A CLINICAL STUDY OF SEVERE HYPONATRAEMIA

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SYNOPSIS

Over a six month period 61 patient with severe hyponatremia (⩽125 mmol.1) admitted to a medical unit were studied. Their ages ranged from 13 years to 81 years with a mean of 61 years. Using simple clinical and laboratory data 38 (62.3%) had hypovolemic states, 13 (21.3%) had hypervolemia and 10 (17.4%) were isovolemic with either the SIADH or multifactorial cause for their hyponatremia. Thirteen (21.3%) died, mostly from underlying fatal illnesses and only 13 (21.3%) required specific treatment for their hyponatremia.

INTRODUCTION

Hyponatremia is commonly countered in clinical practice and very often presents a difficult problem in diagnosis and rational management. It has been reported in 15% to 50% of all 'electrolyte' studies[1 2 3]. The discovery of a severely low 'serum sodium' will prompt many physicians to search for unusual metabolic and endocrine conditions particularly that mixed bag of disorders referred with the acronym 'SIADH'[4]. Accurate radioimmunoassays for ADH (vasopressin) are now available[5] and many laboratories have studied the problem of hyponatremia with these assays and other sophisticated physiological techniques to characterise specific pathological subsets within this 'SIADH' and other syndromes of hyponatremia i.e. 'sick cell'[6 7] and 'resent omostat'[8].

The average clinician does not have these techniques readily at hand and must rely upon simple bedside and biochemical information for assessment and classification of even severe hyponatremia.

It is the opinion of many autors that hyponatremia can very often be managed with 'masterly inactivity' and rarely is it encountered as a medical emergency[1].

We have used a simple and well known approach to severe hyponatremia in a prospective study of medical inpatients by historical, basic clinical and biochemical data[9 10 11]. We have also observed their outcome whether with or without specific treatment.

MATERIALS AND METHODS

From November 1981 to April 1982, all patients admitted to the Unit and found to have severe hyponatremia (⩽125 mmo1.1[1]) were studied. All patients were placed into 3 major clinical groups according to assessment of ECF (extracellular fluid) volume states i.e. hypovolemia, hypervolmia and isovolemia based upon a history of salt and water balance — gastrointestinal symptoms, diuretic therapy, polyuria, input-output charts and body weight change wherever possible and also a simple clinical assessment of hydration state with postural pulse and blood pressure change, mucosal examination and tissue tugor[9 10 11].

All patients were managed in the usual manner for their primary conditions. Serum electrolytes, osmolality, urinary osmolality, specific gravity and sodium were assayed serially. Whenever necessary other investigations i.e. thyroid functions, lipid assays, protein assays, blood sugar and uric acid were performed.

All patients were followed up till either hyponatremia resolved, with or without specific treatment or till death.

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them were obtunded and required nasogastric tube feeding and 2 had lymphoreticular malignancies on multiple cytotoxic and antimicrobial therapy. All of them have clinical and biochemical evidence of multi-system failure.

Overall 13 patients (21.3%) died and as Table 2 indicates: 10 patients had either cancer or a chronic terminal illness; 2 patients had acute respiratory failure and died suddenly; 1 patient had polycythemica vera with chorea and died from staphylococcal septicemia. In only 3 patients could we consider hyponatremia as a possible contributory factor in death.

Majority of the patient do not require specific treatment for hyponatremia. Three patients with 'SIADH' required 3% saline and water restriction; the patient with Sheehan's syndrome responded to saline and corticosteroids. Ten out of 38 patients (26.3%) in the hypovolemic group required salt tablets or intravenous saline out of which 3 (7.8%) required 3% saline.

DISCUSSION

We have selected for study only those patients with severe and unequivocal hyponatremia. This is a prospective study and we saw 61 patients over a 6 month period, we feel that this is a rather common condition among acutely ill medical patients. The sexes were equally respresented but there was a bias towards the older age groups.

Although hyponatremia can present with severe neurological symptoms we encountered this in only one patient[13 14]. We have seen a few patients who were relatively well with hyponatremia<110 mmol/1.

A radioimmunoassay for ADH is available and though useful for delineating precise pathophysiology[15 16 17] we find that using simple clinical data we could classify patients into clear cut groups which point the way towards rational management.

We found a rather large proportion of patients with hypovolemia and 1/3 of these have an iatrogenic contribution to their hyponatremia i.e. diuretic use for control of hypertension or heart failure. This is a problem particularly for the elderly patient on potent diuretics who may develop intercurrent illness resulting in salt deficit[14]. 21.3% of our patients had "hypervolemic hyponatremia" associated with edematous states. This category of patients are traditionally referred to under the non-specific category of 'dilutional hyponatremia'. The 'dilutional' concept is still useful clinically and water restiction while attempting to improve free water clearance and natriuresis is rational therapy. We find a short course of a potent 'loop diuretic' e.g. frusemide to be useful in this group of patients despite its tendency to reduce free water clearance in non-edematous states[9].

The pathophysiology of 'dilutional hyponatremia' is uncertain but peritubular forces acting upon proximal tubular shifts are probably important while recent evidence from ADH assays indicate a possible role for 'vasopressin' as well[9 18 19].

