

## One of the Five Pillars of Islam ‘Ramadan Fasting’ and its Effects on Human Health

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### Abstract

Religious rituals are considered among the principle factors that impact dietary behaviors. Fasting is a practice in which a person restrains himself from having food, and it is applied many religions. In Islam, Ramadan fasting is obligatory for the healthy adult but when fasting may significantly affect the health of the fasting individual or when one is genuinely sick, it is exempts him from fasting. In addition to religious or spiritual fasting, aiming to provide healing and based on such fasting modals, the concept of intermittent fasting came into existence. Ramadan fasting may promote insulin sensitivity, which helps the aid of healthy blood pressure, cholesterol levels, a healthier weight, and heart functions, as well as reducing the overall risk of diabetes. It can help lower blood sugar as well as circulating lipid levels such as triglyceride and LDL cholesterol. By promoting healthy guts aids immune and digestive processes. Remarkably, fasting modifies immune systems and improves the symptoms of chronic inflammatory diseases. Apart from the beneficial effects of fasting there are some contraindications which should also be considered along with the physopathological condition of the person including nausea, headache, nutrient imbalance, and weakness. In this study, it was focused and reviewed the social and psychological as well as physical health benefits of fasting during Ramadan.

**Key words:** Ramadan fasting, Intermittent fasting, Human health, Disease, Spirituality

### 1. Introduction

In Islam, fasting during the month of Ramadan is one of the five pillars of faith, and it is an essential practice carried out by adult Muslims all over the world (The Holy Quran; Al-Baqarah:183-185). [1] Every adult Muslim is required to fast from dawn to sunset for a month during Ramadan in the Islamic (Hijri) calendar. Fasting means abstinence from food, drink, sexual activities, and smoking

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from dawn to dusk. Travellers, the sick, the unwell elderly, pregnant women, menstruating, and lactating ladies are exempted from fasting. [2] Apart from the diurnal intermittent fasting of Muslims during the month of Ramadan, fasting is practiced by Christians, Jews, and other people worldwide for religious, spiritual, and health purposes. The timing of daily fasting varies due to the geographic location of the country and the season when Ramadan falls as the lunar calendar moves forward by about 11 days every year, and its periods vary from 11 to 19 h per day. [3, 4] Interestingly, in an 1888 edition of the British Medical Journal, it is mentioned among the health news that there is an increase in the death rate during Ramadan (Figure 1).

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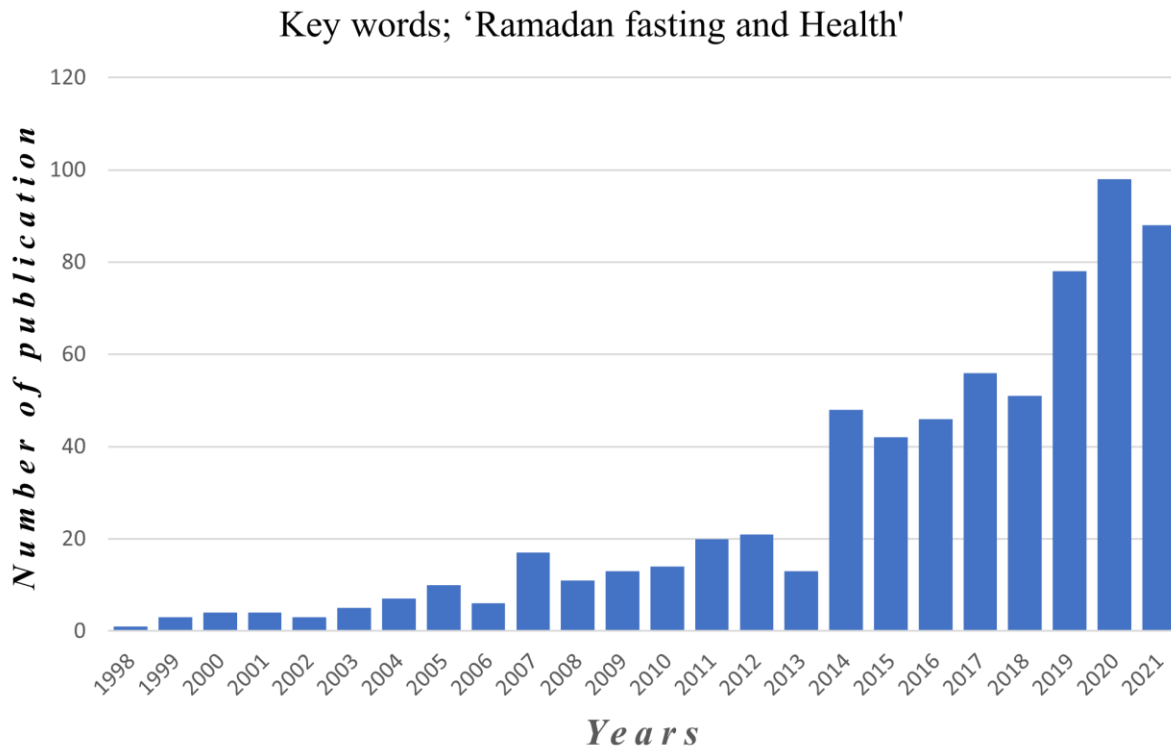
The fast of Ramadan happily ended last Sunday (June 10th), before the great heats which have since set in had commenced. It is really pitiable to see the poor creatures who fast, and yet are obliged to work during a hot season. A conscientious Mussulman --and most of the lower orders are such--will not only not drink anything from sunrise to sunset during a fast, but will not even swallow his spittle should his mouth water from any cause. It is not, therefore, astonishing that in Ramadan the death-rate invariably increases enormously. Fortunately, being a lunar month, it does not always occur in the summer, and is now steadily working its way back every year towards cooler weather. A rich man who can afford to sleep all day, and have his meals at night, may keep Ramadan with impunity, but the poor "fella" who has his daily task to perform must inevitably suffer.

