



Water: Essential for Life

Water is the most essential nutrient required for the human body to function efficiently. Let's take a look at its most important features and impact on health and development.

Essential Nutrient

Our bodies can't produce water, so we need an adequate supply daily to meet our physiological needs. All biochemical reactions in the body occur in water and it helps form structures such as protein and glycogen. Total body water comprises 45 - 75% of a person's body weight and functions in digestion, absorption, transportation and dissolving nutrients 1. Water carries nutrients and oxygen to cells in the brain and other parts of the body. It is also responsible for eliminating waste products, producing saliva, lubricates joints and internal organs, provides structure to cells and tissues, can improve cardiovascular function, facilitates weight management and regulates our body temperature 1, 2.

Brain Function

According to research, mild dehydration can impair some aspects of brain function, as the brain is strongly influenced by hydration status. Dehydration of just 1 - 2 % of total body weight can increase anxiety and fatigue 3. Mild dehydration causes problems with cognitive performance including poor concentration, increased reaction time, reduced short term memory and moodiness 1, 2. Children living in warm climates are more likely to experience dehydration and associated brain fatigue, unless they are drinking water regularly. Reports of the number of children who are dehydrated at school are alarmingly high 4.

Behaviour

Low water intake is a risk factor for constipation in children 5. Research shows that constipated children develop low self esteem, and it affects their social and family life 6. Chronic constipation is considered to be a cause, not a result, of behavioural issues and is underestimated by physicians 6. Children with autistic spectrum disorder are more likely to have constipation issues and more visits to the Emergency Department due to constipation 7. Several researches report that behavioural issues resolved when constipation was treated 6.

Infection

Dehydration is considered a risk factor for Urinary Tract Infections (UTI) 8. Adequate water intake is important and may improve the results of antimicrobial therapy in UTI's 8. Children with constipation were almost 7 times more likely to develop Urinary Tract infections compared to those without constipation 9. Kidney stones are more likely to form when there is a decrease in urine volume. Dehydration is a risk factor for developing kidney stones 9. Small intestinal bacterial overgrowth (SIBO) is more common in patients with constipation 12.

Exercise

Dehydration impairs exercise performance and increases DNA damage during high intensity workouts while fluid replacement prolongs exercise endurance and reduces DNA damage 10. Muscle is composed of between 70 - 75% water and requires fluid to maintain volume following exercise 10. It has been reported that exercise induced dehydration increased blood brain barrier permeability, which was then reduced following water consumption 11.

Saliva

Oral health is affected by fluid consumption. Saliva, which is essential for maintenance of oral health, is made primarily of water. Antibacterial agents in saliva destroy bacteria in our mouth preventing disease and maintaining a healthy oral ecosystem.

Weight Loss

Drinking water assists in losing weight and increasing metabolism. One study reported that drinking 1/2 litre of water boosted metabolism by 23-30% and this was maintained for 1.5 hours 13. The timing of drinking water is equally important. Drinking water before meals increases satiety so you eat less calories. In one study dieters who drank water before meals lost 44% more weight over 12 weeks 14. Drinking water cold burns more calories as your body has to use energy to heat the water.

References

1. Riebl SK, Davy BM. The Hydration Equation: Update on Water Balance and Cognitive Performance. ACSMs Health Fit J. 2013;17(6):21–28.
2. Benton D. Dehydration influences mood and cognition: a plausible hypothesis?. Nutrients. ;3(5): 555–573.
3. Ganio MS, Armstrong LE, Casa DJ, McDermott BP, Lee EC, Yamamoto LM, Marzano S, Lopez RM, Jimenez L, Le Belle L, Chevillotte E, Lieberman HR. Mild dehydration impairs cognitive performance and mood of men. Br J Nutr. 2011 Nov;106(10):1535-43.

4. Watson P, Black K.E., Clark S.C., Maughan R.J. Exercise in the heat: Effect of fluid ingestion on blood-brain barrier permeability. *Med. Sci. Sports Exerc.* 2006;38:2118–2124.
5. Arnaud MJ1. Mild dehydration: a risk factor of constipation? *Eur J Clin Nutr.* 2003 Dec;57
6. Ali SR, Ahmed S, Qadir M, Humayun KN, Ahmad K. Fecal incontinence and constipation in children: a clinical conundrum. *Oman Med J.* 2011;26(5):376–378.
7. Sparks B, Cooper J, Hayes C, Williams K. Constipation in Children with Autism Spectrum Disorder Associated with Increased Emergency Department Visits and Inpatient Admissions. *J Pediatr.* 2018 Nov;202:194-198.
8. Beetz R. Mild dehydration: a risk factor of urinary tract infection? *Eur J Clin Nutr.* 2003 Dec;57
9. https://www.medicinenet.com/kidney_stones/article.htm#what_is_a_kidney_stone_nephrolithiasis
10. Paik IY, Jeong MH, Jin HE, Kim YI, Suh AR, Cho SY, Roh HT, Jin CH, Suh SH. Fluid replacement following dehydration reduces oxidative stress during recovery. *Biochem Biophys Res Commun.* 2009 May 22;383(1):103-7.
11. Maughan RJ, Shirreffs SM, Watson P. Exercise, heat, hydration and the brain. *J Am Coll Nutr.* 2007 Oct;26(5 Suppl):604S-612S.
12. Łokieć K, Klupińska G, Walecka-Kapica E, Błńska A. [Estimation of small intestinal bacterial overgrowth in patients with constipation and diarrhea irritable bowel syndrome]. *Pol Merkuriusz Lekarski.* 2014 May;36(215):307-10.
13. Boschmann M, Steiniger J, Hille U, Tank J, Adams F, Sharma AM, Klaus S, Luft FC, Jordan J. Water-induced thermogenesis. *J Clin Endocrinol Metab.* 2003 Dec;88(12):6015-9.
14. Dennis EA, Dengo AL, Comber DL, Flack KD, Savla J, Davy KP, Davy BM. Water consumption increases weight loss during a hypocaloric diet intervention in middle-aged and older adults. *Obesity (Silver Spring).* 2010 Feb;18(2):300-7.
15. Patil AD. Link between hypothyroidism and small intestinal bacterial overgrowth. *Indian J Endocrinol Metab.* 2014;18(3):307–309. doi:10.4103/2230-8210.131155