

**Evaluation of Hyponatremia in Hospitalized Elderly Patients****Dr. Shanthi G.S.<sup>1\*</sup>, Dr. Kirubakaran.S<sup>2</sup>**<sup>1</sup>Professor & Head, Department of Geriatric Medicine, Madras Medical College, Chennai, India<sup>2</sup>Postgraduate student, Department of Geriatric Medicine, Madras Medical College, Chennai, India**Original Research Article****\*Corresponding author***Dr. Shanthi G.S***Article History***Received: 01.05.2018**Accepted: 14.05.2018**Published: 30.05.2018***DOI:**

10.21276/sjams.2018.6.5.9



**Abstract:** Hyponatremia is a common electrolyte disturbance in the hospitalized elderly patients. It contributes significantly to the morbidity and mortality of older persons. Hence, early recognition and management is essential to improve the outcome. Therefore, this observational study was taken up to assess the clinical profile of hyponatremia and to identify the types and etiological factors of hyponatremia. Hundred elderly patients above 65 years of age admitted in the Medical intensive care unit and Geriatric Medical wards with serum sodium levels less than 135 mEq/litre were included in the study. The mean age is 72 years and male preponderance of cases seen (57%). The common co morbidities are hypertension (52) Diabetes Mellitus (28) CAD (18) CKD (11) hypothyroidism (4). The common symptoms included malaise, nausea, altered sensorium, headache, vomiting, diarrhoea, seizures, Coma and cramps. Euvolemic hyponatremia (42%) is the most frequent type, hypervolemic (31%) and hypovolemic hyponatremia (27%). SIADH was the commonest cause (35 patients), renal (23) and GI loss (17). Among the drug related cause (10) diuretics is most common (8). The conclusion from the above study is hyponatremia occurs in patients with multiple co morbidities. Euvolemic hyponatremia was the most common type, with major contribution by SIADH. Diuretics are the common drug related cause. Hence they have to be used with caution in elderly.

**Keywords:** Hyponatremia, Euvolemia, Etiology, Syndrome of inappropriate Anti Diuretic Hormone secretion, diuretics.

**INTRODUCTION**

Elderly are vulnerable to electrolyte disturbances, hyponatremia being the commonest disorder. It is defined as plasma sodium level below 135 mEq/litre [1]. The prevalence of hyponatremia is higher among elderly due to the impairment in their ability to maintain optimal balance of water and electrolytes. Aging process contributes to hyponatremia due to age associated decrease in free water excretion and glomerular filtration rate, increased loss of sodium in urine, decreased action of Renin Angiotensin aldosterone system (RASS) and exaggerated action of natriuretic hormones[2].

Development of severe hyponatremia is associated with high morbidity and mortality in elderly [3]. Hence identification and assessment of different types of hyponatremia is very important to improve the patient outcome. The etiology of hyponatremia is complex and further complicated by unclear relationship between Arginine Vasopressin and advancing age. Studies also indicate that hyponatremia is related with a poor prognosis in elderly subjects,

because it is independently associated with an increased mortality risk.

Based on the volume status of the individual, hyponatremia is classified as

- Euvolemic Hyponatremia
- Hypervolemic hyponatremia
- Hypovolemic hyponatremia

History, clinical examination including assessment of volume status, measurement of serum osmolality, serum & urine sodium concentration to differentiate types of hyponatremia and to detect possible etiological factor is essential to choose the appropriate treatment. Indian data regarding the prevalence and different types of hyponatremia in elderly is limited. This study was done to know the common clinical features & presenting symptoms and the etiology of hyponatremia in elderly hospitalized patients, which will be helpful to diagnose the condition at the earliest and to provide appropriate treatment.

**Aim of the Study**

- To study the clinical presentation of hyponatremia in Elderly
- To identify the types and Etiological Factors of Hyponatremia

**MATERIALS AND METHODS**

This cross sectional observational study was done in the tertiary care hospital of Madras Medical College, Chennai for nine months from January-September 2015 after obtaining Ethical Committee clearance. 100 Elderly patients above 65 years of age admitted in intensive care unit and Geriatric medical wards with serum sodium levels less than 135 mEq/litre were included in the study. Patients with Pseudohyponatremia were excluded. After the informed consent, detailed history and clinical examination were performed. Blood and urine samples sent for complete blood count, renal function tests, Liver function tests, serum electrolytes, serum osmolality, routine urine examination and chest x-ray were done. Thyroid function tests and serum cortisol were done when indicated.

