Source : www.thehindu.com Date : 2022-02-27

STAYING HEALTHY, EATING LESS

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

Diet control: Other than exercise, only fasting and caloric restriction (CR) have consistently been shown to extend a healthy lifespan. | Photo Credit: Getty Images

For modern humans, three meals a day may seem to be the ideal formula for being healthy and wise. Yet, evolutionarily speaking, our bodies are adapted to occasional periods of fasting, as a constant supply of food was not always guaranteed. Fasting is certainly a part of our heritage, being prevalent in a range of cultures – from Ekadashi to Karwa Chauth among Hindus; the Yom Kippur for Jews, Paryushana among Jains, Ramzan among Muslims, the Christian period of Lent, and so on. One wonders if widespread prevalence points to health benefits in addition to the discipline of the mind.

In 2016, a study of data from 186 countries in the journal *The Lancet* revealed that obese people now outnumber underweight individuals. Our lifespans, too, are much longer than they were two generations ago. Together, these trends have added greatly to the disease burden of society, and other than exercise, only fasting and caloric restriction (CR) have consistently been shown to extend a healthy lifespan.

Fasting and CR are not synonymous. CR results from reducing caloric intake by 15% to 40%, without leading to malnutrition. There are several strategies for fasting. In intermittent fasting (IF), you alternate a 24 hour period without any food (or with no more than 25% of your dietary norm) with 24 hours of normal eating. In periodic fasting you fast for one or two days followed by five days of normal diet. In time-restricted feeding (TRF), all daily intake is done within a 4–12 hour window. In an example of a fasting-mimicking diet (FMD) you reduce intake to 30% of your energy requirements for five consecutive days, once every month. In addition, the ratio of fats, proteins and carbohydrates may be altered during reduced intake to favour more fat.

The island of Okinawa in Japan has an exceptional number of healthy centenarians because adults practice Hara Hachi Bu – stopping eating when they are 80% full (CR). Buddhist monks of certain sects eat their last meal at noon (TRF).

These strategies have been examined in a large number of studies on rodents and on humans – we humans often have difficulty in sticking to restricted diets! When properly adhered to, these practices have been shown to prevent obesity, to protect against oxidative stress and hypertension. They also mitigate and postpone the onset of several age-related diseases.

Careful monitoring and expert advice is essential for choosing suitable strategies based on individual circumstances such as age.

We store glucose in the form of glycogen in the liver, and the energy demands of the body are met from this reservoir. One day of fasting leads to a 20% decrease in blood sugar levels and depleted glycogen reserves. The body switches to a metabolic mode where energy is obtained from fat-derived ketone bodies and from glucose outside the liver. Insulin levels are lowered and lipolysis burns away lipid triglycerides in adipocytes.

The metabolic syndrome is a group of risk factors that are predictors of heart disease and diabetes. The work of Satchidanand Panda at the Salk institute has highlighted the benefits of a 10-hour TRF on sufferers, and noted improvements in blood pressure, heart-rate variability and physical endurance (Longo and Panda, *Cell Metabolism,* 23, 1048–1059 (2016)).

IF has also been shown to cause a remodelling of the gut microbiome. Bacterial diversity goes up, and there is a rise in bacterial species that produce short-chain fatty acids, which are known to thwart inflammation-mediated conditions such as ulcerative colitis.

In the fruit fly, prolonged overnight fasting promotes a recycling process inside cells called autophagy (Latin for self-devouring). This results in a 15%-20% extension in lifespan (Ulgherait, M. et al, *Nature,* 598, 353–358 (2021)). Autophagy mostly occurs at night and is modulated by the body's circadian clock. Autophagy is essential for the fitness and survival of neurons; errors in this process lead to Parkinson's disease.

A plentiful supply of nutrients represses autophagy and activates pathways that promote the biosynthesis of proteins and thus of rejuvenation (Jouandin et al., *Science* 375, eabc4203 (2022)). This dynamic control of degradation and rejuvenation suggests that IF, TRF, FMD and periodic fasting may be better for the body than chronic caloric restriction.,

A few small organic molecules – rapamycin, metformin and resveratrol – appear to affect our metabolic pathways in ways that mimic the effects of fasting. Could it turn out that some day we could be able to imbibe carefully tailored pills and eat our cake, but not put on weight ?

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