

# The Effects of the Ramadan Fasting on Metabolic and Immunological Disorders

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Ramadan is the the ninth month of the Islamic calendar and is observed by believers as a period of fasting. All Muslim adults are expected to restrain from consuming food and drinking; nevertheless, there are exemptions for pregnant or lactating women or those with severe chronic disease or acute illness in which fasting may aggravate their condition.

Ramadan fasting has been shown to exert an impact on body systems and functions in different ways, sometimes with conflicting findings. As such, there is a dearth of clinical guidelines, expert opinions, or consensus statements that could assist physicians in their decision-making process in advising patients willing to fast during the month of Ramadan. In this editorial I briefly overviewed some of the research that summarizes the impact of the Ramadan fasting on several metabolic conditions such as fatty liver, diabetes mellitus, and immunological disorders.

There are few investigations exploring the role of Ramadan on body composition or clinical and laboratory markers of metabolic and immunological impairments, especially in fasting patients who reside in hot climates.

Al-Barha and colleagues [1] observed that Ramadan fasting may not have a significant impact on body composition, other anthropometric indexes, and biomarkers typical of the metabolic syndrome in a sample of healthy adult men,

even though the fasting could lead to a decrease in low-density lipoprotein cholesterol (LDL-C). However, the extent of such a decrease could depend on the habitual lifestyle of the individual. The authors noted that the effects of Ramadan were temporary.

Nachvak and co-authors [2] recruited a sample of 160 healthy men and collected information on several parameters, including fasting blood sugar (FBS), lipid profile, and insulin levels. The authors observed that the impact of Ramadan was subtle and complex, with the fasting exerting both beneficial and detrimental effects on human health, resulting, in decreases in FBS, body weight, body mass index (BMI), and body fat percentage. The effect led to an increase in LDL-C and insulin resistance. However, these effects were all transient, returning to basal pre-Ramadan status shortly afterward.

In one of the largest studies of its kind, Bener et al. [3] showed that fasting during the month of Ramadan had a beneficial impact on type 2 diabetes mellitus patients by decreasing blood pressure, blood glucose, glycated hemoglobin (HbA1C), and BMI, in addition to improving lifestyle (sleep hygiene and duration as well as physical activity levels). These findings suggest the possibility of exploiting Ramadan as an opportunity for managing and treating diabetic patients.

Non-alcoholic fatty liver disease (NAFLD) represents an emerging, important public health condition, together with diabetes. The effects of Ramadan fasting on some metabolic conditions, including NAFLD, have been previously assessed in a few studies. In an investi-

gation aimed at quantitatively exploring the impact of Ramadan on non-alcoholic steatohepatitis (NASH) severity scores, Mari and colleagues [4] found that the Ramadan fasting was able to improve various inflammatory biomarkers, as well as insulin sensitivity, and non-invasive measures for NASH severity.

Ebrahimi et al. [5] documented that the Ramadan fasting could improve liver steatosis in patients with NAFLD, suggesting the feasibility of using a chrono-nutritional strategy in the management of NAFLD and related conditions. The authors reported a significant decrease in the total cholesterol, Visceral Adiposity Index (VAI) and Atherogenic Index of Plasma (AIP) after the fasting, even though only the decrease in the first parameter was significant in the fasting group versus the control group. Moreover, liver enzymes levels and the severity of hepatic steatosis were significantly improved in NAFLD patients.

Aliasghari et al. [6] found statistically significant effects of Ramadan fasting on anthropometric indexes as well as on an array of laboratory parameters like fasting glucose, plasma insulin, and pro-inflammatory cytokines in patients with NAFLD. All these variables were reported to improve.

Based on the available scholarly literature, Ramadan fasting finely tunes and modulates the human immune system, even though the precise magnitude and direction of the induced changes warrant further research [7]. Ramadan fasting affects several physiological systems involved in the response to infectious agents, stressors, and other harmful events.

A recent systematic review of the literature found that Ramadan fasting

- Has a generally mild and transitory impact on immunity
- Does not usually result in negative maternal or fetal outcomes
- Improves lipid profile and oxidation status in patients suffering from cardiovascular disease
- Proves safe in patients with asthma, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), and autoimmune diseases
- May raise some immunological biomarkers in patients with schizophrenia and other psychiatric disorders
- Shows fluctuations and oscillations in a series of immunological parameters have been observed also in athletes maintaining intensive training loads.

In this issue of the *Israel Medical Association Journal (IMAJ)*, Zaina and colleagues [8] discussed the impact on Ramadan fasting during the COVID-19 pandemic among patients with type 2 diabetes mellitus. They concluded that patients with diabetes who fast should be evaluated by healthcare professionals during the pre-Ramadan period to encourage safer fasting. COVID-19 infec-

tion should be considered during patient risk stratification before fasting. -ased therapy represents a favorable modality of treatment for patients who intend to fast Ramadan in particular during the COVID-19 pandemic. Despite the cardiorenal beneficial effects of sodium glucose cotransporter 2 inhibitors, treatment discontinuation is recommended for patients with severe COVID-19 due to increased tendency for diabetic ketoacidosis and euglycemic diabetic ketoacidosis.

### CONCLUSIONS

Despite the increasing body of scholarly investigations, further high-quality studies are urgently needed to assess the impact of Ramadan fasting on different populations and (sub-) groups, especially those with special conditions and disorders. Ramadan 2021 can be an excellent opportunity to shed light on the complex mechanisms underlying the effects of fasting on human health and functions.

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### Capsule

## Thrombotic thrombocytopenia after ChAdOx1 nCov-19 vaccination

**Greinacher** and colleagues assessed the clinical and laboratory features of 11 patients in Germany and Austria in whom thrombosis or thrombocytopenia had developed after vaccination with ChAdOx1 nCov-19. Of the 11 original patients, 9 were women, with a median age of 36 years (range 22–49). Beginning 5 to 16 days after vaccination, the patients presented with one or more thrombotic events, with the exception of one patient who presented with fatal intracranial hemorrhage. Of the patients with one or more thrombotic events, 9 had cerebral venous thrombosis, 3 had splanchnic-vein thrombosis, 3 had pulmonary embolism, and 4 had other thromboses. Of these patients, 6 died. Five patients had disseminated intravascular coagulation. None of the patients had received heparin before symptom

onset. All 28 patients who tested positive for antibodies against PF4–heparin tested positive on the platelet-activation assay in the presence of PF4 independent of heparin. Platelet activation was inhibited by high levels of heparin, Fc receptor-blocking monoclonal antibody, and immune globulin (10 mg/ml). Additional studies with PF4 or PF4-heparin affinity purified antibodies in 2 patients confirmed PF4-dependent platelet activation. Vaccination with ChAdOx1 nCov-19 can result in the rare development of immune thrombotic thrombocytopenia mediated by platelet-activating antibodies against PF4, which clinically mimics autoimmune heparin-induced thrombocytopenia.

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