**Figure 1.** A copy of the British medical journal, dated June 1888, page 1409.

Ramadan fasting is a form of "time-restricted feeding", which combines fast and feast periods daily for a duration of one month every year. Fasting has been practiced for centuries not only to fulfill religious obligations but also as therapy and lifestyle. Like Ramadan fasting, there are different intermittent fasting regimens that influence health outcomes. For instance, "Intermittent Fasting", which consists of periods of normal eating and periods of complete fasting is one of the dieting methods that has been gaining popularity over recent years. Moreover, there are also various methods similar to intermittent fasting or a bit different from it, including "Time-restricted feeding", "Alternate-day fasting", and "Alternate-day energy restriction". [4, 5] Fasting therapy, which was started to be used in the USA and then in Germany about 100 years ago, has become a "complementary clinical practice", which is increasingly used together with similar dietary methods in recent years. [4, 6]

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In fact, there are various exemptions to fasting, especially health. However, many Muslim individuals may choose to fast even if they have health problems. Recently, there has been an increased interest in the health implications of Ramadan fasting. [7, ] When the original and review articles indexed in PubMed and Google Scholar are scanned; it has been observed that subjects such as diabetes, hypoglycemia, insulin, insulin resistance, and body composition are frequently discussed in publications. It was also reported that studies on obesity, metabolic syndrome, and type 2 diabetes were more common and remarkable. [4, 8] Today, studies are carried out on issues such as Ramadan fasting and intermittent fasting, not only in developing countries but also in developed western societies. There has been an important and progressive increase in the number of publications on Ramadan fasting and its health effects, especially in the last two decades (Figure 2). [7-9]



**Figure 2.** Graph showing the increasing number of publications in the Pubmed database about 'Ramadan fasting' in the last two decades (Note; 2021 does not include two last months).

This review article aimed to demonstrate an overview of the impact of Ramadan fasting on human health. For this purpose, it was searched by using the terms ‘Ramadan fasting’ and 'health' in the MEDLINE/PubMed and Google Scholar databases. In addition, some articles with the subject of

'Fasting' or 'Intermittent fasting' and dealing with similar topics including nutrition and COVID-19 were also examined in this context. Because not only 'Ramadan fasting' but also 'Intermittent Fasting' have many beneficial influence health outcomes.

