

The Impact of Ramadan Fasting on Acute Coronary Disease Events among Iraqi Population

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Abstract

Background: Ramadan fasting is a common religious tradition practiced by several prominent faiths in the world. It is also currently regaining interest as a medical practice, both as preventive and as therapy and/or simple choice of lifestyle. Fasting brings about some changes in life style, diet, and sleeping patterns, which raises major concerns for cardiac patients. Thus, the role of Ramadan fasting in acute coronary events could be pivotal for cardiac patients. The association of fasting with acute myocardial infarction (AMI) remains to be further clarified. **Objectives:** The major aim of this study was to determine the prevalence of AMI and its associated risk factors among Iraqi patients during Ramadan (DR) and non-Ramadan months. **Materials and Methods:** A total of 154 AMI patients admitted to the Surgical Specialty Hospital–Cardiac Center, Erbil city were enrolled a month before Ramadan and DR in 2019. The serum levels of lipid profile parameters were analysed using enzymatic immunoassay analyzer. The HbA1c was measured using a fully automated glycohemoglobin analyzer. **Results:** The incidence of AMI was statistically significantly lower among fasted patients (29%) as compared to non-fasting patients (71%) ($P < 0.05$). Low-density lipoprotein-cholesterol and triglycerides statistically significantly decreased in fasted AMI patients (15.6% and 22.2%, $P < 0.05$) compared to nonfasting patients (31.2% and 58.7%), but not with high-density lipoprotein-cholesterol and total cholesterol. No statistically significant changes were found in hypertension and diabetes between fasted and nonfasted patients with AMI ($P > 0.05$). **Conclusion:** Ramadan fasting has a preventive effect, and it does not increase the risks of acute coronary events in Iraqi patients.

Keywords: Acute myocardial infarction, Ramadan fasting, risk factors

INTRODUCTION

Coronary artery disease (CAD) has become the most prevalent serious global burden of morbidity and mortality.^[1] According to the Third Report by the World Health Organization, 12 million people die annually of CVD worldwide, and it is estimated that by 2025, cardiovascular mortality on worldwide scale will likely surpass that of every major disease group, including infection, cancer, and trauma.^[2] Similarly, low- and middle-income countries have witnessed an alarming increase in the rates of CVD during the 20th century, and this rapid change represents a major cause of 80% of global deaths.^[3] CAD is estimated to increase more dramatically in the next decade than any other global regions.^[4] The most evident manifestation of CAD is the acute myocardial infarction (AMI). AMI is attributed to rupture atherosclerotic plaques and lead to thrombosis and decreasing blood flow in the coronary.^[5] In Iraq, the epidemiological data on the incidence

and prevalence of CAD as evidence of awareness are limited due to the unavailability of evidence-based national guidelines for the management of cardiovascular disease and surveillance studies as compared to other Eastern Mediterranean countries. In a recent study in 2014, cardiovascular disease mortality was estimated to account for 33% in Iraq.^[6] Fasting during ramadan (DR) essentially brings about some changes in life style, diet, and sleeping patterns, which raises major concerns particularly for patients having cardiovascular diseases. Fasting is currently regaining interest as a medical practice, both as

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preventive and as therapy and/or simple choice of lifestyle. Until recently, the association of fasting with CAD events is elusive. The relation of fasting with coronary events remains to be further clarified.

The major aim of this study was to investigate the effect of fasting DR on the incidence of AMI and determine changes of cardiovascular risk factors among Iraqi patients in comparison to non-Ramadan months.

MATERIALS AND METHODS

Study design

We prospectively studied consecutive patients with AMI admitted to the Causality Unit of Surgical Specialty hospital – Cardiac Center in Erbil city, a month before and during the month of Ramadan in the year of 2019. The study was approved by the hospital's review board, and informed consent was obtained from all AMI patients. Diagnostic criteria of acute myocardial infarction were followed according to the guidelines of the European Society of Cardiology, such as when the patient is presented with typical chest pain, diagnostic electrocardiogram changes, and a significant elevation of cardiac enzymes. Baseline clinical characteristics including age, gender, and laboratory analysis were recorded. Exclusion criteria for patients and controls included pregnancy, anemia, and kidney failure. All patient case data were filled in a standard questionnaire including their personal histories, major risk factors, and history of ischemic heart disease, and patients provided blood samples for laboratory analysis.

Laboratory analysis

Blood samples were collected from each of the AMI patient DR and non-Ramadan month. The blood sample was transferred into ethylenediamine tetraacetic acid tubes and centrifuged immediately at 4000 ×g for 10 min. The serum was separated and immediately stored at -20°C until further analysis. All serum samples were analyzed by using Cobas c311 analyzer at the admission of the patient presented with AMI to measure the levels of lipid profile parameters, including total cholesterol (TC), high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-cholesterol (LDL-C), and triglycerides (TG). We defined high serum levels as TC ≥200 mg/dL, LDL-C ≥200 mg/dL, and TG ≥130 mg/dL; low serum HDL was defined as ≤35 mg/dL. Moreover, HbA1c was measured using a fully automated glycohemoglobin analyzer.

