RESEARCH ARTICLE

Association of Hyponatremia and Severity of ST Elevation Myocardial Infarction

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ABSTRACT

Background and aim: ST Elevation Myocardial Infarction (STEMI) occurs from occlusion of one or more of the coronary arteries due to abrupt disruption of blood flow which is usually due to plaque rupture, erosion, fissuring, or dissection of coronary arteries that results in an obstructing thrombus. Hyponatremia is a common electrolyte disturbance that is seen frequently in clinical practice. It is also common in patients with myocardial infarction. We tried to study the association between hyponatremia and the severity of STEMI.

Materials and methods: A hospital-based study was done on patients of STEMI fitting in inclusion and exclusion criteria attending the OPD/IPD of Mahatma Gandhi Hospital, Jaipur, Rajasthan, India.

Results: STEMI patients with hyponatremia had reduced ejection fraction as compared to nonhyponatremic patients.

Conclusion: This study concluded that in STEMI patients, decreased sodium levels can be an indicator of worse prognosis as compared to patients with normal sodium levels.

Keywords: Hyponatremia, Killip class, Left ventricular ejection fraction (LVEF), ST elevation myocardial infarction, Troponin-I.

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INTRODUCTION

ST Elevation Myocardial Infarction (STEMI) is an event in which transmural myocardial ischemia results in myocardial injury or necrosis.[1] The current 2018 clinical definition of Myocardial Infarction (MI) requires the confirmation of the myocardial ischemic injury with abnormal cardiac biomarkers.[2] It is a clinical syndrome involving myocardial ischemia, ECG changes and chest pain.

ST Elevation Myocardial Infarction occurs from occlusion of one or more of the coronary arteries due to abrupt disruption of blood flow which is usually due to plaque rupture, erosion, fissuring or dissection of coronary arteries that results in an obstructing thrombus. The major risk factors for STEMI are hypertension, smoking, dyslipidemia, diabetes mellitus, and family history of coronary artery disease.[3,4]

Hyponatremia, which refers to a serum sodium (sNa) concentration <135 mmol/L, is a common electrolyte disturbance frequently seen in clinical practice.

Due to neurohormonal activation in STEMI, there is release of hormones such a vasopressin, renin, and norepinephrine. Hyponatremia is a reflection of these hormonal changes. It has been identified as an independent predictor of short-term mortality, long-term mortality and rehospitalization for heart failure. Therefore, the study was undertaken to assess the association of hyponatremia and severity of STEMI.

MATERIALS AND METHODS

This is a hospital based observational study. It was conducted in Department of General Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan, India. A total of 50 cases of STEMI were considered as sample size.

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Inclusion Criteria

Patients with MI having chest pain of more than 20 minutes, ECG change suggestive of STEMI, elevation of Troponin I (Trop-I) level and given written consent for the study.

Exclusion Criteria

Patients who have not given written consent, patients with acute coronary syndrome without ST elevation in ECG, patients with hyponatremia due to integumentary loss (sweating, burning), hyponatremia due to GI loss (vomiting, diarrhea, obstruction, and fistula), hyponatremia due to renal losses (osmotic diuresis, hypoaldosteronism) and hyponatremia due to drugs (e.g., diuretics).

RESULTS

A total of 50 cases of STEMI were considered as sample size (Tables 1 to 5).

Table 1: Distribution of patients based on gender

Gender	No. of cases (n)	Percentage
Male	34	68
Female	16	32

Table 2: Distribution of patients based on age

Age-group	No. of cases (n)	Percentage
<50 years	6	12
>50 years	44	88

Table 3: Distribution of patients based on hyponatremia

Hyponatremia	No. of cases (n)	Percentage
Yes	28	56
No	22	44

Table 4: Comparison of various variables with hyponatremia

	Hyponatremia				
	Yes		No		
Variables	Mean	SD	Mean	SD	p-value
Trop-I	0.85	0.79	0.72	0.59	0.51
LVEF (%)	36.25	9.19	40.90	6.83	0.03

Table 5: Comparison of various variables with Killip class

	Killip class						
	I		II		III/IV		
Variables	Mean	SD	Mean	SD	Mean	SD	p-value
Trop-I	0.48	0.34	0.69	0.22	2.42	0.70	0.0001
LVEF (%)	44	4.08	36.05	5.15	21.66	4.08	0.0001
Sodium	134.08	5.09	133.31	4.06	130.83	2.85	0.29

Discussion

In this study, a total of 50 patients were included; out of which 34 (68%) were males and 16 (32%) were females.

In this study when we compared hyponatremic patients with nonhyponatremic patients, the difference in left ventricular ejection fraction (LVEF) was found statistically significant (36.25% in hyponatremic vs 40.9% in nonhyponatremic patients). However the Trop-I difference between these two groups is not statistically significant, although mean Trop-I is found to be higher in

hyponatremic patients (0.85) as compared to non hyponatremic patients (0.72).

In our study, no statistically significant difference in sodium was found between different Killip classes; however the mean sNa level was seen decreasing with worsening Killip class. (Mean sodium in Killip I, II and III/IV were 134.08, 133.31, and 130.83, respectively)

Our results also revealed that LVEF was significantly low in Killip class III/IV, that is, 21.66% compared to Killip class II (36.05%) and Killip class I (44%). Trop-I was significantly high in Killip class III/IV, that is, 2.4 as compared to Killip class II (0.69) and Killip class I (0.48). This decreasing trend of LVEF and increasing trends of Trop-I with Killip class in STEMI patients could be an important morbidity indicator.

Conclusion

Our study concluded that more than half of the STEMI patients had hyponatremia and these patients had significantly low LVEF compared to nonhyponatremic patients which indicated that hyponatremia could be an important morbidity indicator in STEMI patients. However, this study did not find any correlation between hyponatremia with Trop-I.

Our study also concluded that STEMI patients showed a decreasing trend of LVEF and increasing trends of Trop-I with worsening Killip class. So this parameter could be used as an important morbidity and severity indicators of post-MI morbidity.

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