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The Safeness of Ramadan Intermittent Fasting Among Patients Who Undergone Primary Percutaneous Coronary Intervention

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Abstract

Objectives: This study aims to assess the ability and the safety of fasting among patients who underwent PPCI within two specified periods.

Methods: This study was a Retrospective Cohort Study with a convenience sample size of 200 consecutive patients who were divided into two groups based on the duration of their last primary PCI for an attack of acute myocardial infarction (AMI) and the start of the month of Ramadan. The patients were admitted to the Causality Department of the Surgical Specialty Hospital-Cardiac Center, Erbil/Iraq. Group I included patients undergone PPCI 6 weeks or less before the start of Ramadan while group II included patients undergone PPCI for more than 6 weeks before the start of the fasting month of Ramadan. Furthermore, each of these two groups was subdivided based on their ability to complete the Ramadan Intermittent Fasting (RIF) with no recurring or worsening of symptoms into those who fasted the whole Ramadan month, those who did not fast, those who could not continue fasting, and those who passed away. At the end of the RIF, patients' symptoms were recorded along with their status according to the New York Heart Association (NYHA).

Results: In a comparison of the proportion of fasting and non-fasting patients among the two groups, 14% in group I were able to complete the 30 days of intermittent fasting during the Ramadan month while this percentage in group II was 54% (*P*-value = 0.001). Among our findings, there were significant associations between post-PCI symptoms (exertional shortness of breath and palpitations) and RIF (*P*-values = 0.001 and *P*-values = 0.004, respectively). With regards to New York Heart Association (NYHA) classifications assessment, Group I had a higher proportion of patients classified as Class III and Class IV compared to Group II (*P*-value = 0.001) meaning patients were more symptomatic during the lesser interval between the start of the fasting month and the primary PCI.

Conclusion: Patients with PPCI within the first 6 weeks after the procedure, as well as patients with NYHA class III, are at a higher risk for health deterioration and are advised not to observe RIF.

Keywords: Coronary Artery Disease (CAD), Primary Percutaneous Coronary Intervention (PPCI), Ramadan Intermittent Fasting, NYHA Classification, chest pain, Shortness of Breath (SOB).

Introduction

Percutaneous Coronary Intervention (PCI) is a non-surgical, invasive procedure that has been used considerably well for ischemic heart disease to relieve symptoms resulting from the mismatch between myocardial oxygen supply and demand.[1] With the extensive use of PCI and the high occurrence of Coronary Artery Disease (CAD) in the regions of the Middle East and North Africa, there has been a rising concern about whether adult Muslim patients can observe Ramadan fasting in the year following primary PCI, especially that the previously mentioned regions are predominantly occupied Muslim populations.[1-3]

Ramadan Intermittent Fasting (RIF) is practiced by Muslims all over the world and is considered one of the five Islamic pillars. RIF can be described as daytime abstinence of food and drink from dawn to dusk in the 9th month of the Lunar Calendar, and it's a sudden pattern of lifestyle change in sleeping schedule, water intake as well as eating which is usually in the form of two large meals per day. According to the Islamic principle, it's only an obligatory practice for healthy non-traveling adults therefore ill patients can be exempt and excused from fasting, but many still wish to fast the month due to spiritual and cultural costumes despite the advice of their physicians.[4,5]

There have been previous studies investigating the physiological effects of fasting and factors that have been considered as risk factors for ischemic heart disease in healthy adults, some showing significant reduction in blood pressure, BMI, and waist circumference with improvement in lipid profile as well as helping in improving some glucometabolic markers in healthy subjects and reducing inflammatory and oxidative stress. Additionally, there has been regard for thrombogenesis for which efforts have been made to decrease the thrombogenicity and increase the viability of PCI intervention through pharmacological approaches.[6-11] Ramadan Intermittent Fasting raises the issue of whether patients can strictly comply with these results.[12] Reports have also shown conclusive significant improvement in 10 years of coronary heart disease risk that was carried out among patients with at least one cardiovascular risk.[13]

Other studies have shown that patients with stable cardiac diseases can safely fast during Ramadan, however, the concern in patients with the PCI procedure is in the aftermath of stent post-PCI medications and the risk of reduced fluid intake

which both may highly affect and increase the rate of thrombogenesis.[14]

To the best of knowledge, fasting in patients for three months post-PCI period was concluded safely in one study exploring the safety of RIF in patients following PCI revealing clinical, biochemical, and imaging changes with regards to fasting and non-fasting patients before, during, and after Ramadan with a recommendation of further data collection and analysis reports in other regions of the Muslim populations due to the variable daytime fasting duration, temperature and humidity.[14]

The aim of this study, therefore, is to assess the ability and the safety of fasting among patients who have undergone primary PCI within two specified periods (within 6 weeks' duration and more than 6 weeks' duration after the primary PCI procedure).

