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RESEARCH ARTICLE

CLINICO ETIOLOGICAL PROFILE OF HYPONATREMIA IN IMCU OF KANNIYAKUMARI GOVERNMENT MEDICAL COLLEGE

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Abstract

Background : Sodium is the dominant extracellular cation and its homeostasis is vital to the normal physiologic function of cells. Hyponatremia is defined as a serum level of <135 mmol/L. This study is to evaluate aetiological factors, clinical features of patients with hyponatremia in IMCU (Intensive Medical Care Unit).

Methods: An observational study was conducted in 100 patients admitted in Kanniyakumari Govt. Medical College from Jan 2016 to Dec 2016 who had serum Sodium <130mmol/L. History, examination and relevant details were taken.

Results: In the present study, the mean age was 68 years. 37% were asymptomatic. The major clinical presentation among those symptomatic was altered sensorium accounting for 45%. The commonest cause was SIADH (Syndrome of Inappropriate AntiDiuretic Hormone secretion) followed by extra-renal causes. The mortality was 5%.

Conclusions: Hyponatremia is one of the common causes of altered consciousness and seizures especially in elderly patients. It is very important to classify the hyponatremia and find out the correct etiology. Treatment of hyponatremia is highly rewarding and it should be done in a more scientific way. The common causes and the management protocol should be available in every IMCU.

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Introduction:-

Sodium is the dominant extracellular cation and its homeostasis is vital to the normal physiologic function of cells. Normal serum sodium level is 135-145 mmol/L.

Hyponatremia is defined as a serum level of <135 mmol/L. It is estimated that nearly 7% of healthy elderly persons have serum sodium concentrations of 135 mmol/L^{1,2} or less. Hyponatremia is a common electrolyte abnormality in hospitalized patients^{3,4}

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Hyponatremia can be classified on the basis of serum osmolality into hyperosmolar, normoosmolar & hypoosmolar states. Hypoosmolar hyponatremia is further classified into hypervolemic, euvolemic and hypovolemic hyponatremia based upon the volume status.

Materials and Methods:-

100 consecutive cases who had serum Sodium levels of <130 mmol/L were identified and studied during a period of 12 months from Jan 2016 to Dec 2016. The patients of age 15 years or more and who were hyponatremic on admission were included in the study. Patients who developed hyponatremia during hospital stay were excluded. Detailed history including onset, duration, and progression of symptoms, history of illnesses such as congestive cardiac failure, chronic kidney disease, chronic liver disease, hypothyroidism, hypopituitarism, pneumonia, malignancies were recorded. History of drugs causing hyponatremia like diuretics, antidepressants, anticonvulsants, chemotherapeutic agents, and NSAIDs were taken and detailed general and physical examinations of the patients were done.

In sera, measurements of sodium, potassium, urea, creatinine, uric acid, albumin and glucose concentration were taken. Serum osmolality was measured using the formula⁵
 $[2 \times (\text{Na} + \text{K})] + (\text{BUN}/2.8) + (\text{glucose}/18)$

Na-Sodium; K-Potassium; BUN- Blood urea nitrogen

Other tests included urine sodium, osmolality, serum cortisol, ACTH level, thyroid function test, liver function test.

After establishing the diagnosis of hyponatremia, the patients were categorized based on the level of hyponatremia into mild, moderate and severe hyponatremia.⁶⁻⁸

126-130 mmol/l	-	Mild
121-125 mmol/l	-	Moderate
≤ 120 mmol/l	-	Severe

They were then further evaluated to find out the etiology. Serum and urine osmolality was calculated. Normal serum osmolality is 275-295 mosm/kg H_2O ⁽¹³⁾. They were then assessed clinically to find out the volume status clinically if they had low serum osmolality.

Hypervolemia - Presence of bilateral basal crepitation, raised jugular venous pressure, bilateral pitting pedal edema, hepatomegaly.

Hypovolemia-Presence of tachycardia, postural hypotension, dry tongue, nature of skin turgor, urine output.

Those patients who had no signs mentioned above was considered to be euvolemic.

Student's t-test and analysis of variance (ANOVA) were statistical methods used to analyse continuous variables. Chi square test and Fisher's exact test were used to analyse categorical variables. The study protocol was approved by the ethical committee.

Results:-

In the present study of 100 patients 48 were males and 52 were females.

