Water and weight: the role of hydration in weight management

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Abstract

Water is a mega nutrient, required in larger quantities than other macro-and micro-nutrients. It also constitutes the bulk of the human body. Yet, hydration is usually missing from normal discourse in medical nutrition therapy and metabolism. This review describes various evidence-based facts related to water and weight, or hydration and baro-homoeostasis. It argues that hydration should be used as a tool to prevent and fight obesity.

Keywords: Aldosterone, hydration, obesity, overweight, vasopressin, water.

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Introduction

Water contributes to 60% of the human body. It is an essential mega-nutrient which ensures cardiovascular, renal and endocrine health.[1] Multiple hormones, including those released by the posterior pituitary, heart, liver and kidneys are influenced by our fluid or hydration status. Yet, hydration is not discussed as a management strategy for obesity. In this communication, we list the ways in which water and weight are connected, and suggest means of managing obesity through fluid intake.

Primary prevention

Large studies have shown that hypohydration, defined by high urine osmolality (>800 m Osm/kg), or by fluid intake, is associated with higher body mass in adults and children alike.[1,2] Healthier hydration, therefore, has been proposed as a public health solution to the public health challenges that obesity poses.[3]

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Secondary prevention

Increased hydration has been found to lead to weight loss. Animal studies suggest multiple mechanisms: increased satiety, leading to less calorie intake, a loss of fat, via increase in lipolysis, and reduction in angiotensin II and its resultant sympathetic activity.[3] This weight lowering effect of hydration has been noted in both adults and children.[4] It must be noted that obesity is associated with raised aldosterone, and perhaps aldosterone resistance.[5] Obese children did not demonstrate a fall in urinary potassium concentration after exercise, as opposed to those with normal body mass index.

Tertiary prevention

Obesity is associated with multiple downstream effects. Poor hydration, associated with high vasopressin and copeptin levels, has been shown to lead to increased glucose intolerance and hepatic steatosis in in obese rats. Hypohydration can also worsen renal outcomes by contributing to pre renal kidney injury.[6]

Data from the United States National Health and Nutrition Examination Survey (NHANES), in fact, show that Hypohydration (diagnosed by serum sodium > 145 mmol/l, spot urine volume <50 ml, and/or spot urine osmolality ≥ 500 mmol/kg) is associated with increased risk of chronic disease mortality. A focus on adequate hydration may help prevent premature death.[2]

The National Institute of Nutrition, Hyderabad suggests a recommended daily allowance of 2.3 litres for adults in temperate climates, adjusted upwards (4+ litres) for hot/humid climes, physical exertion or fever.[7] The guidance highlights thirst as a primary guide for water intake. Persons with diarrheal or non-diarrheal illness associated with fluid loss, should increase their intake of fluid and electrolytes. Ready-to-drink (RTD) options are available for the management of such conditions.

Hydration must naturally be coupled with nutrition in an integrated manner. The healthy plate models that are in use must be expanded to include a healthy glass, mug pitcher or jug as well. Thirst, however, may not be dependable marker for hypohydration. Persons with obesity have altered hypothalamic signaling, with blunted responses to copeptin/vasopressin.[8] This may be

mediated with leptin resistance, which not only delays vasopressin release, but reduces osmoreceptor sensitivity as well. This challenge becomes more acute in the elderly.

The GLP 1 RA era

Hydration has become even more important in the era of glucagon-like peptide 1 receptor agonist (GLP1RA) therapy. Hydration is one of the key means of improving tolerance to GLP1RA therapy, and reducing its side effects .[9] The same is true for persons following a keto diet. Person-friendly, cost-effective methods of enhancing fluid intake, using products with a high beverage hydration index.[10] must be explained. Comfort beverages and spices, as well as fluid-rich comfort foods such as curd rice and juicy fruits can be advised as preventive and therapeutic adjuncts to GLP1RA.

Quaternary prevention

While hydration is important, over hydration, and over reliance on conventional means of assessing hydration must be avoided. There is no single biochemical or clinical measure that can accurately assess hydration status.[11] Careful evaluation is needed before wide sweeping clinical or public health recommendation can be made. Water intake may also influence tests such as body composition analysis. Bioimpedance analysis, for example, is best advised in a fasting state, 4 hours after the last intake of food or beverage.

Water intake must be limited, as per clinical requirement, in persons with advanced heart failure, liver disease or kidney disease.

Severe dehydration itself may lead to weight loss of over 3-6% and cause a false sense of success in obesity management. In fact, most of the weight loss in the first few days of a weight loss programme is due to water loss. Hydration status, therefore, can confound and confuse weight management efforts as well as expectations.[11]

Quinary prevention

Multiple myths abound regarding water and weight. These must be debunked. The World Health Organization clearly states, for example, that alcohol in any amount is injurious to health. Fads such as alkaline water or copper-stored water detract from the real message of healthy living. Drinking calorie-rich beverages, or caffeine-laden "energy" drinks may defeat the purpose of healthy hydration. Reading beverage labels should be taught as an essential literacy and numeracy skill.

Water makes sense

Encourage all people, including adults and children, to drink adequate fluids. Apart from water, options such as buttermilk, milk, natural fruit juices, lemonade, kokum juice and spiced water may be suggested. Individual preferences, availability, affordability, affordability, and comorbid disease states (such as diabetes and cardiorenal health) may influence the choice and quantity of beverage.[9]

While plain water or homemade fluids are easily available affordable options, appropriately formulated RTD flavoured electrolyte solutions are good choices to avoid taste fatigue. Isotonic fluids represent an optimal strategy for rehydration because their osmolality closely matches that of human plasma (≈280–300 mOsmol/kg), enabling rapid fluid absorption and effective cellular rehydration without inducing osmotic stress.[9]

Encourage people at risk of obesity, those living with obesity, and those on GLP1RA or keto diet, to pay special attention to their fluid or low-calorie beverage choices, while ensuring palatability and potability.

Do not rely only on thirst to measure hydration status, especially in the obese, the elderly and those with long standing diabetes. Include other clinical, urinary and serum makers of hydration as indicated. Counsel persons with diabetes advanced heart, liver or kidney disease to consult their physician for expert advice.

Summary

Hydration is an important determinant of health in general, and weight management in particular. Hydration and nutrition hold hope, as a tool for weight management, at both clinical and public health levels.

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