

## Hyponatremia

Carlos Clayton Tôres Aguiar\*

Department of Medicine, Universidade de Fortaleza (UNIFOR), Fortaleza, Ceará, Brazil.

\*Corresponding author: Carlos Clayton Tôres Aguiar, Senior Research Worker, Department of Medicine, Universidade de Fortaleza (UNIFOR), Fortaleza, Ceará, Brazil, Tel: (85) 34773676; E-mail: claytonaguiar@unifor.br

Received date: June 12, 2016; Accessed date: June 13, 2016; Published date: June 18, 2016

Copyright: © 2016 Aguiar CCT. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Editorial

Hyponatremia is defined as a serum sodium level equal to or lower than 135 mmol/L. It is considered the hydro-electrolyte disorder most commonly found in clinical practice. There is a well-known relationship between hyponatremia and the increase in morbidity and mortality.

The first step is to classify hyponatremia according to the volume status as hypovolemia, euvoolemia or hypervolemia. The most frequent causes of hyponatremia by hypovolemia are gastrointestinal losses or sequestration of fluid in a third space, diuretics (mainly in elderly patients and underweight women), osmotic diuresis, mineralocorticoid deficiency or salt-losing nephropathy. The causes of hyponatremia by hypervolemia may be congestive heart failure, nephritic syndrome, hepatic or renal failure. The hyponatremia in euvoolemia may be secondary to glucocorticoid deficiency, hypothyroidism, acute psychosis, induced by exercise, drugs or the syndrome of inappropriate antidiuretic hormone secretion (SIADH), the SIADH being the main cause [1].

Diagnosis of SIADH is usually reached in patients who are apparently euvolemic or patients with mild hypervolemia. The continuous production of ADH, also known as arginine vasopressin (A-VP), may lead to water retention by the renal collecting duct, enough to dilute the total amount of sodium in the body without necessarily producing hypertensive urine. The syndrome was firstly reported in Bartter and Schwartz's classic description in 1957 [2]. SIADH has been associated with a wide variety of clinical conditions such as neoplasia, CNS disorders, lung diseases and medications. A recent multicenter study on hyponatremia revealed that the main causes were neoplasia (24%), drugs (18%), lung disease (11%) and CNS diseases (9%) [3].

The following are the main drugs among those causing hyponatremia: Diuretics, antidepressants, antipsychotics, anticonvulsants and chemotherapeutics. The psychotropic drugs most commonly associated with hyponatremia are the antidepressants, mainly the serotonin reuptake inhibitors [4]. A recent study carried out in Denmark showed that all the antidepressants, except for mianserin, are associated with hyponatremia. The association is stronger with escitalopram and weaker with duloxetine, venlafaxine and mirtazapine [5]. Among the anticonvulsants, the carbamazepine is the drug which is most strongly related with the development of hyponatremia, its incidence varying between 4.8% and 41.5% [4]. Hyponatremia may be associated with gait instability and falls, risk of fractures and worsening of cognitive functions. The following are considered risk factors: previous hyponatremia, weight <60 kg and psychosis [6].

### Clinical Condition

The clinical condition of patients with hyponatremia varies a lot. Patients that have levels of serum sodium above 125 mmol/L are usually asymptomatic. Below that level, the following may occur: Nausea, headache, myalgia, discomfort, drowsiness and ataxia. Moderate symptoms such as lethargy, disorientation, decreased deep tendon reflexes, agitation and psychosis appear when ion concentration reaches between 115 and 125 mmol/L [7]. Severe symptoms such as convulsions, coma usually secondary to cerebral edema and respiratory failure occur when concentration drops below 115-120 mmol/L [8]. The lower the serum sodium concentration and the faster its decrease (>0.5 mmol/h), the more serious the symptoms. Mortality can reach 50% [9] in patients with untreated severe hyponatremia.

