Original Article

Frequency and Etiology of Hyponatremia in Adult Hospitalized Patients in Medical Wards of a General Hospital in Kuwait

Thomas Abraham Vurgese, Sunil Bahl Radhakrishan, Osman Abdul Wahab Mapkar
Department of Medicine, Al Jahra Hospital, Kuwait

Kuwait Medical Journal 2006, 38 (3): 211-213

ABSTRACT

Objective: To determine the incidence and etiology of hyponatremia in adult hospitalized patients in medical wards of a general hospital.

Setting: The four medical wards comprising a total of 140 beds in a 500 bedded general hospital in Kuwait.

Design: Retrospective study of hyponatremia analyzed and reported by the biochemistry laboratory from June to December 2004.

Subjects: All adult patients admitted to medical wards during the six month period from June to December 2004 having serum sodium < 130 mmol/l.

Results: Out of a total of 1825 patients analyzed over a six months period (from June - December 2004), 66 patients (3.6%) had hyponatremia. Of these 37 (56%) were male and 29 (44%) female. Their mean age was 57.05 years. The commonest age group was 45 - 64 years and the least affected group was 12-25 years. Their mean serum sodium level was 122 mmol/l. Among the major causes of hyponatremia was the Syndrome of inappropriate secretion of antidiuretic hormone (SIADH) with pneumonia. Next to SIADH, renal failure and cardiac failure were the two common causes.

Conclusion: Overall incidence of hyponatremia was 3.6% in all medical patients reviewed. The commonest cause of hyponatremia was found to be SIADH due to pneumonia. Renal failure and cardiac failure were the other two common causes. Identification of the cause of hyponatremia is important in order to impart specific treatment. Correction of hyponatremia improves prognosis of the underlying disease and prevents further complications due to hyponatremia itself. It is important to be cautious not to correct hyponatremia too rapidly and also not to exceed a level of 120 to 125 mmol/l (acutely), in order to prevent the complication of osmotic demyelinating syndrome.

KEY WORDS: cardiac failure, osmotic demyelinating syndrome, syndrome of inappropriate secretion of antidiuretic hormone (SIADH)

INTRODUCTION

Hyponatremia is defined as serum sodium levels of ≤ 130 mmol/l. It can be classified on the basis of serum osmolality, volume status and urinary sodium into hypertonic, isotonic and hypotonic types. Hypotonic hyponatremia is further classified into hypervolemic, euvolemic and hypovolemic. It is the most common electrolyte abnormality in the medical wards. Its incidence and prevalence are about 1.0 and 2.5% respectively. Mild hyponatremia may be asymptomatic but may lead to poor treatment outcome in the patient. Severe hyponatremia may progress to seizures, status epilepticus or coma. The treatment of hyponatremia will depend on the volume status of the patient. The aim of our study was to define the most common causes of hyponatremia in the medical wards of our hospital and to compare it with other studies. We also wanted to increase awareness regarding the causes and the recommended treatment in order to prevent complications including osmotic demyelinating syndrome.

PATIENTS AND METHODS

A retrospective study was carried out involving all adult patients admitted to the medical wards over a period of six months (from June to December 2004) for the presence of hyponatremia. Hyponatremia was defined as serum sodium of ≤ 130 mmol/l. All blood samples were analyzed in the biochemistry department on LX-20 machine. Information regarding age and sex distribution, the lowest serum sodium levels (whenever there were several results in a single patient), the clinical diagnosis and further clinical information suggesting the cause of hyponatremia were collected.

RESULTS

Out of the 1825 patients analyzed over the six months period (from June -Decemeber 2004), 66

Address correspondence to:
Dr. Thomas Abraham Vurgese, P.O. Box 62276, Jahra 02153, Kuwait. Tel: (00965) 9567681, Email: thomasvurgese@hotmail.com

Table.1: Sexwise distribution of hyponatremia

Sex	No. of patients	Percentage
Male	37	56.1
Female	29	43.9
Total	66	100

patients (3.6%) had hyponatremia. Out of these, 37 (56%) were male and 29 (44%) female. The age and severity wise distribution of all cases is shown in Table 2. The mean age was found to be 57.05 years ± 2SD. The commonest age group affected was 45 - 64 years and the least affected group was 12 - 25 years. The mean serum sodium level was 122 mmol/l. There was a seasonal variation between the summer and winter months. 39 (59.1%) patients presented during the earlier summer months as compared to 27(40.9%) who presented during the winter months.

