

# Searching for balance in old age: about water and salt

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Hyponatraemia (defined as a serum sodium level < 135 mmol/l) is the most frequent serum electrolyte disorder in clinical practice. Older adults are particularly prone to develop hyponatraemia, due to comorbidities and consequent frequent use of medication and to age-related changes in water and electrolyte balance. Moreover, serum sodium concentrations can slightly decrease with age; a slight reduction in serum sodium concentration equal to 1 mmol/l /decade has been documented.

Hyponatraemia is frequent in older adults. Previous studies performed in both the acute hospital setting and chronic care facilities have shown a relatively high prevalence of hyponatraemia, 16-34% of the older adults in the acute hospital setting and 18% of the nursing home residents can present this disorder.<sup>1-4</sup>

Physiological processes that occur with ageing are associated with changes in water metabolism and electrolyte balance, leading to alterations in plasma osmolality and body-fluid compartment volumes. Ageing typically leads to a 5-10% increase in total body fat, and a decrease in total body water of equal magnitude. In an elderly 70-kg man, this can account for a reduction in total body water of as much as 7-8 litres compared with a young man of the same weight.<sup>5</sup> The consequence of these changes is that an equivalent acute loss, or gain, of body water can cause a greater degree of flux in osmolality in elderly compared with younger individuals. In this way, states of relatively mild dehydration or volume overload in the older adults are more likely to cause clinically significant shifts in the concentration of body electrolytes, such as sodium. Ageing is characterised by impaired homeostasis to stress in different organ systems and physiological functions. The complex mechanisms associated with water metabolism can be particularly vulnerable to age-related impaired homeostasis and to the various disease processes and medical interventions that frequently occur in the elderly.

Several mechanisms can increase the risk of dehydration in older adults, such as the decreased thirst mechanism,<sup>6</sup>

and the decrease in maximal urinary concentrating ability.<sup>7</sup> Also the ability to excrete a water load is delayed in the elderly.<sup>8</sup>

Eventually, structural and functional renal changes that increase susceptibility to alterations of water imbalance are decreased renal mass,<sup>9</sup> cortical blood flow<sup>10</sup> and glomerular filtration rate<sup>11</sup> as well as impaired responsiveness to sodium balance.<sup>10</sup> The impact of a lifetime of accumulated disease and comorbidities must also be considered in every clinical situation with elderly patients. The elderly patient has a diminished reserve of water balance and an impaired regulatory mechanism. Thirst sensation, concentrating abilities and hormonal modulators of salt and water balance tend to be less effective and susceptible to being overtaken by morbid or iatrogenic events.

In the present issue of *The Netherlands Journal of Medicine*, Brouns and colleagues report their findings on the prevalence, clinical presentation and treatment of hyponatraemia in elderly patients referred to the emergency department of a teaching hospital.<sup>12</sup>

The signs and symptoms of hyponatraemia can vary depending on the severity and duration of the condition; they include headache, nausea, vomiting, muscle cramps, disorientation, depressed reflexes, seizures and coma.<sup>13</sup> The symptoms, and any complications which may develop as a result, reflect the underlying cerebral pathophysiology of the hyponatraemia.<sup>13,14</sup>

Several authors have reported associations between mild hyponatraemia and gait instability (and consequent falls), attention deficits, and an increased risk of fractures due to osteoporosis in older adults.<sup>15-17</sup>

Brouns and colleagues found hyponatraemia to be common among elderly patients admitted to the internal medicine ward (26.3%) and associated with a long hospital stay. Moreover, they found that hyponatraemia was independently associated with higher mortality in older patients (increased mortality rate 54% when compared with the reference category). The results of this study show that the clinical implications of hyponatraemia in

hospitalised elderly patients are significant: hyponatraemia is an indicator of poor prognosis and therefore might be considered a marker of frailty in elderly patients. Despite being the most common electrolyte disorder in clinical practice, hyponatraemia is sometimes underdiagnosed and undertreated. Diagnostic evaluation of hyponatraemia in older patients with comorbidities and polypharmacy can be challenging and requires a systematic approach.

Clinicians need to use a systematic approach in evaluating water and sodium disorders, utilising a comprehensive assessment, and directed laboratory tests to make the clinical diagnosis. With the exponential increase of the elderly population and the consequent increasing incidence of hyponatraemia, prospective studies are needed to investigate whether the correction of hyponatraemia in the elderly will reduce the incidence of cognitive impairment, disability and mortality. Hyponatraemia can no longer be considered to be just a biochemical finding.

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