Statistical analysis of data

Data of this study were analyzed using the Statistical Package for Social Sciences version 19 (SPSS, IBM Company, Chicago, IL 60606, USA). The data were reported as mean ± standard deviation, and the incidence was expressed as percentage (%). Differences in variables were tested using Student's *t*-tests to ensure the significant difference between mean values of two continuous variables and were confirmed by nonparametric Mann–Whitney U-test. Fisher's exact and Chi-square tests were performed to test for difference in proportions of

categorical variables between two and more groups. The paired *t*-test was used to compare biochemical variables before and DR month. $P \leq 0.05$ was considered statistically significant.

RESULTS

We focused in this study on two major aspects to determine whether Ramadan fasting had any adverse influence effect on the incidence rate of AMI among Iraqi population:

Incidence of acute myocardial infarction in Ramadan and non-Ramadan months

First, we evaluated the hospitalization of patients with AMI for 1 before Ramadan (BR) and DR holly month in the year of 2019. A total of 154 patients presented with AMI were studied over a period of 2 months; a month before (BR) and DR in 2019. DR month, 79 patients with AMI were admitted to casualty department, Surgical Specialty Hospital, Cardiac Center, in Erbil city, and 74 patients with AMI were admitted in BR month. No statistically significant difference was observed in these periods in the incidence of AMI ($P > 0.05$) Table 1. describes the AMI patient characteristics and prevalence of most frequent cardiovascular risk factors before and DR month. The age distribution of patients with AMI was not statistically significantly different between the BF and DR groups (56 ± 12.8 and 58 ± 8.2 years, respectively, $P > 0.05$).

Significant differences were found between the two groups in relation to gender of AMI patients (male 68.0% and 69.6%, female 32.0% and 32.4%, respectively, $P < 0.05$). The frequency of hypertension (73.3% and 60.9%), hyperlipidemia (49.3% and 46.8%), and diabetes mellitus (27.0% and 43.5%) was not significant between the period before and DR ($P > 0.05$). However, statistically significant differences were observed in the incidence of AMI in relation to smoking habit between the two periods ($P > 0.05$). The incidence of AMI in smoking patients BR (57.0%) was higher comparing to DR month (48.0%).

It is important to note that these findings do not directly assess whether the patient did fast or not DR month, but rather relied

Table 1: Basic clinical characteristics and incidence of cardiovascular risk factors in patients with acute myocardial infarction before and during Ramadan in this study

Variables	Before Ramadan, <i>n</i> (%)	During Ramadan, <i>n</i> (%)	<i>P</i>
Gender			
Female	24 (32.0)	24 (30.4)	<0.05
Male	51 (68.0)	55 (69.6)	<0.05
Age (years)			
<50	19 (25.3)	3 (3.8)	>0.05
>50	55 (73.3)	20 (25.3)	>0.05
Hyperlipidemia	50 (66.7)	17 (21.5)	>0.05
Diabetes mellitus	23 (30.7)	34 (43.0)	>0.05
Hypertension	55 (73.3)	48 (60.8)	>0.05
Smoking	36 (48.0)	45 (57.0)	<0.05

on the cultural norm of our society that most patients would have fasted. This could be a limitation since the effect of fasting on AMI was not measured but estimated.

Effects of Ramadan fasting on the incidence of acute myocardial infarction and cardiovascular risk

The second part of our study was devoted to compare the incidence and changes in the cardiovascular risk fact between fasted AMI patients and non-fasted patients. Our results found that the incidence of AMI among fasted patients (29.0%) was lower as compared to that in nonfasted patients (71.0%), as shown in Figure 1.

Moreover, the proportion of fasted and not fasted patients with AMI in relation to cardiovascular risk factors including diabetes mellitus, hypertension, hyperlipidemia, and smoking risk factors is shown in Figure 2. No significant differences in the frequency of AMI were observed between fasted and nonfasted patients in relation to diabetes (46.7% and 31.2%, respectively, $P > 0.05$) and hypertension risk factor (69.2% and 66.1%, respectively, $P > 0.05$).

Higher prevalence rate of AMI was observed in non-fasted smoker patients (58.4%) as compared to faster smokers (38.5%). This difference was statistically significant ($P < 0.05$). This suggests that cessation of smoking is of upmost importance to prevent acute coronary events. The prevalence of hyperlipidemia was lower in fasted AMI patients (22.2%) compared to nonfasted patients (58.7%) and this difference was significant ($P < 0.05$).

Moreover, while no statistical significant changes were seen in the mean level of TC (173.0 ± 28.9 , 204.2 ± 160.7), TG (147.6 ± 125.7 , 185.4 ± 124.3), and HDL-C (39.4 ± 7.9 , 37.7 ± 9.7) in fasted AMI patients was observed as compared to non-fasted, findings of this study showed significant change in the mean level of LDL-C (113.3 ± 25.7 , 131.7 ± 43.7) and smoking in fasted AMI patients compared to nonfasted patients.

