CIEAH Update

International Chair for Advanced Studies on Hydration

Cátedra Internacional de Estudios Avanzados en Hidratación

UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA
Instituto Universitario de Investigaciones Biomédicas y Sanitarias

N3
Winter 2018

EDITORIAL

FRUCTOSE, SUGARS AND BEVERAGES: PATHOPHYSIOLOGY AND HEALTH

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Sugar is the generic term for short-chain soluble carbohydrates that sweeten food to a greater or lesser extent. They are made up of monomeric units (monosaccharides) and dimeric units (disaccharides).

The most important sugars in our diet from a nutritional point of view are the monosaccharides (glucose, fructose and galactose) and the disaccharides (maltose, lactose and sucrose). The most well-known sugar is sucrose (table sugar), which generates fructose and glucose through hydrolysis.

The main dietary sources of sugars are fruit, fruit juice, certain vegetables, milk and some dairy products, and foods with added sucrose or starch hydrolysates (e.g., glucose syrups or syrups with a high fructose content) such as carbonated drinks, bakery products, sweets and confectionery items.

Global food energy availability has increased progressively from 2,200 kcal/person/d in 1960 to 2,800 kcal/person/d in 2014, according to the FAO. However, total sugar consumption increased from about 200 to 220 kcal/person/d. Analysis of sugar consumption by country shows that in some countries, such as Argentina, Australia, Brazil, Mexico and the United States, consumption is more than 600 kcal a day. According to the recent ANIBES study, average sugar consumption in Spain is 71.5 g/d (17% Total Energy-TE), with intake of intrinsic sugar standing at 38.3 g/day (9.6% ET) and free sugar at 28.8 g/day (7.3% TE).

Glucose is a reducing sugar that is found freely in the blood of all mammals. It is absorbed by all cells through specific transporters (SGL1, GLUT3, GLUT4). Glucose is present in most fruit and many vegetables. It is abundant as a reserve polymer in animals (glucogen) and plants (starch). Fructose is the sugar with the greatest sweetening power; it is abundant in fruit and processed foods containing fructose syrups. In relatively small amounts it is absorbed through facilitated diffusion by a specific transporter (GLUT5), more slowly than glucose. Recent studies have shown that glucose can be absorbed by non-active diffusion mechanisms in response to high luminal concentrations of glucose after intake of food with a high sugar content. The GLUT-2 transporter present in the basolateral membrane of enterocytes can actually enter into the apical membrane of these cells very quickly, resulting in non-saturable facilitated diffusion of both glucose and fructose. This mechanism, cooperative with the active sodium-glucose cotransporter (SGLT-1), appears to be mediated by the intervention of intestinal sweet taste receptors which, in turn, are regulated by paracrine and endocrine mechanisms in which incretins GIP, GLP-1 and GLP-2 intervene. The nutritional significance of this absorption mechanism has not been fully elucidated, but it may help to explain how a high sugar intake can lead to tissue insulin resistance, metabolic syndrome or type 2 diabetes.

When sugars have been absorbed, they are mostly converted in the liver to glucose, which accumulates in the form of glucogen, or certain metabolites that lead to triglyceride synthesis. Blood triglycerides do not increase with habitual consumption of sucrose or fructose, but if consumption is very high (more than 15% of TE, i.e., more than 73 g/d of sugar for a person whose total calorie intake is 2000 kcal), plasma triglycerides increase, which is a risk factor in cardiovascular disease.

Simple sugar intake should therefore be moderate, at less than 10 % of daily energy, to limit potential adverse health effects.

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HYDRATION
III INTERNATIONAL CONGRESS
V SPANISH CONGRESS

HYDRATION SCIENTIFIC LIBRARY

HYDRATION STATUS AND ACADEMIC PERFORMANCE

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Academic performance depends on several elements: memory, attention, intelligence and language. Hydration has an important modulating influence and is essential for correct functioning of the brain.

Water balance in children depends on inputs (drinking water, water in food and oxidation water) and losses (urine - 50%, insensible loss - 40%, sweat and faeces - 10%). A child's requirement for growth is 10-12 ml/kg/day.

In childhood the risk of dehydration is greater due to a series of factors that affect children's hydration requirements, such as a lower heat tolerance, a higher surface to mass ratio, lower sweat capacity, lower cardiac output at a given metabolic rate, longer time required to acclimatise, higher metabolic rate during exercise, dependency on caregivers for food and fluid intake, less ability to express thirst, and higher risk of voluntary hydration.

The effects of dehydration on cognitive function have been insufficiently studied and few works have addressed the paediatric age group, which is difficult to assess. In adults, slight dehydration (loss of 1-2% body weight due to lack of liquids) can impair the ability to concentrate, while losses higher than 2% can affect processing skills and diminish short-term memory. In infants, dehydration causes confusion, irritability and lethargy, and in children it lowers cognitive performance (1).

Most studies on hydration and cognitive function in the paediatric age group have concluded: a) school age children in western societies have inadequate water intake (voluntary dehydration) regardless of physical activity; b) low total body water and low water consumption can affect some cognitive skills that influence academic performance; c) cognitive skills and mood are positively influenced by water intake; and d) strategies for appropriate water consumption should be encouraged in schools (2,3).

