



## Hyponatremia in Congestive Cardiac Failure

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### Abstract

*Hyponatremia is the most common electrolyte abnormality in hospitalized patients with congestive cardiac failure. The prevalence in hospitalized patients is 20 – 25%. This study was done in RMMCH among congestive cardiac failure cases admitted between September 2016 and June 2018. The outcomes of the study was done based on functional status of left ventricle and other risk factors of cardiac failure were studied.*

**Keywords:** *hyponatremia, congestive cardiac failure, ejection fraction.*

### Introduction

The normal range of serum sodium is 135-145 mEq/L. Its homeostasis is vital to the functioning of the cell. An imbalance in the regulation of total body water can lead to abnormal sodium levels. Congestive cardiac failure is associated with disturbance in water homeostasis leading to dysnatremias.

Hyponatremia is defined as concentration of sodium less than 135 mEq/L<sup>(1)</sup>. It occurs when there is excess of water in relation to sodium. It is the most common electrolyte disorder in hospitalized patients and more so in CCF patients. A disturbance in total body water regulation leading to decreased clearance of solute free water and the consequent inability to match the urine output to the amount of water ingested leads to dilutional hyponatremia. The pathogenesis of hyponatremia is multifactorial and linked to the prognosis.<sup>(2)</sup>

Hypernatremia is defined as concentration of sodium more than 145 mEq/L.<sup>(1)</sup> Hypernatremia is

uncommon compared to hyponatremia in CCF patients. However if present, it is associated with increased mortality.

Recent studies have demonstrated significant relation to mortality and morbidity for patients admitted with CCF and dysnatremia<sup>(3,4)</sup>. Several studies have indicated the relationship between admission serum sodium concentration and clinical outcomes in patients hospitalized for heart failure<sup>(5,6,7)</sup> So we undertook a study in our tertiary care hospital, among CCF cases, in order to establish a relation between dysnatremia and congestive cardiac failure among cases admitted in our hospital.

### Aim

The aim of the study is to find the prevalence, clinical profile of dysnatremia, impact of dysnatremia in morbidity and in hospital mortality in congestive cardiac failure. Left ventricular function and ejection fraction correlation with dysnatremia will also be done.

**Objectives**

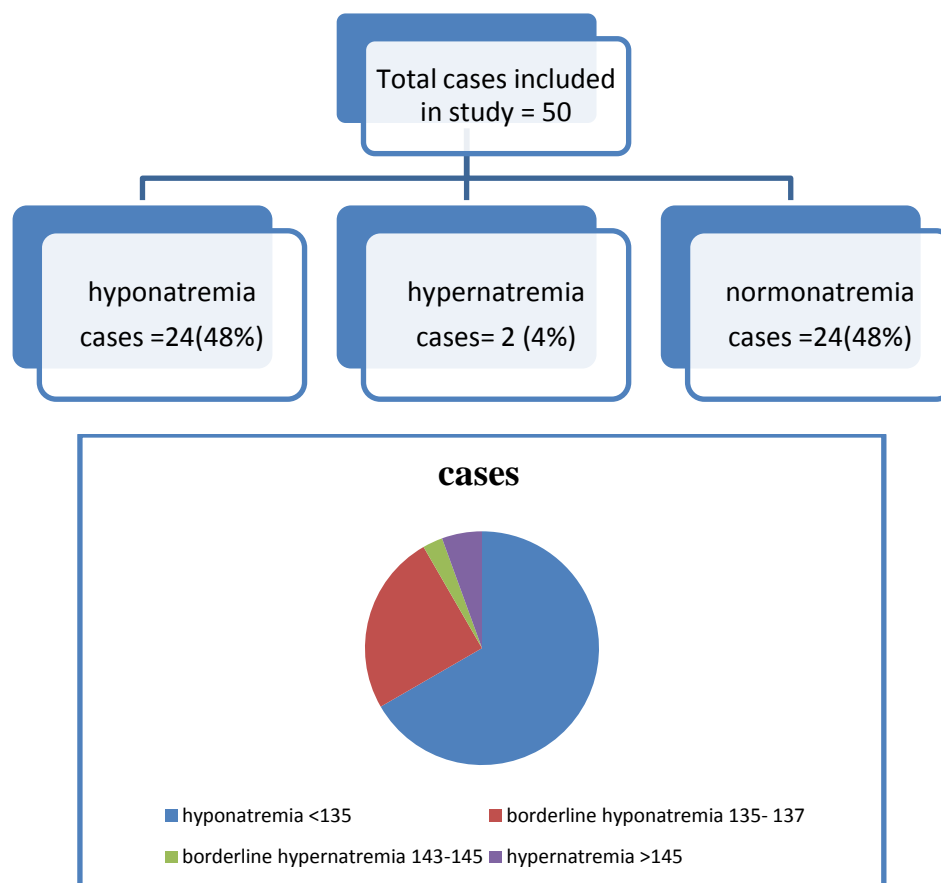
1. To find out the prevalence and clinical profile of dysnatremia in patients with congestive cardiac failure.
2. To estimate the impact of dysnatremia on morbidity and in hospital mortality of congestive cardiac failure.
3. Correlation of ejection fraction and left ventricular function with sodium levels in congestive cardiac failure.

