Evaluation of current clinical algorithms to identify SIADH as a cause of hyponatremia in geriatric patients: A 2 year prospective study

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INTRODUCTION AND OBJECTIVES

Hyponatremia is the commonest electrolyte disorder in clinical practice, with an even higher prevalence in elderly patients due to physiologic changes involving reduced total body water volume, urine concentrating ability and thirst. The clinical evaluation of hyponatremia classically involved the assessment of the patient volume status, which has proven to be quite subjective and unreliable, especially in elderly individuals.

The purpose of this study was to evaluate the clinical and laboratory characteristics of elderly patients admitted with hyponatremia, and assess the effectiveness of current algorithms on the diagnosis of SIADH as a cause of hyponatremia.

METHODS

Prospective cohort study of patients aged 60 years or more, who were admitted in the Internal Medicine Department of the University Hospital of Heraklion in Crete with a serum sodium of 130mEq/L or less (corrected for glucose), and had available urine chemistry, between October 2014 and September 2016. Data were extracted from patients' medical records and the effectiveness of algorithms for the diagnosis of SIADH was assessed.

RESULTS

During the 2-year study period, **138 patients were admitted** with serum sodium of 130mEq/L or less; the characteristics of the patients are shown at Table 1. The commonest underlying conditions were hypertension (87.7%), chronic kidney disease (63.8%), heart failure (46.4%), diabetes mellitus (36%), coronary artery disease (22.5%) and dementia (19.6%). 59.4% of patients were symptomatic. Symptoms consisted of dizziness (34.8%), nausea (33.3%), vomiting (25.4%), headache (13.4%), confusion (10.1%), and recent fall (9.4%). **At admission, 56.5% of patients had clinical signs of hypovolemia, 23.2% of euvolemia and 20.3% of hypervolemia.** The most common **single causes** of hyponatremia were hypovolemia in 34.8% of patients (in the context of infection, GI or renal losses), **volume overload in 17.4%**, and **SIADH in 7.2%** (due to medication, Central Nervous System (CNS) disorder, cancer or infection). However, SIADH was eventually considered to contribute to 26.1% of patients, after reconsideration of the initial volume status. **Importantly, in 36.2% of patients, at least two causes of hyponatremia were found.**

Among the group of patients that were finally considered to have SIADH in this population, 63.9% were initially considered to be euvolemic, 33.3% hypovolemic and 2.8% hypervolemic, had lower Plasma Osmolarity (250.8mOsm/kg vs 264.9mOsm/kg), lower initial serum sodium (119mEq/L vs 122.1mEq/L), higher urinary sodium (62.7mEq/L vs 36.47mEq/L), higher fractional excretion of uric acid (20.2% vs 10.8%), and higher fractional excretion of urea (44.3% vs 33.2%), but similar fractional excretion of sodium, serum chloride and Urine Osmolarity. Of note, 8.3% of patients finally diagnosed with SIADH had Uosm lower than 100mOsm/kg, 19.4% had urinary sodium less than 30mEq/L, and 16.7% had a fractional excretion of uric acid lower than 12%. Table 2 shows the efficacy of different parameters to predict SIADH. The **overall inpatient mortality rate was 17.4%**, mostly in patients with a low Barthel Index (<12) admitted with an infection and hypovolemic hyponatremia. The median length of stay was 6 days (range 1-25 days). The **readmission rate within 3 months following discharge was 26.1%**, among which 55.6% had hyponatremia at readmission.

CONCLUSIONS

This study underlines the difficulty of assessing geriatric patients with hyponatremia. **Reconsideration of the cause of hyponatremia was performed in a significant proportion of patients.** Current diagnostic algorithms were **not adequate to identify SIADH** in our population and as a result further studies could help identify additional tools for evaluation of hyponatremia in the elderly.

CATEGORY

H – Clinical Nephrology

Table 1. Characteristics of patients with hyponatremia

Patient Characteristics	Value
Age (+/- SD)	80.5 (+/-7.7)
Male (%)	36.2
Barthel Index (IQR)	16.5 (8-20)
Hypovolemic (%)	56.5
Euvolemic (%)	23.2
Hypervolemic (%)	20.3
Sodium at admission mEq/L (+/- SD)	121.3 (+/- 6.5)
Plasma Osmolarity mOsm/kg (+/- SD)	261.3 (+/- 18.2)
Urine Osmolarity mOsm/kg (+/- SD)	290.7 (+/- 143.8)
Urine Sodium mEq/L (+/- SD)	43.3 (+/- 32.17)
FeNa % (IQR)	1.1 (+/- 1.1)
Fe Uric acid % (IQR)	13.6 (+/- 9.3)

Table 2. Effectiveness of clinical & laboratory parameters to predict the presence of SIADH.

	Euvole-mia	Uosm >100 mOsm/kg	Una >30mEq/L	Una >30mEq/L & Uosm>100 mOsm/kg	FeUric >12%
Sensitivity	63.9%	91.7%	77.8%	75.0%	78.8%
Specificity	91.2 %	16.5%	49.0%	43.1%	73.3%
Positive Predictive Value	71.9%	26.6%	35.0%	31.8%	56.5%
Negative Predictive Value	87.7%	85.7%	86.2%	83.0%	88.7%
Positive Likelihood Ratio	7.24	1.10	1.53	1.32	2.95
Negative Likelihood Ratio	0.40	0.50	0.45	0.58	0.29

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