## **2. Impact of Ramadan fasting on human health and diseases**

### ***2.1 Metabolic Syndrome and Diabetes Mellitus***

Metabolic syndrome is the medical term for a combination of diabetes, high blood pressure (hypertension) and obesity. The effect of Ramadan fasting on some of the metabolic syndrome markers is still controversial it is understood from available evidence showed positive effect on most of the metabolic syndrome markers. [10] Although most of the positive results seem to be impermanent and some of this variables (symptoms and markers) return to the previous reading after four weeks, Ramadan fasting may be an alternative treatment method in the Metabolic syndrome. [11] For instance, several studies reported that Ramadan fasting may cause reduction in body mass index and some of the blood parameters such as LDL values. [12, 13] Furthermore, studies in rodents support the hypothesis that intermittent fasting improve metabolic profiles of obesity, and reducing by the risks obesity-related conditions including non-alcoholic fatty liver disease, diabetes and cancer. [5] Kiyani et al. reported that Ramadan fasting reduced body weight and had a positive effect on lipid profile and glucose levels. [14] In a cross-sectional study, Yeoh et al. have shown that Ramadan fasting practiced by patients with type 2 diabetes leads to a statistically significant reduction in HbA1c levels, and improves glycaemic control clinically. [15] Moreover, according to a systematic review HbA1c significantly had improved amongst patients who received a Ramadan-focused diabetes education intervention, compared with those receiving conventional care. [16]

### ***2.2 Cardiovascular Diseases***

Ramadan fasting combined with many lifestyle modifications in physical activity, sleep pattern, and circadian rhythmic changes have been shown to incur significant changes in dietary habits and food consumption patterns leading ultimately to significant anthropometric, cardiometabolic,

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glucoregulatory, and inflammatory changes. [4,17] Preclinical studies consistently show the robust disease-modifying efficacy of intermittent fasting in animal models on a wide range of chronic disorders, including obesity, diabetes, cardiovascular disease and cancer. [18,19] Interestingly, intermittent fasting improves multiple indicators of cardiovascular health in animals and humans, including blood pressure; resting heart rate; levels of high-density and low-density lipoprotein (HDL and LDL) cholesterol, triglycerides, glucose, and insulin; and insulin resistance. [20-22] In a previous study, it has been suggested Ramadan fasting is not associated with any change in incidence of acute cardiac illness and the majority of cardiac patients can fast without any difficulty. [23] Whereas in another study, it has been claimed Ramadan fasting may have beneficial effects on endothelial function and can modulate cardiovascular risks. [24] It is also reported that Ramadan intermittent fasting reduces cardiac stress among hypertensive patients controlled by and adherent to hypertensive medication, without affecting their hypertensive state. [25]

### *2.3 Nervous and Immune Systems*

Human and animal studies have shown that diets, especially those that mimic fasting, improve many health indicators, both in healthy people and in people with chronic diseases. Ramadan fasting may contribute to the treatment and prevention of chronic diseases including chronic degenerative and inflammatory diseases [4,26] The benefits of Ramadan fasting also include improvement of mood and body composition-related parameters. In healthy men and women, the benefits of Ramadan fasting have been shown, such as improvement of body composition parameters, mood, fatigue, and health-related quality of life. [27,28] Also according to a new study, it seems the benefits of Ramadan fasting for mood-related symptoms are mediated by different biological mediators, particularly cortisol and brain-derived neurotrophic factor. [29]

Increasingly, there is evidence to support that intermittent fasting is beneficial to human health. It is claimed that like Ramadan fasting the maintenance of an intermittent-fasting regimen, particularly when combined with regular exercise, results in many long-term adaptations that improve mental and physical performance and increase disease resistance. [18] Preclinical studies have shown that dietary restrictions by fasting contribute to the increase of a person's lifespan and slow the development of age-related diseases such as cancer and neurodegenerative and cardiovascular diseases. [30] By the way, during the month of Ramadan, Muslim patients with