### Treatment

The symptoms and duration of hyponatremia will determine the choice of treatment. Patients with acute hyponatremia, defined as hyponatremia of less than 48 hours, need prompt treatment due to the risk of cerebral edema. In patients with chronic hyponatremia (>48 hours), the brain adapts to plasma hypoosmolality and the rapid reversal of hyponatremia may lead to osmotic demyelination [3]. Hyponatremia must be treated as chronic when its duration is not known.

Asymptomatic patients do not need immediate correction. Symptomatic patients with acute hyponatremia should receive 3% hypertonic saline at 1-2 ml/kg/hr and intravenous furosemide simultaneously. Water restriction must be applied in cases of symptomatic chronic hyponatremia. If convulsion occurs, the case must be treated as acute; the other cases should be treated with isotonic saline and intravenous furosemide. The level of serum sodium must be monitored frequently. The objective of the treatment is to correct 8 mmol/L in 24 hours. Sodium concentration should not be increased by more than 12 mmol/L in 24 hours due to the risk of osmotic demyelination.

Most guidelines recently published agree that fluid restriction, despite lack of evidence and worries about its efficacy, must be the first-line therapy for mild to moderate hyponatremia secondary to SIADH [3].

However, patient adherence to continuous water restriction (or chronic) is hard to take place. Besides, fluid restriction may be unfeasible when there is the therapeutic need for intravenous antibiotics, intravenous fluid, or keeping nutritional support.

When water restriction is applied, the physician must make sure such restriction will include all kinds of fluid, including intravenous injections, soup and fruit, and that it will be limited to 500 ml less than

the daily urine volume. Response can be slow and several days of restriction may be necessary to achieve normonatremia. Patients who cannot follow adequate water restriction should receive 30-60 g of urea daily to induce osmotic diuresis. Some patients will not completely achieve normal plasma sodium concentration and the intake of sodium must be continued in order to replace urinary losses [3].

Some cases of SIADH are temporary and do not require specific therapy. Possible etiologies and their respective treatments are most often enough to reverse hyponatremia, such as in hyponatremia associated with pneumonia, which may be corrected by treating the infection. Drug-induced hyponatremia may be reversed by discontinuing the use of the substance causing the problem.

The use of therapies aiming to inhibit vasopressin, such as lithium carbonate, demeclocycline and vaptans, have been used in some situations; however, they have major drawbacks [10].

## References

1. Cuesta M, Thompson CJ (2016) The syndrome of inappropriate antidiuresis (SIAD). *Best Pract Res Clin Endocrinol Metab* 30: 175-187.
2. Schwartz WB (1957) A syndrome of renal sodium loss and hyponatremia probably resulting from inappropriate secretion of antidiuretic hormone. *Am J Med* 23: 529-542.
3. Verbalis JG (2013) Diagnosis, Evaluation, and Treatment of Hyponatremia: Expert Panel Recommendations. *Am J Med*, pp: S1-S42.
4. Liamis G, Milionis H, Elisaf M (2008) A Review of Drug-Induced Hyponatremia. *Am J Kidney Dis* 52: 144-153.
5. Leth-Møller KB (2016) Antidepressants and the risk of hyponatremia: a Danish register-based population study. *BMJ Open* 6: e011200.
6. Mannesse CK (2013) Characteristics, prevalence, risk factors, and underlying mechanism of hyponatremia in elderly patients treated with antidepressants: A cross-sectional study. *Maturitas* 76: 357-363.
7. Rottmann CN (2007) SSRIs and the syndrome of inappropriate antidiuretic hormone secretion. *Am J Nurs* 107: 51-58.
8. Chromik AM (2007) Oral administration of taurolidine ameliorates chronic DSS colitis in mice. *J Invest Surg* 20: 273-282.
9. [www.us.elsevierhealth.com/comprehensive-clinical-nephrology-9781455758388.html](http://www.us.elsevierhealth.com/comprehensive-clinical-nephrology-9781455758388.html)
10. Gross PA, Wagner A, Decaux G, Vaptans (2011) are not the main stay of treatment in hyponatremia: perhaps not yet. *Kidney Int* 80: 594-600.