"A Study on Prevalence of Hyponatremia and Its Outcome on Mortality in Acute Coronary Syndrome in Non-Diabetic Patients"

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Abstract
CONTEXT:
Coronary artery disease is the world's most common cause of mortality and morbidity in the world. Hyponatremia is also common after myocardial infarction and clinical improvement is accompanied by a rise in plasma sodium concentration. Hyponatremia is defined as plasma sodium concentration of <135 mEq/L.
AIMS AND OBJECTIVES:
The aims and objective of this study is to study the prevalence of hyponatremia in acute coronary syndrome and to determine the mortality outcome of hyponatremia in acute coronary syndrome.
MATERIALS AND METHODS:
This study is a prospective based study conducted in Government Vellore Medical College for a period of one year from Sep'2018 to Aug'2019, in 100 patients who were admitted as inpatients in intensive coronary care unit.
RESULTS:
Out of 100 patients in my study, 7 patients had hyponatremia at discharge. Among the 7 patients, 4 patients with hyponatremia had a significant mortality. The study explains the prevalence of hyponatremia is more common among the older age people and this hyponatremia is a single prognostic indicator in patients with acute coronary syndrome.
Keywords: Acute coronary syndrome, Hyponatremia, Acute myocardial infarction, Ventricular tachycardia.

I. Introduction

Hyponatremia mostly occur very common in acute coronary syndrome and it is a bad prognostic indicator in patients with acute coronary syndrome. Also hyponatremia is a single independent predictor of adverse clinical outcomes on mortality in hospitalized patients due to severe heart failure[1]. In these patients with acute coronary syndrome hyponatremia has been related to the non-osmotic release of ADH, activation of RAS and then leading to catecholamine production. Hyponatremia is defined as plasma concentration of <135 mEq/L.

Acute coronary syndrome includes unstable angina and non-ST segment elevation myocardial infarction(NSTEMI). ACS is a spectrum of disease characterized by either one of the following:
1. New onset angina
2. Angina at rest
3. Progression of angina of increasing frequency or severity
4. Angina in response to lower levels of exertion

II. Aims & Objectives Of The Study:

The aim and objective of this study is to study the prevalence of hyponatremia and to determine that hyponatremia is a predictor for short term and long-term mortality in patients with acute coronary syndrome in non-diabetic patients.

MATERIALS AND METHODS OF THE STUDY:
Study design: prospective study

Setting: ICCU in Government Vellore Medical College, Adukamparai, Vellore. Period of study: 1 year
Sample size: 100

Study population: 100 patients admitted as acute coronary syndrome

INCLUSION CRITERIA:
100 clinically diagnosed cases of acute coronary syndrome. Patients with chest pain > 20 min and ST segment elevation in ECG.

EXCLUSION CRITERIA:
Patients with renal failure Diabetic patients
Acute and chronic liver failure Acute gastroenteritis
Adrenal insufficiency

Hypertensive patients on potassium sparing diuretics COPD patients on beta agonist.

STATISTICAL TOOLS:
1.   Questionnaires
2.   Serum Sodium at levels
3.   Chi square test
4.   Mid 'P' Exact
5.   Odds ratio
6.   Risk ratio

LABORATORY INVESTIGATIONS:
1.   ELECTROCARDIOGRAM
2.   ECHOCARDIOGRAM
3.   SERUM SODIUM AT LEVELS
4.   SERUM GLUCOSE LEVELS
5.   SEUM UREA & CREATININE LEVELS

Plasma Sodium at concentration was measured by using an ISE (Ion Selective Electrode) . Hyponatremia was considered as Sodium at < 135mmol/l.

III.   Results:
A study on prevalence of hyponatremia and its outcome on mortality in acute coronary syndrome was studied during the period of September 2018 to August 2019 at Government Vellore Medical College, Vellore. Results and analysis of the study are follows: Analysis done using SPSS Software

TABLE 1: AGE DISTRIBUTION

S.NO	AGE GROUP	NO.OF CASES	% DISTRIBUTION
1	21-30 YEARS	0	0
2	31-40 YEARS	6	66
3	41-50 YEARS	22	22
4	51-60YEARS	24	24
5	61-70YEARS	26	26
6	71-80YEARS	19	19
7	≥ 81 YEARS	3	3
	TOTAL	100	100

