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Original Article

Internal Medicine Section

Clinical, Biochemical, and Outcome Profile of Hyponatremia in Geriatric and Non-geriatric Individuals Admitted to a Tertiary Care Centre: A Prospective Cohort Study

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ABSTRACT

Introduction: Hyponatremia is one of the most common electrolyte disturbances encountered in medical wards, occurring in up to 22% of hospitalised patients. Timely recognition and correction of hyponatremia in hospitalised patients may help decrease in-hospital mortality and symptom severity, reduce the need for intensive hospital care, decrease the duration of hospitalisation and associated costs, and improve the treatment of underlying co-morbid conditions and patient's quality of life.

Aim: To compare the clinical presentation, aetiology, biochemical profile, management strategies, and outcomes of hyponatremia in geriatric and non-geriatric individuals admitted to a tertiary care centre.

Materials and Methods: This prospective cohort study was conducted in the Department of General Medicine at Mahatma Gandhi Medical College and Research Institute, Pondicherry, India, from March 2021 to September 2022. A total of 166 subjects (83 geriatric and 83 non-geriatric patients) receiving inpatient services with hyponatremia were enrolled in the study by consecutive sampling. Patients over 18 years of age admitted to the Department of General Medicine with serum sodium levels below 135 mEq/L were included. Comparison of both the groups were done based on clinical presentation, laboratory values, co-morbidities, prescription drugs taken, aetiology, treatment given, and outcomes. For quantitative variables, mean, standard deviation, and independent t-tests were used, while percentages were used for qualitative variables.

Results: The majority of subjects in the non-geriatric group belonged to the age group of 50-59 years, with a mean age of 50.7 years. In the geriatric group, most subjects were in the age group of 65-74 years, with a mean age of 74.5 years. The most common cause of hyponatremia in both groups was Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH), with 32 (38.6%) cases in the non-geriatric group and 27 (32.5%) cases in the geriatric group. This was followed by volume overload in the non-geriatric group, with 14 (16.9%) cases, and drug-induced hyponatremia in the geriatric group, with 22 (26.5%) cases. The most common drug causing hyponatremia was furosemide in both groups. In non-geriatric patients, the most common symptom was giddiness, with 28 (34.1%) cases, while in geriatric patients, it was nausea/vomiting, with 25 (30.1%) cases. Tolvaptan was the most common treatment used in both groups, with 12 (92.3%) of patients with mild hyponatremia receiving it in the non-geriatric group ($p=0.042$), and 46 (55.4%) patients in the geriatric group, with most of them having moderate hyponatremia (26, 86.7%, $p<0.001$).

Conclusion: The results of the non-geriatric and geriatric groups were similar in terms of clinical presentation, biochemical parameters, management strategies, and outcome of hyponatremia. However, the aetiology of hyponatremia appeared to be different. The most common cause of hyponatremia was SIADH in both groups, followed by volume overload in the non-geriatric group and drug-induced hyponatremia in the geriatric group.

Keywords: Diagnosis, Drug therapy, Electrolyte imbalance, Metabolic diseases

INTRODUCTION

Hyponatremia is defined as a serum sodium concentration of less than 135 mEq/L (or 136 mmol/L) [1]. Disorders in serum sodium concentration are caused by abnormalities in water homeostasis [2]. Patients may be asymptomatic or experience symptoms such as headache, nausea, vomiting, seizures, central herniation, and even coma. Hyponatremia occurs in approximately 22 percent of hospitalised patients [2] and 15-30% of ICU patients. The in-hospital mortality rate of patients with hyponatremia is around 30-40%. Therefore, an in-depth study and analysis of hyponatremia is necessary [3,4].

One of the contributing factors in the development of hyponatremia in geriatric patients is an age-associated decrease in free water excretion and Glomerular Filtration Rate (GFR), reduced action of the Renin-Angiotensin and Aldosterone System (RAAS), the prevalence of accompanying co-morbidities, and the intake of multiple prescription drugs. The most common factors that contribute to hyponatremia in non-geriatric patients [5], can be Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH), vomiting, diarrhoea, primary renal disease, nephrotic syndrome, adrenal insufficiency, stroke, intracranial haemorrhage, severe burns, pancreatitis, intravenous administration of hypotonic fluids, use of antidiuretic hormone or its analogues, and diuretics [6].

