ST ELEVATION MYOCARDIAL INFARCTION;
HYPONATREMIA AND ITS PROGNOSTIC IMPORTANCE

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ABSTRACT… OBJECTIVE: To evaluate the frequency of hyponatremia and its prognostic importance in ST elevation myocardial infarction. **Period:** Six months. **Design:** Case series. **Setting:** Tertiary care hospital Hyderabad. **Methods:** All the cases with ST elevation myocardial infarction admitted in the CCU were recruited and evaluate for serum sodium level at admission and then at 24, 48 and 72 hours. The data was analyzed in SPSS 16 and the frequency and percentage was calculated. **Results:** One hundred patients with acute myocardial infarction were recruited and assessed for sodium level. The mean age $\pm$SD of whole population was 57.52$\pm$9.51 whereas in male and female population it was 58.72$\pm$7.53 and 53.84$\pm$7.93 respectively. The sodium level was 130.21$\pm$3.42 and 127.41$\pm$4.21 in male and female population. The p-value was statistically significant ($<$0.01) in context to age and sex whereas the age in context to hyponatremia is non significant (p=0.77). The hyponatremia and its severity was statistically significant in context to sex (p=0.04) and duration of the myocardial infarction (p=0.03). The serum sodium level in context to duration of MI was also significant (p=0.03) whereas the mortality at the end of 30 days was 11% of which 02 patients had normal sodium level while the 09 had low sodium level (hyponatremia). **Conclusion:** Hyponatremia in patients with acute STEMI is a important predictor of thirty days mortality.

Key words: Hyponatremia, prognosis, myocardial infarction & mortality.

INTRODUCTION

Myocardial infarction is a medical emergency and has physical, economic and psychological effects on human being.[1] Despite advanced literature and awareness, the acute MI yet a big health issue in the developing countries.[2,3] Beside the burden of infectious disorders, the atherosclerosis and ischemic / coronary heart diseases is increasing in developing countries.[4-6] The primary preventive programs at community level are best tools as far as AMI prevention and management is concerned.[7] Hyponatremia is a major electrolyte disturbance in ill subjects, especially in postoperative period and in volume overloaded cases and Its homeostasis play a major role in the cellular function.[8-10] By detecting the etiology of hyponatremia the complications can be reduced and improve the survival.[11-15] Hyponatremia is a predictor of CV mortality in subjects with cardiac failure and a common issue after MI and proper management with clinical improvement leads to stabilization of serum sodium level.[16-19]

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.

This study was conducted to evaluate the frequency of hyponatremia in subjects with acute ST elevation MI and to assess its importance in predicting survival and mortality.

PATIENTS AND METHODS

The case series study was conducted in department of cardiology at Liaquat University Hospital from January 2013 to June 2013. All the patients $\geq$35 years of age, either gender presented with chest pain typical, shortness of breath / discomfort for 20-30 minutes were assessed for AMI thru ECG, cardiac enzymes and the diagnosed subjects were admitted in coronary care unit (CCU) for emergency management and were recruited in the study. The informed consent (by attended of the patients) was

taken after explaining the procedure of the study. The exclusion criteria of the study were the patients with acute coronary syndrome, the subjects on diuretic, vaptans or demeclocycline therapy, knows cases of nephrotic, hypothyroidism, or malabsorption syndrome and pregnant ladies. The plasma sodium concentration was noted at admission and at 24, 48 and 72 hours and the value <135 mmol/L was labeled as low or hyponatremia. The severity of hyponatremia was categorized as: 130-135 mmol/L (mild), 125–130 mmol/L (moderate) and <125 mmol/L (severe).[20]The outcome was observation of mortality and survival within 30 days after myocardial infarction in relation to sodium level. The patients were followed-up for thirty days by advising them to visit the out patient department or visit at their house whatever was possible.

The proforma was designed to collect the data and all the clinical maneuvers were by the collaboration of whole research team. Then the data was saved and analyzed in SPSS 16. The frequency and percentage (%) was calculated while the mean ± SD was computed for numerical variables. The stratification was done for age and gender, the chi-square test was used for categorical variables and independent sample t-test was applied to compare the means at 95% confidence interval and the level of significance was p-value ≤0.05.

RESULTS

One hundred patients of acute myocardial infarction were observed for serum sodium level. The mean age ±SD forwhole population was 57.52±9.51 whereas it was 58.72±7.53 and 53.84±7.93 in male and female population. The mean ±SD of plasma sodium level was 130.21±3.42 and 127.41±4.21 in male and female population. The age in relation to sex and hyponatremia is presented in Table-I and II while sex in context to hyponatremia is presented in Table-III. The severity of hyponatremia in context to duration is displayed in Table-IV whereas the serum sodium level in context to duration is presented in Table-V. The mortality at the end of thirty days in context to normal and hyponatremic individuals is mentioned in Table-VI.