The factors responsible for the influence of dehydration on cognitive function are not well known, although suggestions include a diminished blood flow to the brain, changes in the blood-brain barrier and impaired transmission in monoaminergic systems (noradrenaline, serotonin and dopamine).

References

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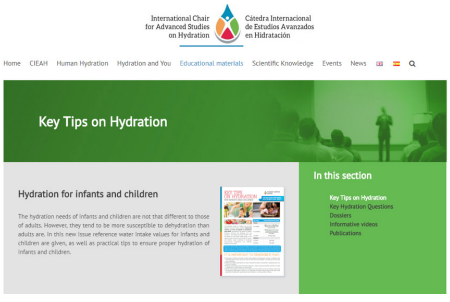
WEBSITE NEWS

DISCOVER WHAT'S AVAILABLE IN THE EDUCATIONAL MATERIALS SECTION OF OUR WEBSITE

In the Educational Materials section of our website you will find documents relevant to a range of population groups (families, education professionals, pregnant and breastfeeding women, older people, athletes, students, etc.).

The section includes key advice about maintaining adequate hydration and answers to hydration FAQs, as well as highly relevant educational videos, dossiers and publications.

Find out more on our website
www.cieah.ulpgc.es



HEALTH PROFESSIONALS CORNER

HEALTHY HYDRATION IN THE SENC 2016 DIETARY GUIDELINES

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Chair, Spanish Society of Community Nutrition (SENC)

It has long been acknowledged that water is essential for life, and therefore hydration status is addressed in clinical practice, particularly in certain pathological situations and clinical contexts. However, publications about recommended and dietary reference intakes have only recently included age- and gender-specific recommended or adequate water intake values. In 1945 in the United States, the Food and Nutrition Board of the National Research Council recommended an intake of 1 mL water per Kcal of energy expended. This amount was raised to 1.5 mL in 1989 to cover variations due to physical exercise, sweating and solute loading.

In 2003 a World Health Organisation (WHO) document on water supply and health used various reports to determine water intake requirements of 1 L/day in children up to three years of age and 2.2 L/day for women and 2.9 L/day for men. In 2004, the United States Institutes of Medicine defined Adequate Intake (AI) of water and dietary reference values (DRV), and in 2005 these were mentioned in a WHO document on nutrients in drinking water. Australia and New Zealand published DRV for water in 2006. In Europe, the European Food Safety Agency (EFSA) published the document Scientific Opinion on Dietary Reference Values for Water in 2010.

Dietary guidelines aim to shift the prevalent model of food and beverage consumption in a population towards healthier habits that help to prevent health problems and improve wellbeing and quality of life. This approach must be based on the best scientific evidence available, taking into account the habitual practice in the target population and making recommendations that are convenient and easy to follow.

The latest edition of the SENC Dietary Guidelines for the Spanish Population recognises water inputs as an essential pillar of healthy and sustainable eating. The recommended intake is equivalent to four-six glasses of water a day, through consumption of water, food (mainly fruit and vegetables) and a range of drinks. This is illustrated at the base of the pyramid by a jug and four glasses of water, with a reference to the SENC specific healthy hydration recommendations.

Daily water consumption is recommended as a first level drink to comply with the recommendations: tap water, spring water or mineral water with low saline content. The second level includes sugar-free drinks that can be consumed in lower amounts to complete daily water inputs. Drinks on the third level provide calories and nutrients of interest: milk, natural fruit juices and vegetable juices. This level also includes teas with added sugar and sports drinks. Consumption of these drinks is recommended in the context of a healthy diet, taking into account not only their water content, but also their contribution to energy and nutrient intake. Drinks on the fourth level have added sugars and therefore consumption should be occasional/discretionary and in limited amounts within a healthy diet.

The Guidelines include a series of advice and recommendations, such as controlling fluid intake, drinking between meals even when not thirsty (preferably water), and paying special attention to children and people who are elderly or ill, as well as situations of high ambient temperature, intense physical effort and certain circumstances.