In hospitalised patients, timely recognition and correction of hyponatremia may help reduce the severity of symptoms, the need for intensive hospital care, in-hospital mortality, the length of hospitalisation, associated costs, and improve the treatment of underlying comorbid conditions and the patient's quality of life. There is a lack of data available on the comparison of hyponatremia between geriatric and non-geriatric age groups hospitalised in tertiary care centres in the Indian population. Therefore, this study was conducted to analyse the clinical presentation, aetiology, treatment options, and outcomes of hyponatremia in geriatric and non-geriatric individuals admitted to a tertiary care centre.

The alternative hypothesis of the study was that there is a difference in the clinical presentation, aetiology, management strategies,

outcomes, and complications of hyponatremia among geriatric and non-geriatric hospitalised patients.

MATERIALS AND METHODS

This was a prospective observational study conducted in the Department of General Medicine at a Medical College in Pondicherry from March 2021 to September 2022. A total of 166 subjects (83 geriatric and 83 non-geriatric patients) receiving inpatient services in the Department of General Medicine with hyponatremia were enrolled in the study using consecutive sampling. Ethical clearance was obtained from the Institutional Human Ethics Committee with ethical approval number IHEC/336, and informed consent was obtained from all patients included in the study.

Sample size calculation: The proportion of comorbidity among patients with hyponatremia was assumed to be 73% [4]. Assuming an alpha level of 0.05, a precision of 0.1, and an attrition rate of 10%, the sample size was calculated as 83 geriatric patients and 83 non-geriatric patients. The formula used for sample size calculation was:

$$n=Z^2_{1-\alpha/2}\frac{P(1-P)}{d^2}$$

n=sample size

Z=standard normal value of alpha=1.96

Alpha=type I error

P=proportion of comorbidity

d=precision=10%

Inclusion criteria: A total of 166 patients over 18 years of age admitted to the Department of General Medicine with a serum sodium level less than 135 mEq/L were included in the study. According to the sample size calculation, 83 non-geriatric patients (18-64 years) and 83 geriatric patients (>65 years) were included in the study.

Exclusion criteria: Patients who had undergone surgery and were hospitalised within 30 days prior to the current admission, patients on dialysis, and patients on total parenteral nutrition were excluded from the study.

Procedure

The selected patient underwent a thorough history taking and clinical examination. The history of hyponatremia symptoms, predisposing factors, and pre-existing illnesses was noted. Clinical assessment of symptomatology and volume status was conducted. The drugs and co-morbidities causing hyponatremia were recorded. The history of fluid loss, such as vomiting, diarrhoea, diuretic use, and excessive sweating, was documented for all patients. CNS examination was repeated after the correction of hyponatremia, and symptoms such as dizziness, lethargy, altered sensorium, and seizures were attributed to hyponatremia unless there was a co-existing medical condition or medication effect that could account for these symptoms.

For all patients, clinical details, final diagnosis, investigations, and management were recorded on a standard data collection sheet. Analysis was conducted to identify characteristics that differentiate hyponatremia in geriatric and non-geriatric hospitalised patients. The outcome was described as successful treatment of hyponatremia, defined by a serum Na+ level at discharge greater than 135 mEq/L. Patients who did not meet this criterion at discharge were classified as having failed treatment of hyponatremia.

STATISTICAL ANALYSIS

Quantitative variables were expressed as mean and standard deviation, while qualitative variables were expressed as frequency and percentage. The association between categorical variables was assessed by chi-square test. The comparison of continuous variables between two groups was analysed using the independent samples t-test. A p-value less than 0.05 was considered statistically significant.

RESULTS

In [Table/Fig-1], it can be observed that the majority of subjects in the non-geriatric group belonged to the age group of 50-59 years, with a mean age of 50.7 years. On the other hand, in the geriatric group, the majority belonged to the age group of 65-74 years, with a mean age of 74.5 years.

Age (years)	Frequency	Percentage
Non-geriatric		
<30	6	7.2
30-39	9	10.8
40-49	15	18.1
50-59	27	32.5
60-64	26	31.3
Geriatric		
65-74	46	55.4
75-84	33	39.8
85-94	4	4.8
Total	166	100

[Table/Fig-1]: Age distribution for hyponatremia in percentage (non-geriatric and geriatric).

