FEATURE ARTICLE

Sleeping and Fasting to Prevent Lifestyle Diseases

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BENJAMIN Franklin, an American polymath, once famously said: “The best of all medicines are resting and fasting.” Modern evidence-based scientific research keeps on bolstering that statement.

Evolutionarily, human beings were hunter-gatherers for a vast majority of their timeline; it was merely 20,000 years ago that we began agriculture. As hunter-gatherers, our lives were more at random, and so were our meals – there were no breakfast, lunch and dinner. We ate whenever we gathered a fruit or hunted a game.

Fasting was a built-in component of human lifestyle (like that of any wild animal now) until humans invented farming. Farming enabled us to plan our meals; three meals each day as we do now. As a relic of the ancient human lifestyle, today fasting remains an integral component of a number of world’s philosophical movements and religions like Stoicism, Islam, Hinduism, Buddhism, Judaism and Shintoism.

What exactly does fasting do to our bodies? A host of research papers over the last few decades have revealed a number of physiological effects of fasting. First, it leads to use-up of stored carbohydrates from our body. Due to an overabundance of food and our systematic three-meals-a-day culture, our bodies always use readily available carbohydrates. Before it is completely used-up, we eat again to replenish the carbs, leading to the storage of excess carb in liver and muscles as glycogen and its conversion to fat.

When fasting, we completely use-up circulating carbs, then stored glycogen and finally stored fats. As there will not be any carb (sugar) spikes in our blood, fasting lowers circulating insulin. Insulin is a hormone produced in our pancreas in response to carbs that we consume. The more we eat carbs, the more the pancreas produces insulin to remove the excess sugar. However, our cells become lesser and lesser sensitive to the insulin if they are bathed in a continuous supply of insulin, leading to diabetes.

Diabetes is treated by injecting insulin so that blood concentrations of it increase; as the disease progresses doctors prescribe more and more insulin doses to sensitize the cells to remove excess sugar. This is exactly what happens after a day of fasting. As insulin in our blood reduces, the sensitivity of our cells to insulin does not decrease (Halberg et al., 2005).

In addition, glycogen is stored in the liver with three to four molecules of water. As we use up glycogen during fasting, stored water is released by our kidneys, leading to weight loss and feeling less “bloated” (Olsson & Saltin, 1970). A Randomized Control Trial in 2013 concluded that alternate day fasting is effective for weight loss and cardio-protection in normal weight and overweight adults (Varady et al., 2013).

Fasting has several other benefits as well. It lowers VLDL cholesterol, the bad fats in our blood (Peebles, Burnham, Walzem, Branton, & Gerard, 2004). Fasting has no effect on HDL cholesterol, the good fats. VLDLs are responsible for building-up plaques in our arteries, leading to heart diseases. A popular myth is that we can lower VLDL cholesterol by eating less fatty foods like egg yolk. However, almost 80% of cholesterol in our body is produced by the liver from the carb that we eat. The liver converts carbs into triglycerides, a form of VLDL.

One way to lower VLDLs is by taking expensive commercial drugs like statins, however, statins are well known to cause several serious side effects, including muscle damage, liver damage and diabetes (Thompson, Panza, Zaleski, & Taylor, 2016). Latest meta-analysis concludes that statin therapy results only in small gain in life expectancy (Kristensen, Christensen, & Hallas, 2015).
The best way to lower VLDL is through fasting, although profit-driven pharmaceutical firms (and people whose research is supported by these firms) don’t want you to do that. This is a classic example of ‘conflict of interests’; a situation in which a person acts in a biased way because of ulterior motives and personal interests.

Conflicts of interests spreading myths against fasting are surprisingly very common. For example, ‘breakfast is the most important meal of the day’ is more an advertisement propagated by breakfast cereal companies than science. If more and more people fast, the firms must hard hit would be drug, supplement and food industries. Does fasting put your life in danger, does it cause gastric ulcers or make you gain more weight in the long run? All of these are mere myths.

Among other science-backed benefits of fasting are protection from cancer and hypertension, overall mental health, better immunity and extension of lifespan. Research has revealed a link between obesity, insulin and cancer; as insulin levels in our blood increase, the risk for developing cancer increases as well (Chan et al., 1998). Fasting helps to control obesity and reduces insulin levels; both help in cancer prevention (Lv, Zhu, Wang, Wang, & Guan, 2014).

