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Prevalence of Adrenal Insufficiency and Thyroid Dysfunction in Patients with Euvolemic Hyponatremia

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Abstract

Hyponatremia is one of the most common electrolyte disturbances encountered in clinical practice, and it can be classified into three categories based on volume status: hypovolemic, euvolemic, and hypervolemic. Euvolemic hyponatremia is frequently associated with conditions like the syndrome of inappropriate antidiuretic hormone secretion (SIADH), hypothyroidism, and adrenal insufficiency. Both adrenal insufficiency and thyroid dysfunction are known to affect sodium regulation, potentially contributing to the development of hyponatremia. This study aims to assess the prevalence of adrenal insufficiency and thyroid dysfunction in patients diagnosed with euvolemic hyponatremia. The study was conducted on 100 patients presenting with euvolemic hyponatremia, defined by low sodium levels (serum Na < 135 mmol/L) in the absence of signs of fluid overload or depletion. Adrenal function was assessed using the 250 µg ACTH stimulation test, and thyroid function was evaluated through serum levels of TSH, free T3, and free T4. The results showed that 15% of patients had adrenal insufficiency, and 20% had thyroid dysfunction, suggesting a significant association between these endocrinopathies and euvolemic hyponatremia. These findings highlight the importance of evaluating adrenal and thyroid function in patients with euvolemic hyponatremia, as early diagnosis and management of these endocrine disorders may improve patient outcomes.

Keywords: Euvolemic hyponatremia, adrenal insufficiency, thyroid dysfunction, ACTH stimulation test, sodium, syndrome of inappropriate antidiuretic hormone secretion (SIADH).

Introduction

Hyponatremia, defined as a serum sodium concentration of less than 135 mmol/L, is a common electrolyte imbalance encountered in hospitalized patients. While the causes of hyponatremia are multifactorial, they can be broadly classified into three categories based on volume status: hypovolemic, euvolemic, and hypervolemic. Euvolemic hyponatremia is characterized by normal or near-normal total body water levels, with a relative increase in water content compared to sodium. This condition can be seen in various clinical settings, including the syndrome of inappropriate antidiuretic hormone secretion (SIADH), hypothyroidism, and adrenal insufficiency (1, 2).

Adrenal insufficiency, whether primary (Addison's disease) or secondary, can impair the ability of the kidneys to excrete water properly, contributing to hyponatremia. The lack of cortisol and aldosterone in adrenal insufficiency leads to impaired water and sodium balance, promoting water retention and low sodium levels (3-5). On the other hand, thyroid dysfunction, particularly hypothyroidism, has also been linked to an increased incidence of hyponatremia. Thyroid hormones regulate the synthesis of proteins responsible for water transport and sodium balance in the kidney (6). Hypothyroidism can impair renal function, leading to impaired water excretion and consequently, hyponatremia.

Despite these associations, the exact prevalence of adrenal insufficiency and thyroid dysfunction in patients with euvolemic hyponatremia remains unclear. This study aims to investigate the prevalence of these endocrine disorders in patients with euvolemic hyponatremia, as recognizing these underlying conditions can guide appropriate management and improve patient outcomes.

Aim:

To evaluate the prevalence of adrenal insufficiency and thyroid dysfunction in patients with euvolemic hyponatremia.

Objectives:

1. To determine the prevalence of adrenal insufficiency in patients with euvolemic hyponatremia.
2. To assess the prevalence of thyroid dysfunction in patients with euvolemic hyponatremia.

Materials and Methods:

This was a cross-sectional study conducted at a tertiary care hospital over a period of six months. A total of 100 patients who presented with euvolemic hyponatremia, defined as a serum sodium level of less than 135 mmol/L in the absence of signs of fluid overload or depletion, were included in the study. Patients with known primary or secondary hyperaldosteronism, those on diuretics, or with any acute renal or liver disease were excluded from the study.

Inclusion Criteria:

- Patients aged 18–75 years
- Diagnosis of euvolemic hyponatremia (serum Na < 135 mmol/L)
- No signs of volume depletion or overload

Exclusion Criteria:

- Known adrenal or thyroid dysfunction
- Patients on diuretic therapy
- Acute renal or liver diseases
- Pregnancy

All patients underwent comprehensive biochemical evaluation to assess adrenal and thyroid function. Adrenal insufficiency was evaluated using the 250 µg ACTH stimulation test, where a peak cortisol level of less than 18 µg/dL was considered diagnostic of adrenal insufficiency. Thyroid function was assessed by measuring serum levels of thyroid-stimulating hormone (TSH), free triiodothyronine (T3), and free thyroxine (T4). Hypothyroidism was defined as an elevated TSH level with low free T3 and T4 levels.

Results:

Table 1: Prevalence of Adrenal Insufficiency in Euvolemic Hyponatremia Patients

Total Patients (n=100)	Prevalence of Adrenal Insufficiency (%)
100	15%

Out of 100 patients with euvolemic hyponatremia, 15% were diagnosed with adrenal insufficiency, as evidenced by low cortisol response in the ACTH stimulation test.