Methodology

Study Population

This is a retrospective cohort study conducted with a convenience sampling method with a sample size of 200 patients undergoing primary PCI for an attack of acute myocardial infarction (AMI), after their admission to the Causality Department of the Surgical Specialty Hospital-Cardiac Center, Erbil/Iraq.

The participants have been divided into two groups according to the duration of the last PPCI done for them to assess the safeness of fasting after undergoing the PPCI procedure. Group I included 100 patients who had PPCI within 6 weeks and less before the start of Ramadan 2021 (13-April-2021 G.C; 1st Ramadan 1442 H). Group II included the other 100 patients who had PPCI within a period of more than 6 weeks to 11 months before the start of Ramadan 2021. Each of these groups was further subdivided for comparison and association into those who fasted the whole Ramadan month, those who did not fast, who could not continue fasting, and those who passed away. Medical records, risk factors, and lab analyses have been taken for both groups before the PPCI.

The duration of fasting on the first day of the month of Ramadan was 14 hours and 35 minutes while it was 15 hours and 45 minutes on the last day in the local center in Erbil where the study was conducted. Regarding the weather, the average temperature was 17.4°C and the humidity was 57%.[15,16]

One month after Ramadan, both Group I and Group II have been followed up with a thorough follow-up questionnaire to confirm whether the intended fasting patients were able to complete 30 days of RIF with no complications or adverse consequences and to follow up both fasting and non-fasting patients with regards to their health and any prevailing symptoms, as well as any emergency admission for acute cardiac events and recent cardiac intervention.

The persistent symptoms have been evaluated accurately during both fasting/non-fasting days along with the recording of the New York Heart Association (NYHA) classification which is a Functional Classification that provides a simple way of classifying the patients regarding their severity of symptoms. It places patients in one of four categories based on how much they are capable of performing physical activity without developing limitations/symptoms that are in regard to normal breathing and varying degrees of shortness of breath and/or angina.[17]

Statistical Analysis

The studying data have been analyzed using the Statistical Package for Social Science version 25 (SPSS, IBM, Armonk, NY, USA). Quantitative data have been expressed as mean ∓ standard deviation (SD), while qualitative data as frequency and percentages (%). Fisher's exact and Chi-square tests have been performed to test for differences in proportions of categorical variables between the two groups (I & II) and a *P*-value of ≤0.05 was considered statistically significant.

Results

After following up on 200 patients (mean age of 57.5 ∓ 12.1) of whom 147 (73.5%) were males. Half of the patients, 100 (50%) had decided not to fast from the beginning, 68 (34%) completed the 30 days of RIF, the remaining 18 (9%) could not continue the initiated fasting, and 14 (7%) had passed away on follow up with undisclosed causes. The factors that are known to be common risk factors for cardiovascular diseases, as well as the patients' presentation after their admission to the cardiac center and before the primary PCI procedure, are shown in Table 1 and Table 2, respectively. The association between the risk factors and RIF among the whole study population is shown in Table 3. The majority of the patients 156 (78%) were known to have 3 to 5 risk factors, while patients who fasted had mostly less than 2 risk factors of cardiovascular disease (*P*-value = 0.002). Figure 1 and Figure 2 show an elaboration of the association between gender and fasting among each group.

Table 1. **Sociodemographic and risk factors among Group I and Group II**

Risk factor	*N* (%) in Group I	*N* (%) in Group II	*P*-value[a]
Sex			
Male	69 (69.0)	78 (78.0)	0.149
Female	31 (31.0)	22 (22.0)	
Age			
<39	4 (4.0)	10 (10.0)	0.096
≥40	96 (96.0)	90 (90.0)	
Previous HD[b]			
Yes	27 (27.0)	22 (22.0)	0.411
No	73 (73.0)	78 (78.0)	
Hypertension			
Yes	67 (67.0)	54 (54.0)	0.060
No	33 (33.0)	46 (46.0)	
Diabetes			
Yes	54 (54.0)	56 (56.0)	0.776
No	46 (46.0)	44 (44.0)	
Hyperlipidemia			
Yes	54 (54.0)	18 (18.0)	0.001
No	46 (46.0)	82 (82.0)	
Smoking			
Yes	35 (35.0)	38 (38.0)	0.659
No	65 (65.0)	62 (62.0)	
Family history			
Yes	15 (15.0)	20 (20.0)	0.352
No	85 (85.0)	80 (80.0)	

[a]*P*-value has been analyzed with Pearson Chi-Square. [b]Heart disease.

