



Ramadan Fasting Basic Information and Nutritional Habits among MASHAD Study Population

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Research Paper</p>	<p>Introduction: Ramadan is the ninth lunar month. During this month, Muslims fast from sunrise to sunset. This study aimed to describe the Persian cohort participants' basic information and nutritional habits regarding Ramadan fasting.</p>
<p><i>Article History:</i> Received: 14 Mar 2023 Accepted: 04 Apr 2023 Published: 14 Apr 2023</p>	<p>Method: This cross-sectional study was conducted on Mashhad study population who completed the validated Ramadan fasting questionnaire.</p>
<p><i>Keywords:</i> Ramadan Fasting Nutritional habit Questionnaire</p>	<p>Results: Total number of 8769 individuals (59.2% females, mean age of 57.44±8 years) participated in this study. There was a significant difference in fasting between men and women in society; 97% of women and 90.2% of men have fasted during their lifetime ($P < 0.001$). In total, 63.2% of those who did not fast suffered from chronic diseases, 7.5% from acute conditions, 14.9% from weakness, and 14.5% from personal reasons. Almost 94% of the studied population did not experience any medical problems during fasting. Among these, severe hypoglycemia was the most reported during fasting (1.9%) followed by loss of consciousness in 1.5% of subjects, which was statistically different based on gender (1% of men and 1.7% of women, $P = 0/008$).</p>
	<p>Conclusion: Based on the results, 94.3% of the studied population had a history of fasting, and women have fasted sooner and significantly higher than men during their lifetime. The main reasons for non-fasting were chronic disease in women and personal reasons in men. Almost 94% of the fasted population reported no medical problems during fasting. The most commonly reported problem during fasting was severe hypoglycemia.</p>

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Introduction

Ramadan is the ninth lunar month. Hundreds of millions of Muslims fast in Ramadan every year (1, 2). Fasting during Ramadan is an obligatory duty in Islam. During fasting, Muslims avoid eating, drinking, and smoking. The duration of fasting varies according to geographical location and season (3). As a result of fasting, eating, and sleeping patterns are profoundly altered, so the two traditional night feasts replace the usual daily meals (4). During Ramadan, calorie intake, dietary routine, medications, and sleeping habits are temporarily changed, as related behavioral

and social changes (5, 6). People are exempt from fasting when fasting may be challenging for people or even harmful to health, including traveling, acute illness, pregnancy, and breastfeeding. Still, they must make up for it in the coming days. In addition, fasting is not obligatory for people with chronic diseases, and their disease is uncontrollable and does not need compensation (7).

The Mashhad stroke and heart atherosclerotic disorder (MASHAD) study is a 10-year cohort study aimed to evaluate the impact of various genetic, environmental, nutritional, and

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psychosocial risk factors on the incidence of cardiovascular events among an urban population in eastern Iran (8).

The current study aimed to describe the cohort population's basic information and nutritional habits regarding Ramadan fasting.

Methods

This cross-sectional study was conducted on subjects derived from the MASHAD study who started recruitment in 2010 and followed until 2020, with follow-up examinations every three years. The cohort population's basic information and nutritional habits during Ramadan fasting were assessed in phase 2, using a validated Ramadan fasting questionnaire. This questionnaire was developed to address the short-term and long-term Ramadan fasting effects with 16 items, categorized into "Basic information on fasting (demographic information)" and "Fasting nutritional habits,"

including 13 and three questions, respectively (9).

Statistical Analysis

SPSS software (Version 21, Chicago, IL, USA) was used for statistical analysis. Mean±standard deviation (SD) or frequency and percentage were assessed for quantitative and qualitative variables. Differences between groups were evaluated by the T- student test and chi-square. Statistical significance was assessed for all analyses at 0.05 (two-tailed). Figures were plotted by Graph Pad Prism 6 software.

Ethics

The study was approved by the Ethics Committee of Mashhad University of Medical Sciences (ID= 951214). Each item for the agreement was explained individually to obtain written consent from those who agreed to participate in the study.