The different etiological factors causing hyponatremia are shown in Table 3. Among the major causes of hyponatremia, syndrome of inappropriate secretion of antidiuretic hormone (SIADH) [due to different etiological factors] constituted the major cause. SIADH is defined as non-osmotically stimulated anti diuretic hormone release causing euvolemic hyponatremia. In our study pneumonia was the commonest cause of SIADH leading to hyponatremia. Renal failure and congestive cardiac failure were the next frequent causes of hyponatraemia.

DISCUSSION

The incidence of hyponatremia (3.6%) in our study correlates well with most of the other studies[1]. The male preponderance seen in our study is in variance with a number of other studies that show female preponderance[2]. A majority of our patients (82%) showed mild to moderate hyponatremia (120-130 mmol/l) which again correlates well with the other studies.

A number of studies have evaluated the incidence and etiology of hyponatremia in general, but there are very few relevant studies related to hyponatremia in inpatients in medical wards.

In our study SIADH[4] was the commonest cause of hyponatremia. This was confirmed by the diagnostic criteria for SIADH in the form of decreased serum sodium and serum osmolality, increased urinary osmolality, urinary Na > 20 mmol/l with normal renal, adrenal, thyroid and cardiac function in euvolemic patients. In our study pneumonia was the commonest etiological factor for SIADH.

Many of the causes of hyponatremia have multifactorial pathophysiology. Patients with

Table 2: Age and severity wise distribution of hyponatremia

Age	Number	Mild (126 -130 mmol/l)	Moderate (120 - 125 mmol/l)	Severe (< 120 mmol/l)	Percentage
12 - 25 yrs	8	3	3	2	12.1
26 - 45 yrs	10	5	3	2	15.1
46 - 64 yrs	30	10	15	5	45.5
> 65 yrs	18	4	11	3	27.3
Total	66	22	32	12	100

congestive cardiac failure have hypervolemic hyponatremia due to the salt and water retention. They also have hyponatremia due to low salt diet and diuretic therapy.

Similarly patients with DM have hyponatremia possibly due to the associated renal failure, SIADH due to drug therapy and also some amount of pseudohyponatremia due to the excess blood sugar causing hyperosmolar hyponatremia. In cerebrovascular accidents[5] hyponatremia is usually due to SIADH and hyperosmolar hyponatremia secondary to mannitol therapy. Two cases of pseudohyponatremia in our study where due to hyperlipidemia with triglyceride concentration more than 6 mmol/l. There were two cases of drug induced SIADH, one due to carbemazepine in an epileptic patient and the other due to paroxetine (serotonin specific reuptake inhibitors)[6] used to treat depression. One of our cases of SIADH was due to human immunodeficiency virus (HIV) infection as reported in some other studies[7]. Three cases of SIADH in our study were due to bronchogenic carcinoma[8]. Seasonal variation was noted in our study with 59.1% patients presenting in the summer months. This was probably due to variations in the ambient temperature influencing insensible fluid losses that could possibly have altered hydration status and sodium balance. It is important to delineate the underlying cause of hyponatremia as the treatment may differ in each case. For example, hypervolemic and euvolemic hypotonic hyponatremia may be treated with salt and water restriction but hypovolemic hypotonic hyponatremia will require volume repletion with normal saline. As SIADH causes euvolemic hyponatremia the main stay of treatment is restriction of fluid intake to 800 to 1000 ml per day. Since the intake is almost always exceeded by urinary output a negative water balance ensues and a gradual increase in serum sodium is seen with symptomatic improvement. Unless and until the underlying cause of the SIADH can be corrected, fluid intake should be restricted continuously to maintain normonatremia until serum Na exceeds 135 mmol/l. Drugs that block the effect of argentine vasopressin like demecocycline can help normalize

Table 3: Etiological factors associated with hyponatremia.

