

Intermittent Fasting: A Fast Forward to Wellness

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ABSTRACT: Intermittent fasting is an eating pattern that restrict food intake for specific period of time. Intermittent fasting can be effective method for weight loss because it reduces calorie intake and increases metabolism. Alternate day fasting and time restricted eating is a simple lifestyle therapy for causative factor for cardio vascular disease and it also involves in the consumption of ad libitum energy intake within 8 hours, followed by a 16 hour's fast. Intermittent fasting is beneficial for type 2 diabetes, in lowering blood pressure and cardio vascular risk factor such as lipid profile. Intermittent fasting focuses on the food quality at the time of fasting. Autophagy is an early stage of cellular response to stress stimuli to prevent host cell from subsequent injuries by removing damaged organelles and misfolded proteins.

I. INTRODUCTION:

Intermittent fasting (IF), which is another version that involves eating and not consuming food. While on a continuous calorie restriction diet the emphasis is often placed upon which foods to eat, with intermittent fasting you can eat whatever it is that you want during your eating window. Intermittent fasting is not a diet but it shows good results if people consider food quality at the time of intermittent fasting. It is simple and has become increasingly popular due to its potential health benefits like weight loss [8]. It can be beneficial in decreasing energy intake and increasing energy expenditure with losing weight. When one follows the intermittent fasting increases insulin and there by decrease the insulin sensitivity and lower the risk of type 2 diabetes it also promotes cellular repair your body induces important cellular repair processes, it removes the dysfunctional proteins and organelles to promote self-repair through autophagy. Change in hormone fasting can change the hormones levels to boost fat burn and muscle gain. Health Improvements while some research claims that intermittent fasting could enhance the

physical health of the heart, brain and even life expectancy more research must be conducted [16].

Types of Intermittent Fasting[2],[10]:

Alternate Day Fasting: The plans work on the cycle of normal days where normal amount of food which provides moderate number of calories are taken and fasting days where very few or no calories at all are taken. Fast 1 or 2 days per week and allow for 5-6 days per week of ad-libitum food consumption.

Caloric restriction: Daily reducing by 15 to 40% of caloric intake without causing malnutrition.

Time Restricted Feeding: This is defined as complete fasting consumption of no calories for at least 12 hours per day with ad libitum feeding for the rest of the day.

Religious Fasts: Ramadan fasting improve the lipid profile in the healthy, obese and dyslipidaemia. This fast refraining from eating and drinking. This increases serum HDL (high density lipoprotein) levels and decrease serum LDL (low density lipoprotein). However, it has been found to be relatively safe even for individuals with chronic conditions such as kidney transplant recipients, heart failure and diabetes [14].

Fasting methods[7]:

8:16 Method: This includes eating within 8-hour span and being on a fasting mode for the other 16 hours. For example, a person might skip breakfast and eat their meals between 12:00 pm and 8:00 pm.

5:2 Diet: This method involves eating as one would normally for 5 days a week and a 500-600 calories diet for two days of the week.

Warrior Diet: This method entails consuming the raw fruits and vegetables throughout the day and a huge meal at night provided it is within 4 PM to 8 PM.

Spontaneous Meal Skipping: This approach is less formal and entails fasting at will, that is when one is not hungry, or feels it is convenient to do so.

How intermittent fasting works on our body[5]:

Metabolic Shifts: But in the periods of fasting, including night-time, the glycogen store which is stored glucose is depleted, and fats are burned as the major source of energy. It is therefore possible to lose fats depending on the workouts to be observed because different workouts use different sources of energy[1].

Insulin Sensitivity: The periods of fasting result in enhanced insulin sensitivity. This is a hormone that is used to maintain a balance between the sugar in body and the level of insulin. Better management of blood sugar is one aspect and would help reduce the chances of getting type 2 diabetes.

Autophagy: While fasting, your cells go through autophagy where your cells eliminate or recycle damaged or dysfunctional components. These steps may prove useful in the facilitation of cellular repair and maintenance.

Reduction in Inflammation: According to some reported works it has been seen that the process of intermittent fasting helps in the decrease in the level of inflammation and that helps in lowering the possibility of chronic diseases[4].

Caloric Intake: IF(Intermittent fasting) can also make the calorie intake to decrease since the meal taking is only allowed for break. This caloric deficit can help one lose weight.

Human growth hormone (HGH) level:

Blood levels of human growth hormone may increase, higher level of the hormone promote fat burning and muscle gain and also have other health benefits.

