Examine the Frequency and Short Term Outcomes of Hyponatremia in Patients with Acute ST Elevation Myocardial Infarction

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ABSTRACT

Aim: To examine the frequency of hyponatremia and associated short term outcomes such as mortality during hospitalization and heart failure in patients presented with acute myocardial infarction.
Study design: Cross-sectional/observational
Place and duration: North West General Hospital Peshawar 1st January 2019 to 30th June 2019
Methods: Total 165 patients of both genders having ages 20 to 70 years presented with acute myocardial infarction were enrolled in this study. Patient's detailed demographics were recorded. Blood samples were taken to examine the serum sodium level. Hyponatremia was defined as serum sodium level <135 mmol/L. Outcomes such as mortality and heart failure were examined.
Results: 103(62.42%) were male while 37.58% were females with mean age 56.14±10.46 years. Hyponatremia was found in 58(35.15%) patients while 107(64.85%) had sodium level >135mmol/L. Among hyponatremic patients 30(51.72%) were died and 22(37.93%) patients had acute heart failure during hospital stay. A signification association was observed between hyponatremia and in-hospital mortality and acute heart failure with p-value <0.05.
Conclusion: Frequency of hyponatremia in acute myocardial infarction patients was high and highly associated with in-hospital mortality and acute heart failure.
Keywords: ST segment, Myocardial infarction, Hyponatremia, Mortality, Heart failure

INTRODUCTION

Cardiovascular diseases, especially STEMI and heart failure have been known to cause 17.3 million deaths worldwide annually.[1-3]Hyponatremia, which refers to a serum sodium concentration <135mmol/l is a common electrolyte disturbance that is seen frequently in clinical practice. Moreover, previous studies have shown the prevalence of hyponatremia in patients suffering from STEMI ranges between 12.5%-23.2%[4] and close to 25% in patients with HF[5].

Hyponatremia is a common electrolyte disorder amongst hospitalized patients, especially in postoperative period3 and in patients with heart failure, nephrotic syndrome or cirrhosis[6,7]. Hyponatremia has been shown to be a predictor of cardiovascular mortality among patients with heart failure[8]. In fact, the neurohormonal activation that accompanies acute myocardial infarction is similar to that which accompanies heart failure. Hyponatremia is common after MI, and clinical improvement is accompanied rise in plasma sodium concentration[9]. However, while the prognostic value in hyponatremia in chronic heart failure is well established[10], data on the prognostic importance of hyponatremia in the setting of acute myocardial infarction are lacking.

Hyponatremia is a predictor of CV mortality in subjects with cardiac failure and a common issue after MI and

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proper management with clinical improvement leads to stabilization of serum sodium level.[11,12] The prognostic importance of hyponatremia in congestive cardiac failure is well documented formerly while the literature on the prognosis of hyponatremia in context to acute myocardial infarction is still lacking. The present study was conducted aimed to examine the frequency of hyponatremia and associated outcomes in patients with acute myocardial infarction.

MATERIALS AND METHODS

This cross-sectional/observational study was conducted at Department of Cardiology North West General hospital Peshawar from 1stJanuary 2019 to 30thJune 2019. One hundred and sixty five patients of both genders presented with acute ST segment myocardial infarction were enrolled in this study. Patient's ages were ranging from 20 to 70 years.Patient's detailed demographics including age, sex, co-morbidities such as hypertension, diabetes mellitus, smoking, and obesity were recorded. Patients with acute renal failure, patients with chronic liver diseases, patients with congestive heart failure and those with no consent were excluded. Blood samples were taken from all the patients to examine the serum sodium level at admission and at 48 hours. Hyponatremia was defined as serum sodium level <135 mmol/L. Outcomes such as mortality during hospital stay and acute heart failure were examined. All the data was analyzed by SPSS 24. Chi-square test was done to compare the outcomes between hyponatremic

and non-hyponatremic patients to examine the association with p-value <0.05 was taken as statistically significant.

RESULTS

There were 103 (62.42%) males while 37.58% were females with mean age 56.14±10.46 years. Mean BMI was 27.16±3.34 kg/m². Hypertension was found to be most common co-morbidity in 74 (44.85%) followed by diabetes mellitus, smoking, dyslipidemia, obesity and family history of cardiovascular diseases in 40 (24.24%), 36 (21.82%), 20 (12.12%), 18 (10.91%) and 15 (9.09%) patients respectively (Table 1). At admission mean serum sodium level was 136.48±8.25 mmol/L and at 48 hours mean sodium level was 136.85±12.44 mmol/L. Hyponatremia was found in 58 (35.15%) patients (sodium level <135 mmol/L) while 107 (64.85%) had sodium level >135mmol/L (Fig. 1).