depression and fasting were not observed to have an exacerbation of intermittent depressive symptoms, and fasting was associated with a significant loss in body mass and body fat. [31] Fasting has been practiced for millennia, but only recently have studies begun to shed light on its role in adaptive cellular responses that reduce inflammation and oxidative damage, optimize energy metabolism, and increase cellular protection. Levels of oxidative stress and inflammation are reduced throughout the body and brain in response to intermittent fasting. This may lead to positive changes that could improve learning and protect against diseases like Alzheimer's. [4,19] Additionally, of interest is that diurnal intermittent fasting and its model of Ramadan affect immunity by changing the body's response toward infection, inflammation, and oxidative stress. [32] For instance, Ramadan fasting reduces the pathogenicity of *Mycobacterium tuberculosis* by increasing the macrophage number and interferon-gamma secretion in fasting volunteers. [33] According to Patterson et al. intermittent fasting regimens are assumed to influence metabolic regulation via effects on circadian biology, the gut microbiome, and modifiable lifestyle behaviors. [5] Interestingly, Mihaylova et al. showed that short-term fasting promotes intestinal stem and progenitor cell function in young and old mice by inducing robust fatty acid oxidation. They reported that fasting has many effects on the intestines, which include promoting regeneration as well as potential benefits against disease, infection, and cancer. [34] Moreover, considering the presented scientific evidence in a new study report, it is also suggested that fasting makes a positive contribution to the fight against COVID-19 and the recovery process of COVID-19 patients by increasing body health and immune system performance. [35]

#### ***2.4 The Other System Diseases and Undesirable Effects***

Benefits of fasting were also reported in several patient groups such as asthma and allergic patients. Moreover, it even shows promise for improving response to autoimmune diseases such as rheumatoid arthritis and multiple sclerosis. [4,9,19] In addition, there seems no relation between exposure to Ramadan during pregnancy and birth outcomes. On the contrary, it was found that fasting during the second trimester of the pregnancy decreased the risk of gestational diabetes and excessive weight gain during pregnancy. [36] According to another study results too, Ramadan fasting does not adversely affect birth weight. [37] In another recent study, it could not demonstrate an independent adverse effect of Ramadan exposure, either by the number of days exposed, and

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length of fasting period on birthweight or gestational weight gain in the 345 Muslim women with singleton pregnancies. [38]

Apart from the beneficial effects of fasting, there may be some contraindications that should also be considered along with the pathological condition of the person. These contraindications include conditions such as nausea, headache, nutrient imbalance, weakness, etc. along with the impact on the circadian clock and hormonal imbalances. [4,39] Meanwhile, it is known there are various health risks associated with both Ramadan fasting including dehydration, heartburn, high-stress levels, and sleep disorder [26,40]. There are conflicting results between studies regarding the potential risk of dehydration and kidney stone development during Ramadan [41]. Also, there may be some potential complications or risks associated with fasting in patients with diabetes including hypoglycaemia, hyperglycaemia, diabetic ketoacidosis, dehydration, and thrombosis. In this regard, patient education, regular glucose monitoring, and adjustment of treatment regimens are constantly updated to minimize adverse effects in patients with diabetes who want to fast [16,42]. Although Ramadan fasting was found beneficial for patients with Non-alcoholic fatty liver disease, it was found deleterious to patients with cirrhosis and patients with peptic ulcer. [43]

### **3. The Effects of Ramadan Fasting Spiritual and Social Life**

Ramadan is a time of intensive worship and devotion to God, of reading the Qur’an and reflecting on its teachings, of comprehensive thanksgiving, giving to charity, practicing self-control and kindness, of training oneself to be a better person spiritually and improving. During this time, many focus on establishing self-control, and relearning positive life-changing habits. People acquire patience, strong will, and discipline by striving for Ihsaan. Prayer is significant during Ramadan, serving a purpose to sharpen the awareness of and closeness to God, and gives people strength and self-control. According to the masters of Sufism, the spiritual dimension of Islam, not only one’s organs but also one’s thoughts and feelings need to be tightly controlled during this month. [44-46] Ramadan fasting also empowers our spiritual side over our physical tendencies. If we imagine our body as a vessel, such as a ship, our mind, heart, and carnal desires are like hands that are trying to control this vessel. Fasting weakens the effect of the carnal self and strengthens the effects of the mind and the heart on the control of the body (Table 1). [45]