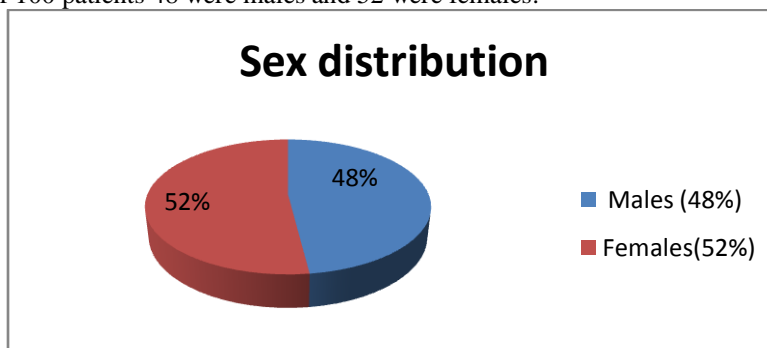


Figure 1:Sex distribution

The patients were between 15- 85 years of age, predominantly between 65-85 years.

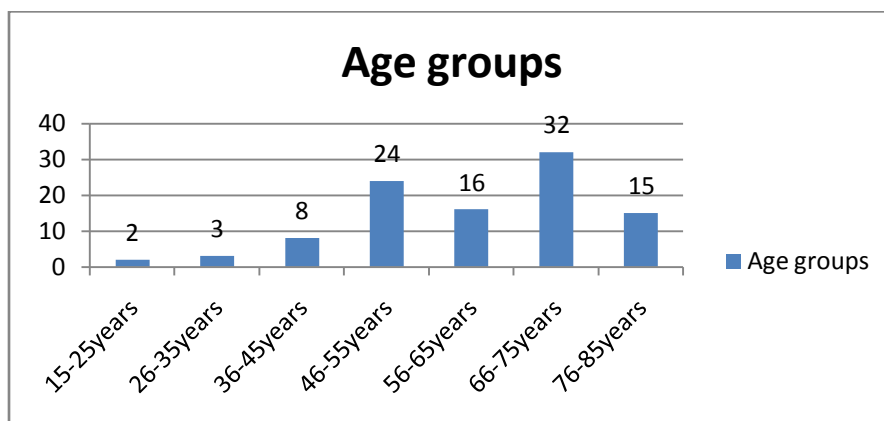


Figure 2: Age distribution

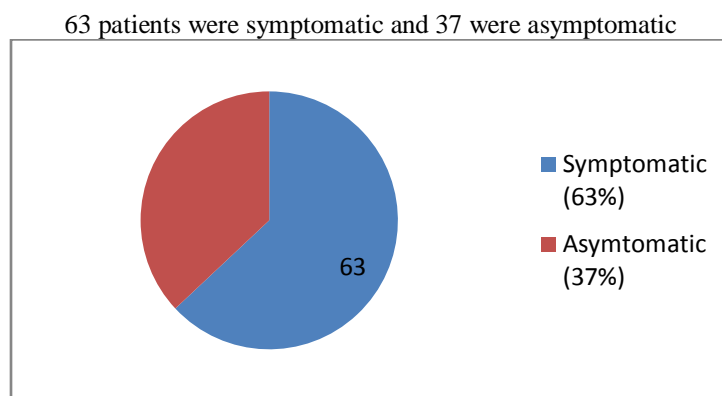


Figure 3: Symptomatic vs Asymptomatic

Serum sodium levels
126-130 mmol/L – 13
121-125 mmol/L – 32
<120 mmol/L – 55

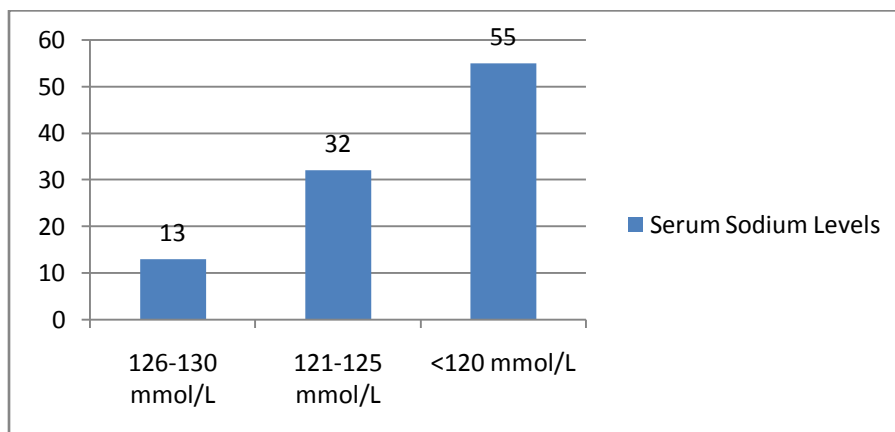


Figure 4: Serum Sodium levels

Causes of hypoosmolar hypovolemic hyponatremia:-

Extra renal loss – 17
Diuretic induced – 10

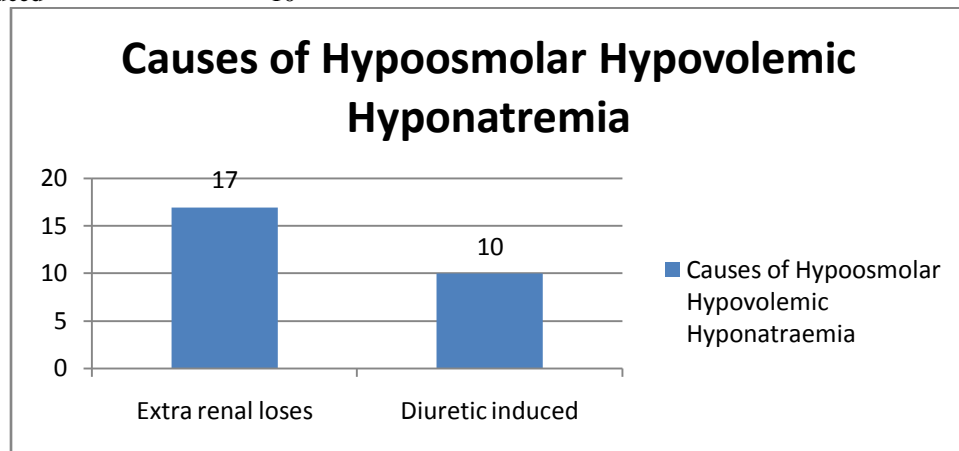


Figure 5: Causes of Hypoosmolar Hypovolemic Hyponatremia

Causes of hypoosmolar Euvoletic Hyponatremia:-

