

Coffee and Hydration

Overview

In hot climates and conditions of intense heat, or extreme energy expenditure, our bodies lose water, which if not replenished will lead to dehydration. For many years, health and exercise experts believed that coffee and other caffeinated beverages, which are mildly diuretic, promoted dehydration and consequently didn't count these beverages as a source of fluid in the diet. In fact research studies have shown that drinks containing caffeine have no greater diuretic effect than water. A moderate intake of coffee and other caffeinated drinks does not lead to dehydration and may count towards our daily fluid intake.

How did this myth start?

The normal average daily loss of water from our bodies is around 2500 ml. Of this, urine accounts for approximately half, while a further 800 ml is from water lost through the skin and most of the remainder is from the lungs. This amount will of course vary and, in conditions of extreme heat and exercise, daily fluid loss may exceed 10 litres as we sweat more.

Urine output is often used as an indicator of dehydration. Earlier studies (Robertson et al. 1978; Nussberger et al. 1990) only collected urine samples over a 2-4 hour period after caffeine consumption, not over 24 hours. It is now understood that the period over which urine is collected is a significant factor. The small increase in urine output after 3 hours is compensated for by a decrease in output later in the day: i.e. total urine output over the day remains unchanged. (Grandjean et al. 2000) Passmore et al. (1987) demonstrated that the effect had already disappeared within 4 hours.

Current Research

Professor Lawrence Armstrong, an avid runner and well respected scientist, undertook a review of the scientific literature to see whether or not abstaining from coffee and other caffeinated drinks was scientifically justifiable. In his published report Armstrong et al. (2002) concluded: "Moderate consumption of caffeine containing beverages appears to have a mild diuretic effect, however regular consumers of caffeinated drinks have a higher tolerance to the diuretic effect". The author found no evidence that consuming caffeinated beverages causes an imbalance of fluids and electrolytes, such as sodium and potassium, in the body, or that moderate intake of caffeine is detrimental to health or exercise performance. In a later study Armstrong reported that: "*Caffeinated fluids contribute to the daily human water requirement in a manner that is similar to pure water*" (Armstrong et al. 2007).

Maughan and Griffin (2003) produced a review of scientific studies published between 1996 and 2002. The authors concluded that: "The most ecologically valid of the published studies offers no support for the suggestion that consumption of caffeine containing beverages, as

part of a normal lifestyle, lead to fluid loss in excess of the volume ingested or is associated with poor hydration status.” These conclusions are further supported in a recent review by Ganio et al. (2007) where it was noted that in relation to hydration, there was no evidence to support caffeine restriction.

So how much should we drink?

Fluids are an important part of our diet and, to maintain our body’s fluid balance, we should be drinking in excess of on average 1.5 litres of various liquids throughout the day.(Popkin et al. 2006) The amount of fluid intake will need to be increased to around 2-3 litres in hotter weather, during and after exercise, or undertaking strenuous work and when experiencing high body temperatures associated with a fever. – Studies show that - consumption of caffeinated drinks at levels of (200-300 mg caffeine/day – equivalent to 3-4 cups of coffee) will have no adverse effect on hydration and may count towards this daily fluid intake (Grandjean et al. 2000).

When we drink more fluids, our urine output is greater in response to that increased intake. Fluid balance is maintained as long as our intake matches our losses. However, the regulatory mechanism can be rather insensitive and we may already be slightly dehydrated before we are prompted to drink.

Conclusion

Despite being widely believed, the claim that caffeine containing drinks promote dehydration is not supported by the latest research, published in scientific and medical literature. Moderate intakes of caffeine have no long term adverse effect on hydration and can actually count towards daily fluid intake, which is good news for all of us who enjoy drinking coffee as part of a healthy diet.

Frequently Asked Questions

Q. Is it true that drinks containing caffeine will cause our bodies to lose even more water than normal?

A. No. Despite what you may have heard or read, there is no evidence to support this claim. In fact, a moderate intake of coffee and other caffeinated drinks does not lead to dehydration and may contribute to daily fluid intake.

Q. What happens if you drink 3-4 cups of coffee a day – is urine output increased?

A. Evidence shows that regular consumers of caffeinated drinks, including coffee, have a higher tolerance to the mild diuretic effect, so the overall long term effect on hydration is very similar to water.

Q. How much water do we lose on average per day?

A. The normal average daily water loss is around 2500 ml of which urine accounts for approximately half. About 800 ml of water is lost through the skin and most of the remainder is from the lungs. This will of course vary, and in extreme conditions of heat and exercise, daily fluid loss may exceed 10 litres.

Q. Is dehydration harmful to health?

A. Severe dehydration is detrimental to health; it is associated with less efficient functioning of the heart and kidneys and generally makes us feel unwell. Doctors also agree that on going mild dehydration also has a negative effect on our general well-being.

Q. How much do we need to drink?

A. Fluids are an important part of our daily diet and to maintain our body's water balance we should be drinking in excess of on average 1.5 litres of various fluids throughout the day, and may include caffeinated drinks such as coffee. This amount will need to be increased to around 2-3 litres in hotter weather, during and after exercise, when working in very hot conditions, or when experiencing high body temperatures associated with a fever. In these circumstances we need to top up fluid levels on a regular basis.

Q. Are caffeine containing drinks the main cause of dehydration during the heat of summer?

A. No. The main factors affecting water loss from our bodies are surrounding air temperature and humidity. If the temperature increases we are likely to sweat more and this loss is greater still if we undergo prolonged exercise in a warm environment.

Q. So, what makes us thirsty?

A. We are consciously stimulated to drink when our blood volume falls and there is a rise in the concentration of sodium in the blood. This regulatory mechanism is rather insensitive and we may already be slightly dehydrated before we are prompted to drink. The sensation of thirst is often also reduced in elderly people, so they may not always drink enough to replace normal fluid losses.

Q. Where do we get caffeine from in our diet?

A. Caffeine is naturally occurring in coffee, tea, chocolate and cocoa and is added to cola and "energy" drinks. Caffeine is also present in some over-the-counter cold remedies and pain relief products.

References

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