

## Effects of Ramadan Fasting on Ischemic Heart Disease (IHD) A Prospective Observational study

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### ABSTRACT

#### Background:

Most previous studies documented a beneficial effect for Ramadan fasting in patients with cardiovascular disease. However, majority of these studies concerned with the risk factors and some have conflicting findings. On the other hand, few studies investigated the effect of Ramadan fasting on the ischemic heart diseases (IHD).

**Objective:** This study assesses the effects of fasting on the admission rate due to ischemic heart disease.

**Patients and Methods:** For this prospective study, a questionnaire was prepared to ask the admitted patients in Sulaymaniyah Cardiac Center and Shar Hospital during Ramadan of 2022 in Sulaymaniyah, Iraq, due to ischemic heart disease. In total, 137 patients (94 males and 43 females) participated in this study. Their diagnosis of ischemic heart disease was performed based on either the old result of cardiac catheterization or C-T coronary angiography.

**Results:** It is observed the average age of the patients was 60.64 years varying between 27 years to 90 years old. It is found that fasting during Ramadan may cause more admission to hospitals due to ischemic heart disease in Sulaymaniyah, Kurdistan Region of Iraq as from the 107 patients who were not admitted before, 63% ( $P=0.00002$ , z-test) (67 patients) were fasting during their admission while only 37% (40 patients) of them were not fasting.

**Conclusion:** It is deduced that fasting during Ramadan can cause an increase in hospital admission of patients due to ischemic heart disease.

**Keywords:** Angiocardiology, Electrocardiography, Heart disease

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## 1. INTRODUCTION

Most non-communicable disease deaths worldwide are attributed to cardiovascular diseases as more than 17 million people die annually because of them. In Iraq, the leading cause of illness-related mortality is cardiovascular disease (1). The prevalence of these diseases increases over time as in Iraq only the rate of patients with Ischemic Heart Disease (IHD) increased from 0.63% to 0.82% in 14 years between 2000 to 2014 (2). Several cardiovascular risk factors contribute to this increase rate such as an increase in hypertension, diabetes, etc. However, the effects of fasting on that increase rate of IHD are still unknown even though most Muslims practice fasting during Ramadan. The fasting duration varies depending on the locality between 12 to 20 hours a day. Ceasing to eat and drink for that period of time has impacts on taking medicines, smoking, sleeping, and exercise routines. Thus, it is evident that alterations in lifestyle may have major effects on the cardiovascular system. Most of the researchers investigated only the relationship between fasting and cardiovascular risk factors such as hypertension while others studied the effects of fasting on heart failure (3). Many researchers found that fasting is beneficial for patients with cardiovascular disease (4–6) . While other researchers only suggested that it is safe to observe fasting while the patients suffer from cardiovascular disease (7,8). Some scholars had only recommendations for patients with cardiovascular disease who like to practice fasting (9–11). However, there is rarely a research study on the effects of fasting on IHD. Therefore, his research study was designed to fill this gap in the literature. Also, it is necessary to investigate the effects of fasting on IHD in a Muslim community as 97 % of the 38.9 million Iraqis are Muslim and most of the Muslim population observe Ramadan fasting during Ramadan (12). Yet, for some patients who are diagnosed with IHD, the decision to fast or not is fraught with controversy. To clear out the doubt to a certain degree this research study is designed to investigate the effects of fasting on the admission rate of patients with IHD.

