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Clinico-aetiological profile of hyponatremia in adults

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ABSTRACT

INTRODUCTION: Hyponatremia is a common electrolyte abnormality observed in hospitalised patients. Hyponatremia is usually under diagnosed and the management is often inadequate and inappropriate. The aetiology, clinical behaviour and the prognosis of hyponatremia vary widely from hospital to hospital. **METHODS:** Patients with surgical illness, head injury and post-operative patients were excluded from the study. A total of sixty consecutive cases of hyponatremia were taken for retrospective study and sixty cases for prospective study. In all these cases detailed history taken and thorough clinical examination was done as per protocol attached. Relevant investigations were done as per the protocol, base line random blood sugar, urea, creatinine, fasting lipid profile were measured. Serum sodium levels were monitored till it became normal. **RESULTS:** The mean age of presentation is 57 years. Drowsiness was commonest symptom (60 patients, 53.2%) followed by vomiting, hiccoughs and seizures. Nearly half of the patients (58 patients, 48.3%) had euvolemic hyponatremia. Less than half of the patients (47 patients, 39%) had hypovolemic hyponatremia. SIADH was the commonest cause of hyponatremia (46 patients, 38.3%) followed by salt losing nephropathy (32 patients, 26.7%). **CONCLUSIONS :** Hyponatremia is common in elderly. Severity of hyponatremia becomes greater as the age advances. Drowsiness is the common symptom. Seizures are present only in severe hyponatremia. Over all the commonest cause of hyponatremia is SIADH

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1. Introduction

Hyponatremia is a common electrolyte abnormality observed in hospitalised patients. Hyponatremia is defined as serum sodium levels of <135 mEq/L. This is the most common electrolyte abnormality among the patients in medical wards as well as in the intensive care unit. Hyponatremia is usually under diagnosed and the management is often inadequate and inappropriate. The aetiology, clinical behaviour and the prognosis of hyponatremia vary widely from hospital to hospital. It adds significantly to the mortality and morbidity of the patients if not treated in time. There is lack of published data regarding the aetiology, clinical behaviour and prognosis of hyponatremia in Indian settings. This study has been undertaken to find out the clinical symptoms and causes among patients with hyponatremia.

2. Materials and methods

This study is a clinical study on hyponatremia, designed to analyse the causes and symptoms among patients presenting with hyponatremia. This study was done over a period of two years in which one year was retrospective and one year was prospective study. Sixty consecutive patients were selected for each study. A total of 120 patients were analysed. Patients above 15 years of age documented with hyponatremia were included. Patients with surgical illness, head injury and post-operative patients were excluded from the study. All patients aged above 15 years admitted in our hospital were taken to our study. A total of sixty consecutive cases of hyponatremia were taken for retrospective study and sixty cases for prospective study. In all these cases detailed history taken and thorough clinical examination was done as per protocol attached. In retrospective analysis patients data were collected from case records. Relevant investigations were done as per the protocol, base line random blood sugar, urea, creatinine, fasting lipid profile were measured. Serum sodium levels were monitored till it became normal. Rapidity of correction and the treatment approach were decided after considering the volume status of the

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patient and the severity of symptoms. In patients with severe hyponatremia 3% saline was used at the rate of 1-2ml/kg body weight in first 2-3 hours followed by slow infusion. Correction was not allowed to exceed 9mEq/day so as to prevent the adverse effects of over correction. In other patients correction was done at slower rate.

In patients with hypovolemic hyponatremia normal saline 0.9% was used to correct the volume depletion. In patients with euvolemic hyponatremia fluid restriction was instituted. In patients with hypervolemic hyponatremia fluids were restricted. Diuretics were added to the patients who did not respond to the fluid restriction alone.

3. Results

Distribution of age among patients with hyponatremia is seen in Table 1. The mean age is 57 years. Table 2 shows the distribution of age group among patients with hyponatremia. A majority of our patients (73 patients, 60.8%) were above 55 years of age. One third of patients (40 patients, 33%) were in the age group between 35-55 years. Only a few patients (7 patients, 5.8%) were below 35 years. Among patients aged above 55 years, about 40% of patients (29 patients, 39.7%) had moderate hyponatremia and about 30% of patients (21 patients, 28.8%) had severe hyponatremia and rest about 30% of patients (23 patients, 31.5%) had mild hyponatremia. Among patients aged between 35-55 years more than half of the patients (60%, 24 patients) had moderate hyponatremia. The remaining were divided equally among mild and severe hyponatremia (8 patients each, 20%). Among patients below 35 years, the vast majority of patients (5 patients, 71.4%) had mild hyponatremia. Only one patient (14.3%) each had moderate and severe hyponatremia (Table 3). In other words mild, moderate and severe hyponatremia were equally seen among the older patients (>55 years), where as the majority of middle aged patients (35-55 years) had moderate hyponatremia, while the vast majority of younger patients (<35 years) had mild hyponatremia. Males were 63.3% and females were 36.7% (Table 4). Nearly one fifth of our patients (22 patients, 18.3%) were asymptomatic. Among symptomatic patients drowsiness is the commonest symptom (60 patients, 53.2%). Vomiting, hiccoughs and seizures were 11.3%, 9.2% and 8.2% respectively (Table 5 and 6). Nearly half of our patients had euvolemia (58 patients, 48%), less than half of our patients (47 patient, 40%) had hypovolemia and only a few cases (15 patients (12.5%) had hypervolemia (Table 7). Out of 120 patients nearly half of the patients (58 patients, 48.3%) had euvolemic hyponatremia. Less than half of the patients (47 patients, 39%) had hypovolemic hyponatremia. Only one eighth of patients had dilutional hyponatremia (Table 8). Among patients with euvolemic hyponatremia 46 patients (79.3%) had SIADH and very few patients had endocrine abnormality. Among patients with hypovolemic hyponatremia about two thirds of the patients had salt wasting nephropathy. About one third of patients had GI loss.

