

Review Article

Ramadan Intermittent Fasting and Its Beneficial Effects of Health: A Review Article

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Abstract: During the Ramadan month, Muslims abstain from eating any food, drinking any liquid, smoking and sexual intercourse in this holy month as testimony of faith, charity, pilgrimage, and daily prayer during daylight hours. Food and drinks are allowed before dawn and after sunset these meals are called suhoor and iftar, respectively. The aim of this article is to review the health benefits of Ramadan fasting by addressing peer reviewed human and animal studies published in international academic journals. This article is reviewed 40+ published papers from the period of 1970 up to 2019. The papers were searched from different databases, including PubMed/Medline, science direct, PLoS one, Scopus, directory of open access journals and the Cochrane library by using the following key words: - "intermittent fasting", "Ramadan fasting", "Ramadan month", "fasting", "and/or", "cardiovascular diseases", "coronary heart diseases", "diabetics", "dyslipidemia", "HDL", "LDL", "cholesterol", "overweight", "obesity", "metabolic diseases", "metabolism", "cancer", "immunity", "immune system". This review article concluded that, Ramadan fasting significantly reduces the risk for cardio-vascular diseases and diabetics by decreasing body weight, total cholesterol, LDL cholesterol and increasing HDL cholesterol. Other hand, Ramadan fasting have beneficial effects of metabolic markers. It also improves the effectiveness of immune system by decreasing pro-inflammatory cytokines, increasing level of complement proteins and phagocytic activity of polymorphs. It lowers the incidence of diabetes by decreasing insulin resistance, increasing insulin sensitivity, glucose uptake, decreasing lipolysis, and assisting in weight loss. According to the results of the current review, the health benefits of Ramadan fasting could be sustained by leading a healthy lifestyle and practicing optional fasting regularly after the holy month of Ramadan twice a week on Mondays and Thursdays.

Keywords: Ramadan Intermittent Fasting, Cardio-Vascular Diseases, Diabetics, Immunity, Cancer

1. Introduction

According to the Islamic lunar year, Ramadan is the 9th month, and it is the 4th pillar of Islam. Approximately 1.8 billion Muslims worldwide abstain from eating any food, drinking any liquid, smoking and sexual intercourse in this holy month as testimony of faith, charity, pilgrimage, and daily prayer during daylight hours. Furthermore, Ramadan has a strong ethical and spiritual dimension, in that it is a time to purify the soul and to gain proximity to God ("Allah") through reflection and supplication. While Muslims fast from dawn until sunset, food and drinks are allowed before dawn and

after sunset these meals are called *Suhoor* and *Iftar*, respectively [1].

The month of Ramadan covers a period of 28 to 30 days. The dates of observance differ each year because Ramadan is set to a lunar calendar. Fasting extends each day from dawn until sunset, a period that varies by geographical location and season. In summer months and northern latitudes, the fast can last up to 18 hours or more [2].

Food and fluid intake are mainly nocturnal and usually, food frequency and quantity, sleep duration at night and daily physical activity are reduced. The food habits are not similar outside and during Ramadan in that the proportion of fat,

protein and carbohydrate intake can differ during Ramadan. There is a tendency to consume foods and drinks that are richer in carbohydrates than those consumed during other months of the year. The quality of ingested nutrients can also differ during Ramadan compared with the rest of the year [3].

Recent scientific studies are now discovering many health benefits of fasting; from lowering the risk factors of cardiovascular disease and diabetes [4-8] protecting against brain disease [6, 7, 9] to reduction and effective treating cancer in human cells [10-12].

Imagine when you stop the overindulgence and rest the digestive system, you allow your liver to remove absorbed and metabolic toxins from the body, repair worn out cells and tissues which in turn leads to a better physical and mental health.

Our bodies know how to heal themselves, we just need to give them the time and opportunity to do so. When we fast (be it only water or liquids), the body starts using the stored fat as a source of energy. In the beginning, our body will naturally get rid of diseased tissues, excess nutrients, and accumulated waste and toxins. This cleansing process creates an environment for the body to begin its healing – it starts to repair and regenerate different organs. Like when you are sick, your appetite decreases, or even for animals, they often lie down and don't eat or drink. Energy goes towards healing our bodies instead of digesting food.

The aim of this article is to review the health benefits of Ramadan fasting by addressing peer reviewed human and animal studies published in international academic journals.

2. Materials and Methods

This article is reviewed 40+ published papers from the period of 1970 up to 2019. The papers were searched from different databases, including PubMed/MEDLINE, Science Direct, PLOSE one, Scopus, Directory of Open Access Journals and the Cochrane Library by using the following key words:- “intermittent fasting”, “Ramadan fasting”, “Ramadan month”, “fasting”, “AND/OR”, “cardiovascular diseases”, “coronary heart diseases”, “diabetics”, “Dyslipidemia”, “HDL”, “LDL”, “cholesterol”, “overweight”, “obesity”, “nervous system”, “neurons”, “metabolic diseases”, “metabolism”, “cancer”, “immunity”, “immune system”.