Apart from the 14 (7%) of the participants who passed away, 23 (11.5%) were found to have had acute admissions post-PCI while the other 163 (81.5%) were not, and on comparing the proportions of acute admissions among those who had PPCI for less than six weeks, 15 (15.0%) were found to be while it was 8 (8.0%) among those who had PPCI more than six weeks and the *P*-value was 0.095. On following up, 8 (4.0%) were found to have had at least one cardiac intervention of vascularization particularly with PPCI and the other 178 (89.0%) did not have any interventions, apart from the remaining 14 (7%) who were found to have passed away. The proportion of intervention in patients who had PPCI in less than six weeks was 6 (6%) while it was 2 (2%) in patients who had PPCI in more than six weeks and the *P*-value was 0.101.

Table 2. **Presentation of the patients with admission to the Cardiac Center before PCI procedure**

Type of MI[a]	***N* (%)**
STEMI	163 (81.5)
NSTEMI	34 (17.0)
No significant change	3 (1.5)
Name of the occluded artery	***N* (%)**
LAD	99 (49.5)
RCA	55 (27.5)
LCX	18 (9.0)
D1	4 (2.0)
OM	6 (3.0)
Double vessel for staged PCI	10 (5.0)
3VD for CABG[b]	8 (4.0)

[a]Myocardial infarction. [b]Coronary artery bypass grafting.

The Chi-square association of post-PCI symptoms among the two groups showed that only exertional shortness of breath with a *P*-value of 0.001 and palpitation with a *P*-value of 0.004 were significant between the two groups, where 53% of patients in group I had SOB compared to 26% in group II and 17% of patients in group I had palpitation compared to group II as clarified in Table 4. NYHA classification of the patients during the month of Ramadan in both groups is shown in Table 5. The proportion of fasting and non-fasting patients showed a significant association with the duration of post-PCI with a *P*-value of 0.001 as 14 (14%) in Group I successfully fasted the month while it was 54 (54%) in Group II (Figure 3).

Among our findings, there were significant associations with *P*-values of 0.001 between post-PCI symptoms and RIF in Group I (patients with less than 6 weeks of the PPCI procedure) with a percentage of 2 (14.3%), 19 (27.1%), and 2 (16.7%) for patients who complained of chest pain, respectively, among fasting, non-fasting, and patients who could not continue to fast during the month. On the contrary, the proportions of those who complained of chest pain in Group II (patients with more than 6 weeks' duration post-PCI) were 14 (25.9%) among the fasting patients, 6 (20.0%) among

Table 3. **Shows the proportions of the risk factors among the whole study population who fasted, who did not fast, who could not continue fasting, and those who passed away**

Risk factor	**Fasting *N* (%)**	**Non-fasting *N* (%)**	**Could not continue fasting *N* (%)**	**Dead *N* (%)**	***P*-value**
Age					
<39	6 (8.8)	8 (8.0)	0 (0.0)	0 (0.0)	0.618[a]
≥40	62 (91.2)	92 (92.0)	18 (100.0)	14 (100.0)	
Sex					
Male	51 (75.0)	64 (64.0)	18 (100.0)	14 (100.0)	0.001[a]
Female	17 (25.0)	36 (36.0)	0 (0.0)	0 (0.0)	
Previous HD[b]					
Yes	24 (35.3)	15 (15.0)	7 (38.9)	4 (38.6)	0.007[a]
No	44 (64.7)	85 (85.0)	11 (61.1)	10 (71.4)	
Smoking					
Yes	29 (42.6)	36 (36.0)	4 (22.2)	4 (28.6)	0.379[c]
No	39 (57.4)	64 (64.0)	14 (77.8)	10 (71.4)	
Hypertension					
Yes	42 (61.8)	59 (59.0)	10 (55.6)	10 (71.4)	0.796[c]
No	26 (38.2)	41 (41.0)	8 (44.4)	4 (28.6)	
Diabetes					
Yes	28 (41.2)	58 (58.0)	10 (55.6)	14 (100.0)	0.001[c]
No	40 (58.8)	42 (42.0)	8 (44.4)	0 (0.0)	
Hyperlipidemia					
Yes	16 (23.5)	48 (48.0)	6 (33.3)	2 (14.3)	0.003[c]
No	52 (76.5)	52 (52.0)	12 (66.7)	12 (85.7)	
Family history					
Yes	10 (14.7)	16 (16.0)	7 (38.9)	2 (14.3)	0.131[c]
No	58 (85.3)	84 (84.0)	11 (61.1)	12 (85.7)	