**Materials and Methods**

This is an observational study, conducted during September 2016 to June 2018. During this period all the patients presenting with congestive cardiac failure, admitted to intensive care units and medical wards in RMMCH were studied.

**Inclusion Criteria**

- All patients more than 18 years presenting with CCF with serum sodium level <135

**A. Demographic Profile****1. Distribution of Cases**

**Fig 1:** Distribution of cases among hypo and hypernatremia

2. Age Distribution

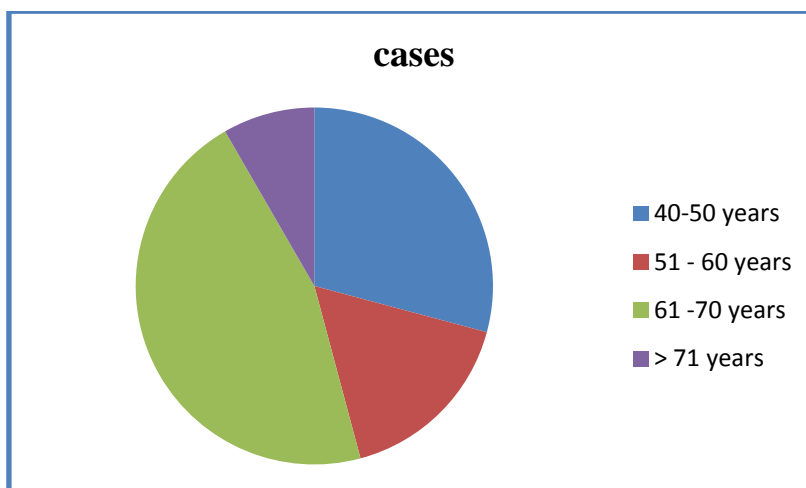


Fig 2 Age distribution of cases of hyponatremia

High incidence of hyponatremia was found between the age group between 61 and 70 years.

3. Sex Distribution

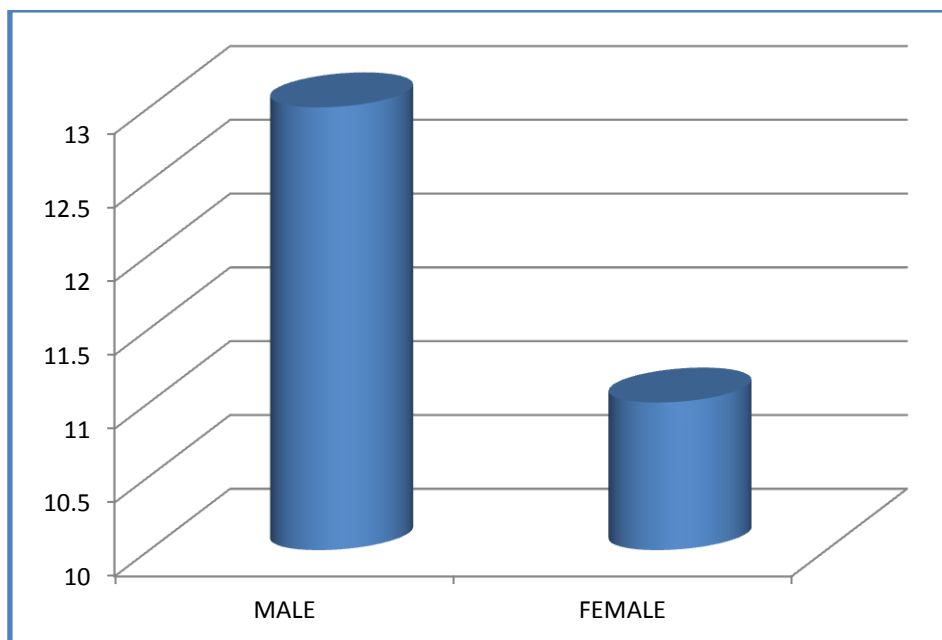


Fig 3 Male to female ratio of hyponatremia

Among 24 cases of hyponatremia, 13 were males and the remaining 11 were females.