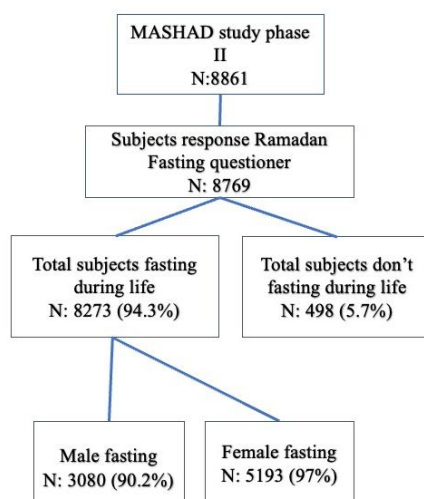


Figure 1. The study flowchart

Results

The study population was 8769 people from the MASHAD study, including 5193 females and 3080 males, who completed the fasting questionnaire (Figure 1).

The average age of the male population was 58.57±9.07 years, of whom the female population was 56.72±8.86 years (Table 1).

According to self-expression, 94.3% of the study population had a history of fasting, 8160 participants (93.1%) of whom was in Ramadan and 2900 participants (33.2%) in other months

of the year. There was a significant difference in fasting between men and women in society. About 97% of women and 90.2% of men have fasted during their lifetime ($P < 0.001$). A significant difference was observed between women and men regarding fasting in non-Ramadan months (42.9% vs. 17.9%, respectively, $P < 0.001$). Moreover, the mean age of first Ramadan fasting significantly differed between men and women groups (15.29±3.57 vs. 9.98±2.64, respectively, $P < 0.001$). Summer was the most frequent season that subjects started

their Ramadan fasting (42.5%). There was a significant difference between males and females in the season of the first Ramadan fasting ($P=0.043$). Most participants stated that their parents had a history of fasting ($n=8744, 98.6\%$). In addition, a considerable percentage of the

participant's mothers had fasted during their fetal period (98.8 %, Table 1).

Most individuals reported a combination of Iftar and Sahari as their meal distribution during Ramadan fasting (89%, $P<0.001$, Table 1).

Table 1. Fasting during life according to gender (n=8769)

		Total	Male (3426)	Female (5391)	p-value
Age, year		57.44±8.98	58.57±9.07	56.72±8.86	<0.001
Fasting during life	Yes	8273 (94.3%)	3080 (90.2%)*	5193 (97%)	<0.001
	No	498 (5.7%)	335 (9.8%)	163 (3%)	
Fasting in Ramadan	Yes	8160 (93.1%)	3053 (89.5%)	5107 (95.4%)	<0.001
	No	605 (6.9%)	357 (10.5%)*	248 (4.6%)	
Fasting in other month	Yes	2900 (33.2%)	607 (17.9%)	2293 (42.9%)	<0.001
	No	5844 (66.8%)	2791 (82.1%)	3053 (57.1%)	
Age of first Ramadan fasting		12.07±4.01	15.29±3.57	9.98±2.64	<0.001
Season of first Ramadan fasting	Spring	164 (2.1%)	77 (2.6%)*	87 (1.8%)	0.043
	Summer	3318 (42.5%)	1211 (41.3%)	2107 (43.2%)	
	Fall	178 (2.3%)	72 (2.5%)	106 (2.2%)	
	Winter	660 (8.4%)	263 (9%)	397 (8.1%)	
Parent fasting	Yes (98.8%)	8744 (98.6%)	3402 (98.6%)	5342 (98.6%)	0.92
	No (1.2%)	122 (1.4%)	48 (1.4)	74 (1.4%)	
Mother fasting during pregnancy	Yes (98.9)	8757 (98.8%)	3408 (98.8%)	5349 (98.8%)	0.16
	No (1.1%)	109 (1.2%)	42 (1.2%)	67 (1.2%)	
Meal distributions during Ramadan	Iftar, Sahar	7366 (89%)	2672 (86.8%)	4694 (90.3%)	<0.001
	Iftar, Sahar, diner	621 (7.5%)	322 (10.5%)*	299 (5.8%)	
	Iftar, diner	184 (2.2%)	56 (1.8%)	128 (2.5%)	
	Iftar	109 (1.3%)	30 (1%)	79 (1.5%)	
Reason for not fasting	Chronic disease	2497 (63.2%)	880 (52.4%)	1617 (71.2%)	<0.001
	Acute disease	295 (7.5%)	114 (6.8%)	181 (8%)	
	Disinclination	571 (14.5%)	441 (26.3%)*	130 (5.7%)	
	Weakness	587 (14.9%)	243 (14.5%)	344 (15.1%)	