## 2. METHODOLOGY

The study is a prospective observational study in Sulaymaneyah, Iraq. In total, 137 patients diagnosed with IHD were admitted to Sulaymaniyah Cardiac Center and Shar Hospital during Ramadan of 2022. Based on a questionnaire, they were asked whether, they had ischemic heart disease in the past three months while they were not fasting. From those 137 patients, the fasting patients fasted for more than 15 hours a day at that time of Ramadan. These cases were selected out of a larger group filtering only the patient who were diagnosed with IHD, therefore, all the patients with acute hear failure and other heart disease were excluded in the study. Therefore, all the patients who were admitted due to IHD were included in the study and the rest of the patients were excluded. The inclusion of IHD patients in the study was regardless of other factors that might affect the IHD admission such as diabetes. The diagnosis of the ischemic heart disease was performed based on either old result of cardiac catheterization or C-T coronary angiography. To differentiate the two groups clearly, “previously admitted” term is used in the rest of the paper for the patients who were admitted to the hospital due to IHD and the term of “Recently admitted” is used for the patients who admitted during Ramadan due to IHD. Also, the term “Fasting” is used for the patients who were fasting during Ramadan and “Not fasting” for the patients who were not fasting during Ramadan. The study was carried out by asking the patients questions from a questionnaire prepared to be asked on the day of their admission. The patients were asked whether they were admitted to the hospital because of IHD or not during the past three months before Ramadan. Other data related to each of the patients were collected such as their age, gender, date and time of their admission, and their status of fasting. Also, their history of chronic illness was documented. Finally, they were asked about their status of smoking. All the data were gathered and analyzed using MS Excel 2019 and Minitab Statistical software version 21.2. As an ethical approval, informed consent was taken from all of the participants.

### 3. RESULTS

The selection of the individuals was random regardless of their age and sex. 68.61% (94) of the patients were males and the rest were females. The age of the patients was varying between 27 years to 92 years old with an average age of 60.64 years old. The standard deviation of their age was 12.2 which shows a normal distribution of their age as in (**Figure 1**). It was found that 24% of the patients were smokers ( $P < 0.001$ ) while nearly half of them 48% (66 patients) ( $P = 0.334$ ) had hypertension and 38% (52 patients) ( $P < 0.001$ ) were diabetic out of the 137 patients. Only 22% (30 patients) were previously admitted due to IHD while the other 78% (107 patients) were recently admitted, this indicated that fasting patients had higher rate of admission compared to non-fasting ones (**Table 1**).

The majority of the patients were fasting during their admission. This counts for 58.4% (80 patients) ( $P < 0.001$ ), (**Figure 2**).

We found that out of 80 fasting patients, 83.8% (67 patients) were not admitted previously while the remaining 16.3% (13 patients) were admitted previously. Looking at the patients who were not fasting, 17/57 (29.8%) were previously admitted and the other 70.2% (40 patients) were not admitted previously, (**Table 2**). This might approve that patient admission might have a little with fasting.

To further elaborate the results, the patients were analyzed based on their admission history as shown in (**Figure 3 (a & b)**), where 63% (67 patients) of the patients who were not admitted before were fasting and the remaining 37% (40 patients) were not fasting. This reflects that fasting increases the admission rates while after analyzing the patients who were previously admitted, a different result can be achieved which is only 43% (13 patients) of the patients were fasting and the other 57 % (17 patients) were not actually fasting.

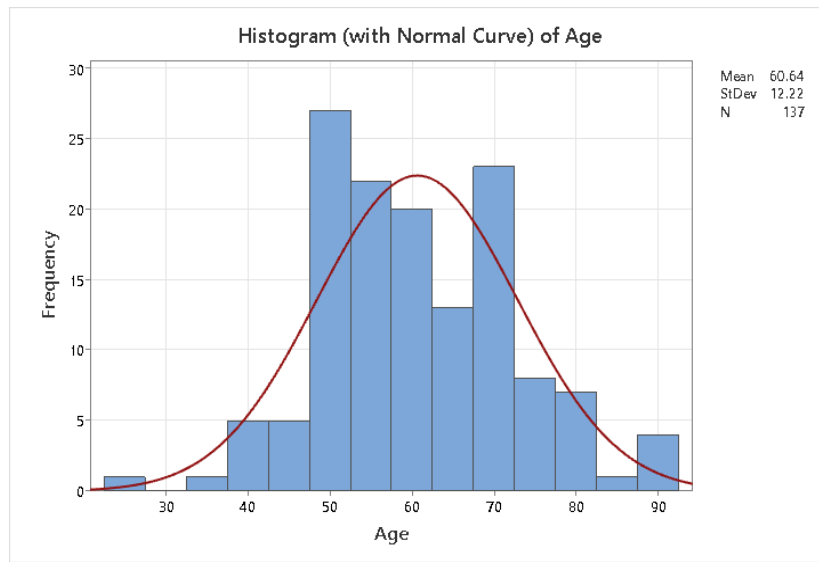


Figure 1. Patients' age histogram

Table 1. Different Results from the survey (N=137)