Regarding the severity levels of hyponatremia, in non-geriatric patients, most of them had moderate hyponatremia (41, 49.4%) and severe hyponatremia (29, 34.9%). In the geriatric group, severe hyponatremia (38, 45.8%) and moderate hyponatremia (30, 36.1%) were more common. Severe hyponatremia was more prevalent among the geriatric group.

The most common cause of hyponatremia in both groups was SIADH, accounting for 38.6% in the non-geriatric group and 32.5% in the geriatric group. Volume overload was the second most common cause in the non-geriatric group (16.9%), while drug-induced hyponatremia (26.5%) was the second most common cause in the geriatric group. Furosemide was the most common drug causing hyponatremia in both groups, with 8.4% in the non-geriatric group and 12% in the geriatric group [Table/Fig-2-4].

	Non geriatric		Geriatric		Total	
Cause of hyponatremia	N	%	N	%	N	%
Beer potomania	0	0	1	1.2	1	0.6
Cerebral salt wasting syndrome	2	2.4	1	1.2	3	1.8
Dehydration	0	0	2	2.4	2	1.2
Diarrhea	10	12	2	2.4	12	7.2
Drug induced	9	10.8	22	26.5	31	18.7
Hyperglycaemia	3	3.6	3	3.6	6	3.6
Hyperlipidemia	2	2.4	2	2.4	4	2.4
Hypothyroidism	4	4.8	6	7.2	10	6
Ketonuria	4	4.8	5	6	9	5.4
Mannitol	1	1.2	0	0	1	0.6
Pancreatitis	1	1.2	0	0	1	0.6
Radiocontrast	0	0	1	1.2	1	0.6
Salt losing nephropathy	0	0	2	2.4	2	1.2
SIADH	32	38.6	27	32.5	59	35.5
Volume overload	14	16.9	5	6	19	11.4
Vomiting	1	1.2	4	4.8	5	3
Total	83	100	83	100	166	100

[Table/Fig-2]: Cause of hyponatremia.

Drugs causing hyponatremia (Non-geriatric)	Severity of hyponatremia			Total
	Mild	Moderate	Severe	
Furosemide	0	6	1	7
Hydrochlorothiazide	0	0	1	1
Torsemide	0	1	0	1

[Table/Fig-3]: Drugs causing hyponatremia in non-geriatric.
Total non-geriatric patients N=83, out of which 13 were in mild, 41 were in moderate and 29 were in severe

Drugs causing hyponatremia (geriatric)	Severity of hyponatremia			Total
	Mild	Moderate	Severe	
Furosemide	0	4	6	10
Furosemide, hydrochlorothiazide	2	0	1	3
Furosemide, spironolactone	2	0	4	6
Hydrochlorothiazide	0	1	0	1
Torsemide	0	0	2	2

[Table/Fig-4]: Drugs causing hyponatremia in geriatric.
Total cases in geriatric were 83, out of which 15 were mild, 30 were in moderate and 38 were in severe

Among non-geriatric individuals, 37.3% had one comorbidity, while 28.9% had more than one comorbidity. The most common co-morbidities were Chronic Kidney Disease (CKD), Cerebrovascular Accident (CVA), and systemic Hypertension (HTN). Among geriatric individuals, 45.8% had more than one comorbidity, and 31.3% had one comorbidity. The most common co-morbidities were systemic HTN, Type-2 Diabetes Mellitus (DM), and hypothyroidism.

In terms of medication, geriatric patients consumed a higher number of prescription drugs (3-5) compared to non-geriatric patients who took two drugs for their pre-existing co-morbidities.

A higher percentage of patients in the geriatric group (49, 59%) were symptomatic compared to the non-geriatric group (46, 55.4%). Most patients who were symptomatic had severe hyponatremia, with 71% in the geriatric group and 69% in the non-geriatric group.

In non-geriatric patients, the most common symptoms were giddiness (28, 34.1%), followed by nausea/vomiting (22, 26.5%) and altered sensorium (10, 12.2%). Among geriatric patients, the most common presentations were nausea/vomiting (25, 30.1%), giddiness (20, 24.1%), altered sensorium (14, 17.1%), and hiccups (10, 12%).

Altered sensorium (13, 35.1%) was the most common symptom among geriatric individuals with severe hyponatremia, and this difference was statistically significant (p=<0.001). It suggests that geriatric individuals are more prone to developing altered sensorium as the severity of hyponatremia increases.

