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RESEARCH ARTICLE

STUDY OF HYPONATREMIA IN HEART FAILURE PATIENT ADMITTED IN KRH MYSORE

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Abstract

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Introduction:-

Heart failure (HF) remains a deadly clinical syndrome despite advances in its management.

It represents a considerable burden to the health care system, responsible for high rates of hospitalizations and approximately 5% of all hospital admissions.⁽¹⁾

It is multifactorial in origin, which results from a combination of mechanisms. HF Therapy is another factor contributing to hyponatremia⁽³⁾.

Thiazide diuretics are most often implicated; non-thiazide agents such as furosemide and spironolactone also have been associated with hyponatremia.⁽⁵⁾

Most cases of hyponatremia among patients hospitalized with HF are usually chronic and asymptomatic, often detected incidentally. As a result, patients with pre-existing hyponatremia are often untreated and are at higher risk of severe hyponatremia if not recognized early⁽⁸⁾.

Aims And Objective:-

Study of hyponatremia in heart failure patient admitted in KRH Mysore.

Materials And Methods:-

Source of Data

Primary Data:

The present study was conducted on 105 people with heart failure admitted in KRH , Mysore.

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Secondary Data:

Information including published articles, journals, books, case sheets and related website.

Method of collection of data**Study Design:**

A hospital based cross sectional observational study

Period of the study:

August 2022 to December 2022

Place of study:

DEPARTMENT OF GENERAL MEDICINE, KR HOSPITAL, MMCRI, MYSORE.

Sample Size

105

The sample size was calculated using one sample mean formula

i.e., $n = z^2 j^2 / d^2$

where $z_{\{1-\alpha/2\}} = 1.96$ for 95% confidence interval

Inclusion Criteria:

1. Patients with heart failure.
2. Patients age more than 18 years

Exclusion criteria:

1. Patients with hyperlipidaemia
2. Patients with hyperproteinaemia
3. Patients with cirrhosis, renal pathology, conditions causing SIADH, pancreatitis, burns, hypothyroidism.

Methods:-

After taking the institutional ethical clearance for the study purpose. The study will be explained to the patient and attenders. written informed consent will be taken from the subjects. Relevant history and clinical examination will be done as per the proforma.

Statistical Analysis:

Data obtained from the study will be entered in excel sheets and it will be double checked. Data analysed using SPSS software version 22.0 and it will be presented as descriptive statistics in form of frequency table, figures and graphs. Association between variables will be done using chi-square test and unpaired t test for qualitative and quantitative variables. Result will be expressed as mean+/-sd. correlation of parameters is done by Pearson's correlation formula, a p value of <0.05 is considered statistically significance

Results:-

In the present study, serum sodium levels were studied among 105 patients who were admitted in our tertiary care hospital and correlated with in hospital mortality, the results observed has been tabulated as follows;

TABLE 1: DISTRIBUTION OF THE SUBJECTS BASED ON AGE GROUPS

Age groups	Frequency	Percent
40 to 50 yrs.	9	8.5
51 to 60 yrs.	39	37.1
61 to 70 yrs.	45	42.8
71 to 80 yrs.	12	11.4
TOTAL	105	100

Majority of patients were in 61-70 year group (42.8%) followed by 51-60 years (37.1 %)

TABLE 2: DISTRIBUTION OF THE SUBJECTS BASED ON GENDER

GENDER	Frequency	Percent
Females	49	46.2
Males	56	53.8
Total	105	100.0

Our study had male predominance with 53.8% .