Variable		No.	%	P. value
Smoking	Smoker	33	24.0	< 0.001
	Non-Smoker	104	76.0	
Diabetes mellitus	Diabetic	52	38.0	0.003
	Not Diabetic	85	62.0	
Hypertension	Hypertensive	66	48.0	0.334
	Not Hypertensive	71	52.0	
Admission	Previously Admission	30	22.0	< 0.001
	Recently Admission	107	78.0	

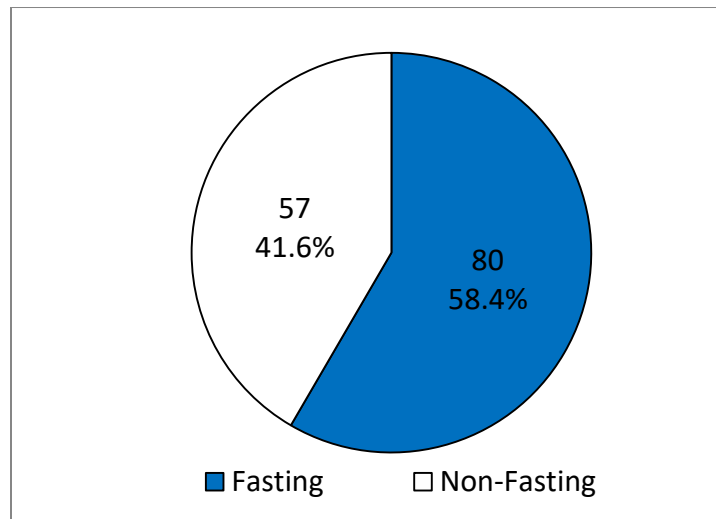


Figure 2. Patients' fasting status

Table 2. Status of fasting and admission to hospital (N=137)

Patients Status		No.	%	P. value
Fasting (n=80)	FNAP	67	83.8	< 0.001
	FPA	13	16.3	
Non-Fasting (n=57)	NFNAP	40	50.0	0.0012
	NFPA	17	29.8	

Note: FNAP: Fasting Not Admitted Previously, FPA: Fasting and Previously Admitted. NFNAP: Not Fasting and Not Admitted Previously. NFPA: Not Fasting and Previously Admitted.

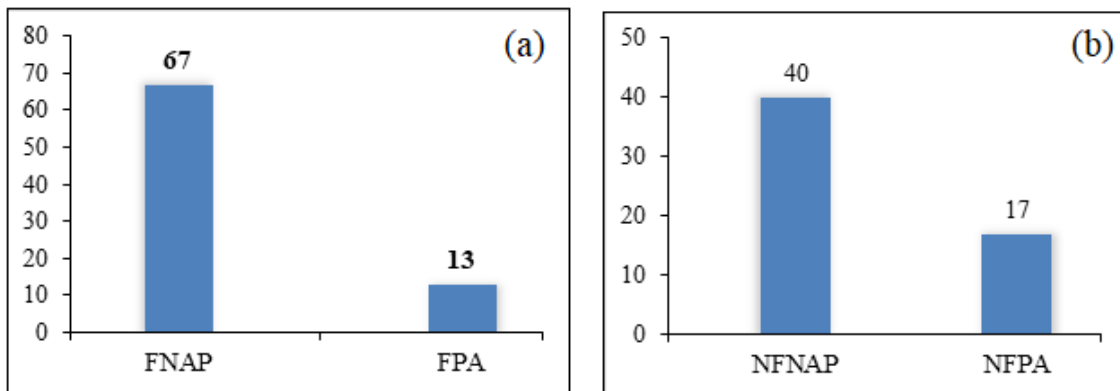


Figure 3. Distribution of IHD Patients according to their fasting and admission.(a) fasting group, (b) non-fasting group

#### 4. DISCUSSION

Effect of Ramadan fasting on the risk factors of cardiovascular diseases had been widely investigated in previous studies and literatures. Previous studies investigated the effect of Ramadan fasting on the body systems among Muslims, for instance, some authors assessed the relationship between fasting and cardiovascular risk factors (5,10).