When comparing the biochemical parameters [Table/Fig-5], it was found that in the non-geriatric group, the mean serum creatinine values were 1.50 mg/dL in mild and moderate hyponatremia, and 2.16 mg/dL in severe hyponatremia. This difference was statistically significant (p=0.032). However, in the geriatric group, the difference was not statistically significant. This suggests that kidney diseases may have contributed to the development of severe hyponatremia in non-geriatric individuals but not in the geriatric group. The values of other biochemical parameters were in a similar range in both groups and were not statistically significant.

In non-geriatric patients, the maximum number of patients were managed with Tolvaptan. Among the mild group patients, 12 (92.3%) received Tolvaptan, while 25 (61%) and 12 (41.4%) in the moderate and severe groups, respectively, also responded to the treatment. Similarly, in geriatric patients, Tolvaptan was the most common treatment used (46, 55.4%), with the majority of it being received by patients with moderate hyponatremia (26, 86.7%) [Table/Fig-6,7].

The mean duration of hospital stay across both groups was mostly in the range of 3-7 days, followed by more than seven days [Table/Fig-8,9]. All patients in both groups have recovered from hyponatremia at the time of discharge, and none of them needed follow-up. There were no deaths among any of the subjects during the study.

Laboratory findings	Non-geriatric (n=83)		Geriatric (n=83)		Independent sample t-test	
	Mean	SD	Mean	SD	t	p
Serum sodium when hyponatremia detected (mEq/L)	124.2	7.0	123.5	7.2	0.569	0.570
Discharge sodium (mEq/L)	137.2	2.0	137.4	2.4	0.743	0.458
Urine spot sodium (mEq/L)	87.8	53.1	75.1	36.1	1.806	0.073
RBS (mg/dL)	196.2	105.3	186.1	89.9	0.663	0.508
Urea (mg/dL)	47.7	34.9	49.3	46.4	0.256	0.798
Serum osmolality (mosmol/kg)	272.9	17.0	271.0	21.4	0.625	0.533
Creatinine (mg/dL)	1.73	1.12	3.37	15.11	0.984	0.326
Potassium (mEq/L)	3.91	1.01	4.24	0.98	2.134	0.034
T3 (pg/mL)	1.40	0.52	1.53	0.54	0.966	0.338
T4 (ng/dL)	1.31	0.37	1.19	0.38	1.122	0.266
TSH (uIU/mL)	2.72	2.03	2.55	1.96	0.317	0.752
Cortisol (mcg/dL)	18.2	7.3	22.9	14.3	0.62	0.544

[Table/Fig-5]: Levels of biochemical parameters of patients with hyponatremia.

Treatment given Non geriatric group	Severity of hyponatremia						Total		p-value
	Mild		Moderate		Severe				
	N	%	N	%	N	%	N	%	
IVF NS	1	7.7	9	22	10	34.5	20	24.1	0.042
TOLVAPTAN	12	92.3	25	61	12	41.4	49	59	
3% NACL, fluid restriction	0	0	7	17.1	7	24.1	14	16.9	
Total	13	100	41	100	29	100	83	100	

[Table/Fig-6]: Treatment given in non-geriatric group with severity of hyponatremia.
*Chi-square test

Treatment given geriatric group	Severity of hyponatremia						Total		p-value
	Mild		Moderate		Severe				
	N	%	N	%	N	%	N	%	
IVF NS	3	20	3	10	15	39.5	21	25.3	<0.001
TOLVAPTAN	10	66.7	26	86.7	10	26.3	46	55.4	
3% NACL, fluid restriction	2	13.3	1	3.3	13	34.2	16	19.3	
Total	15	100	30	100	38	100	83	100	

[Table/Fig-7]: Treatment given in geriatric group with severity of hyponatremia.
*Chi-square test

Age in years (Non-geriatric)	Duration of hospital stay in days			Total
	≤2 days	3-7 days	>7 days	
<30	0	4	2	6
30-39	0	4	5	9
40-49	0	10	5	15
50-59	0	14	13	27
60-64	1	16	9	26
Total	1	48	34	83

[Table/Fig-8]: Association of age distribution and duration of hospital stay (non-geriatric).
p=0.825 *Chi-square test

Age in years (Geriatric)	Duration of hospital stay in days			Total
	≤2 days	3-7 days	>7 days	
65-74	1	22	23	46
75-84	0	21	12	33
85-94	0	3	1	4
Total	1	46	36	83

[Table/Fig-9]: Association of age distribution and duration of hospital stay (Geriatric).
p=0.539 *Chi-square test

The mean potassium levels among non-geriatric and geriatric patients were found to be 3.91 and 4.24 mEq/L, respectively, which was found to be statistically significant. However, the difference in other biochemical parameters between both groups was not statistically significant.