SIADH – 39
Hypothyroidism – 6
Central hypopituitarism – 2

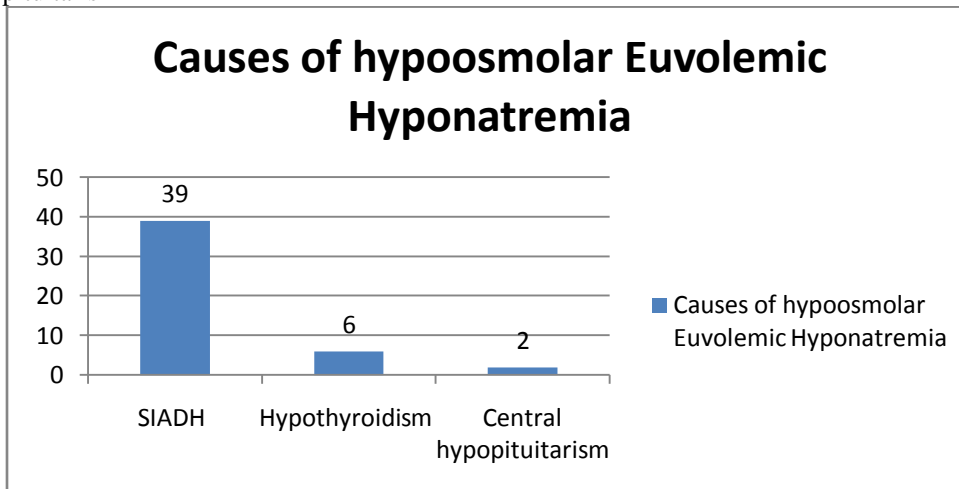


Figure 6: Causes of hypoosmolar Euvoletic Hyponatremia

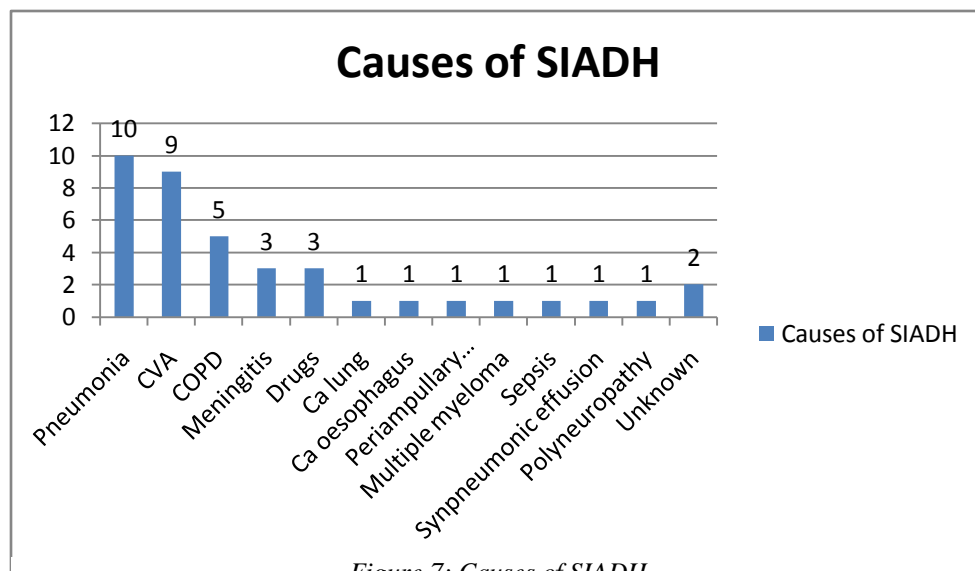
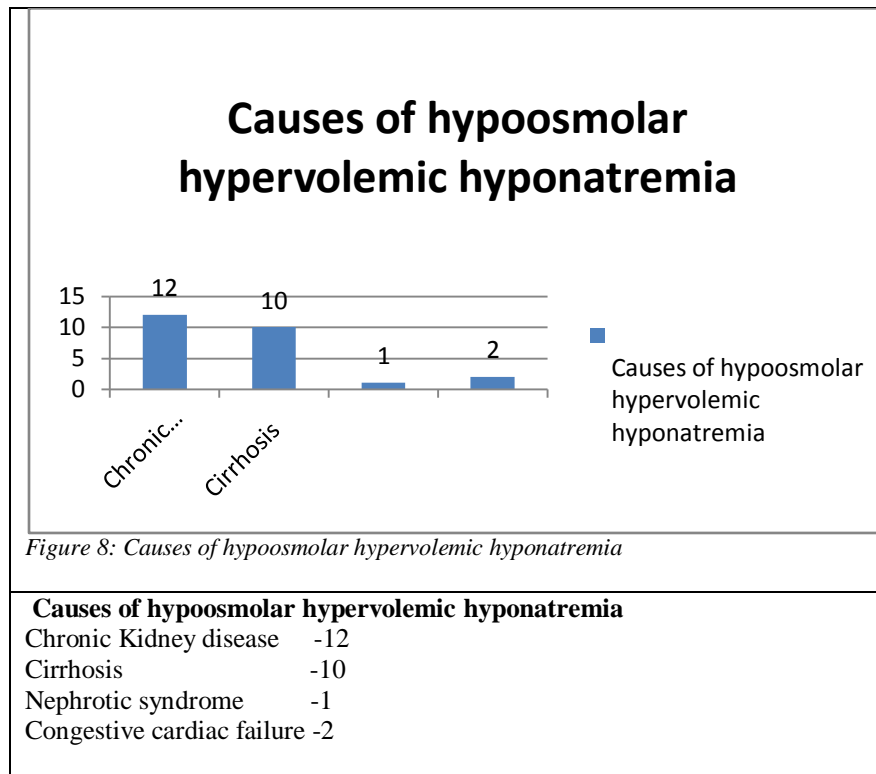


Figure 7: Causes of SIADH

Causes of SIADH:-

Pneumonia	-10
Cerebrovascular accidents(CVA)	-9
COPD	-5
Meningitis	-3
Drugs	-3
Ca lung	-1
Ca oesophagus	-1
Periapillary Carcinoma	-1
Multiple myeloma	-1
Sepsis	-1
Synpneumonic Effusion	-1
Polyneuropathy	-1



Discussion:-

Hyponatremia is a common clinical problem which is being increasingly recognized in all departments. The management is highly rewarding as the patient comes back to a near normal state of health. At the same time, over treatment is also dangerous as it can lead to permanent neurological damage. As hyponatremia is becoming an increasingly common clinical state, a proper systematic study of the causes, management and outcome of hyponatremia is timely. Our study throws light to all the aspects.

Of the 100 patients studied, 48% were male 52% were female. The female preponderance in our study correlates well with most of the other studies. Mean age group is 68.34 years. It is well known that older group patients are more liable for metabolic abnormalities and a small tilt in metabolic stability will make them more symptomatic.