**Table 1.** The spiritual benefits of Ramadan fasting [30,44,45].

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- As a spiritual dimension, fasting during Ramadan is an act of obedience. It leads to sincere thankfulness, which is the heart of worship.
  - Fasting while exalts the soul, weakens the effect of the carnal self, and strengthens the effects of the mind and the heart on the control of the body.
  - Fasting provides an opportunity for reflection, intense worship, and thankfulness.
  - Ramadan fasting is an exercise in willpower, it serves as an aid for spiritual experiences.
  - Thanks to fasting exercising self-control helps people refocus on psychological wellbeing, and what is important to them.
  - Fasting teaches compassion; compassion based on empathy is much stronger and more consistent than compassion based on pity.
  - Fasting teaches the worth of blessing, a person how to economize.
  - Fasting controls worldly desires, protects a person against sins.
  - Fasting teaches patience, endurance, and contentment.
  - Fasting leads to a sense of order and harmony.
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Ramadan fasting has many spiritual benefits. It allows deep introspection and increased awareness of one's relationship with God and others around them, a greater appreciation of blessings, and encourages compassion, care, and charity. [47] Remarkably, in the text seen in Figure 1, it is mentioned two social classes in society as the rich and the poor. As known, during Ramadan, it is traditional for Muslims to collect and donate to charities. Communities come together to donate to local mosques for Allah's sake and good causes. Giving to charity is just as important as fasting. Muslims are obliged to give 2.5% of their assets to charity, (this is known as Zakah) and is another of the five pillars of Islam. [44,48] Ramadhan is also known as the month of selflessness and charity, with more than £100 million estimated to be donated to charity by British Muslims during the month. A report in 2016 revealed Muslim charitable donations at an incredible £38 each second during Ramadhan. [49]

Ramadan fasting increases people's sympathy and compassion for those who have been deprived of their daily means of survival. Although everybody knows, in an abstract sense, that there are people who suffer from hunger and poverty around the world, this knowledge may not be great enough to have an impact on our daily behavior. During the fast of Ramadan, this knowledge is internalized, because we now not only know that there are hungry people, but we have a glimpse



into their experience of hunger. This deeper, internalized knowledge helps us minimize wastefulness and sincerely do our best to help those in need (Table 2). [44,45]

**Table 2.** The social benefits of Ramadan fasting. [44-47].

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- o Thanks to Ramadan fasting develop spiritual, social, and moral values.
  - o In Ramadan month, the poor are paid attention, given charity, and wealthy families and neighborhoods practice hospitality.
  - o As rich people who experience hunger through fasting learn to respect and appreciate the indigent people, a sense of equality is achieved between the rich and poor and established a bridge thanks to zakah.
  - o Ramadan fasting strengthens ties within and between families and contributes to the peace and tranquillity of the community.
  - o Due to living in a consumer society, another important benefit of fasting is that it can help us in our struggle against dependencies.
  - o Ramadan fasting ensures the unity and harmony of society.
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#### **4. Discussion and Conclusion**

This study focused on and reviewed the social, psychological, and physical health benefits of fasting during Ramadan. Thanks to Ramadan fasting, every Muslim becomes aware of the blessings it has by obeying mental and physical discipline and focuses on learning to be thankful for what it has by thinking about them. Ramadan is a time when Muslims should reflect to develop their character for the better. In a way, they are presented with the opportunity to start new commitments, much like New Year's resolutions, e.g., thanks to fasting, smokers get the opportunity to get rid of this habit, which is very harmful to health. Indeed, the Ramadan fasting model in the UK has been used by health departments to reduce cigarette smoking. [47,50] Briefly, Ramadan fasting reduces low-density lipoprotein and cholesterol levels and improves weight and glycemic control. It could also regenerate the entire immune system by ‘flipping a regenerative switch’ according to several recent studies. [9,35] According to Dr. Mughal, Ramadan is a month held important by the Muslim population, and acknowledging this, valuing diversity, understanding patients’ concerns, and striving to provide support regardless of an individual’s