DISCUSSION

Fasting DR as one of the five major pillars of Islam includes similar instructions for Muslims of any nationality and ethnicity all over the world. The findings of this study demonstrate that Ramadan fasting does not increase the risk of coronary artery events among Iraqi population, and there was no significant

differences in the number of hospitalization for AMI while fasting DR when compared to non-Ramadan month. Our results were consistent with some recent studies,^[7,8] which reported no significant changes regarding incidence of cardiovascular events in cardiac patients DR compared to non-Ramadan months. Similarly, another study from Turkey based on 815 AMI cases admitted to their hospital during a 5-year period reported that there was no significant difference in the frequency of AMI between the Ramadan month and other months.^[9] Another large-population study conducted in Egypt reported no difference between the AMI rates in the Ramadan and the month previous to Ramadan.^[10] In a study that compared stroke hospitalizations across the month BR, Ramadan month, and the month after Ramadan, Comoglu *et al.*^[11] from Turkey reported no significant changes in ischemic as well as hemorrhagic strokes in those months. Similar results were observed in a study in Qatar by Al Suwaidi *et al.*,^[12] in which there was no significant difference in the incidence of stroke 1 month before, during, and 1 month after Ramadan. Retrospectively reviewing a 13-year stroke database on 335 Muslim patients, Bener *et al.* reported that there was no difference in the incidence of stroke in the month before, during, and 1 month after Ramadan. The authors also estimated the incidence of stroke for the remaining 9 months of the year and found no difference in the occurrence of stroke in the Ramadan-related months.

Of noteworthy, a study by Al Suwaidi *et al.*^[13] showed the effect of Ramadan fasting on patients with coronary artery events to be protective with regard to the incidence of acute coronary events. However, in a large population-based study, it was reported that patients with a previous AMI were found to be more likely to be hospitalized for heart failure DR month compared to non-Ramadan months.^[14] Another study by Mousavi *et al.*^[15] reported no significant effect of Ramadan fasting on the clinical characteristics or precipitation of coronary artery events. Findings of these studies suggest that though no significant change in AMI incidence DR was found, precautions have to be taken particularly by patients with previous heart failure to minimize the risk of recurrence DR due to strict and prolonged fasting conditions, and possible change in eating habits.

Effects of fasting on lipid profile parameters DR are controversy. While a recent observation^[16] reported amelioration of HDL

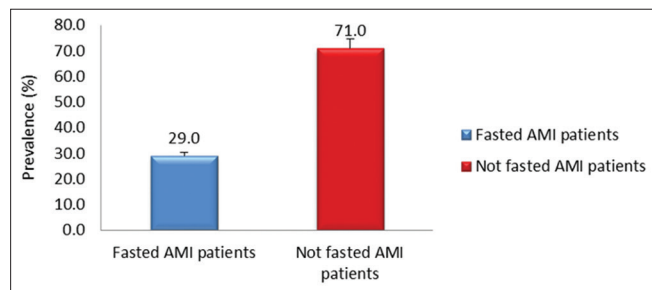


Figure 1: Prevalence of acute myocardial infarction among fasted and non-fasted patients in this study

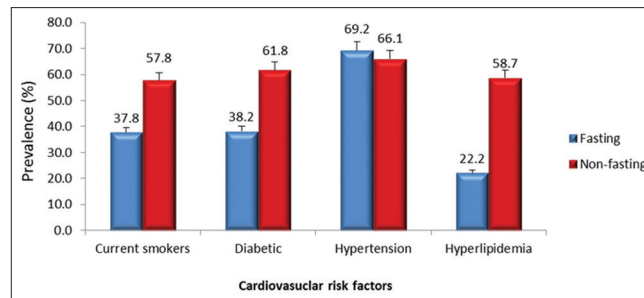


Figure 2: Prevalence of cardiovascular risk factors in fasted and non-fasted patients in this study

levels during fasting in patients with coronary heart disease history, another study^[17] showed a decrease in HDL level and increase in LDL level DR fasting. Furthermore, no significant changes in the level of TC in cardiovascular patients were observed during fasting. In our study, no significant changes were observed in the HDL level. Although there was a trend toward a decrease in the levels of LDL, TC, and TG in fasted AMI patients compared to nonfasted patients, this was not statistically significant. Hypertension is a well-recognized cardiovascular risk factor for acute coronary events. It is important to note the effects of fasting on hypertension in cardiac patients. Previous studies observed a trend toward decrease in blood pressure during fasting.^[18] Regarding serum glucose level, until recently, no study reported a significant change DR fasting compared to non-fasting month in cardiac patients.^[19] We also found similar trend in this study.

CONCLUSION

Taken together, this study concludes that there are no significant differences in the incidence of AMI and changes in cardiovascular risk factors DR and non-Ramadan month in Iraqi population. To the best of our knowledge, this is a first small population-based study investigated the effect of Ramadan fasting on incidence of acute coronary events and its risk factors. This study can be expanded to a large-sample size population of patients with AMI for longer periods of time to bring higher statistical reliability and generalizability regarding any adverse effects Ramadan fasting could have on health of patients with AMI and should take some precautions.

Ethical consideration

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients verbal and analytical approval before sample was taken. The study protocol and the subject information and consent form were reviewed and approved by a local ethics committee.

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Conflicts of interest

There are no conflicts of interest.

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