DISCUSSION

This prospective observational study was conducted in the Department of General Medicine over a period of 18 months. The majority of patients in the non-geriatric group were found to be in the age group of 50-59 years, while the majority of geriatric patients were in the age group of 65-74 years.

Similar results were obtained in a study by Sindhu RP et al., where they found that 34.14% of patients were in the age group of 50-59 years, followed by 27.3% in the age group of 60-69 years. These patients had multiple co-morbidities and were taking multiple prescription drugs [6]. Baji PP and Borkar SS also found that 63% of patients in the age group of 50-69 years were most commonly affected [7], whereas Prabhu T found that patients in the age group of 66-80 years were most commonly affected among geriatrics [8].

Regarding the severity levels of hyponatremia, non-geriatric patients showed the highest number of patients suffering from moderate hyponatremia, followed by severe hyponatremia. On the other hand, geriatric patients showed severe hyponatremia followed by moderate hyponatremia. Severe hyponatremia was more common among the geriatric group.

When assessing the aetiology of hyponatremia, the most common cause in the non-geriatric group was SIADH, followed by volume overload and diarrhoea. In the geriatric group, the most common cause of hyponatremia was SIADH, followed by drug-induced cases (26.5%). This is in agreement with the study by Vurgese TA et al., where the most common aetiology was SIADH (34.8%), followed by CKD (19.69%), CCF (18.18%), DM, HTN, cirrhosis (6% each), and acute gastroenteritis (3%) [9]. Similar results were observed by Rao MY et al., who also found the common causes to be SIADH (30%) followed by drugs (24%) [10].

The most common drug causing hyponatremia was furosemide in both groups, with 8.4% in the non-geriatric group and 12% in the geriatric group [Table/Fig-7,8]. Similar results were found by Sunderam SG and Mankikar GD, who found that 17% of elderly patients taking diuretics developed hyponatremia [11]. Studies by Wierzbicki AS et al., and Fadel S et al., showed that thiazide diuretics such as amiloride/hydrochlorothiazide can also cause significant hyponatremia [12,13]. Volume overload was the second most common cause of hyponatremia in the non-geriatric group, caused by CKD, heart failure, and liver failure.

When comparing the history of prescription drugs being taken for other illnesses/co-morbidities, it was found that among non-geriatric patients, the majority of patients with hyponatremia were not taking any prescription drugs. 22.9% consumed two drugs, and 19.3% consumed 3-5 drugs. Among geriatric patients, the majority of patients with hyponatremia consumed 3-5 drugs, followed by two drugs. This difference showed statistical significance with a p-value of 0.008, suggesting that the intake of an increased number of prescription drugs is a contributing factor to the development of hyponatremia in the elderly. A study conducted by Agarwal SM and Agarwal A also showed that the intake of multiple drugs can be one of the contributing factors for hyponatremia in admitted patients [14].

Among non-geriatric individuals, the majority had only one comorbidity, whereas 28.9% had more than one comorbidity. The most common co-morbidities in the non-geriatric group were CKD, CVA, systemic HTN, Type-2 DM, hypothyroidism, and seizures. Among geriatric individuals, most of them had more than one comorbidity. The most common co-morbidities in the geriatric group were systemic HTN, Type-2 DM, hypothyroidism, and CVA.

A study conducted by Saeed BO et al., also showed that hyponatremia was found to be caused by renal disorders (21%), liver disorders (7%), and CHF (9%) [15]. Vurgese TA et al., found in their study that the common predisposing factors were CCF (18%), CKD (19.69%), HTN (6.06%), DM (6.06%), and cirrhosis (6.06%) [9]. Rao MY et al., also found that the most common comorbid conditions were HTN (62%), DM (51%), CKD (22%), and IHD (18%) [10].