Among patients with dilutional hyponatremia just over two thirds of patients had CCF and others had cirrhosis of liver. Table 9 Shows the different aetiologies among patients with hyponatremia, SIADH was the commonest cause of hyponatremia (46 patients, 38.3%). the second common cause was salt losing nephropathy (32 patients, 26.7%), equal number of patients had other causes like dilutional, endocrine and hyponatremia due to GI loss. All patients with endocrine diseases, SIADH and salt wasting nephropathy had urine sodium of more than 20 mEq/L, as expected (Table 10). In 15 patients with hypovolemic hyponatremia secondary to GI loss, 10 patients had urine sodium <20mEq/L as expected but the remaining 5 patients had urine spot sodium of more than 20 mEq/L which is unusual. In the 15 patients with dilutional hyponatremia only 2 patients had urine sodium of <20mEq/L as expected. The remaining 13 patients had urine sodium of >20mEq/L because they were on diuretic therapy.

Table 1: Age distribution among patients with hyponatremia

MEAN AGE	57.32
MEDIAN	60
MODE	60
STD DEVIATION	13.5
RANGE	65
MINIMUM AGE	23 YEARS
MAXIMUM AGE	88 YEARS
TOTAL	120

Table 2: Distribution of patients with hyponatremia among different age groups

AGE GROUP	NO. OF PATIENTS	PERCENT
<= 35 YEARS	07	5.8
35-55 YEARS	40	33.4
>55 YEARS	73	60.8
TOTAL	120	100

Table 3: Correlation between severity of hyponatremia with age groups

AGE GROUP	SEVERE <115	MODERATE (115-124)	MILD (>=125)	TOTAL
<35 YEARS COUNT % WITHIN AGE GROUP	1(14.3%)	1(14.3%)	5(71.4%)	7(100%)
35-55 YEARS COUNT % WITHIN AGE GROUP	8(20.0%)	24(60.0%)	8(20.0%)	40(100%)
>55 YEARS COUNT % WITHIN AGE GROUP	21(28.8%)	29(39.7%)	23(31.5%)	73(100%)

Table 4: Gender distribution among patients with hyponatremia

GENDER	NO.OF PATIENTS
FEMALE	44(36.7%)
MALE	76(63.3%)
TOTAL	120(100%)

Table 5- Distribution Of Patients With Symptoms Among Hyponatremia

SYMPTOMS	NO.OF PATIENTS	PERCENT
ASYMPTOMATIC	22	18.3
DROWSINESS	60	50.0
VOMITING	15	12.5
HICCUGHS	13	10.8
SEIZURES	10	8.4
TOTAL	120	100

Table 6 - Correlation Between Symptoms And Severity Of Hyponatremia

SYMPTOMS	SEVER (<115mEq/L)	MODERATE (115-124mEq/L)	MILD (>125mEq/L)
ASYMPTOMATIC	0	10	12
DROWSINESS	6	36	18
VOMITING	4	5	6
HICCUGHS	10	0	0
SEIZURES	10	3	0
TOTAL	30	54	36

Table 7- Distribution Of Volume Status Among Patients With Hyponatremia

VOLUME STATUS	NO OF PATIENTS
EUVOLEMIA	58(48.4%)
HYPOVOLEMIA	47(39.2%)
HYPERVOLEMIA	15(12.5)
TOTAL	120(100%)

Table - 8 Distribution of patients based on aetiology of hyponatremia and volume status

DIAGNOSIS	NO OF PATIENTS	PERCENT
DILUTIONAL HYPONATREMIA	15/120	12.5
1-CCF	11/15	74%
2-CIRRHOSIS OF LIVER	04/15	26%
EUVOLEMIC HYPONATREMIA	58/120	48.3
1-SIADH	46/58	79.4%
2-ENDOCRINE	12/58	20.65
HYPOVOLEMIC HYPONATREMIA	47/120	39.2
1-GILOSS	15/47	32%
2-SALT WASTING NEPHROPATHY	32/47	68%

Table 9- Aetiology Among Patients With Hyponatremia

DIAGNOSIS	NO OF PATIENTS
DILUTIONAL	15(12.5%)
ENDOCRINE	12(10%)
SIADH	46(38.3%)
GILOSS	15(12.5%)
SALT LOOSING	32(26.7%)
TOTAL	120(100%)

Table 10-Correlation Between Different Aetiologies And Urine Sodium Among Patients With Hyponatremia

DIAGNOSIS	<20mEq/L	>20mEq/L	TOTAL
DILUTIONAL	2(13.3%)	13(86.7%)	15
ENDOCRINE	0	12(100%)	12
SIADH	0	46(100%)	46
GILOSS	10(66.7%)	5(33.3%)	15
SALT LOOSING	0	32(100%)	32
TOTAL	12	108	120

4. Discussion

This is a clinical study on hyponatremia, designed to analyse the causes and symptoms among patients presenting with hyponatremia.