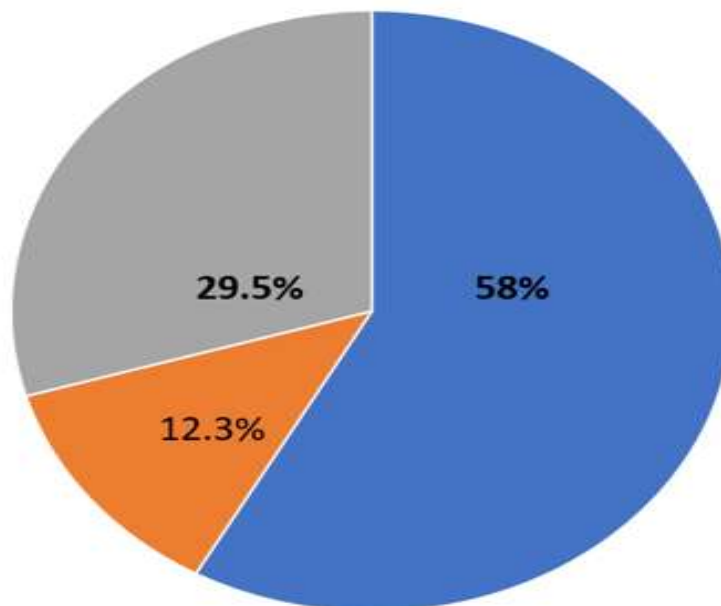
TABLE 3: DISTRIBUTION OF THE SUBJECTS BASED ON CO-MORBIDITIES

Co-morbidities	Frequency	Percent
HTN	21	20
IHD	35	33.33
T2DM	35	33.33
T2DM ,COPD	10	9.5
NONE	4	3.8
TOTAL	105	100

Majority of patients had type two diabetes and ischemic heart disease(33.33%)

Chi-square =36.268; p value = 0.001

Figure 1:-
SODIUM LEVELS IN PATIENTS.



Majority of patients had hyponatremia (58%) followed by normonatremia (29.5%) However, 12.3% patients had hypernatremia.

Table 4:-**DISTRIBUTION OF THE SUBJECTS BASED ON ECG CHANGES**

ECG	MALE	FEMALE	TOTAL	PERCENTAGE
AF	8	10	18	17.14
LBBB	2	2	4	3.8
RBBB	2	5	7	6.86
Q WAVES	21	11	32	30.4
NSR	12	10	22	21.56
LVH	9	8	17	16.19
MAT	2	3	5	4.7

The most common Ecg finding was presence of pathological Q waves (30.4%) followed by normal sinus rhythm (21.56%)

Chi -square value =4.627

Distribution of subjects based on diuretics**Table 5:-**

DIURETICS	MALES	FEMALES	PERCENTAGE
LD	32	31	60
LD, SPL	7	4	10.4
LD, TZD	8	10	17.14
TZD	8	5	12.38

Majority of patients were on single class of diuretics (loop diuretics) 60%

Followed by dual class of diuretics consisting of loop diuretics and either potassium sparing spironolactone or thiazide group of drugs (28%).12% of patients were on single thiazide group of drugs.

Table 6:-**CORRELATION OF SERUM SODIUM LEVELS AND MORTALITY**

Serum sodium levels MEQ/L	MALES	FEMALES	DEATH	PERCENTAGE
130-135	5	2	7	25
125-130	2	7	9	32.1
BELOW 125	2	1	3	10.71
135-145	4	3	7	25
ABOVE 145	2	0	2	7.14

In our study mortality rate was higher in subjects with moderate hyponatremia which was (32%), with female predominance followed by equal mortality in mild hyponatremia and normonatremia which was (25%) having male predominance.