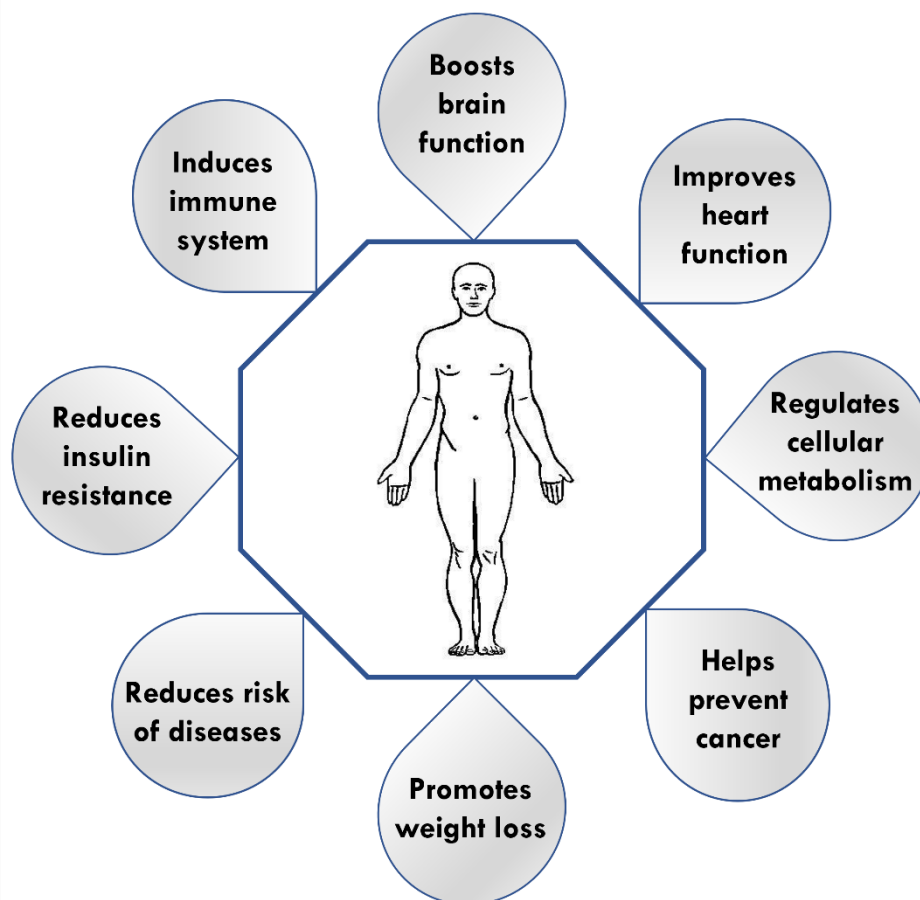
decision, will further improve care in general practice. [50] By the way, most research groups are based in Muslim-majority developing countries, and Ramadan fasting seems to be at the center of their academic interest. However, due to the size of the 1.8 billion Muslim population and its distribution around the world, studies are also carried out in developed western societies on issues such as Ramadan fasting and intermittent fasting. Briefly, research-based molecular and clinical studies on Ramadan and other fasting methods agree that fasting has positive effects on human health (Table 3, Figure 3). [4,9,51]

**Table 3.** The beneficial effects of fasting on the systems/organs in human body (4,5,26,51).

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Brain	Enhanced neurogenesis - Enhanced cognitive function and network plasticity - Increased neurotrophic factors - Reduced oxidative stress - Reduced inflammation - Promote neuronal stress resistance - Enhanced autophagy
Heart	Increased heart rate variability - Reduced resting heart rate - Decreased blood pressure - Increased parasympathetic tone - Increased stress resistance
Liver	Increased insulin sensitivity, glycogenolysis, and ketone body production - Decreased IGF-1 levels
Muscles	Enhanced anabolism - Increased insulin sensitivity - Increased stress resistance - Enhanced autophagy
Fat tissue	Increased lipolysis - Increased adiponectin - Reduced leptin - Reduced inflammation and oxidative stress
Intestines	Enhanced intestinal regeneration - Reduced energy uptake - Reduced inflammation - Reduced cell proliferation - Increased stem cell number and activity
Circulating blood	Decreased glucose, insulin, leptin, total and LDL cholesterol, inflammation markers such as CRP, TNF- $\alpha$ , and IL-6, oxidative stress markers, and IGF-1 - Increased 3-hydroxybutyrate, adiponectin and ghrelin

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**Figure 3.** A summary of the main useful effects of fasting in the body (4, 51).

In addition, fasting as a religion there has been in Islam, Christianity, Judaism, and Buddhism, and it has been using in many cultures worldwide to treat illnesses. Many of the greatest doctors of ancient times, and many of the oldest healing systems, have used fasting in the healing and prevention of disease. It can be said there is not any culture that hasn't used fasting for either physical and/or spiritual healing. Ramadan is the holiest month in Islamic tradition, a time to train for self-discipline and for inner reflection but when utilized to eat right and healthy food, the holy month of fasting also comes with tangible health benefits. Consequently, Ramadan fasting has many effects on health and disease. Nevertheless, it can be said due to unknown research gaps in Ramadan fasting studies, it needs to be comprehensive studies about some issues such as heart and kidney diseases.

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