Referencias

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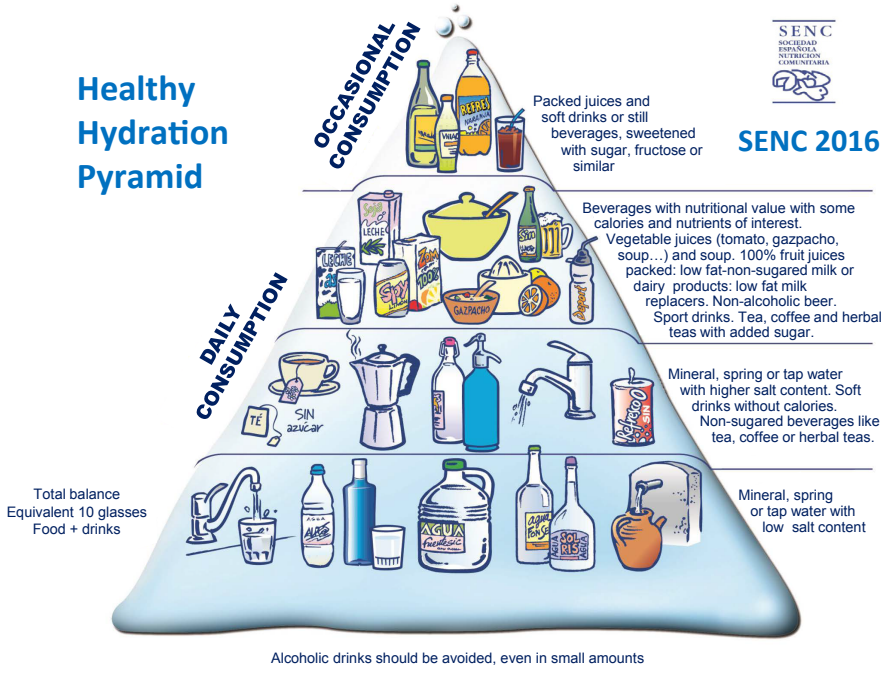
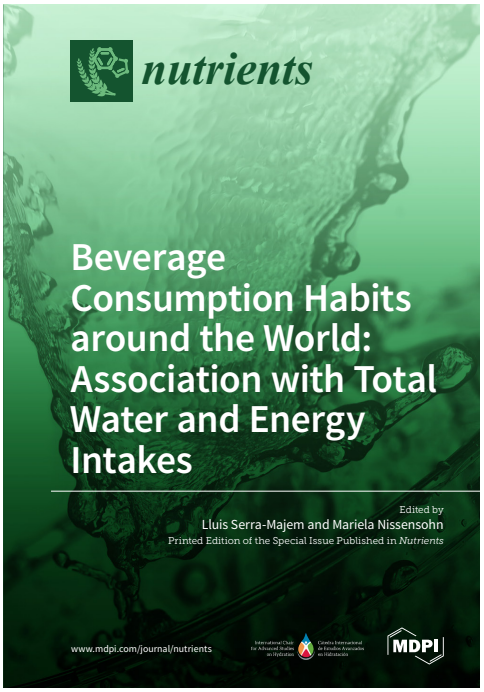


CIEAH NEWS

COMPENDIUM OF ARTICLES FROM THE NUTRIENTS SPECIAL ISSUE PUBLISHED IN BOOK FORMAT. "BEVERAGE CONSUMPTION HABITS AROUND THE WORLD: ASSOCIATION WITH TOTAL WATER AND ENERGY INTAKES"

The publication includes 20 articles. The studies included were developed in different settings and different populations around the world; the diversity methodologies employed in the quantitative assessment of beverages consumption and all the details that the results of the studies have shown may eventually help to adequately address their policies worldwide. Broadly, the papers in the present volume provide a valuable milestone on our journey to understand the impacts of the hydration on health and disease and they will be helpful for those planning future studies. Our main interest has been to gradually increase the general interest placed on this emerging and fascinating area of study.

Again, those of us engaged in nutrition research will be highly appreciative of the great efforts of our colleagues who have produced this volume documenting our progress to date. The full text is available in the publications section, of the educational material heading of our website.



CIEAH EVENTS

III INTERNATIONAL AND V SPANISH HYDRATION CONGRESS, IN BILBAO

From 13 to 15 May 2018, the International Chair for Advanced Studies on Hydration (CIEAH) is holding the III INTERNATIONAL AND V SPANISH HYDRATION CONGRESS, at Palacio Euskalduna, Bilbao.

The programme includes a series of workshops. Registration entitles participants to attend no more than two workshops (one in the morning and one in the afternoon).

We are sure you will find something of interest in the list of workshops:

Workshop 1	Bioimpedance in clinical practice and research
Workshop 2	Assessing hydration status
Workshop 3	Water in cooking
Workshop 4	Water quality
Workshop 5	Water tasting and other sources of hydration
Workshop 6	Questionnaires to estimate fluid intake
Workshop 7	Calculating water consumption and fluid intake needs
Workshop 8	Guidelines of healthy hydration. International comparison

For more information, please see:
http://hydration2018.cieah.ulpgc.es

WHAT'S NEW?

COLLABORATION AGREEMENT WITH THE MEXICAN SOCIETY OF TRANSPLANTATION

In January 2018 the International Chair for Advanced Studies on Hydration and the Mexican Society of Transplantation signed a collaboration agreement to work together for progress in research on hydration and knowledge applied to hydration management in patients with renal transplant, aiming to help and support health professionals and patients in this population group.

Signed by Dr Josefina Alberú Gómez, Chair of the Mexican Society of Transplantation, the agreement aims to establish a line of study to provide scientific evidence about hydration management in patients with renal transplant by promoting scientific research, seeking to gain a better understanding of hydration and the health and wellbeing of these patients. It also intends to conduct sociological research to understand patients' knowledge, behaviour, fears and attitudes in relation to hydration.

This collaboration is expected to lead to the formation of an international team to strengthen collaboration links with Latin America, and facilitate exchange of information, opinions and knowledge about hydration of patients with renal transplant among scientists, health professionals and patients to help this population group lead a healthy lifestyle.

SOCIEDAD MEXICANA DE TRASPLANTES