Chi-square value = 6.43

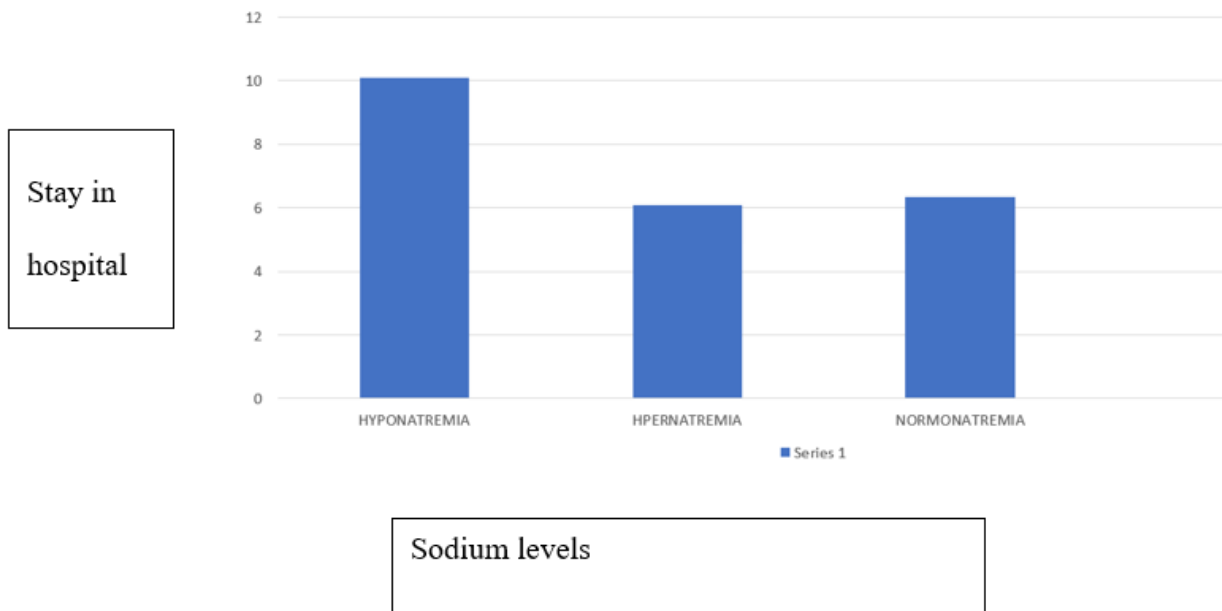
Table 7:-

DISTRIBUTION OF THE SUBJECTS BASED ON OUTCOME		
Outcome	Frequency	Percent
DEATH	28	26
DISCHARGE	77	74
Total	105	100.0

Chi-square value = 28.810; p value= 0.001

Majority of patients got discharged (74%) while 26% patients were dead. Mortality rate was marginally higher among males which was 15 patients as compared to females which were 13 in number.

Graph 1:-



Chi-square value = 33.6; p value 0.001

The average hospital stay in patients with hyponatremia as evident from above graph was 10 days as compared to around 6 days in patients with hypernatremia and normonatremia.

Discussion:-

The number of people with heart failure in India is thought to be between 1.3 to 4.6 million, but this number may be drastically understated. The reality that heart failure is a concerning global issue cannot be disputed, nevertheless.

This study was undertaken keeping in view of frequent occurrence of hyponatremia in heart failure patients who are at highest risk of developing electrolyte disturbance even those who are on therapy for HF.

In the present study totally 105 patients are included. Out of 105 patients, 43.2% (49) were female, 53.8% (56) were male.

In this study, majority of patients were in age group 61 -70 yrs. (42.8%) followed by 51-60 yrs. (37.1%). Least common age group was 40-50 yrs. (8.5%).

In the present study, 33.33 % had diabetes mellitus, 33.33% had ischemic heart disease 20% had hypertension, 10 % had COPD and 3.8% had no known comorbidities and 22% had arrhythmia mainly 17% had AF and 5% had MAT.

Some patients had more than one risk factors like T2DM with COPD (10%).

At the time of admission in hospital, patient with HF had different levels of sodium Concentration.