Effect of intermittent fasting on heart[1],[15]:

Improvement in Cardiovascular Risk Factors: An observational study of 2001 patients undergoing catheterization without prior myocardial infarction or heart failure reported that prolonged nightly fasting or with religious fasting was associated with a 71% reduced incidence of heart failure. The Intermountain Heart Collaborative Study Group performed a meta-analysis of two studies involving Latter Day Saints that combined about 648 patients. They Compared the incidence of coronary artery with $\geq 70\%$ stenosis in those who underwent a monthly 1-day religious fast to those who did not. It shows that who followed the fast had a lower risk of coronary heart disease.

Lipid Profile: Intermittent Fasting can also reduce total cholesterol, LDL cholesterol & triglycerides in the blood. These changes can significantly reduce the possibility of getting

atherosclerosis, commonly known as hardening of the arteries and other cardiovascular diseases[6].

Effects of intermittent fasting on skin-Aging Longevity[11],[15]:

As we grow, the hypodermis layer of the skin begins to atrophy and wrinkled appearance of skin. Intermittent fasting and calorie restriction increased the lifespan and reduced aging. In Vitro method is done on human skin, fibroblast showed longer lifespan than controls. It shows that there aging process is reduced and build youthful morphology whereas controls showed senescent morphology which states the process aging. There is rise in number of stem cells due to caloric restriction diets, which plays a major role in tissue homeostasis and growth. Intermittent fasting helps in protection against granulomatous inflammation and enhanced in wound healing by the phagocytic activity of macrophages.

Effect of intermittent fasting on hypertension[15]:

Hypertension is the global health problem and plays a major role in cardiovascular disease, chronic kidney disease and stroke. It is considered when systolic/diastolic blood pressure is 140/90 or more than this. Study was conducted in which prediabetic patients put on the 18 hours fasting regimen for 5 weeks showed reduction in systolic and diastolic Blood pressure 11 ± 4 mmHg and 10 ± 4 mmHg respectively. Study that took place at Buchinger Wilhelmi clinic in Germany on 1422 people subjected to intermittent fasting period about 4-21 days with daily meals constituting 200-250 kcal. Reduction level of systolic and diastolic blood pressure was observed and believed that it may be due to increase in parasympathetic activity, more norepinephrine excretion and increased insulin sensitivity.

Effect of intermittent fasting on Cancer[3]:

Breast cancer is the most common cause of cancer mortalities among women in developing countries and also causes of cancer deaths. The correlation between dietary changes and their effects on cancer and treatment has increased over last decade. Long term calorie confined human subjects have demonstrated a decrease in metabolic and hormonal factors associated with cancer. Calorie restriction can be achieved through dietary reduction or by intermittent fasting. Intermittent fasting is a nutritional way that requires fasting for varied periods, typically for 12 hours or longer.

Medicinal aid reported to be a reproducible and effective foe protecting mammals from tumors and prolonging survival. Nutrients deprivation signals healthy cells to regulate cell division and growth by protecting them from chemotherapy, whereas the mutation in cancer cells make them less capable of adaptation during fasting, and therefore, fasting cycle render tumor cells more sensitive to chemotherapy. Intermittent fasting is a promising strategy for increasing chemotherapy effectiveness and tolerability.

Intermittent fasting impact on stroke[15]:

Intermittent fasting also showed promising results in cerebrovascular disease, including stroke. Ischemic stroke and haemorrhagic stroke are two types of strokes and causes various disabilities. Study was done on young mice and middle-aged mice, 3 months and 9 months respectively. Focal ischemic stroke was induced and then they were subjected to intermittent fasting. It was observed that due to intermittent fasting risk of stroke reduces up to some extent. Adenosine monophosphate activated protein and SIRT1 protein activation due to intermittent fasting it might be accountable for risk reduction in stroke as they regulate neuroprotective protein thus preventing pathological processes in the brain.

Effect of intermittent fasting on type 2 diabetes[9]:

Type 2 diabetes (T2D) is a chronic condition that affects the way that the body metabolises sugar, which is characterized by elevated insulin resistance and an integral part of the metabolic syndrome. It may lead to many complications. The prevalence of diabetes is expected to rapidly increase in the future. The elevated blood glucose levels are managed by using insulin and oral hypoglycaemic agents. The increase regular usage or more frequent use of insulin or other drugs may increase the risk of mortality because of cardiovascular disease. Preventing type 2 diabetes involves making life style changes that improve overall health and reduces the risk of developing the different health condition. Intermittent Fasting has gained popularity as a potential strategy for managing and even preventing type 2 diabetes. It involves cycling between period of eating and fasting and they are various method, such as 5:2 method (eating normally for 5 days and restricting calories for 2 non – consecutive days), 16/8 method (16 hours of fasting ,8 hours of eating), and alternate day fasting.