In addition, fasting also increases the process of autophagy (self-eating) - removal of old and mutated cells from our body (Alirezaei et al., 2010). These old and mutated cells thrive on excess carbs and develop into various forms of cancer. During fasting, the cellular machinery that performs autophagy “recycles” these old and deformed cells thereby preventing the development of cancer (Lee & Longo, 2011).

Several studies have also revealed that fasting elevates levels of IgA (Godínez-Victoria et al., 2014; Lara-Padilla et al., 2015), a crucial antibody of our immune system involved in protection from pathogens invading through mucous membranes (skin covering gut, genitals, eyes, etc.). It has been revealed in mouse studies that intermittent fasting lasting a whole day on every other day or fasting on two days per week extended lifespan up to 30% (Xie et al., 2017). Effect of fasting on ageing is also an active research area with a lot of global attention (Martin, Mattson, & Maudsley, 2006).

Fasting is also known to increase the Brain-Derived Neurotrophic Factor (BDNF) (Katate, Kakinuma, Arikawa, Yamasaki, & Sato, 2009; Mattson & Wan, 2005). BDNF is a crucial molecule involved in the overall health of neurons in the brain. BDNF also prevents the accumulation of toxic substances in the brain that leads to neurodegenerative diseases including Alzheimer’s disease (Halappa et al., 2007) and Parkinson’s disease (Maswood et al., 2004).

Effect of fasting on the community structure of human gut microbiome is an emergent field of research (Kau, Ahern, Griffin, Goodman, & Gordon, 2011). Several studies have revealed that bad bacteria (like Salmonella) that live in our intestine have shorter doubling-times compared with good bacteria (Stecher, Maier, & Hardt, 2013). When we fast, these bad bacteria starve to death forcing a significant change in community structure from bad to good flora (Li et al., 2017). As gut microbiome is associated with several human physiological processes including glucose metabolism, heart health and even protection from depression, fasting magnifies most of its health benefits via a change in the gut microbiome (Shreiner, Kao, & Young, 2015).

**Sleeping**

An equally important lifestyle habit is sleeping. Evolutionarily, human beings slept with dusk and got up with the dawn. However, this habit was disturbed with the advent of controlled fire. Several scientific researches associate lack of sufficient sleep with a range of diseases including diabetes, heart diseases, obesity, cancer and cognitive impairment. The World Health Organization estimates that around two-thirds of the human population around the world suffers from sleep deprivation (less than eight hours of sleep).

A noteworthy scientific discovery is that a single night of reduced sleep of about 4-5 hours would drastically reduce (up to 70% reduction!) count of Natural Killer (NK) cells – a subtype of white blood cells (Irwin et al., 1996). It would take the next several days of adequate sleep to bring the levels back to the normal. NK cells are known to attack and eat deformed or mutated cells (that would later turn into cancer cells) as well as invading pathogens. Naturally, with NK cells depleted, our immune system would become too weak to fight off cancer and infectious diseases.

In addition, sleep deprivation also spites excretion of melatonin from our body (Akerstedt, Fröberg, Friberg, & Wetterberg, 1979). Melatonin is an essential substance for cancer prevention and its reduced levels put us at an increased risk of developing cancer (D. Blask & Hill, 1986).

Association of sleep deprivation with cancer is strongest in the case of colon cancer, breast cancer and prostate cancer (D.E. Blask, 2009). The World Health Organization recently labelled sleep deprivation and night-shifts as ‘probable carcinogens’ (Straif et al., 2007). Easily, ensuring enough sleep is the foremost step in the prevention of cancer and other diseases.

Sleep deprivation is also linked to reduced brain function, especially cognitive response times (Killgore, 2010). A fast response to the stimuli becomes a limiting factor in situations where split-second decisions matter the most; for example while driving at high speeds. A significant portion of traffic accidents worldwide can be attributed to sleep deprivation (Teran-Santos, Jimenez-Gomez, Cordero-Guevara, & Burgos-Santander, 1999).

Sleep deprivation is also strongly associated with coronary heart diseases and heart attacks. A study in Japan concluded that sleeping for less than six hours a day increases the risk of getting a heart attack by more than 400% (Liu & Tanaka, 2002).

A lifestyle with periodic fasting and ensuring enough sleep not only saves our money, time and helps our own health and well-being; it helps the world at large to fight world hunger and energy crises. Eating less and sleeping adequately also reduce our dependency on fossil fuel and carbon footprint, and, therefore, a habit good for our environment and planet. Embracing a frugal lifestyle through periodic fasting and ensuring enough sleep is a win-win situation in all dimensions.

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