Comparison of age and sex ratio between different studies

Study	Number of patients	Mean age in years	Sex ratio
Present study	105	61-70 years	1.14:1
Saravana Madhav et al Tamilnadu	50	61- 70 years	1.18:1
Polok das et al silchar Assam	100	51-70 years	2.5:1

In our study majority of patients were in the age group of 61-70 years and sex ratio of 1.14:1

As compared to study done by Saravana Madhav et al and polok das et al majority of patients were in age group of 61-70 years and 51-70 years respectively with sex ratio of 1.18:1 and 2.5:1 respectively.

Comparison of comorbidities in different study

comorbidities	Present study	Saravana Madhav et al Tamilnadu	Mahmood T,Raj k, et al
CAD	33%	24%	46%
HTN	20%	20%	20%
T2DM	33%	15%	25%
COPD	9.5%	0%	0%
HYPOTHYROIDISM	0%	1%	0%
NONE	4%	0%	0%
OTHERS	0%	10%	9%

In our study the most common comorbidities were coronary artery disease and type 2 diabetes with 33% each. As compared to study done by Saravana madhav et al where most common comorbidities were CAD (24%) and HTN (20%) and Mahmood t, raj et al Where it was CAD (46%) and T2DM (25%).

Comparison of sodium levels and average hospital stay

Sodium levels	Present study	Saravana Madhav et al Tamilnadu	Days of stay Present study	Saravana Madhav et al
Total patients	105	50		
Hyponatremia	61%	24%	10.5 days	5.4 days
Hypernatremia	13%	2%	6.1 days	5.4 days
Normonatremia	31%	24%	6.35days	4.6 days

In our study hyponatremia was the most common finding (61%) with prolonged average hospital stay of 10.5 days.

As compared to study done by Saravana madhav et al where hyponatremia was seen in 24% patients and had average hospital stay of 5.4 days.

Comparison of serum sodium levels in different studies.

Study	Total patients	Hyponatremia	Normonatremia	Hypernatremia
Present study	105	61	31	13

SaravanaMadhav S etal Tamil nadu	50	24	24	2
Khalid Ali etal Ethiopia	152	44	102	6
Tuba Mahmoodetal Faisalabad	189	58	131	0

Majority of patients in our study had hyponatremia 61 out of 105 patients followed by normonatremia. As compared to Khalid Ali etal and Tuba Mahmoodetal studies where normonatremia was predominant finding. However, study conducted by SaravanaMadhavetal had similar results as compared to our study.

Comparison of serum sodium levels with in hospital mortality in different studies.

Study	Total patients	Hyponatremia With death	Normonatremia With death	Hypernatremia With death
Present study	105	19	7	2
Dai-yin Lu etal	2556	358	102	0
Khalid Ali etal Ethiopia	152	5	1	0
Tuba Mahmoodetal Karachi	189	7	1	0

Majority of deaths occurred in patients with hyponatremia (26%) in our study. Similar results were obtained in Dai-yin Lu etal, Khalid Ali etal and other studies which were comparable to our study.

Comparison of outcome of patients

Study	Number of patients	Death	Discharged
Present study	105	28	77
Moazzam Ali etal	360	75	285
Khalid Ali etal	152	6	146
Mahmoodetal	189	8	181

In our study the death rate was higher 28 patients out of 105 as compared to Moazzam Ali etal study where death rate was lower 75 patients out of 360 similar results were obtained with other two studies also.

Conclusion:-

The most prevalent chronic heart-related disease in developed nations is heart failure. It is characterized by a unique neurohormonal activation of numerous connected systems that can cause clinical deterioration as well as severe morbidity and mortality.

This means that despite hypoosmolality and volume overload, vasopressin continues to operate inappropriately, resulting in hyponatremia. The use of diuretics to address volume overload might potentially result in hyponatremia. Hyponatremia is a sign of severe heart failure and a predictor of higher mortality in patients.

Longer hospital stays, more severe forms of heart failure, and abnormal blood pressure are all common in hyponatraemic HF patients.

Hyponatremia is independently linked to poor outcomes, such as short- and long-term mortality, in hospitalized patients with a diagnosis of heart failure (HF).

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