[a]*P*-value has been analyzed with Fisher's Exact Test. [b]Heart disease. [c]*P*-value has been analyzed with Pearson Chi-Square.

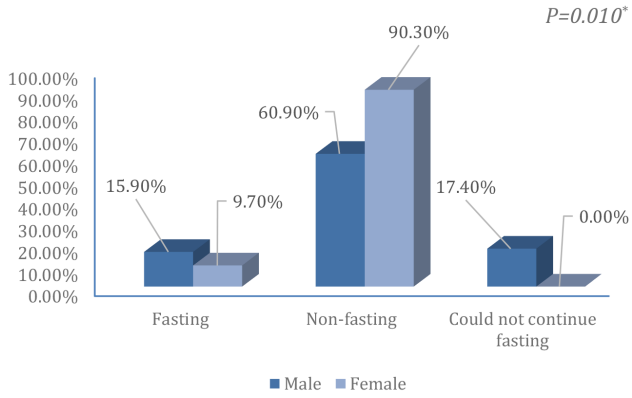

Fig. 1 **Shows the percentages of males and females among the 100 patients in Group I who fasted, who did not fast, and those who could not continue their fasting. *P-value has been analyzed with Fisher's Exact Test.**

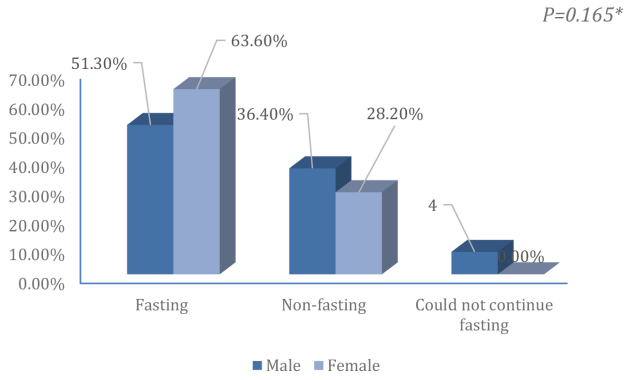

Fig. 2 **Shows the percentages of males and females among the 100 patients in Group II who fasted, who did not fast, and those who could not continue their fasting. *P-value has been analyzed with Fisher's Exact Test.**

Table 4. **Shows the proportions of post-PCI symptoms among both groups.**

Post-PCI symptoms	*N* (%) in Group I	*N* (%) in Group II	*P*-value[a]
Chest pain	23 (23.0)	24 (24.0)	0.229
SOB[b] with exertion	53 (53.0)	26 (26.0)	0.001
Palpitation	17 (17.0)	4 (4.0)	0.004
Easy fatigability	39 (39.0)	26 (26.0)	0.062

[a]*P*-value has been analyzed with Pearson Chi-Square. [b]Shortness of breath. *Note: These frequencies are apart from the 4% of patients who passed away in the group of fewer than 6 weeks duration and the 10% of patients of more than 6-week duration group.

non-fasting patients, and 4 (66.7%) among those who could not continue to fast during the month. The proportion of those who experienced shortness of breath on exertion in Group I were 7 (50%) among fasting patients, 39 (55.7%) among non-fasting patients, and 7 (58.3%) among those who could not continue to fast while in Group II, the proportions were 10 (18.5%) among those who fasted, 14 (46.7%) among those who did not and 2 (33.3%) among those who could not continue the fast. For the palpitation complaint in Group I, the proportions were 2 (14.3%) among the fasting group,

Table 5. **NYHA classification of the patients during the month of Ramadan in both groups**

Post-PCI NYHA[a] classification	*N* (%) in Group I	*N* (%) in Group II	*P*-value[b]
Class I	32 (32.0)	44 (44.0)	0.001
Class II	26 (26.0)	40 (40.0)	0.001
Class III	21 (21.0)	4 (4.0)	0.001
Class IV	17 (17.0)	2 (2.0)	0.001

[a]New York Heart Association. [b]*P*-value has been analyzed with Pearson Chi-Square. *Note: These frequencies are apart from the 4% of patients who passed away in the group of fewer than 6 weeks' duration and the 10% of patients of more than 6-week duration group.