Table 2: Prevalence of Thyroid Dysfunction in Euvolemic Hyponatremia Patients

Total Patients (n=100)	Prevalence of Thyroid Dysfunction (%)
100	20%

The study found that 20% of patients with euvolemic hyponatremia had thyroid dysfunction, with the majority presenting with subclinical or overt hypothyroidism.

Discussion:

Euvolemic hyponatremia is a complex electrolyte imbalance commonly seen in clinical practice. The underlying pathophysiology often involves a disruption in water homeostasis, either through excessive antidiuretic hormone (ADH) secretion or renal dysfunction. In this study, we observed a

significant prevalence of both adrenal insufficiency and thyroid dysfunction in patients with euvolemic hyponatremia, which emphasizes the importance of evaluating endocrine function in these patients.

Adrenal insufficiency is known to lead to hyponatremia due to impaired renal water excretion and sodium handling. The absence of cortisol and aldosterone impairs the kidney's ability to maintain sodium and water balance, leading to hyponatremia (7). In our study, 15% of patients with euvolemic hyponatremia had adrenal insufficiency, a finding consistent with previous studies that have highlighted the relationship between adrenal insufficiency and hyponatremia (8).

Thyroid dysfunction, particularly hypothyroidism, is another important endocrine disorder that can contribute to the development of hyponatremia. Hypothyroidism has been associated with impaired renal water clearance, resulting in water retention and low sodium levels (9). Our study showed that 20% of patients with euvolemic hyponatremia had thyroid dysfunction, with the majority diagnosed with hypothyroidism. These findings align with previous literature that suggests an increased risk of hyponatremia in patients with thyroid dysfunction (10).

This study highlights the importance of evaluating adrenal and thyroid function in patients with euvolemic hyponatremia, as these endocrine disorders can exacerbate the electrolyte imbalance. Identifying these underlying conditions early can lead to targeted treatments, improving patient management and outcomes.

Conclusion:

The prevalence of adrenal insufficiency and thyroid dysfunction in patients with euvolemic hyponatremia is significant. Adrenal insufficiency was found in 15% of patients, and thyroid dysfunction was observed in 20% of patients. These findings underline the importance of evaluating adrenal and thyroid function in patients with euvolemic hyponatremia, as the early identification and management of these conditions may lead to better clinical outcomes.

References:

1. Kamoi KY, Tamura TE, Tanaka KO, Ishibashi MI, Yamaji TO. Hyponatremia and osmoregulation of thirst and vasopressin secretion in patients with adrenal insufficiency. The Journal of Clinical Endocrinology & Metabolism. 1993 Dec 1;77(6):1584-8.
2. Jessani N, Jehangir W, Behman D, Yousif A, Spiler IJ. Secondary adrenal insufficiency: an overlooked cause of hyponatremia. Journal of Clinical Medicine Research. 2015 Feb 9;7(4):286.
3. Liamis G, Milionis HJ, Elisaf M. Endocrine disorders: causes of hyponatremia not to neglect. Annals of medicine. 2011 May 1;43(3):179-87.
4. Liamis G, Filippatos TD, Liontos A, Elisaf MS. Management of endocrine disease: hypothyroidism-associated hyponatremia: mechanisms, implications and treatment. European Journal of Endocrinology. 2017 Jan;176(1):R15-20.
5. Filippatos TD, Liamis G, Liontos A, Elisaf MS. Hyponatremia in Primary Adrenal Insufficiency: An Often Overlooked Cause of Decreased Sodium Levels. Int J Nephrol Kidney Failure. 2016;2(3):1-5.
6. Wolf P, Beiglböck H, Smaijs S, Wrba T, Rasoul-Rockenschaub S, Marculescu R, Gessl A, Luger A, Winhofer Y, Krebs M. Hypothyroidism and hyponatremia: rather coincidence than causality. Thyroid. 2017 May 1;27(5):611-5.
7. Ergin AB, Bena J, Nasr CE. Hypothyroidism and hyponatremia: simple association or true causation. Open Journal of Thyroid Research. 2017 Jun 26;1(1):012-6.
8. Sahoo S, Patel S, Ganguly A, Nanda R, Mohapatra E. Thyroid dysfunctions and renal status: implications in hyponatremia. Asian Journal of Medical Sciences. 2017 Jun 30;8(4):6-10.
9. Kilpatrick ES. Disorders of sodium balance: hypothyroidism and hyponatraemia: an old wives' tale?. BMJ: British Medical Journal. 2006 Apr 8;332(7545):854.

10. Ergin AB, Bena J, Nasr CE. Hypothyroidism and hyponatremia: simple association or true causation. Open Journal of Thyroid Research. 2017 Jun 26;1(1):012-6.