Among all the patients during hospital stay we found that overall 35 (21.21%) patients were died and 40 (24.24%) patients had acute heart failure. Among all the hyponatremia patients 30/58 (51.72%) were died and 22 (37.93%) had acute heart failure and among non-hyponatremic patients 5/107 (4.67%) were died and 18/107 (16.82%) patients had acute heart failure. A significant association was observed between hyponatremia and in-hospital mortality and heart failure with p-value <0.5 (Table 2).

Table 1: Demographical details of all the patients

Variable	No.	%
Age (yrs)	56.14±10.46	
Gender		
Male	103	62.42
Female	62	37.58
Co-morbidities		
Hypertension	74	44.85
Diabetes Mellitus	40	24.24
Smoking	36	21.82
Dyslipidemia	20	12.12
Obesity	18	10.91
Family history of CVD	15	9.09
BMIkg/m²	27.16±3.34	

Figu1: Frequency of hyponatremia among all the AMI patients
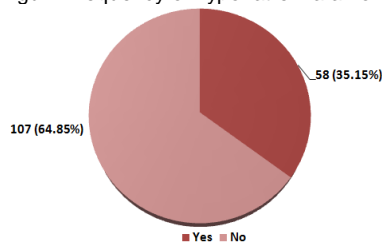
Table 2: Outcomes associated with hyponatremia

Variable	Normal sodium Level	Hyponatremia	P value
Died			
Yes	5 (4.67%)	30 (51.72%)	<0.001
No	102 (95.32%)	28 (48.28%)	
Acute heart failure			
Yes	18 (16.82%)	22 (37.93%)	0.02
No	89 (83.18%)	36 (62.06%)	

DISCUSSION

Acute myocardial infarction is one of the most common disorders found all over the world and associated with high rate of morbidity and mortality.[13] Many of previous studies demonstrated that electrolyte disorders like hyponatremia is highly associated with adverse outcomes in patients with acute ST segment myocardial infarction.[14,15] We conducted present study to examine the frequency of hyponatremia and its association with in-hospital mortality and acute heart failure in patients with acute myocardial infarction.In this regard 165 patients of both genders presented with acute myocardial infarction were enrolled. Majority of patients 62.42% were males while 37.48% were females with mean age 56.14±10.46 years. Mean BMI was 27.16±3.34 kg/m². These results showed similarity to many of previous studies in which males patients population was high 55% to 65% as compared to females and the majority of patients were ages above 45 years.[16,17]

In present study we found that hypertension was found to be most common co-morbidity in 74 (44.85%) followed by diabetes mellitus, smoking, dyslipidemia, obesity and family history of cardiovascular diseases in 40 (24.24%), 36 (21.82%), 20 (12.12%),18 (10.91%) and 15 (9.09%) patients respectively. A study conducted by Jamilet al[18] reported that hypertension was the most common co-morbidity found in STEMI patients 47.2% followed by diabetes mellitus, dyslipidemia and obesity. Many of other studies demonstrated that hypertension was the most frequent co-morbidity among acute myocardial infarction patients.[19,20]

In our study hyponatremia was found in 58 (35.15%) patients while 107 (64.85%) patients had normal serum sodium level. A study conducted by Hashmiet al[21] reported that hyponatremia was found in 75% patients among acute myocardial infarction patients. Jamilet al[18] reported that among 159 acute STEMI patients hyponatremia found in 35 (22%) patients.

A study by Tang et al[22] regarding relationship between hyponatremia and in-hospital mortality reported that hyponatremia was found in 212 (13.1%) patients among 1620 STEMI patients.

We found that among all the hyponatremia patients 30/58 (51.72%) were died and 22 (37.93%) had acute heart failure and among non-hyponatremic patients 5/107 (4.67%) were died and 18/107 (16.82%) patients had acute heart failure. A significant association was observed between hyponatremia and in-hospital mortality and heart failure with p-value <0.5. These results showed similarity to many of previous studies in which hyponatremia was highly associated with increased in-hospital mortality and acute heart failure.[23,24] A meta-analysis by Ma et al[25] reported that hyponatremia has a significant prognostic value for short- and long-term adverse event in patients after acute coronary syndromes. Adhityaet al[26] reported that mortality rate was significantly high in patients with hyponatremia as compared to patients with normal sodium level with p-value <0.05.

CONCLUSION

Electrolyte disorders highly contributed increased rate of in-hospital mortality and adverse life threatening outcomes.

We concluded that frequency of hyponatremia in acute myocardial infarction patients was high and highly associated with in-hospital mortality and acute heart failure.

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