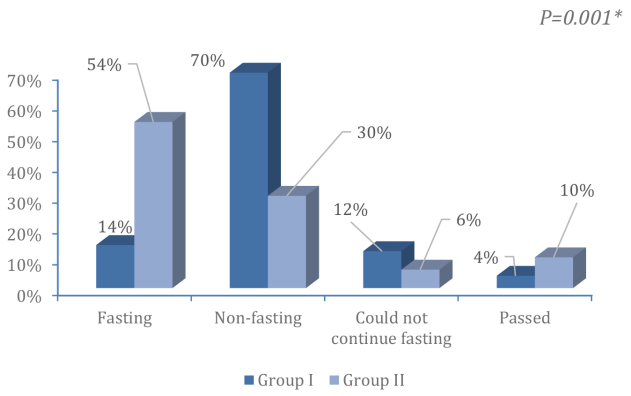

Fig. 3 **Shows the proportions of fasting, non-fasting, could not continue fasting, and those who passed away among Group I and Group II. *P-value has been analyzed with Pearson Chi-Square.**

10 (14.3%) among the non-fasting, and 5 (41.7%) among those who could not continue, while in Group II the proportions were 2 (3.7%) among the fasting, 2 (6.7%) among the non-fasting, and 0 (0%) among those who could not continue to fast. While for easy fatigability in Group I, the proportions were 2 (14.3%) among fasting, 28 (40.0%) among non-fasting, and 9 (75.0%) among those who couldn't continue, while the proportions in Group II were 14 (25.9%) among fasting, 12 (40%) among non-fasting, and 0 (0%) among those who couldn't continue. Figure 4 shows the association of post-PCI symptoms with fasting in Group I.

In relating acute admissions with specific cardiac symptoms among the 12 patients who couldn't continue their RIF in Group I, the proportion of acute admission among those who experienced shortness of breath was 2 (28.6%) while it was 5 (100%) among those who did not experience shortness of breath with a significant *P*-value of 0.028. However, in cases of easy fatigability, there were 7 (77.8%) acute admissions among those who experienced the symptom while it was 0 (0.0%) among those who did not experience it with a significant *P*-value of 0.045. This is shown in Table 6.

The relation between NYHA classification RIF showed a significant *P*-value of 0.001 with proportions of class III classification in Group I which showed 2 (14.3%) among fasting, 12 (17.1%) among non-fasting, and 7 (58.3%) among those who could not continue their fasting while in Group II, the proportions showed 2 (3.7%) among fasting, 2 (6.7%) among non-fasting, and 0 (0%) among those who could not continue their

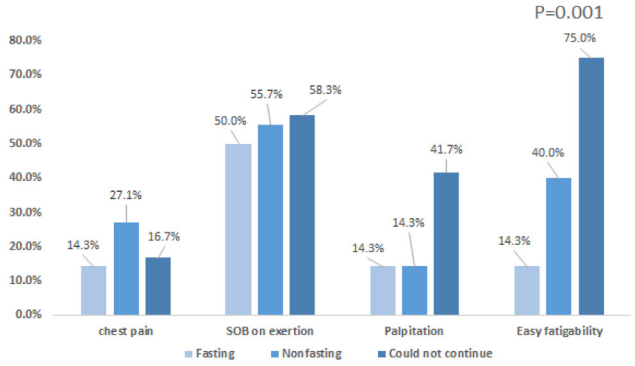

Fig. 4 **Shows the percentage of post-PCI symptoms among the 100 patients in Group 1 who fasted, who did not fast, and those who could not continue their fasting. * *P*-value has been analyzed with Fisher's Exact Test.**

fasting. The percentages of each NYHA class among the 100 patients in Group I in relation to those who fasted, who did not fast, and those who could not continue their fasting is shown in Figure 5.