3. Results and Discussions

3.1. Reduction for the Risk of Cardiovascular Diseases and Diabetics

Globally the burden of CVD increases time to time. Today is responsible for approximately one-third of deaths worldwide, and that figure will surely increase in both developing and developed countries as risk factors for the disease — primarily obesity, dyslipidemia, hypertension, diabetes, physical inactivity, uncontrolled diet, and smoking — continue to increase [13].

Weight loss is associated with an reduction of risk for the

development of cardiovascular disease, hypertension, and non-insulin-dependent diabetes mellitus [14]. Several studies revealed that, the normal weight individuals lose at least one kg after they have fasted in Ramadan month. Weight losses of 1.7 kg [15], 2.0 kg [16], and 3.8 kg [17] have been reported from those studies. It has also been reported that overweight persons lose more weight than normal or underweight subjects [16]. Therefore, intermittent fasting clearly associates with the reduction for the development of cardiovascular diseases and non-insulin dependent diabetic mellitus.

Intermittent Ramadan fasting may be a dietary method to aid in the improvement of the lipid profile in healthy, obese and dyslipidemic men and women by reducing total cholesterol, LDL, triglycerides and increasing HDL levels. However, the majority of studies that analyze the intermittent fasting impacts on the lipid profile and body weight loss are observational based on Ramadan fasting, which lacks large sample and detailed information about diet [18].

In Morocco, the study subjected on 32 health volunteer men entitled “Fasting during Ramadan Induces a Marked Increase in High-Density Lipoprotein Cholesterol and Decrease in Low-Density Lipoprotein Cholesterol” concluded that the feeding behavior that occurs during Ramadan month beneficially affects plasma lipids and lipoproteins. The results of that study showed a significant decrease in serum total cholesterol concentration (7.9%, $p < 0.001$), significant decrease of serum triglyceride concentration (30%, $p < 0.001$) and HDL cholesterol had markedly increased (14.3%, $p < 0.001$) in contrast to LDL cholesterol which showed a significant decrease (11.7%, $p < 0.001$) during Ramadan as compared with the pre-fasting period [19].

Moreover, the Ramadan fasting can effectively change body weight and some biochemical parameters in healthy subjects compared pre-Ramadan period as shown a meta-analysis conducted in 2013. The primary findings of that meta-analysis was that after Ramadan fasting, low-density lipoprotein (LDL), and fasting blood glucose levels were decreased while high-density lipoprotein (HDL) levels were increased compared to the levels prior to Ramadan [20].

Considering with the reduction of hypertension, Ramadan fasting can be an effective non-pharmacological intervention [21, 22]. Ramadan fasting has been reported to have significant reduction for the systolic and diastolic blood pressures [23, 24].

Additionally, the dehydration associated with Islamic fasting could lower the blood pressure, arterial stiffness and ventricular ejection [25, 26].

The review of many literatures on this point concluded that the Ramadan fasting appears to have significant effect on weight loss and LDL cholesterol that could be translated in to significant reductions of cardiovascular diseases, coronary heart disease, myocardial diseases and atherosclerosis [27-32].

Ramadan fasting have significant impact with lowering the incidence of diabetes by decreasing insulin resistance, increasing insulin sensitivity, glucose uptake, decreasing lipolysis, and assisting in weight loss [33, 34].

Insulin resistance is the major cause of diabetes type II, pre-diabetes, and gestational diabetes. Insulin resistance could be reduced by fasting through the reduction of serum leptin levels and elevation of adiponectin levels [35, 36]. Fasting

could also reduce the risk of diabetes indirectly through decreasing lipolysis and the circulating concentrations of free fatty acids [37].

Table 1. Summary of effect of Ramadan fasting on reduction of cardio-vascular diseases and diabetics.

Notable change after fasting	Health outcome	References
Caloric restriction and less intake of food Reduction of serum level of LDLc, total cholesterol and TAG Increasing serum level of HDLc	Improving lipid profile	[14, 18, 19]
Loss of sodium through the dehydration Decreased heart beat Reduction of salt absorption from GIT	Reduces blood pressure	[23-26]
Decreasing insulin resistance Increasing insulin sensitivity Increasing glucose uptake Decreasing lipolysis	Lowers the incidence of diabetic mellitus	[33, 34]

3.2. Improves the Effectiveness of Immune System and Cancer Resistance

Immunity is the resistance of the body to disease. It's the state in which the organism's body have normal physiological defenses to fight infectious diseases or other biological invasion, while having adequate tolerance to avoid allergy and autoimmune diseases. Immunity involves both specific and nonspecific components. The nonspecific components act as barriers of a wide range of pathogens irrespective of their antigenic make-up. Other components of the immune system adapt themselves to each new disease encountered and can generate pathogen-specific immunity [38, 39].

