Veg	10	9.5%
Mixed	95	90.5%

Co-morbidities: Hypertension was the most common co-morbidity (39%) followed by coronary artery disease (11.4%), and COPD (7.6%) (Figure 1).
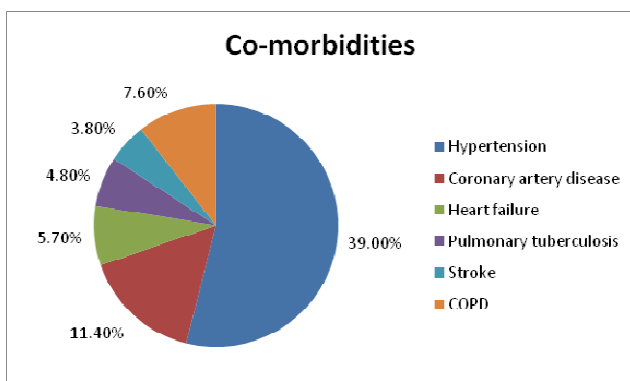

Figure 1. Co-morbidities

Distribution of hyperglycemia: Out of total 105 patients, 53 patients (50.4%) were known diabetics and 52 patients(49.53%) had no prior history of diabetes and had presented with new hyperglycemia. Based on HbA1c levels, patients were further categorized. Out of the total 105 patients, 42 patients (40%) i.e majority were found to have uncontrolled diabetes. 21 patients (20%) had pre diabetes. 16 patients (15%)

had newly diagnosed diabetes whereas 15 patients (14%) were diagnosed as having stress induced hyperglycemia. 11 patients (10%) had well controlled diabetes (Figure 2).
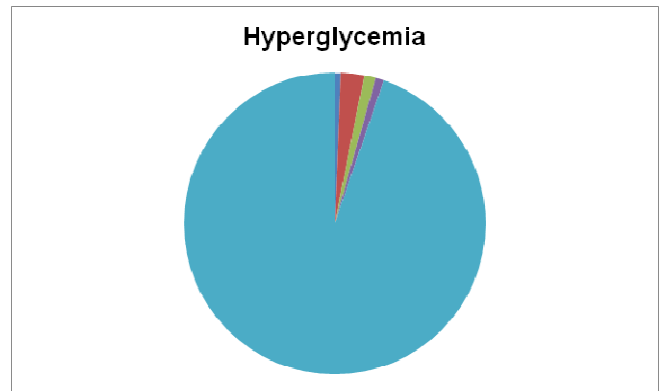
Figure 2. Distribution of hyperglycemia

ECG findings: Normal ECG was seen in only 30 patients while 75 patients had ECG changes, majority of which were ST elevation (22%) followed by sinus bradycardia/ tachycardia (22%) and ST depression (17%). 11 patients(10%) had LVH while 7 patients (7%) had BBB/CHB. 3 patients (3%) had evidence of arrhythmia (Figure 3).
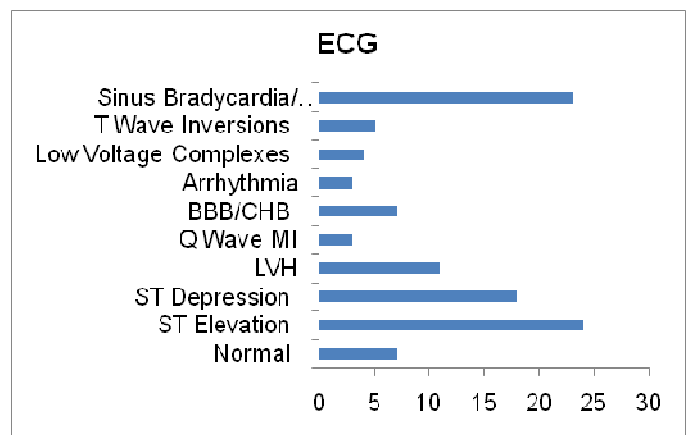
Figure 3. ECG findings

DISCUSSION

In this study, mean age of the patients was 60.33 ± 15.21 years with 61% aged above 60 years. Finney *et al*studied hyperglycemia in 531 critical ICU patients in UK and reported a median age of 64 years with 50% of the patients ranging between 54-71 years (Finney, 2003). Similarly, Godinjak *et al* reported that mean age of patients to be 61.54 ± 16.9 years ranging from 21-88 years (Godinjak, 2015). These were similar to our study having mean age of around 60 years. Dhakal *et al* reported a near equal distribution of gender with 32 males and 34females.[7] In the study by Godijnak *et al*, out of 100 patients, 55% were male and45% female.[6] Similar to this, in our study, there was a near equal distribution of gender distribution with 50.5% males and 49.5% females. Although all of our patients had in hospital hyperglycemia based on the inclusion criteria, out of total 105 patients, 50.4% were known diabetics and 49.5% had no previous history of diabetes. Based on HbA1c level, 14% had stress induced hyperglycemia, 40% with uncontrolled diabetes, 20% with pre-diabetes, 15% with newly diagnosed diabetes while 10% had well-controlled

diabetes. In a study by Sharma *et al*, frequency of stress hyperglycemia in the medical ICU was 20.33%. (2017) Our study finding is also lower than what was reported by Di Nardo *et al*. (2004) that one-third (33.33%) of patients in tertiary care facilities were non diabetic hyperglycemic and Corstjens *et al*. (2006) that 23% of non diabetic patients had blood glucose levels above 11.1 mmol/L (200 mg/dl) upon admission. In this study, abnormal ECG were found in 75 patients, majority of them presented with CAD, including ACS, ADHF or arrhythmia or myocarditis. Presence of arrhythmia was seen in only 6.7% of a total number of cases in ICU. Frontera *et al* found that arrhythmia occurred in 4.3% (n = 25) of hyperglycemic patients. Atrial fibrillation and flutter were the most common arrhythmias, occurring in 76% (n =19) of these patients (Frontera, 2008).

Conclusion

In our study, the profile of patients with hyperglycemia was observed in ICU setting. There was a near equal gender distribution with most patients being above 60 years of age with majority of them falling in the uncontrolled diabetes category with most common ICU diagnosis being that of ACS in cardiovascular system.

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