Sodium concentrations were measured using ion specific electrode technique in the automated analyser ensuring measurement of true hyponatremia. The plasma osmolality is calculated by the formula:

$$\text{Plasma osmolality} = 2 \times \text{serum Na} + \text{glucose}/18 + \text{BUN}/2.$$

The normal range is 275 – 293 mosm/Kg of water.

The urine sodium estimation is done by spot urine sodium examination test. If urine sodium excretion is more than 20 it indicates renal cause and if less than 20 it indicates extrarenal source of sodium loss.

Thyroid function test is performed in select patients to rule out hypothyroidism in Euvolemic hyponatremia. TSH is sensitive and the normal range is between 0.3 and 5.0 mIU/litre

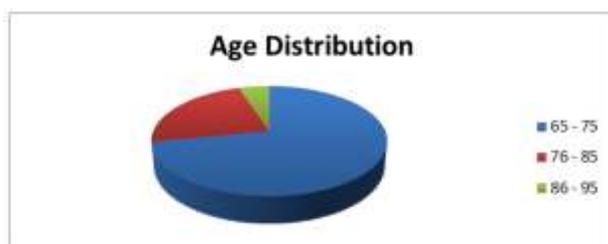
In selected patients to rule out adrenal insufficiency, basal ACTH & Cortisol level are estimated followed by injection of 250 microgram of synthetic ACTH and blood samples at 30 minutes and 60 minutes are collected and estimated for cortisol level.

Excel and SPSS software packages were used for data entry and analysis. The Proportions were compared using Chi-square test of significance. In all the above tests “p” value of less than 0.05 was accepted as indicating statistical significance.

**RESULTS**

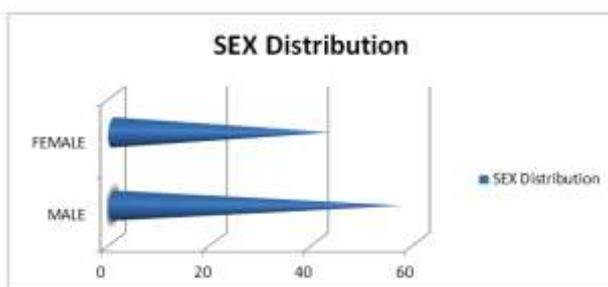
**Age distribution**

Of the 100 patients studied, 72 patients are in the age group of 65 – 75 yrs, 23 patients in 76 – 85 yrs and 5 patients in 85 – 95 yrs.



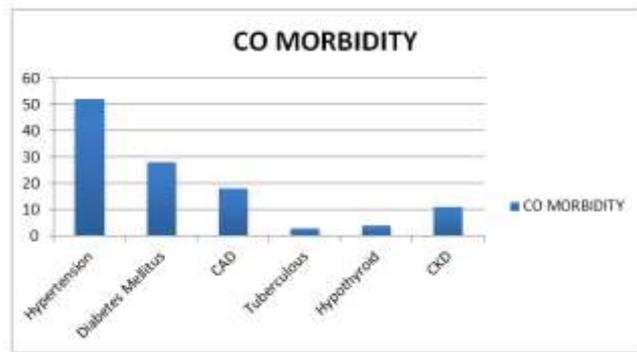
**SEX DISTRIBUTION**

SEX	NO: OF PATIENTS	PERCENTAGE
MALE	57	57
FEMALE	43	43



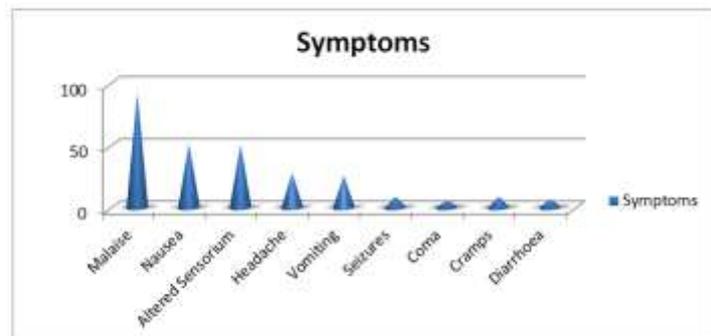
**CO MORBID ILLNESS**

S.No	CO MORBIDITY	NO: OF PATIENTS
1	Hypertension	52
2	Diabetes Mellitus	28
3	CAD	18
4	Tuberculosis	3
5	Hypothyroidism	4
6	Chronic Kidney Disease	11