		GENDER		Total
		Male	Female	
AGE	35-39	5	4	9
		7.4%	12.5%	9.0%
	40-49	22	6	28
		32.4%	18.8%	28.0%
	50-59	14	17	31
		20.6%	53.1%	31.0%
	60-69	23	3	26
		33.8%	9.4%	26.0%
	70 +	4	2	6
		5.9%	6.3%	6.0%
Total		68	32	100
		100.0%	100.0%	100.0%

Table-I. The age in context to gender
*p-value <0.01

		Hyponatremia		Total
		Yes	No	
AGE	35-39	7	2	9
		9.3%	8.0%	9.0%
	40-49	22	6	28
		29.3%	24.0%	28.0%
	50-59	21	10	31
		28.0%	40.0%	31.0%
	60-69	21	5	26
		28.0%	20.0%	26.0%
	70 +	4	2	6
		5.3%	8.0%	6.0%
Total		75	25	100
		100.0%	100.0%	100.0%

Table-II. The age in context to hyponatremia
P value 0.77

		HYPONATREMIA		Total
		Yes	No	
GENDER	Male	55	13	68
		73.3%	52.0%	68.0%
	Female	20	12	32
		26.7%	48.0%	32.0%
Total		75	25	100
		100.0%	100.0%	100.0%

Table-III. The gender in context to hyponatremia
*P value 0.04

		DURATION		Total
		On admission	Within 72 hours	
SEVERITY	Mild	11	8	19
		44.0%	16.0%	25.3%
	Moderate	8	25	33
		32.0%	50.0%	44.0%
	Severe	6	17	23
		24.0%	34.0%	30.7%
Total		25	50	75
		100.0%	100.0%	100.0%

Table-IV. The severity of hyponatremia in relation to duration
P value 0.03

Duration	n = 75	Mean ± SD of serum sodium	P-value
On admission	25 (33.3%)	127.6000 ± 4.06	
Within 72 hours	50 (66.6%)	129.5880 ± 3.77	0.03*

Table-V. The mean ± sd of serum sodium level in context to duration

	Sodium level			
	Normal	Hypona-tremia on admission	Hypona-tremia within 72 hours	Total
Number of patients	25	25	50	100
Mortality at the end of 30 days	02	04	05	11

Table-VI. The serum sodium status in relation to mortality

DISCUSSION

The subjects with acute myocardial infarction and hyponatremaia on admission or developed hyponatremia during hospitalization labeled as high risk population.

In present series the subjects with acute ST elevation myocardial infarction had hyponatremia on admission in 25 cases while 50 subjects had hyponatremia during the first seventy two hours of hospitalization.

The study by Goldberg A, et al observed that hyponatremia was detected in 12.5% patients and it developed in 9.9% cases during the first 72 hours of hospitalization. [19]

In present series eleven deaths occurred within thirty days of admission, of which two was without hyponatremia, and nine cases with hyponatremia on admission as well as during seventy two hours of hospitalization. The study by Goldberg A, et al, total of 10% mortality occurred within thirty days of admission and 6.2% cases were without hyponatremia. [19]

In our series, we noted a pattern of increasing

mortality to the severity of hyponatremia. We divided subjects into three categories depending on the serum sodium level (hypontaremia) in AMI, i.e. mild 25.3%, moderate 44% and severe 30.7%. This was consistent with the study published in 2004 which shown directly proportional relationship between mortality & severity of hyponatremia. [19]

Our study is consistent to the study by Goldberg A, et al, who observed hyponatremia was associated with thirty days mortality. [19] Flear CT et al, reported high hospital mortality rate in patients with sodium level <130 mmol/L. [21]

It was observed that the development of hyponatremia is a biochemical marker for prognostic importance i.e. left ventricular dysfunction severity, hemodynamical changes and neurohumoral activation. [22, 23]

Therefore in our study, we concluded that hyponatremia at admission or early hyponatremia in cases with acute STEMI is a predictor of thirty days mortality.

CONCLUSION

The hyponatremia in subjects with acute STEMI is a predictor of thirty days mortality and serum Na+ levels act as a biochemical marker to detect the patients at risk.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Syed Fasih Ahmed Hashmi	Contribution to conception and design, acquisition of data, analysis and interpretation of data.	
2	Dr. Mashooq Ali Dasti	Drafting the article and shares its expert research opinion and experience in finalizing the manuscript.	
3	Dr. Nisar Ahmed Shah	Contributed in conception and interpretation of data and give his expert view for manuscript designing.	
4	Dr. Syed Saad Hussain	Collecting & acquisition of data.	
5	Dr. Munaza Gohar	Analysis and interpretation of data, contributed in conception and shares its expert research opinion.	
6	Dr. Zul Farah	Collecting & acquisition of data.	
7	Dr. Syed Zulfiquar Ali Shah	Data analysis & interpretation.	