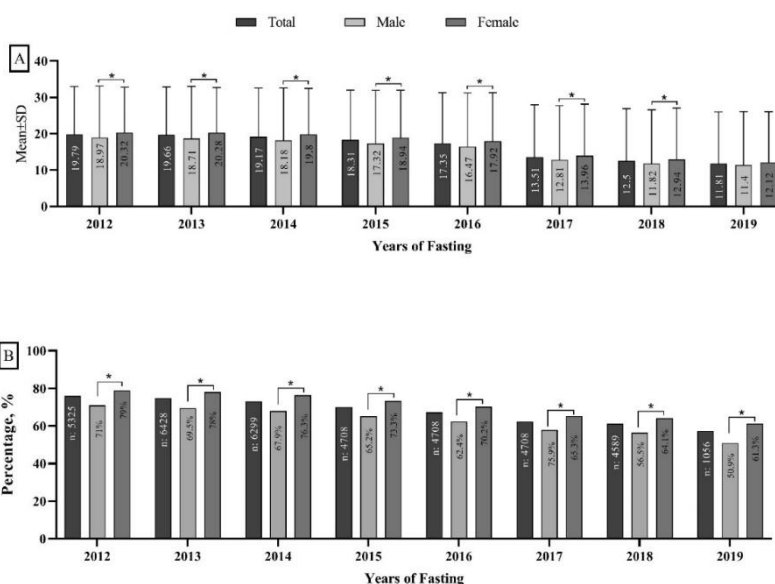


Figure 2. A) Days of fasting during the last decade by gender; B) Prevalence of fasting during the last decade by gender. N= the number of fasted individuals.

As reported in Figure 2, there was a decreasing trend in fasting attendance and the number of Ramadan fasting days during the last decade among both genders of the studied population. Generally, 2497 (63.2%) of not being fasted were due to chronic diseases. Moreover, 295 (7.5%) of

them were not fast because of acute conditions, 587 (14.9%) reported weakness as a result, and 571 (14.5%) had not fasted for personal reasons. According to people's comments, chronic disease in women and personal reasons in men were the most common cause of not fasting (Table 1).

Table 2. History of severe problem during fasting by gender

		Total * N=8273	Male N=3080	Female N=5193	p-value
Heart attack	No	8237 (99.6%)	3064 (99.5%)	5173 (99.6%)	0.49
	Yes	36 (0.4%)	16 (0.5%)	20 (0.4%)	
Stroke	No	8254 (99.8%)	3071 (99.7%)	5183 (99.8%)	0.44
	Yes	19 (0.2%)	9 (0.3%)	10 (0.2%)	
Coma	No	8269 (99.9%)	3078 (99.9%)	5191 (100%)	0.64
	Yes	4 (0.1%)	2 (0.1%)	2	
Loss of consciousness	No	8152 (98.5%)	3048 (99%)	5104 (98.3%)	0.008
	Yes	121 (1.5%)	32 (1%)	89 (1.7%)*	
Sever. hypoglycemia	No	8112 (98.1%)	3025 (98.2%)	5087 (98%)	0.2
	Yes	161 (1.9%)	55 (1.8%)	106 (2%)	
Diabetic ketoacidosis	No	8231 (99.5%)	3067 (99.6%)	5164 (99.4%)	0.39
	Yes	42 (0.5%)	13 (0.4%)	29 (0.6%)	
Hyperosmolar hyperglycemic coma	No	8253 (99.8%)	3075 (99.8%)	5178 (99.7%)	0.15
	Yes	20 (0.2%)	5 (0.2%)	15 (0.3%)	

*fasted individuals included to analysis

As shown in Table 2, almost 94% of the studied population stated that they did not experience any medical problems during fasting. In addition, the experience of severe hypoglycemia during fasting was reported with the most significant frequency (1.9%). The second problem was the loss of consciousness in 1.5% of subjects, which

was statistically different based on gender (1% of men and 1.7% of women, $P=0/008$). Other problems, including diabetic ketoacidosis, heart attack, hyperosmolar hyperglycemic coma, stroke, and coma, were observed in 0.5%, 0.4%, 0.2%, 0.2%, and 0.1% of the study population, respectively.