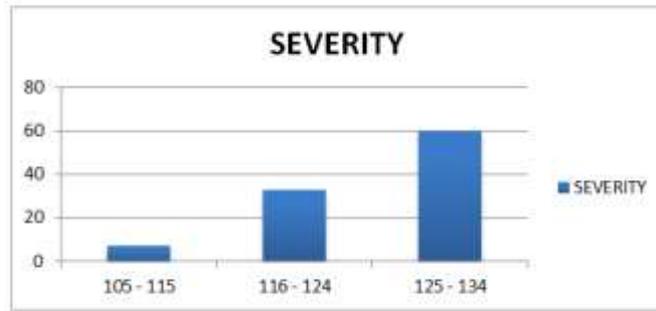
**Presenting symptoms of hyponatremia patients**

S NO	Presenting symptoms	No of Patients
1	Malaise	92
2	Nausea	52
3	Altered Sensorium	51
4	Head ache	28
5	Vomiting	26
6	Seizures	9
7	Coma	6
8	Muscle Cramps	9
9	Diarrhoea	7



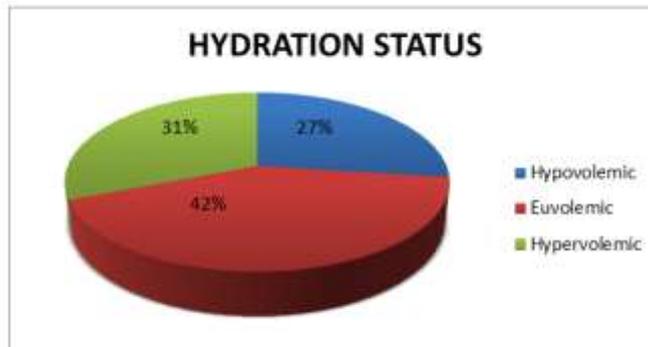
**SEVERITY OF HYPONATREMIA**

S.NO	Serum Sodium (mEq/L)	No of Patients
1	126 - 134	60
2	116 - 125	33
3	< 115	7



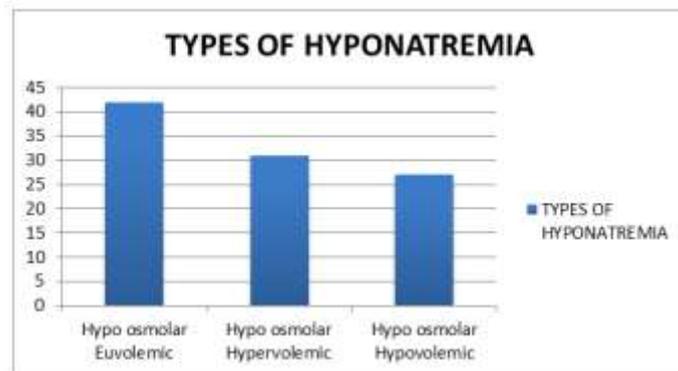
**HYDRATION STATUS**

S.NO	HYDRATION STATUS	NO OF PATIENTS
1	Hypovolemic	27
2	Euvolemic	42
3	Hypervolemic	31



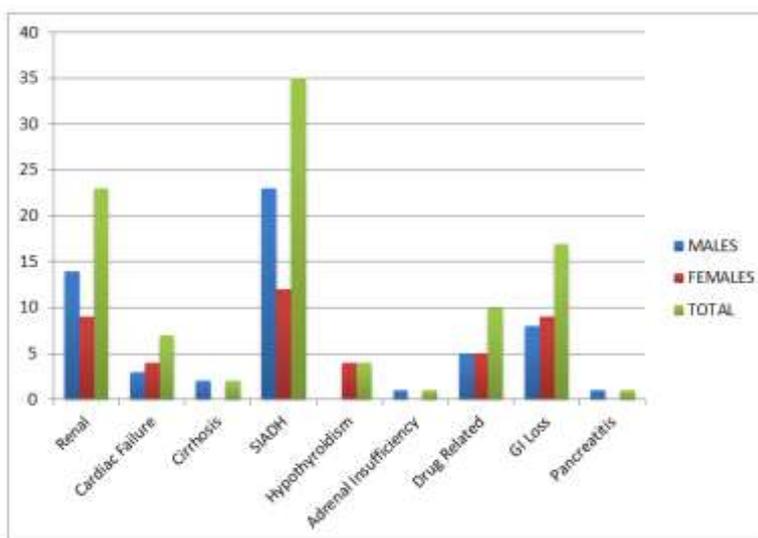
**TYPES OF HYPONATREMIA**

S.NO	TYPES	NO OF PATIENTS
1	Hypo osmolar Euvolemic	42
2	Hypo osmolar Hypervolemic	31
3	Hypo osmolar hypovolemic	27