The study conducted in 2013 revealed that Fasting could be a lifestyle strategy to reduce systemic low-grade inflammation and age-related degenerative diseases linked to immune-senescence, without compromising physical performance [40]. Time-restricted feeding including Ramadan fasting, decreases total white blood cells, lymphocytes, and neutrophils allowing the hematopoietic stem cells in the bone marrow to produce new effective cells. So fasting may be effective in preventing inflammation by decreasing natural killer cells.

Some studies reported that fasting can trigger the regeneration of new immune cells and eliminate the old damaged cells [41, 42]. It also prevents accumulation of damaged immune-senescent cells by stimulation and activation of immune stem cells [43].

Elevated levels of pro-inflammatory cytokines may

increase the risk of inflammatory diseases, such as insulin resistance, diabetes, atherosclerosis, and cardiovascular diseases [44].

The pro-inflammatory cytokines IL-1 β , IL-6, and tumor necrosis factor (TNF α) were significantly decreases ($P < .05$) during Ramadan. So RIF attenuates inflammatory status of the body by suppressing pro-inflammatory cytokine expression and decreasing circulating levels of leukocytes, reducing the chances for the development of autoimmune disorders [44].

The levels of complement proteins (C₃ and C₄) in the plasma were significantly increased during fasting period. Due to a significant increase in some components of complement system, it seems that the immune system is strengthened by fasting [45].

Some authors demonstrate the beneficial effect Ramadan fasting on neutrophil phagocytic activity [46]. However other study reported that, there were no significant change phagocytic activity of circulating neutrophils during the Ramadan fasting [47, 48].

Furthermore, it has been reported that fasting depresses delayed type hypersensitivity and potentially prevent many age-related diseases, including autoimmunity, possibly by delaying aging [43, 49].

According to study of Chia-Wei Cheng and colleagues [41] reported, that fasting reduces circulating IGF-1 levels and PKA activity in various cell populations, leading to signal transduction changes in long-term hematopoietic stem cells and niche cells that promote stress resistance, self-renewal, and lineage-balanced regeneration.

Table 2. Summary of effect of Ramadan fasting on improving effectiveness of immune system and cancer resistance.

Notable change after fasting	Health outcome	References
Significant decrease of the pro-inflammatory cytokines IL-1 β , IL-6, and tumor necrosis factor (TNF α)	Reduces inflammation	[44]
Reduction of total white blood cells, lymphocytes, and neutrophils	Stimulate the production of effective cells	[41-43]
Significant increase the levels of complement proteins (C ₃ and C ₄) in the plasma	Strengthened of immune system	[45]
Increases phagocytic activity	Protect cells against DNA damage	[46]
Diminishes cell growth and augmented apoptosis of damaged cells		[50]

In order to resist the occurrence of cancer, the Ramadan fasting protect cells against DNA damage through diminished cell growth and augmented apoptosis of damaged cells [50]. In

addition, Fasting could decrease the incidence of breast cancer possibly through reducing the serum IGF-1 levels [51, 52], which regulates cellular proliferation, growth, and apoptosis.

Prolonged nightly fasting has been reported to decrease the risk of breast cancer recurrence by improving gluco-regulation and sleep patterns [52].

Furthermore, Fasting and chemotherapy can promote the DNA breaks in cancer cells and results in the reduction of chemotherapy-induced complications [53, 54].

4. Conclusion

This review article concluded that, Ramadan fasting significantly reduces the risk for cardio-vascular diseases and diabetics by decreasing body weight, total cholesterol, LDL cholesterol and increasing HDL cholesterol. Fasting improves the health of overweight individuals: insulin sensitivity is increased, BP is decreased, cellular oxidative stress and inflammation are reduced and cellular stress resistance is increased.

It lowers the incidence of diabetes by decreasing insulin resistance, increasing insulin sensitivity, glucose uptake, decreasing lipolysis, and assisting in weight loss. Other hand, Ramadan fasting have beneficial effects of metabolic markers. It also improves the effectiveness of immune system by decreasing pro-inflammatory cytokines, increasing level of complement proteins and phagocytic activity of polymorphs.

5. Recommendation

Research recommendations from this review include the need for more adequately powered, high quality, large scale randomized control trials conducted in different countries with a more heterogeneous mix of participating genders and age ranges.

Based on the recent researches, fasting could be sustained by leading a healthy lifestyle and practicing optional fasting regularly after the holy month of Ramadan twice a week on Mondays and Thursdays.

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