When comparing the clinical presentation of hyponatremia between both groups, it was observed that a higher percentage of patients in the geriatric group were symptomatic compared to the non-geriatric group. Most patients who were symptomatic had severe hyponatremia, with 71% in the geriatric group and 69% in the non-geriatric group. Among non-geriatric patients, giddiness was the most common symptom, followed by nausea/vomiting, altered sensorium, hiccups, and seizures. In geriatric patients, the most common symptom was nausea/vomiting, followed by giddiness and altered sensorium.

Baji PP and Borkar SS found that nausea and vomiting were the most common gastrointestinal symptoms present in 54% and 48% of patients, respectively, with seizures accounting for 11% of hyponatremia patients [7]. A study by Prabhu T found that 46% of patients were asymptomatic, 30% were lethargic, and 28% experienced giddiness [8]. Agarwal SM and Agarwal A recorded confusion in 30% and altered sensorium in 17.1% (similar to the present study in the geriatric population), with 2% having seizures and 14% being asymptomatic [14]. Rao MY et al., showed that lethargy, drowsiness with slow response, and altered sensorium were the most common symptoms [10]. Sharabi Y et al., from his study found weakness and vomiting to be the most common manifestations in hyponatremia [16].

When comparing the mean values of biochemical parameters between both groups, it was observed that in the non-geriatric group, the mean serum sodium value when hyponatremia was first detected during admission was 132.1 mEq/L in mild hyponatremia, 127.1 mEq/L in moderate hyponatremia, and 116.5 mEq/L in severe hyponatremia, and this difference was statistically significant (p=<0.001). In the geriatric group, the mean serum sodium value when hyponatremia was first detected during admission was 132.0 mEq/L in mild hyponatremia, 127.2 mEq/L in moderate hyponatremia, and 117.3 mEq/L in severe hyponatremia, and this difference was statistically significant (p=<0.001).

In the non-geriatric group, the mean serum creatinine value was 2.16 mg/dL in severe hyponatremia, and this difference was statistically significant (p=0.032). However, in the geriatric group, it was not statistically significant, suggesting that kidney diseases contributed to the development of severe hyponatremia in non-geriatric individuals but not so in the geriatric group. The values of other biochemical parameters were in a similar range in both groups and were not statistically significant. Patients were treated with intravenous fluid normal saline (IVF NS), tolvaptan, 3% NaCl, and restriction of fluid intake. The treatment for each patient was decided based on osmolality status, volume status, urine spot sodium, severity of hyponatremia, and contributing factors. In the study done by Agarwal SM and Agarwal A, 3% saline was given to 48.5% of patients, NS to 48.6%, and fluid restriction was given to 40% of hyponatremia patients [14].

It was observed that 24.4% of patients in the non-geriatric group and 32.5% of patients in the geriatric group had a prolongation of hospital stay attributable to hyponatremia. In both groups, the prolongation of hospital stay was associated with moderate and severe hyponatremia. The authors also found that the mean duration of hospital stays across both groups ranged from 3-7 days, followed by more than 7 days, and the least number of patients were discharged in less than or equal to 2 days. In a study by Agarwal SM and Agarwal A, the time taken for recovery was reported as 3.7±2.4 days [14]. In another study by Chua M et al., the mean

length of hospital stay was 13 days [17]. Lohani S and Devkota UP found that the mean duration of hospital stay was 26.73 days in hyponatremia patients with Traumatic Brain Injury (TBI) [18].

Factors contributing to prolonged hospital stay among the non-geriatric group were drug-induced, SIADH and DCLD, whereas in the geriatric group, the most common factors were SIADH, CVA, and drug-induced.

Limitation(s)

The volume status of the patient was clinically assessed, which might vary subjectively. This method of estimation was not accurate. Urinary osmolality could not be measured. Further studies are needed to compare the geriatric population and the non-geriatric population in order to eliminate discrepancies and reach a consensus regarding the severity of hyponatremia.

CONCLUSION(S)

In this study, both the geriatric and non-geriatric groups showed similarities in clinical presentation and biochemical parameters. However, the aetiology of hyponatremia seemed to be different in both groups. The most common cause of hyponatremia was SIADH in both groups, followed by volume overload in the non-geriatric group and drug-induced in the geriatric group. Irrespective of age group, the management strategies were the same in both groups. All patients recovered from hyponatremia at the time of discharge, and there was no statistically significant difference between the two groups in terms of the prolongation of hospital stay due to hyponatremia.

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