Table 3. The first food/drink that people break their fast with

Food	Tea	Milk	Date& Milk	Juice	Water	Syrup	Date	Soup	Food	Sweet tea	Dat& Tea
Number	2499	153	29	11	627	338	3870	514	249	5	1108
Percent%	28.2	1.7	0.3	0.1	7.1	3.8	43.6	5.8	2.8	0.1	12.5

Table 3 shows the first food/drink that people break their fast with. Based on self-expression, tea, dates, and date with tea were the most preferred things by the study population for breaking their fasting.

Discussion

This study indicated a significant difference in fasting frequency between men and women in society. Women have fasted sooner and significantly higher than men during their lifetime. The observed earlier age of fasting in women might be due to the lower age of puberty in girls. In addition, a decreasing trend of fasting attendance and several Ramadan fasting days was found during the last decade among the studied population, possibly due to population aging or reducing religious inclinations. According to self-expression, chronic disease in

women and personal reasons in men were the most common reasons for not fasting.

Almost 94% of the fasted population reported no medical problems while fasting. Meanwhile, severe hypoglycemia and loss of consciousness were the most commonly reported complications.

Most previous studies are one-year assessments of Ramadan fasting effects on different populations, including metabolic syndrome volunteers, cardiovascular, type 2 diabetes, hypertensive or hemodialysis patients. The mentioned studies have focused on fasting safety for them (10-13), any change in risk factors (12) or incidence of complications (4).

A previous study on type 2 diabetic patients showed that Ramadan fasting deteriorated their glycemic control (14).

Some studies have demonstrated an increment in the rate of emergency advice for abdominal pain (15), peptic ulcer perforation (16), uncomplicated headache (17), the incidence of acidosis or hypoglycemia among diabetic patients, severe asthma exacerbations, severe hypertension, acute ischemia (18), and renal colic (19) during the month of Ramadan. Another study did not find any difference in the clinical features of patients received at a hospital emergency section during Ramadan (20).

This study reported the experience of consciousness loss in 1.5% of fasted individuals. There are some studies from the United Arab Emirates (21) and Saudi hospitals (22) that have shown an increase in road accident admission during Ramadan, which may be due to the reduced concentration of fasting people. However, Langford et al. reported that the accidents associated with the presence of Muslims were not significantly different compared to non-Muslims in an emergency hospital in London (20).

Further, stroke during Ramadan fasting was reported in 0.2% of the study population. Bener et al. retrospectively studied a 13-years stroke database and reviewed the data on Muslim patients admitted to the hospital with a stroke. The number of hospitalizations for strokes (29 subjects) was not significantly different during Ramadan when compared to the month before Ramadan (30 subjects) and the month after Ramadan (29 subjects). This study found that stroke risk factors, such as diabetes mellitus, hypertension, hypercholesterolemia, congestive heart failure, and acute myocardial infarction, were not significantly different during Ramadan compared to the month before and after Ramadan (21). In contrast to these findings, there are reports about the increasing frequency of cerebral venous sinus thrombosis during Ramadan compared to other non-fasting months (5.5 cases vs. 1.95 cases per month, respectively) (23).

In the present study, tea, dates, and dates with tea were the most popular drink/food items for people to break their fast. Some studies have reported that carbohydrate consumption increased during Ramadan (24, 25, 26). However, several studies have reported no change in carbohydrate intake (27, 28) or a reduction in carbohydrate consumption (29).

This study has several strengths and limitations. To the best of our knowledge, this is the first comprehensive study to describe the long-term Ramadan fasting basic information and nutritional habits using the validated fasting questionnaire among a large cohort study population. Nevertheless, there are some limitations, including self-declaration in data gathering or probability of recall bias like in any other prospective observational study.

Assessment of long-term incidence of non-communicable disease or related complications among the fasted population is suggested for further studies.

Conclusions

Based on the results, more than 90% of the studied population had a history of fasting, and women have fasted sooner and significantly higher than men during their lifetime. The main reasons for non-fasting are chronic disease in women and personal causes in men. Fasting was safe and without any complication for almost 94% of the fasted population, and the most commonly reported problem during fasting was the experience of severe hypoglycemia.

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