An earlier study in 2004 conducted by Saleh et al. (13), found that Ramadan fasting had a positive effect to improve lipid pattern, atherogenicity and blood count parameters. In 2012, Nematy et al. found a significant improvement in the 10-years CHD risk score and other CVD risk factors particularly in those with history of CVD (5). Moreover, Ünalcak et al. (14) documented a beneficial influence for fasting on the inflammatory status, metabolic and atherogenic parameters. Also diurnal fasting during Ramadan has shown to improve lipid profile, C-reactive protein levels and serum leptin level with a stability of cardiac patients (15). In other study conducted by Abdullah et al. in 2020 (16) reported that both Adipokines and leptin to adipokines ratio affected by intermittent Ramadan fasting in type II diabetic patients. However, authors such as Turin et al. (7) and Mousavi et al. (8) suggested that fasting is safe for people with cardiovascular disease. However, the effect of Ramadan fasting on IHD still needs further assessment, hence, the present study designed to fill this gap particularly in our region, and to estimate the effects of fasting on the admission rate due to IHD, therefore, a total of 137 patients (94 males and 43 females) were enrolled in this study, the age and gender distribution, history of smoking, hypertension and diabetes was consistent with the epidemiological and clinical picture of IHD cases where IHD is more frequent in older age population as we found that the mean age of the patients was  $60.64 \pm 12.22$  years and majority of the cases were older than 50 years. Also we found that 68.61% of cases were males, 24% smoker, 48% hypertensive and almost 38% were diabetic, the higher rate of smoking, hypertension and DM among IHD cases are not unexpected as these factors among the major risk factors of IHD (17–20). The modifiable risk factors are common among Iraqi population, however, the smoking, hypertension and DM reported among IHD cases in our study are higher than their corresponding rates among general Iraqi population which confirm that these are significant risk factors of IHD among Iraqis (21,22).

In the present study further analysis was carried out on the fasting status to differentiate the patients who were admitted previously and the ones who were not admitted before.

According to our findings, it may be deduced that fasting causes more admission of IHD patients. This is true as the ratio of the patients who were fasting and not admitted previously outweighs the ratio of the patients who were not fasting and not admitted previously by 14%. From this figure, one can conclude that fasting causes more admission of patients due to IHD. This contradicts the results found by other researchers who claimed that Ramadan fasting can benefit patients with cardiovascular disease (5–7). In a study conducted by Raffee et al. in 2020 (23), it had been concluded that ramadan fasting had insignificant effect on the cardiac patients and no difference between admission due to IHD during Ramadan and other months of the years among Jordanian population

However, the ratio of fasting patients (84%) is more than that of non-fasting (70%) for the case of the patients who were not admitted before. It can be deduced that fasting may increase the admission ratio of patients to hospitals due to IHD. Nevertheless, one might claim that the ratio of fasting patients who were admitted previously is less than that of not fasting and previously admitted therefore, fasting may help in reducing the admission rate due to IHD. Hence, as the number of patients who were fasting but not admitted previously outweighs the patients who were not fasting, it can be concluded that fasting can cause more patient admission as a result of IHD. However, as the ratios are relatively close, therefore, further investigation is needed to prove the negative effects of fasting on IHD admission. From other point of view, previous studies documented that Ramadan fasting was neither associated with increased mortality or morbidity of IHD (15)nor increased rate of emergency admission due to IHD (24)

Nonetheless, further studies with larger sample size and multiple centers are still needed for further assessemnt

## **5. CONCLUSIONS**

When it comes to the influence of fasting on ischemic heart disease admission rate, fasting during Ramadan causes an increase of 14% in the admission of the patients to hospitals due to IHD in Sulaymaneyah, Kurdistan Region of Iraq.



### **Ethical Approval:**

All ethical issues were approved by the author. Data collection and patients enrollment were in accordance with Declaration of Helsinki of World Medical Association , 2013 for the ethical principles of researches involving human. Signed informed consent was obtained from each participant and data were kept confidentially. The study registered as a clinical study under the reference Registration Number: **0466216**

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