Classical 'SIADH' is uncommon, usually announcing itself by persistent and severe hyponatremia in association with clinically evident primary disease e.g. malignancies, acute respiratory illnesses, intracranial injuries and endocrine disorders. The concept of 'inappropriate' ADH secretion is changing in the light of recent pathophysiologic data revealing non-osmotic stimuli controlling ADH secretion in body fluid homeostasis. The purist would regard only 'ectopic' ADH secretion from a tumour as true 'SIADH'[1].

We did not encounter any patients with 'pseudohyponatremia' also called 'iso-osmotic hyponatremia' as in hyperproteinemic and hyperlipidemic states. No patients had 'hyperosmotic hyponatremia' i.e. in association with severe hyperglycemia, mannitol infusion and severe azotemia. These conditions are uncommon and usually cause only mild hyponatremia[11 20].

We saw a small group of patients with 'multifactorial' causes for their hyponatracmia. They have acute illnesses with multisystem organ failure and multimodality treatment. They have been variously labelled as 'sick cell syndrome' or 'reset osmostat syndrome' but there is no agreement regarding the pathophysiology in this problematic group of patients[6 7]. We found an association with prolonged nasogastric feed and this is rather surprising because nasogastric feeding is well known to produce hypernatremia if high osmotic feeds are delivered in patients with borderline renal function[21]. This paradox may be explained by the nature of the feeds used as our patients have received more dilute solutions with low osmotic loads.

In conclusion, we found severe hypotnatremia to be a common problem which can be rationally approached using simple clinical information and a tradition classification.

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Figure 1
Frequency Distribution of Patients by Age

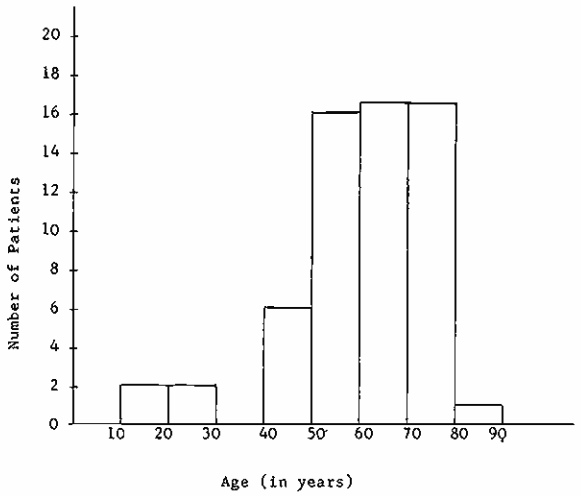

Table 1

Extracellular Volume Status of Patients with Severe Hyponatraemia

Extracellular Volume Status	Number of Patients	Percentage of Patients
Hypervolaemic hyponatraemia	13	21.3
Isovolaemic hyponatraemia	10	16.4
Hypovolaemic hyponatraemia	38	6.23
	61	100.0%

Table 2

Causes of Death in Patients wtih Severe Hyponatraemia

Causes of Dealth	Number of Patients	Comments
Cancer	5	Terminal
Chronic congestive heart failure	2	Terminal
Cerebral vascular accident	2	Terminal
*Malnutrition and cachexia	1	Terminal
*Chronic obstructive lung disease	2	Unexpected
Staphylococcal septicaemia	1	Polycythaemia vera
	13	

*** Hyponatraemia possible contribution to death.**

RESULTS

There were 61 patients with hyponatremia ⩽125 mmol/l. Only one patient presented with neurological symptoms attributable solely to severe hyponatremia. He had SIADH associated with nasopharyngeal carcinoma. All other patients presented with primary medical illnesses.

There were 26 men and 35 women. Their mean age was 61 years with an age range from 13 years to 81 years. As figure 1 indicates, there is a strong bias towards the older age groups and 39 (64%) were 60 years or older.

All patients had hyponatremia at ⩽ 125 mmol/1 with a range of 104 mmol/1 to 125 mmol/1 and a mean of 120.2 mmol/l.

In Table 1, 13 patients (21.3%) had hypervolemia, 38 patients (62.3%) were hypovolemic and a third group of 10 patients. (17.4%) were isovolemic.

Of the 13 patient with hypervolemia (edematous states) 4 had liver failure, 3 had chronic airways disease with right heart failure, with 2 patients each having renal disease, congestive heart failure, and malnutrition.

Fourteen out of 38 patients (36.8%) with hypovolemia had a possible iatrogenic contributing cause for their hyponatremia i.e. diuretic administration prior to or after admission. The diuretics used were either frusemide or a thiazide.

In the third group of patients with isovolemia, 4 had 'SIADH! The first patient had nasopharyngeal carcinoma, another had ovarian carcinoma with pulmonary metastases, one had primary out all carcinoma of the lung and a fourth patient had Sheehan's syndrome. The other 6 patients had multifactorial causes for their hyponatremia. They had neither salt-water depletion (hypovolemia) nor edema (hypervolemia) and they did not have those disorders traditionally associated with 'SIADH'[12]. Four of