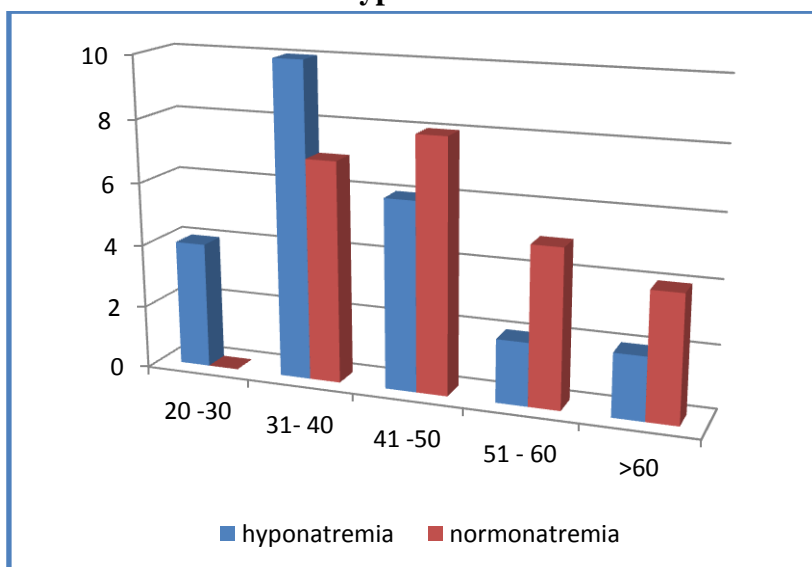
B. Risk Factors Comparison between Cases

S. No	Risk factors	Hyponatremia	Normonatremia
1	CAD	11 (45%)	13 (54%)
2	Hypertension	12 (50%)	8 (33%)
3	Type 2 diabetes mellitus	12 (50%)	3 (12%)
4	RHD	2 (8%)	1 (4%)
5	Hypothyroidism	1 (4%)	nil
6	Anemia	17 (70%)	12 (50%)
7	Others	5 (20%)	5 (20%)

Coronary artery disease, hypertension, diabetes and anemia were found to be risk factors for

hyponatremia. Among these modifiable factors were hypertension, diabetes and anemia.

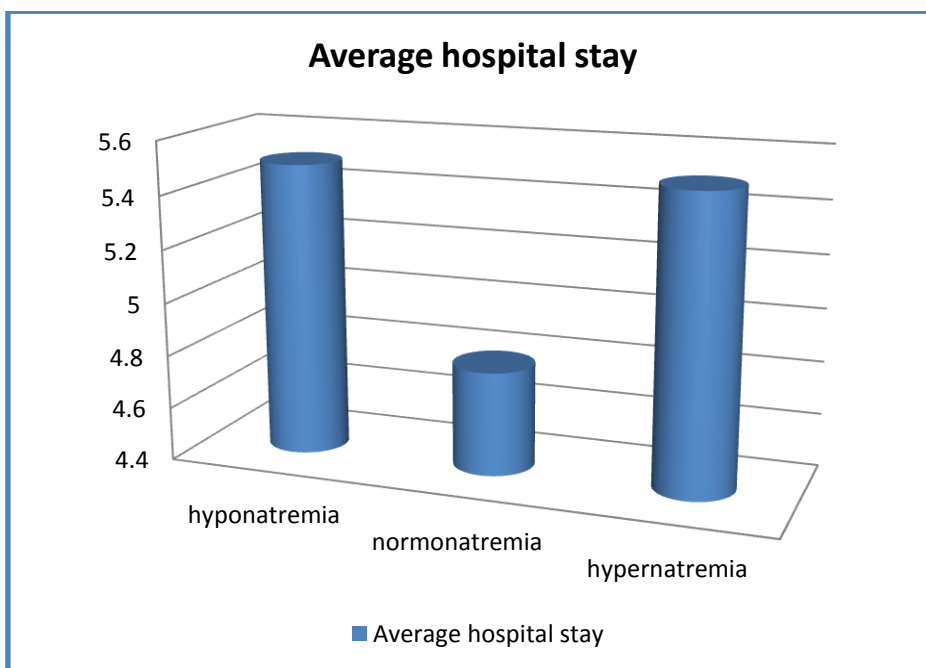
**C. Comparison of Ejection Fraction between Hyponatremia and Normonatremia**



**Fig 4:** comparison of ejection fraction

More cases with reduced ejection fraction were found in hyponatremia group.

**D. Hospital Stay**



**Fig 5:** Average hospital stay

The morbidity in terms of average hospital stay was 5.5 days for CCF cases with hyponatremia and hypernatremia, whereas it was 4.7 days for normomatremic cases.

**Conclusion**

- Out of 50 patients, hyponatremia was found in 24 cases (48%) and hypernatremia in 2 cases (4%).

- Many modifiable risk factors like anemia, diabetes and hypertension constituted many of the cases of hyponatremia. Among modifiable risk factors, anemia was found to be significant with  $p < 0.01$ .
- More cases were found among older individuals and particularly male cases. In our study we found that the incidence of hyponatremia was high among congestive

cardiac failure cases. The incidence being high among elderly male patients and was associated with prolonged hospital stay. Among the modifiable risk factors, anemia was found to have a statistically significant association.

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