Discussion

In regards to the NYHA classifications assessment compared between the two groups, our study showed that Group I (patients undergone PPCI 6 weeks or less before the start of Ramadan) had a higher proportion of patients classified as Class III and Class IV compared to Group II (patients undergone PPCI for more than 6 weeks duration before the month of Ramadan) which also agreed with a study that compared NYHA classification on stable and unstable patients with chronic heart failure.[17] The results in Group I showed with significance that the lower the NYHA classification, the higher the proportion of patients who were able to continue their fasting the entire Ramadan with Class IV in which none were from fasting patients as clarified in Figure 5. While in comparison to Abazid et al.[17] no difference was shown in NYHA classification with regards to fasting and non-fasting patients.

The symptoms of patients during RIF were assessed and it was found that in Group I, non-fasting patients experienced chest pain in a higher proportion than fasting patients and those who could not continue. Mousavi et al.[18] in a study on RIF among patients with coronary artery disease showed that patients who were not complaining of chest pain with an unspecified history of post-revascularization, later on, did not experience chest pain during RIF as well. While in our study we specified the time of the PPCI procedure being done, we did not have data on the symptomatic status of the patients before Ramadan. However, if patients did originally complain of chest pain before Ramadan in our study of Group I patients, this may have prevented them from fasting which could be an explanation for the higher proportion of chest pain among the non-fasting participants. Chest pain in Group II was found to be significantly higher in proportion among patients who could not continue to fast, and fasting might or might not be the reason for the increased proportion of chest pain while there was another study that showed that fasting did not affect the symptoms of patients with stable cardiac diseases.[18]

Table 6. **The proportions of symptoms among those who could not continue their fasting in Group I**

Symptoms	Acute admission *N* (%)	*P*-value[a]
SOB[b] on exertion		
Yes	2 (28.6)	0.028
No	5 (100)	
Easy fatigability		
Yes	7 (77.8)	0.045
No	0 (0.0)	

[a] *P*-value has been analyzed with Fisher's Exact Test. [b] Shortness of breath.

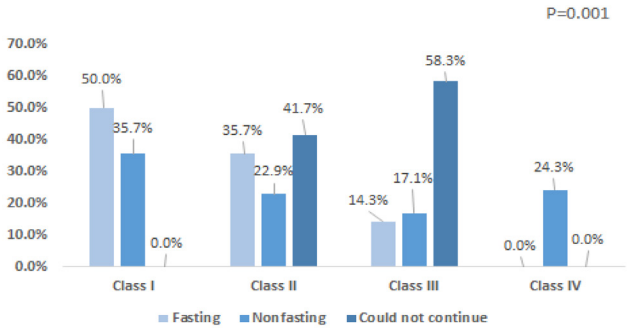

Fig. 5 **Shows the percentages of each NYHA class among the 100 patients in Group I who fasted, who did not fast, and those who could not continue their fasting. **P*-value has been analyzed with Fisher's Exact Test.**

The two specific cardiac symptoms (easy fatigability and shortness of breath after exertion) which were important to assess post-PCI were higher in proportion among those who could not continue fasting in Group I while they were higher among non-fasting patients in Group II. Therefore, it's suggestive that it might not be safe for patients to fast for a short duration post-PCI as there was a significantly higher percentage of patients who could not continue fasting in Group, I compared to Group II and this is may be due to a new-onset or worsening of these two symptoms. There are already a group of research studies that have shown that fasting did not clinically deteriorate patients with stable cardiac diseases which is corresponding to our findings in Group II.[19-21]

There is little conclusive data with correspondence of RIF within a short duration post-PCI. To the best of our knowledge, there's data already showing that fasting is only relatively safe after three months of post-PCI.[14,18] Another study also suggests that Intermittent fasting in the month of Ramadan results in a favorable inflammatory state, and does not increase the risk of ischemic coronary events.[19] And with regards to attitudes of patients towards fasting, studies show that patients still fast despite physicians' advice to avoid it.[22] In our Group I study sample patients (Patients within six weeks' duration post-PCI), all 100 participants were advised against fasting in the following Ramadan, yet 26 (26%) patients still intended to fast but only 14 (14%) of them completed fasting the whole month making up 54% of the total fasting participants, while comparing to Group II (Patients with more than 6 weeks duration post-PCI), 90% successfully fasted the 30 days. There was also another study on patients with stable heart disease which

also showed that 86% could successfully finish the whole month.[12]

