

# Effects of Ramadan Fasting on Oxidative Stress and Pro-Oxidant-Antioxidant Balance

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## ABSTRACT

**Introduction:** Ramadan is a holy month in the Islamic calendar during which people abstain from eating, drinking, and smoking from dawn to sunset. This study was conducted to investigate the effects of Ramadan fasting on oxidative stress.

**Methods:** Overall, 23 individuals (16 males and 7 females), within the age range of 25-65 years, participated in this study. One week before Ramadan, 10 cc venous blood samples were drawn after 8-10 hours of fasting; the same procedure was undertaken at the end of Ramadan (27<sup>th</sup> day). Some portions of serum samples were used immediately to measure pro-oxidant-antioxidant balance.

**Results:** The results did not show any significant change in oxidative stress level. Moreover, gender did not have any significant relationship with changes in oxidative stress level. However, oxidative stress significantly increased in fasting patients with coronary artery disease.

**Conclusion:** It seems that Ramadan fasting does not have a significant effect on oxidative and pro-oxidant-antioxidant balance; however, further studies are required in this area.

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## Introduction

Ramadan is a holy month in the Islamic calendar during which people abstain from eating, drinking, and smoking from dawn to sunset. The duration of this lunar month varies between 29 and 30 days (1). The exact date of Ramadan changes every year as Islam uses a lunar calendar; it should be mentioned that the lunar months are shorter than the solar months used elsewhere.

Fasting duration is not fixed and the month in which it falls varies based on the season and geographical location (fasting duration varies from 12 to 19 hours per day) (2). During Ramadan, food contents and eating habits change which might be due to the consumption of more carbohydrates and sweet foods, served mainly in form of two large meals at dawn and sunset (3).

Oxidative stress signals an imbalance between the systemic manifestation of reactive oxygen species and biological system's ability to detoxify the reactive intermediates or to

repair the subsequent damages. Disorders in the normal redox state of cells can bring about toxic effects through the production of peroxides and free radicals, damaging all cell components including proteins, lipids, and DNA. Oxidative stress originating from oxidative metabolism results in base damage, as well as strand breaks in DNA. Base damage is mostly indirect and is caused by generated reactive oxygen species, e.g., superoxide radicals, hydroxyl radicals, and hydrogen peroxides (4).

Given the significant role of oxidative stress and balance between oxidant and anti-oxidant agents in public health, especially fasting individuals, this study was carried out to investigate the effects of Ramadan fasting on oxidative stress.

## Material and methods

Overall, 23 individuals (16 males and 7 females), aged between 25 and 65 years, were recruited in this study. All the participants were

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trained for leading a healthy life, based on their routine clinical and laboratory checkups. Medications, antioxidant agents, or supplements (e.g., herbal, mineral and vitamin supplements) were not used by any of the participants. None of the subjects consumed alcohol or cigarettes on a regular basis.

One week before Ramadan, 10 cc venous blood samples were drawn after 8-10 hours of fasting; the same procedure was undertaken at the end of Ramadan (27<sup>th</sup> day). Some portions of the serum samples were used immediately to measure pro-oxidant-antioxidant balance (PAB). A modified PAB assay was applied based on the this method (5).

### Ethical considerations

The aims and methods of the study were explained to the participants and consequently, consent forms were obtained from the participants before being enrolled in the study. Moreover, the study protocol was approved by the Ethics Committee of Research of Mashhad University of Medical Sciences, Mashhad, Iran.

### Statistical analysis

Analyses of the collected data were performed, using SPSS version 22. Paired t-test was performed to compare the obtained data before and after Ramadan. Moreover, non-paired test was used to compare control and patient groups. P value less than 0.05 was considered significant.

### Results

The control group was compared with patients with coronary artery disease (CAD), who participated in a study by Nematy and colleagues (6). As presented in Table 1, changes in oxidative stress were not significant in the control group. Besides, these changes were not significant in neither of genders. However, according to Table 2, oxidative stress significantly escalated in patients with CAD during Ramadan fasting.

### Discussion

The primary finding of this study was the insignificant effect of Ramadan fasting on oxidative stress. The results of this study were in line with the findings reported by some previous studies (7, 8). In regard with numerous variables in studies on fasting (e.g., gender,

geographical location, fasting duration, disparate diets in different countries, sundry physical activity levels, differences in climate, variations in the season in which Ramadan falls, and health status of the subjects), contradictory results were obtained in different studies. For instance, a number of studies noted that Ramadan fasting ameliorated oxidative stress and pro-oxidant-antioxidant balance (9, 10), whereas some others reported the detrimental effects of fasting on these variables (11). Given the significant effect of fasting on public health in Islamic countries, it is highly recommended to perform further studies in different areas in order to reach comprehensive and reasonable conclusions regarding this issue.

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**Table 1.** Oxidative stress in the control group during Ramadan

		Before Ramadan (%H <sub>2</sub> O <sub>2</sub> (HK)) Mean±SE	After Ramadan (%H <sub>2</sub> O <sub>2</sub> (HK)) Mean±SE	P-value
PAB	Control cases	80.636 + 4.849	80.065+3.678	N.S.*
	Control (female)	98.635+9.924	96.213+5.453	N.S.
	Control (male)	80.636+4.849	74.572+5.203	N.S.

\*Not significant

**Table 2.** Oxidative stress in patients with CAD during Ramadan

	Before Ramadan (%H <sub>2</sub> O <sub>2</sub> (HK)) Mean±SE	After Ramadan (%H <sub>2</sub> O <sub>2</sub> (HK)) Mean±SE	P-value
PAB	32.331+3.12	55.821+7.70	P< 0.01

and pro-oxidant-antioxidant balance (9, 10), whereas some others reported the detrimental effects of fasting on these variables (11). Given the significant effect of fasting on public health

in Islamic countries, it is highly recommended to perform further studies in different areas in order to reach comprehensive and reasonable conclusions regarding this issue.

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