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Original Article

Evaluation of thyroid and adrenal functions in patients with hyponatremia

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ABSTRACT

Background: Hyponatremia is frequently detected as a cause in patients admitted to command Hospital Kolkata with altered sensorium. We evaluated these patients to rule out two common endocrine causes as etiological factors i.e. hypothyroidism and hypoadrenalism.
Method: We studied 100 patients over a period of two years in all seasons who were admitted to hospital with altered sensorium and found to have hyponatremia as a cause, after ruling out other causes of altered sensorium as per inclusion and exclusion criteria. They were subjected to thyroid and adrenal evaluation in addition to detailed history, clinical examination and lab evaluation as per study protocol.
Results: Total 100 patients were enrolled in the study. The age of patients varied from 31 years to more than 70 years. Majority of patients were between the age group of 41–60 years (49 patients. Males were predominant in the study. Only 8 patients were detected to have hypothyroidism requiring replacement therapy and only 2 patients had adrenal insufficiency. 48 patients had drug induced hyponatremia and 42 idiopathic hyponatremia. No seasonal variation was noted.
Conclusion: Thiazide diuretic intake as antihypertensive drug was found to be a major cause of hyponatremia. Most of the patients in this group were using thiazide diuretics. In idiopathic group the cause of hyponatremia can be hypothesized as multifactorial. The hot and humid climate of Kolkata and other coastal regions made them more vulnerable to develop hyponatremia. Hypothyroidism and hypoadrenalism were not found to be major causes of unexplained hyponatremia.

Introduction

Hyponatremia is common in inpatients and outpatients and remain an under diagnosed condition. Its causes are numerous and invariably elusive. Hyponatremia is an important and common electrolyte abnormality that can be seen in isolation or as most often the case, a complication of other medical illnesses.[1] The normal serum sodium level is 135–145 mq/L. Hyponatremia is defined as a serum level of less than 135 mq/L and is considered severe when the serum level is below 125 mq/L.[2] Patients may be brought to medical attention owing to symptoms directly referable to low serum sodium concentrations or due to a manifestation of other medical co morbidities. Patients may manifest clinical symptoms due to the cause of hyponatremia or the hyponatremia itself.

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Hyponatremia is often found to be a cause of altered sensorium after evaluation of patients admitted to a tertiary care hospital Kolkata. All such patients primarily presented with altered sensorium. Hot and humid climate and poor salt intake are often attributed as the cause of hyponatremia in these cases.

Keeping in view the high incidence of hyponatremia as noted in this hospital the study was undertaken to evaluate hypothyroidism and hypoadrenalism as a cause of hyponatremia in such patients as these two endocrine conditions though rare are often associated with hyponatremia. Symptoms of hyponatremia range from nausea and malaise, with mild reduction in the serum sodium, to lethargy and decreased level of consciousness, headache, seizures and coma.[3] Neurologic symptoms most often are due to very low serum sodium levels (usually <115 mq/L) and the severity of neurologic symptoms correlates well with both the rapidity and the severity of the drop in the serum sodium.[4]

Material and method

This study was carried at command hospital (EC) Kolkata from June 2007 to July 2009. A total 100 patients of unexplained hyponatremia as defined above were selected based on inclusion and exclusion criteria.

Inclusion criteria

All the patients with altered sensorium in which no apparent cause was detected at the time of admission. Only hyponatremic patients were evaluated further as per study protocol.

Exclusion criteria

1. Pregnant ladies, children and post operative patients were excluded from the study.
2. Patients with other co morbidities, known to be associated with hyponatremia e.g.

Cerebrovascular accident, diabetic ketoacidosis etc were also excluded. A total 100 patients ($n = 100$) fulfilling the inclusion and exclusion criteria were enrolled in the study. All these patients were admitted to the hospital. Informed consent was taken from the attendants or the patient when they became conscious. A detailed history (From attendants and patient when he/she became conscious) and physical examination was carried out as per study protocol with special focus on clinical features of hypothyroidism and hypoadrenalism. All the old medical documents were perused for prescription and to find any co morbidity.

Methodology

All the patients who fulfilled the criteria of the study were evaluated further. The diagnosis of hyponatremia was made after evaluating (serum sodium less than 135 mq/L) two venous blood samples taken 1 h apart. Depending upon the serum sodium levels patients were treated with intravenous or oral sodium replacement as per standard guidelines. Their clinical response was recorded in the case sheet. Their serum sodium levels were then tested six hourly. All the investigations were done in the hospital laboratory. All the values were compiled in a format along with the relevant other lab investigations.

On next day of admission, fasting samples of thyroid profile total (T3, T4, TSH) and serum cortisol were taken. Thyroid profile was done by Radioimmunoassay and intra-assay and inter-assay coefficient of variation were considered for different kits used in our laboratory. Hypothyroidism was defined in patients with raised TSH and low free T4/T3 levels. The normal values as per hospital lab were T3 = 0.5–1.2 ng/ml, T4 = 4.5–11 μg/dl and TSH = 0.5–6.2 μIU/ml. Only those patients who had serum cortisol levels less than 15 μgm/dl (Normal values as per lab = 10 to 20 μgm/dl) were subjected to ACTH stimulation test (only 5 patients). ACTH test was performed in 5 patients by giving 250 μg IV ACTH and taking blood for serum cortisol before and after 1 h of ACTH injection.

Results

Total 100 patients were enrolled in the study. The age of patients varied from 31 years to more than 70 years. Majority of patients were between the age group of 41–60 years (49 patients) Males were predominant in the study. Only 19 patients had severe hyponatremia (<125 mg/L). Eight patients were detected to have hypothyroidism and only 2 patients had adrenal insufficiency. 48 patients had drug induced hyponatremia and 42 idiopathic hyponatremia (Table 1, Fig. 1). No seasonal variation was noted.[5] Eight (8%) patients who were detected to have hypothyroidism, all of them required thyroid hormone replacement therapy (Fig. 2). All these patients had overt hypothyroidism clinically and biochemically at the time of evaluation when presented with altered sensorium and subsequently detected to be hyponatremic. The five hypocortisolemic patients who had serum cortisol levels less than 15 μg/dl were provisionally diagnosed to have hypoadrenalism initially. All these patients were then subjected to ACTH stimulation test. Three out of these five patients showed an absolute increase in the cortisol levels above 20 μg/dl and were not labeled as hypoadrenalism. Two patients showed no increase in the serum cortisol levels and subjected to insulin tolerance test showing no significant increase in cortisol level and were diagnosed as cases of *adrenal* insufficiency (Fig. 3).

Discussion

Hyponatremia was frequently observed as a cause of altered sensorium in patients who were admitted to command

Table 1 – Showing the patient distribution as per etiologies of hyponatremia.

Hypothyroidism	8
hypoadrenalism	2
Idiopathic	42
Drugs	48