Out of 120 patients included in our study, the majority were in the age group of >55 years, the mean age was 57 years. Thomas Abraham Vurgese et al^{4,5}, from Kuwait reported similar finding in their study, where the commonest age group was 45-64 years and the mean age was 57 years. In our study and most of the other studies hyponatremia was more common among the elderly. The elderly were more likely to have comorbid conditions that predispose to hyponatremia such as diabetes, hypertension and ischemic heart disease. They are also more likely to be on drugs such as ACE-I and diuretics, which produce hyponatremia.

Male preponderance was noticed. Male to female ratio was 1.7:1. A retrospective study of hyponatremia in tetraplegic/paraplegic patients by Soni BM^{4,5,6,7}, also showed male preponderance. A few other studies have also shown that males are more commonly affected than females (30&34). Jalan et al⁸ from Singapore have reported that gender is not an important risk factor for disturbances in serum sodium concentration. A majority of our patients had mild to moderate hyponatremia, only one fourth had severe hyponatremia. However, among patients with severe hyponatremia two thirds of patients were in the age group >55 years. Thomas et al⁴ in 2006 have reported that a majority of their patients between 45-64 years had mild to moderate hyponatremia. Jalan et al⁸ in 2003 from Singapore have reported increasing age is a strong independent risk factor for hyponatremia.

Nearly one fifth of our patients were asymptomatic. Drowsiness was the commonest symptom in our study (it was present in half of our patients). Vomiting, seizures and hiccoughs were each seen in about 10% of the patients. Patients with more severe degree of hyponatremia were more likely to be symptomatic. One third of patients with mild and one fifth of patients with moderate hyponatremia were asymptomatic. All the patients with severe hyponatremia were symptomatic. Hiccough was seen in moderate and severe hyponatremia and not in mild hyponatremia. Seizures were seen in severe hyponatremia. Similar findings were seen in other studies.^{6,7}

All of our patients had hypotonic hyponatremia. Nearly half of our patients (48.3%), had euvolemic hyponatremia. Less than half (39%) of the patients had hypovolemic hyponatremia. Only one eighth (12.5%) of the patients had hypervolemic hyponatremia. Minneke J^{8,9,10} has reported, out of 41 hyponatremic patients 12 were due to normovolemic disorders, 10 were due to hypovolemic disorders, 11 were due to hypervolemic disorders in their study. In our study among patients with Euvolemic hyponatremia 46 patients (79.3%) had SIADH and very few patients had endocrine abnormalities.

Among patients with hypovolemic hyponatremia about two thirds of patients had salt wasting nephropathy. About one third of patients had GI loss. Among patients with dilutional hyponatremia just over two thirds of patients had CCF. The remainder had Cirrhosis of liver. Over all SIADH was the commonest cause of hyponatremia in our patients 46 patients (38.3%). Salt losing nephropathy was the second most common cause 32 patients (26.7%). These two account for three fourths of all cases. The remainder is due to dilutional hyponatremia, GI loss and endocrine deficiency. Among patients with SIADH about half of the patients had drug induced hyponatremia. About one third of patients had infections as the underlying cause of SIADH: the other aetiologies were CVA, malignancy and TB meningitis.

In our study out of 120 patients more than half of our patients were diabetics and one eighth of our patients were hypertensive. All patients with euvolemic hyponatremia had urine spot sodium of >20mEq/L, which was expected. Among patients with hypovolemic hyponatremia 32 patients had salt losing nephropathy, and all had urine spot sodium >20mEq/L as expected. As all these patients had diabetes and hypertension with associated renal impairment and also they were on diuretics and ACE 1 therapy, 15 patients had GI loss induced hyponatremia, among them 10 patients had urine spot sodium of >20mEq/L which is unexplained.

Out of 15 patients with hypovolemic hyponatremia only 2 patients had urine spot sodium of >20 mEq/L. which is expected but rest 13 patients had urine spot sodium of >20mEq/L, as these patients were on diuretic therapy. Thomas Abraham et al have also reported that the cause of hyponatremia in CCF patients are salt and water retention, diuretic therapy and low salt diet, which also correlated well with other studies also.^{11,12,13,14}

5. Conclusions

Hyponatremia is common in elderly. Severity of hyponatremia becomes greater as the age advances. Drowsiness is the common symptom. Seizures are present only in severe hyponatremia. Over all the commonest cause of hyponatremia is SIADH, followed by salt losing nephropathy. Diuretics, ACE-I are the commonest cause of drug induced SIADH. Among non-diabetic patients with SIADH, infections were the commonest cause for SIADH.

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