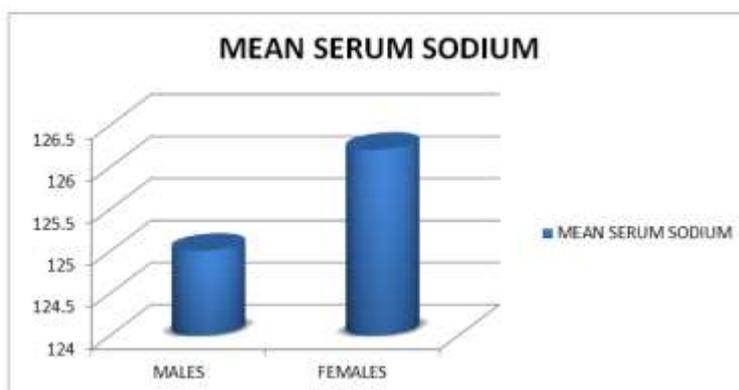
**Etiology of hyponatremia**

S.No	CAUSES	NO OF MALES	NO OF FEMALES	TOTAL CASES
1	Renal	14	9	23
2	Cardiac Failure	3	4	7
3	Liver Cirrhosis	2	-	2
4	SIADH	23	12	35
5	Hypothyroidism	-	4	4
6	Adrenal Insufficiency	1	-	1
7	Drug Related	5	5	10
8	GI Loss	8	9	17
9	Pancreatitis	1	-	1



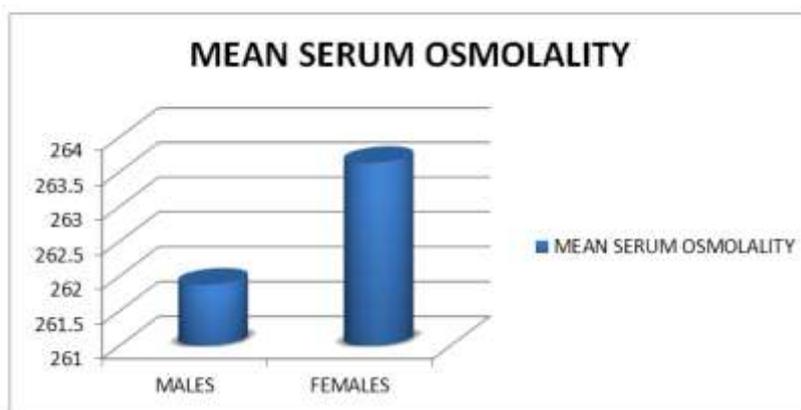
**Mean serum sodium in hyponatremic patients**

S.NO	SEX	MEAN SERUM SODIUM
1	MALES	125.01 ± 6.56
2	FEMALES	126.21 ± 7.10
3	TOTAL	125.55 ± 6.79



**MEAN SERUM OSMOLALITY IN HYPONATREMIC PATIENTS**

S NO	SEX	MEAN SERUM OSMOLALITY
1	MALES	261.88 ± 11.76
2	FEMALES	263.63 ± 12.23
3	TOTAL	262.63 ± 11.9



## DISCUSSION

This study was done in a tertiary care hospital, in the patients who had serum sodium less than 135 mEq/L at the time of admission. This study was undertaken due to frequent occurrence of hyponatremia in the elderly sick patients who are prone to develop electrolyte disturbances, as these people have age related physiological changes in the function of kidneys and other multiple co-morbid conditions.

The mean age of this study population is 72 years with a standard deviation of 6. This is similar to the mean age of studies conducted by Richard h Sterns *et al.* [4] Sudhir MY rao *et al.* [5]. Various studies from different parts of the world indicate that Euvolemic hyponatremia is the most common type. In the study done by Anderson *et al.* the Euvolemic hyponatremia was commonest followed by hypervolemic hyponatremia and hypovolemic hyponatremia? The study done in a tertiary hospital in Eastern India by N,Sengupta, Nandhini Chatterjee *et al.*[10] also revealed Euvolemic hyponatremia in 50.74%, hypervolemic hyponatremia in 26.86%, and hypovolemic hyponatremia in 22.4%. The results of our study are similar to the above studies with 42%, 34% and 27% of Euvolemia, hypervolemia and hypovolemia respectively.