Case study:

This case documents a patient referred to the Intensive Dietary Management (IDM) clinic in Toronto, Canada, for insulin-dependent T2D. The IDM clinic works with clients to adopt a low carbohydrates diet and use intermittent fasting for weight loss and control of T2D.

A 69-years -old man diagnosed with T2D for 35 years was initially seen in consultation on 07 April 2017. At the time, the patient was taking 160 units of insulin daily and 1000 mg of metformin twice a day to manage his diabetes. His medications included the following:

- Quinapril 40 mg daily
- Eze-trol 10 mg daily
- Aggrenox 200/25 mg daily
- Lipitor 20 mg daily
- Metformin 1000 mg twice daily

The patient has been on metformin for 35 years and on insulin treatment for the past 11 years. He was never used any other forms of diabetic medication. He has no known microvascular or macrovascular complications.

The hypertension, hypercholesterolaemia, a transient ischemic attack 2002 bilateral cataract all of these are included in other significant medical history. The patient weighed 92.6 kg, with a waist circumference of 109cm.

The patient started an initial fasting prescription introduce a 24 hour fast, 3 times a week. He reduced his dietary intake of sugar and refined carbohydrates and increased his consumption of natural fat. The patient was instructed to consume approximately 70% of his daily calories from natural fats, 20% from proteins both plant and animal based and 10% from net carbohydrates from leafy greens and non- starch vegetables. Fluids include water, non- sugared tea, black coffee and homemade bone broth.

After 1 month into the treatment, he started feeling more confident with the program, so he extended and began fasting between 24 hours 3 times a week. After 2 months he again pushed fasting schedule between 24 hours and 42 hours, two to 3 times in a week. A physician and dietary counsellor monitor the patient every 2 weeks until insulin was discontinued. Targeted daily blood sugars were between 7 mmol/L and 10 mmol/L.

After 2 months of therapeutic fasting in conjunction with substantial reduction in glycated haemoglobin levels, from 7.7% to 7.2%. Patient completely discontinued this treatment. He remains on his oral hypoglycaemic medication, 1000 mg

metformin twice a day. The patient reduced his body weight and waist size. The patient weight decreased by 17.8% (from 92.6 kg to 76.1 kg) and waist circumferences by 11% (109 cm to 97 cm).

Overall, the patient stated that he did not find it difficult to stick to his fasting schedule and his confident in counting his fasting regimen. He reported normal energy level and noted no minor adverse effect because of the fasting.

Intermittent fasting helps boosting immune system and autophagy[13],[15]: Intermittent fasting and calorie restriction is the optimum method to strengthen the immune system. Intermittent fasting show good results in boosting the immune system especially at the time of pandemic situation(SARS-CoV-2). It is always believed that if a person has a good immune system, less disease they face. IF as mentioned earlier helps in reducing insulin level and increases insulin sensitivity, thus helps in resilience in the immune system. Intermittent fasting promotes cellular autophagy, is a process that recycles and breaks dysfunctional, mutant and lethal biomolecules, organelles and invades the pathogens to retail their cellular homeostatis activity. Autophagy is also associated with immunity as well as cell survival and aging.

Effect of intermittent fasting on body weight[15],[17]:

Obesity is a major global health issue that has seen a significant rise in decent decades. It is defined has having a body mass index (BMI) of 30 or higher, and it is associated with numerous health risk and complication. Obesity rates have been increasing worldwide. According to world health organisation (WHO) obesity has nearly tripled since 1975. As of the latest data, over 1.9 billion adults aged 18 and older are overweight, and of these, over 650 million are obese. Intermittent fasting is effective in reducing weight irrespective to body mass index. Furthermore, significant decreases in fat mass, low-density lipoprotein, triglycerides were consistently reported in all included studies. A 2018 meta- analysis of 6 clinical trials also found intermittent fasting to be more effective than no treatment for weight loss but not superior to continuous energy restriction.