Studies reported rates of readmission after PCI within 30 days to be between 3.3%–15.8% influenced highly by the healthcare system,[23] while our study of Group I showed a rate of readmission of 15% which is within the common incidence rate of previously studied cohorts which might suggest the indifference effect of fasting on the rate of readmission. Beyond 30-days, Kwok et al.[23] also showed that the readmission rate was 6% at 2 months, 31.5% at 6 months, 18.6-50.4% at 12 months, and 26.3–71% beyond 48 months. In our study, however, the duration of the PPCI in Group II was not specified in terms of the exact months and the rate of readmission was 8%. The results of the association between readmission and duration post-PCI were statistically insignificant. Regarding the association of symptoms with readmission and cardiac intervention, there was a significant result of the only two patients who had chest pain among fasting patients in Group I were found to have a history of readmission and cardiac re-intervention (*P*-value of 0.011).

In the overall association of the cardiovascular risk factors with fasting in Ramadan, Egypt study[14] showed no significant finding compared to what our data revealed. Our study results showed that there was a significant association between RIF and the risk factors of (sex, previous heart diseases, diabetes, and hyperlipidemia), while there was no significant association between fasting and hypertension, smoking as well as family history. Non-fasting patients had a higher proportion of diabetes (58.0%) than patients who could not continue fasting (55.6%), and patients who completed fasting the whole month (41.2%) with a *(P*-value = 0.001) which also corresponded with the results of another study on RIF association with diabetes among hemodialysis patients. In that study, non-fasting patients had a higher proportion than those who fasted as well as those who could not continue fasting the month.[24] This might be due to the general concern around fasting among diabetic patients because it has already been shown that fasting causes fluctuation in blood sugar levels and leads to more adverse events during Ramadan.[25] In contrast to diabetes, risk factors of male gender and previous heart disease were higher in proportion among patients who could not continue to fast rather than fasting and non-fasting patients, while in hyperlipidemia, proportions were higher in non-fasting patients with a percentage of 48% and a *P*-value of 0.003 (Table 3).

Limitations

Firstly, we were not able to consider the non-fasting patients as a control group because we did not know the exact reason for their abstinence from fasting. Secondly, the data would have been more conclusive if we had reports of the biochemical and physical status including the vital signs before, during, and after Ramadan as well as the symptomatic status and NYHA classification of the patients periodically after their PPCI and at the time of breaking the fast including their type of diet during the non-fasting hours. Two other limitations include the unspecified exact timing of patients who had passed away as fasting might have been the reason for their deterioration, as well as the unascertained causes and reasons behind discontinuing fasting among those who decided to fast the entire month. We also recommend multi-regional studies and a larger number of patient samples regarding the topic at hand.

Conclusion

In a conclusion, we would like to emphasize what has already been suggested in a previous study on the unsafety of RIF within a short duration (6 weeks in our study) after the primary PCI procedure as well as the safety of fasting after a long duration post-PCI. However, we also want to take into consideration that all of the patients with Class I in Group I were able to complete their fasting the entire month without any significant events. And we further recommend more detailed reports before, during, and after RIF.

List of Abbreviations

3VD: Three Vessel Disease, AMI: Acute Myocardial Infarction, BMI: Body Mass Index, CABG: Coronary Artery Bypass Surgery, CAD: Coronary Artery Diseases, D1: First Diagonal, HD: Heart Disease, LAD: Left Anterior Descending artery, LCX: Left Circumflex artery, MI: Myocardial Infarction, NSTEMI: Non-ST Elevation Myocardial Infarction, NYHA: New York Heart Association, OM: Obtuse Marginal, PCI: Percutaneous Coronary Intervention, PPCI: Primary Percutaneous Coronary Intervention, RCA: Right Coronary Artery, RF: Ramadan Fasting, SOB: Shortness of Breath, SPSS: Statistical Package for Social Science, STEMI: ST Elevation Myocardial Infarction.

Declarations

Ethics Approval

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with the patient's verbal/written consent. The study protocol, the subject information, and the consent form were reviewed and approved by the Ethics Committee of Hawler Medical University (HMU-MC6-PC7).

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Author Contributions

S.A., B.R., and S.Y. contributed to the conception and design of the study. A.R. and S.S. were in charge of the data analysis and interpretation as well as the writing of the paper. P.Q., A.S., R.A. contributed to the acquisition of the data and helped in analysis. S.A., B.Q., D.S., and D.P. revised the manuscript. All authors read and approved the final manuscript.

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