S. No.	Disorders	No. of patients	Percentage
1	Congestive cardiac failure.	12	18.18
2	Renal failure (acute and chronic)	13	19.69
3	Acute gastro-enteritis	2	3.03
4	SIADH due to	23	34.8
	- Pneumonia	13	19.69
	- Drugs	2	3.03
	- COPD	3	4.54
	- Malignancy (bronchogenic carcinoma)	3	4.54
	- HIV	1	1.51%
	- CVA	1	1.51%
5	Hypertension	4	6.06%
6	Addisons disease	1	1.51%
7	Cirrhosis	4	6.06%
8	DM	4	6.06%
9	Others		
	- (psedo-hyponatremia due to increased triglyceride)	2	3.03%
	- IV drip etc.	1	1.51%
	TOTAL	66	100%

serum sodium by antagonizing the action of ADH in the collecting duct. Demecocycline is administered in the dose of 900 to 1200 mg per day. An important point to note here is that chronic hyponatremia should be corrected slowly (@ 0.5 - 1 mmol/l/hour) and not more than 12 mmol/l in 24 hours[9] in order to prevent central pontine myelinolysis (osmotic demyelinating syndrome: quadriplegia and pseudobulbar palsy caused by demyelination of corticospinal and corticobulbar tracts within the pons)[10]. Hyponatremia in the range of 110 - 120 mmol/l and lower values are treated with 3% hypertonic saline (0.05 ml/kg/minute) especially if symptomatic[9]. The serum sodium should be re-estimated in two to three hours before deciding whether to continue or stop the drip, aiming to bring the serum sodium upto 120 mmol/l.

CONCLUSION

The overall incidence of hyponatremia in our study was 3.6% in all the patients reviewed. The commonest cause of hyponatremia was found to be SIADH. The commonest etiology for SIADH in our study was pneumonia. Next to SIADH, the other common causes in our study were renal failure and congestive cardiac failure. Delineating the cause of hyponatremia is important in order to impart specific treatment tailored to the etiology. The correction of hyponatremia also helps improve the prognosis of the underlying disease and helps prevent further complications due to the hyponatremia itself. There is a need to be cautious not to correct the hyponatremia too fast (rate not more than 0.5-1 mmol/l/hour) and not to exceed a level of 120-125 mmol/l (acutely), in order to prevent the complication of osmotic demyelinating syndrome.

ACKNOWLEDGEMENTS

We acknowledge all the help provided by Mr Humayun Minhas from the biochemistry department in performing all the tests and Mr Sunny J Parackal for his secretarial services.

REFERENCES

1. Kende M, Udayan R, Benjamin H. Review of cases of Hyponatremia in Port Moresby General Hospital. PNG Med J 1999; 42:84-89.
2. Grikiniene I, Volbehar V, Stablsati D. Gender differences of Sodium. Metabolism & Hyponatremia. Medicina 2004; 40:935-936.
3. Conrad MJ, Meinders AE. Causes of Hyponatremia in department of Internal Medicine and Neurosurgery. Eur J Internal Med 2003; 14:302-309.
4. Kumar Sumit, Beel Tomas. Sodium. The Lancet 1998; 352:220-228.
5. Lim JK,Yap KB. Hyponatremia in hospitalized elderly patients. Med J Malaysia 2001; 56:232-235.
6. Arinzon Z, Lehman Y, Fidelman Z. Delayed Recurrent SIADH associated with SSRIs. Ann Pharmacother 2002; 36:1175-1177.
7. Tang W, Kaptun EM, MassrySG. Hyponatremia in hospitalized patients with AIDS. Am J Med 1993; 94:169-174.
8. Berghmans T, Body JJ. A prospective study on hyponatremia in medical cancer patients: epidemiology, etiology and differential diagnosis. Support Care Cancer 2000; 8:192-197.
9. Garry G, Brenner BM. Fluid and Eelectrolyte Disturbances. In: Kasper DL, Braunwald E, editors. Harrison's Principles of Internal Medicine, 16th Edition, Mcgraw Hill; 2005, p 256-257.
10. Martin RJ. Central pontine and extrapontine myelinolysis: the osmotic demyelination syndromes. J Neurol Neurosurg Psychiatry 2004; 75:22-28.