Case study:

A healthy overweight Asian male age 48 years was interested to explore the use of intermittent fasting as life style approach for weight

loss. He was 83 kg previously and had successfully reduced his weight to 61 kg by adopting a strict plant-based diet and exercise over three years. He was moderately active and walked for at least an hour daily. He was not diagnosed with any chronic conditions and also did not have any gastrointestinal issues other than an isolated incident of bleeding duodenal ulcer when he was teenager, which had since been resolved after treatment with ranitidine.

He was experienced gradual weight gain to 66 kg over the last 2 years, with a height of 1.64 meters his BMI was 24. 53 kg /m despite continuing a plant -based diet and moderate exercise.

Role of Intermittent fasting on chronic diseases[19]:

Nutritional Intake: The aspect of nutrition is a very delicate one that needs to be well understood by individuals suffering from cancer. Intermittent fasting might restrict food thus make it very difficult for the patient to get adequate nutrients in a day let alone in a day in case the patient or the candidate already has it difficult to eat or his appetite is low.

Impact on Treatment: Chemotherapy for instance which is one of the treatments for cancer has its impact on food and fasting. This requires reflective analysis of IF in relation to current therapies, including the possibilities of worsening the condition or producing new symptoms.

Immune System: IF could affect the immune system, in a positive way through the inhibition of inflammation and oxidative stress. This may indirectly assist the body in coping with the disease as well as its treatment, although research on this topic remains rather promising.

Quality of Life: Thus, intermittent fasting for some patients might result in increased QoL due to changes in energy status or amelioration of effects which are typical for cancer patients and result from cancer treatment. There may be cases that it may bring about some degree of stress or inconvenience to others[10].

Maintaining of intermittent fasting[6]:

Stay hydrated. Drink lots of water and calorie free drinks, such as herbal teas, throughout the day. This can help to ensure electrolytes, sodium and potassium chloride.

Resting and relaxing. Avoid strenuous activities on fasting days, although light exercise such as yoga may be beneficial.

Making calorie count. If the chosen plan allows some calories during fasting periods, select nutrients-dense food that are rich in protein, fibre and healthful fats. Examples include beans, lentils, eggs, fish, nuts, avocado and processed meats.

Eating high-volume food. Select filling yet low calorie foods, which include popcorn, raw vegetables and fruits with high water content, such as grapes, melon.

Choosing nutrient-dense food. Eating foods that are high in fibres, vitamins minerals and other nutrients helps to keep blood sugar levels steady and prevent nutrient deficiencies. A balanced diet will also contribute to weight loss and overall health.

Disadvantages of intermittent fasting[4]:

The disadvantages and side effects of Intermittent fasting can vary among individuals. Side effects may include headaches, lethargy, constipation, dehydration, hypoglycemia, sleep disturbance, dizziness.

Potential health concerns and contraindications [4]:

Individual with diabetes: Intermittent fasting is not suggested for type 1 diabetes because of the risk of profound hypoglycaemia. Although intermittent fasting may improve the body's response to insulin, it can be challenging to maintain stable blood sugar levels and adjust medications to prevent low blood sugar. As a result, intermittent fasting can pose challenges for people with diabetes in managing their condition.

Pregnant and breastfeeding women: Intermittent fasting may lead to insufficient intake of nutrients during pregnancy or breastfeeding, potentially affecting the health of the mother and the child. Taking fewer calories means fewer vitamins and minerals and decreasing nutrients.

Individual with a weakened immune system:

Intermittent fasting might not be suitable for people with compromised immune system because it can exacerbate their condition. Those with weakened immunity, such as patients undergoing chemotherapy, individuals with HIV/AIDS, or those with autoimmune disorders, may need consistent energy and nutrient intake to support their body's defence mechanisms. Intermittent fasting can disrupt the nutritional balance, potentially worsening the health status.

II. CONCLUSION:

Intermittent fasting proved to be an excellent approach on a healthy body. Intermittent fasting studies confirm the therapeutic effectiveness on the human body. It shows a positive effect on humans by reducing blood pressure, stroke, boosting the immune system, promoting autophagy. Intermittent fasting has an alternative dietary intervention to calorie restriction with equivalent benefits in improvement of glucose homeostasis, body weight reduction and lipid profile. A nutritious diet has huge benefits for health and also can reduce the risk of various chronic health conditions such as heart diseases and diabetes. Intermittent fasting lowers the triglycerides, and LDL cholesterol level which is beneficial for reducing the risk of cardiovascular disease. Intermittent fasting on patients is safe and effective to optimize their health and well-being.

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