The maximum number of cases is found among the 6th decade group. The minimum incidence is found in the third decade among this study.
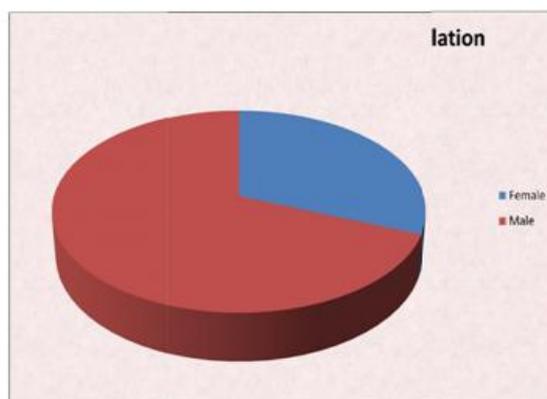
GRAPH 2: SEX DISTRIBUTION

The above graph clearly explains the prevalence of CAD is common in males compared to females. In t h i s study 69% were males and 31% were females.

TABLE 2: DIAGNOSIS OF MI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ASMI	16	16.0	16.0	16.0
	AWMI	62	62.0	62.0	78.0
	IPWMI	5	5.0	5.0	83.0
	IWMI	13	13.0	13.0	96.0
	LWMI	4	4.0	4.0	100.0
	Total	100	100.0	100.0	

This table explains the distribution of myocardial infarction of different sites of occlusion. The most common type was the AWMI of which it is 62% and the least common type is LWMI which is only 4% of my study population.

TABLE 3: OUTCOME OF PATIENTS WITH ACUTE MI

	Frequency	Percent	Valid Percent	Cumulative Percent
	93	93.0	93.0	93.0
2*HB ACUTE	1	1.0	1.0	94.0
MR	1	1.0	1.0	95.0
Valid CCF	1	1.0	1.0	96.0
CHB	1	1.0	1.0	97.0
PE	1	1.0	1.0	98.0
VT	2	2.0	2.0	100.0
Total	100	100.0	100.0	

The above table explains the outcome after myocardial infarction. The common complications of myocardial infarction includes second degree heart block, complete heart block, acute MR, CCF, ventricular tachycardia, pulmonary embolism etc. of all these complications, ventricular tachycardia was found among 2 patients in our study.

TABLE 4:

	Frequency	Percent	Valid Percent	Cumulative Percent
A	92	92.0	92.0	92.0
Valid D	8	8.0	8.0	100.0
Total	100	100.0	100.0	

GRAPH – 2 FOLLOW UP STATUS OF THE STUDY
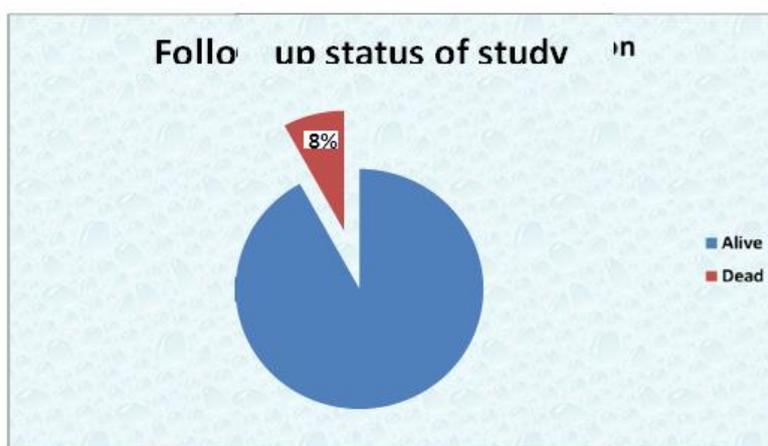
The above table demonstrates the percentage of mortality in my study. 8% mortality was shown in my study.

TABLE 5: SODIUM AT ADMISSION * OUTCOME

			OUTCOME	2*HB	ACUTE MR
Sodium at admission	<135	Count	11	0	1
		% within Sodium at admission	78.6%	0.0%	7.1%
	>=135	Count	82	1	0
		% within Sodium at admission	95.3%	1.2%	0.0%
Total		Count	93	1	1
		% within Sodium at admission	93.0%	1.0%	1.0%

			OUTCOME	CHB	PE
			CCF		
Sodium at admission	<135	Count	0	1	0
		% within Sodium at admission	0.0%	7.1%	0.0%
	>=135	Count	1	0	1
		% within Sodium at admission	1.2%	0.0%	1.2%
Total		Count	1	1	1
		% within Sodium at admission	1.0%	1.0%	1.0%