Most of the patients in our study had multiple co-morbid conditions. Hypertension, diabetes and CAD were common. Hyperglycemia by shifting water from intra-cellular to extra-cellular compartments can induce a fall in serum sodium levels. It has been calculated that serum sodium falls by 1.6 to 2.4 mmol/L for every 5 mmol/L rise in serum glucose levels[8]. Hyponatremia in hypertensives is also common, especially in patients receiving diuretics[9].

Coronary disease leading to congestive cardiac failure results in hypervolemic hyponatremia. In our study, 8 patients received diuretics for systemic hypertension and CCF.

SIADH was the most common cause of hyponatremia in our study with 35 patients out of 42 euvolemic patients having this syndrome. According to the study by Clayton *et al.* [6] nearly half the patients with severe hyponatremia had SIADH. The study done by Laczi *et al.* in Hungary also revealed that SIADH was the most common cause of euvolemic hyponatremia[7].

The drug related hyponatremia is avoidable. Diuretics were the major contributor. In our study, out of the 10 patients, 7 were using Thiazide diuretic. Many studies have reported that drugs especially thiazide diuretics are a major cause of hyponatremia in elderly[3, 5, 6, 9, 11]. Hence much caution is required while prescribing diuretics in elderly. If essential it should be prescribed in low doses in older persons. The mean serum sodium is 125.55 mEq/L. Many earlier studies indicate a higher mortality in the elderly patients with severe hyponatremia. Hence it is important to identify the condition at the earliest and appropriate treatment will improve the outcome.

## CONCLUSION

- Hyponatremia is common in elderly with male preponderance in our study.
- Mostly present in people with multiple co morbidities.
- Majority of them were Euvolemic and the most common cause is SIADH.
- Drug related hyponatremia is mostly due to Thiazide diuretics.
- Since severe hyponatremia is associated with high mortality especially in elderly, early identification and assessment of different types of hyponatremia is very important to improve the outcome in older persons.

## REFERENCES

1. Reynolds RM, Padfield PL, Seckl JR. Disorders of sodium balance. *BMJ* 2006;332:702-5
2. Tareen N, Martins D, Nagami G, Levine B, Norris KC. Sodium disorders in the elderly. *Journal of the national medical association.* 2005 Feb;97(2):217.

3. Adrogue H, Madias N. Hyponatremia. *N Engl J Med* 2000; 342:1581– 1589.
4. Sterns R. sodium & water balance disorder: Nephrology SAP 2006; 5: 35 - 50
5. Rao MY, Sudhir U, Anil Kumar T, Saravanan S, Mahesh E, Punith K. Hospital based descriptive study of symptomatic hyponatremia in elderly patients. *J Assoc Physicians India*. 2010; 58:667–9.
6. Clayton JA, Le Jeune IR, Hall IP. Severe hyponatraemia in medical in-patients: aetiology, assessment and outcome. *Journal of the Association of Physicians*. 2006 Aug 1;99(8):505-11.
7. Laczi F. Etiology, diagnostics and therapy of hyponatremias. *Orvosi hetilap*. 2008 Jul 1;149(29):1347-54.
8. Hillier TA, Abbott RD, Barrett EJ. Hyponatremia: evaluating the correction factor for hyperglycemia. *The American journal of medicine*. 1999 Apr 1; 106(4):399-403.
9. Hamburger S, Koprivica B, Ellerbeck E, Covinsky JO. Thiazide-induced syndrome of inappropriate secretion of antidiuretic hormone: time course of resolution. *Jama*. 1981 Sep 11;246(11):1235-6.
10. Chatterjee N, Sengupta N, Das C, Chowdhuri AR, Basu AK, Pal SK. A descriptive study of hyponatremia in a tertiary care hospital of Eastern India. *Indian journal of endocrinology and metabolism*. 2012 Mar;16(2):288.
11. Gerard McDade. Hyponatraemia and drug use (and abuse). *BMJ* 2006; 332:853
12. Sterns RH. Severe symptomatic hyponatremia: treatment and outcome: a study of 64 cases. *Annals of Internal Medicine*. 1987 Nov 1;107 (5):656-64.