The prevalence of severe hyponatremia (<120 mmol/L), formed the major group which is in contrast to other studies by Thomas et al⁹, Gross et al¹⁰ and Hochman et al¹¹ who had mild to moderate cases as the predominant group. This stresses the fact that hyponatremia is recognized and diagnosed quite late in our country. Lowest serum sodium was 100 mmol/L. Mean serum sodium at the time of presentation was 118mmol/L.

The causes of hyponatremia in decreasing order of frequency are as follows:

Causes	No. of patients
SIADH	39
Extrarenal loss	17
Chronic kidney disease	12
Cirrhosis	10
Diuretic induced	10
Hypothyroidism	6
Congestive cardiac failure	2
Central hypopituitarism	2
Nephrotic Syndrome	1
Hyperglycemia	1

In our study SIADH was the commonest cause of hyponatremia. Respiratory diseases like pneumonia (25.64%) followed by CVA (23.07%) was the commonest etiological factor for SIADH. This is comparable with other studies by Thomas et al⁹, Gross et al¹⁰, and Hochman et al¹¹.

Cardiac failure was one of the important causes in other studies. In our study it was only 2%, which is in contrast to 18%, 13% and 25% by Thomas et al⁹, Hochman et al¹⁰ and Gross et al¹¹ respectively. Other possible explanation being, patients with mild congestive heart failure are increasingly being treated in outpatient clinics. But our study is comparable with the study by Minneke. J. Coenradl et al¹².

Majority of patients (62.9%) with hypoosmolar hypovolemic hyponatremia is due to extra renal loss which is comparable with other studies.

Many drugs produce SIADH. In our study anti depressants were the commonest cause which is comparable with other studies. Six patients who had hypoosmolar euvoletic hyponatremia were due to hypothyroidism which is comparable with other studies.

It is not difficult to diagnose hyponatremia who present with acute symptoms. It is important to recognize those patients without much symptoms, some of them having chronic hyponatremia and it is important to correct them at a slower pace.

63% of our patients were symptomatic and the rest 37% were asymptomatic. The major clinical presentation among those symptomatic was altered sensorium accounting for 45%.

23% had chronic hyponatremia which included patients with serum sodium <125 mmol/L and mild or no symptoms. The major causes include chronic renal failure and cirrhosis. Hence it is evident that it is very important to study serum electrolytes in patients who are having chronic illness.

We followed up the patient till the discharge or death of the patient with twice daily measurement of serum sodium and serial monitoring of other parameters. No complications of treatment was noted in our study.

The mean hospital stay of our patients was 11.6 days. The mortality in our study group was 5%. The cause of mortality include squamous cell carcinoma of lung, sepsis, hepatic failure, meningitis and periampullary carcinoma. It is well observed that death is due to underlying primary conditions and not due to hyponatremia itself.

Summary and Conclusions:-

1. Total of 100 cases of hyponatremia admitted in IMCU during a period of 12 months were studied.
2. Of them 48% were male and 52% were female.
3. The mean age was 68.34 years. The commonest age group being 65-85 years and the least affected group was < 50 years.
4. Among the 100 cases 63% were symptomatic, who had seizures, altered sensorium or GI symptoms.
5. Their mean serum sodium level at the time of presentation was 118 mmol/L. Lowest serum sodium recorded was 100 mmol/L.
6. 65% of patients had severe hyponatremia ≤ 120 mmol/L
7. The commonest cause of hyponatremia was SIADH followed by extra renal losses due to vomiting and diarrhea and chronic renal failure.
8. The treatment was based on the basic principles but modified to suit the clinical situation.
9. The mean hospital stay was 11.6 days.
10. The mortality in our study group was 5%.

Conclusion:-

Hyponatremia is one of the common causes of altered consciousness and seizures especially in elderly patients. It is very important to classify the hyponatremia and find out the correct etiology. According to this study the common causes of hyponatremia are SIADH followed by extra renal loss due to vomiting and diarrhea and chronic renal failure.

Our study shows that many people had serum sodium of <120mmol/L which we considered as severe hyponatremia. Such severe hyponatremia was not observed in many foreign studies. Treatment of hyponatremia is highly rewarding.

The mortality in our study group is 5% and most of them were due to the underlying primary disease and not due to hyponatremia itself.

It is necessary to recognize such an increasing electrolyte abnormality and to correct them. The common causes and the management protocol should be available in every IMCU.

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