			OUTCOME VT	Total
		Count	1	14

Sodium at admission	<135	% within Sodium at admission	7.1%	100.0%
	>=135	Count	1	86
		% within Sodium at admission	1.2%	100.0%
Total		Count	2	100
		% within Sodium at admission	2.0%	100.0%

TABLE 6: SODIUM AT DISCHARGE * OUTCOME

			OUTCOME		
				2*HB	ACUTE MR
Sodium at discharge	<135	Count	6	0	0
		% within Sodium at discharge	85.7%	0.0%	0.0%
	>=135	Count	87	1	1
		% within Sodium at discharge	93.5%	1.1%	1.1%
Total		Count	93	1	1
		% within Sodium at discharge	93.0%	1.0%	1.0%

			OUTCOME		
			CCF	CHB	PE
Sodium at discharge	<135	Count	0	0	0
		% within Sodium at discharge	0.0%	0.0%	0.0%
	>=135	Count	1	1	1
		% within Sodium at discharge	1.1%	1.1%	1.1%
Total		Count	1	1	1
		% within Sodium at discharge	1.0%	1.0%	1.0%

			OUTCOME	Total
			VT	
Sodium at discharge	<135	Count	1	7
		% within Sodium at discharge	14.3%	100.0%
	>=135	Count	1	93
		% within Sodium at discharge	1.1%	100.0%
Total		Count	2	100
		% within Sodium at discharge	2.0%	100.0%

P Value – 0.412. The above tables compares the sodium levels at admission, at 48 hrs and at discharge with the outcome of patients presented with Acute Coronary Syndrome.

GRAPH 3 : ASSOCIATION OF HYPONATREMIA AND MORTALITY
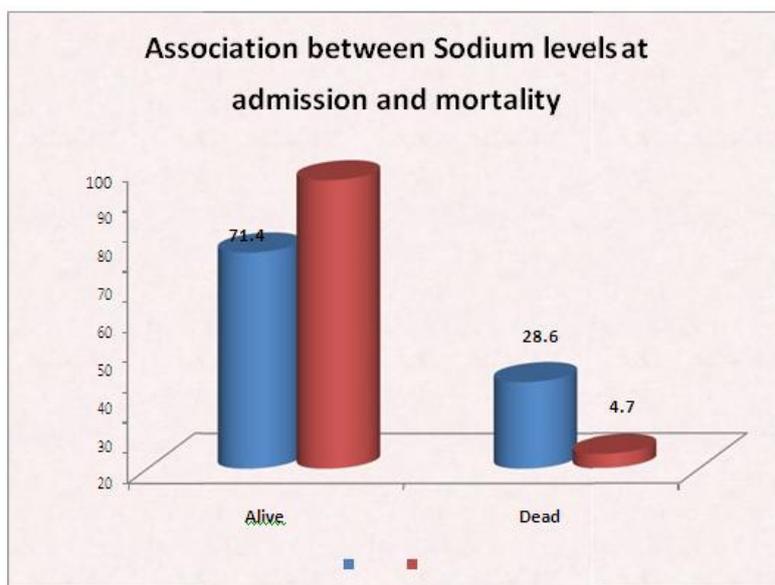
The above graph explains that 71.4% of people presented with less than 135 sodium level of which 28.6% were dead. 95.3% of people presented with sodium level >135 of which 4.7% were dead.

IV. Discussion:

▪ 100 cases of acute coronary syndrome was selected in our study conducted in Government Medical College, Vellore, from 2018 to 2019 and was found that hyponatremia was a major prognostic factor in acute myocardial infarction.

▪ In our study 28 patients below 50 years presented with acute myocardial infarction, among which 6 were below 40 years.

▪ Among the patients in our study hyponatremia was more common in the 6th decade.

▪ The study finally suggest that hyponatremia can be taken as a predictor for the prognosis in acute coronary syndrome which also has references among many studies done across the world.

V. Conclusion:

In conclusion, hyponatremia has a significant prognostic value in short term and long term adverse events in patients diagnosed with acute myocardial infarction. It is a single strong predictive factor for prognosis of acute coronary syndrome. Prognosis worsens with increasing severity of hyponatremia. Repeated monitoring of serum Sodium at levels will help physicians to identify high risk ACS patients earlier and they can stratify the risk for a better management.

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