



Ramadan Fasting Dietary Patterns and Gastrointestinal Discomforts

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ARTICLE INFO

Article type:
Research Paper

Article History:
Received: 14 Jan 2020
Accepted: 19 Sep 2020
Published: 02 Jun 2021

Keywords:
Ramadan fasting
Gastrointestinal discomforts
Dietary patterns
Muslim adults

ABSTRACT

Introduction: Ramadan, the ninth month of the Islamic lunar calendar, has special religious importance among Muslims. During this month, Muslim adults and adolescents (who have reached the age of adulthood according to the Islamic rules) fast. Gastrointestinal (GI) disorders present with symptoms generally called GI discomforts such as heartburn, abdominal pain, dyspepsia, constipation, bloating, and irritable bowel syndrome. This study aimed to assess the effects of Ramadan fasting on GI discomfort.

Methods: One hundred fasting subjects were enrolled in the study. Personal information (age, gender, education level, and occupation) was collected from participants and they were assured that their information would remain confidential. Participants had to fill out a food questionnaire before and in the third week of Ramadan. Food patterns were identified by factor analysis. The relationship between dietary food patterns and GI symptoms was assessed by logistic regression analysis.

Result: The results of logistic regression analyses of the association between dietary patterns and the development of GI discomforts in Ramadan represented that adherence to high fat and protein dietary patterns significantly reduced dyspepsia and diarrhea ($P < 0.05$) while adherence to relatively healthy dietary pattern caused a marginally significant reduction in constipation ($P < 0.1$).

Conclusion: This study showed that total energy intake during Ramadan fasting did not differ compared to before the month while the dietary patterns changed significantly. The full-fat diet reduced hunger pain and constipation but increased diarrhea while a healthy diet reduced dyspepsia and diarrhea during fasting.

► Please cite this paper as:

Jafari T, Forouzan Ganji F, Batenipour M, Nasiri J. Ramadan Fasting Dietary Patterns and Gastrointestinal Discomforts. *J Nutr Fast Health*. 2021; 9(2): 137-145. DOI: 10.22038/JNFH.2020.45830.1247.

Introduction

Ramadan, the ninth month of the Islamic lunar calendar has special religious importance among Muslims. During this month, Muslim adults and adolescents who have reached the age of adulthood according to the Islamic rules are fast. Since the lunar calendar is based on the movement of the moon, Ramadan is at different times of the Georgian calendar each year. It takes 29 to 30 days with a fasting period of 12–18 hours a day. Muslims avoid eating, drinking, and smoking from dawn to dusk (1).

Meals in Ramadan reduce to two main meals. Before dawn, a meal like a regular breakfast or a little bigger is eaten (Sahari), and after the dusk, a meal like a dinner or lunch is eaten (Iftari). Dietary patterns and habits, quality, and quantity of foods eaten by fasting people are changed notably. The season in which Ramadan

is placed also affect the diet. Along with the changes in food intakes, other aspects of life show significant changes. For instance, time and duration of sleep and wake up alter; fasting people usually rest on the day and wake up at night. The number of working hours usually decreased. Habits like smoking, alcohol drinking, or using drugs are reduced and Muslims are more engaged in religious duties and worship (2).

It seems that alteration in lifestyle and food intakes have profound effects on organ functions (3). According to religious teachings, Muslims believe that fasting improves their health status. The beneficial effects of fasting on body metabolism and function like insulin function, lipid profile, and blood pressure were studied before (4).

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Gastrointestinal (GI) disorders refer to diseases involving the digestive tract from the esophagus to the rectum. Although the mouth is anatomically part of the digestive tract, diseases of the mouth are often not classified as GI disorders. In other words, mouth problems are usually related to dental plaque and caries. GI disorders appear with symptoms generally called GI discomforts such as heartburn, abdominal pain, dyspepsia, constipation, bloating, irritable bowel syndrome, etc. GI discomforts are one of the most common medical complaints worldwide. The prevalence of dyspepsia, constipation, irritable bowel syndrome, and bloating in Iran is estimated to be 29.9%, 27%, 25%, and 8.8%, respectively (2). In addition to various medical, herbal, and traditional therapeutic remedies that have been proposed, fasting is also suggested as a way to cure or reduce the severity of these problems. The effects of fasting on GI discomforts is one of the topics of interest for researchers in recent decades (4). Therefore, this study aimed to assess the effects of Ramadan fasting-dietary patterns on GI discomfort.

Materials and Methods

Study design and participants

In this descriptive study, Muslim adults (≥ 18 years old) who did not have a medical or religious problem and could fast during the Ramadan were evaluated. The sample size was calculated according to the study of Darwish Moghadam et al, (5). One hundred fasting subjects were needed for the project. The inclusion criteria were as follows: tending to fast, not consuming contraceptive drugs, and not having metabolic, hormonal, or malignancy disorders. Personal information (age, gender, level of education, occupation) was taken from participants and they were assured that their information would remain confidential. Participants filled out a food questionnaire before and in the third week of Ramadan.

To cover possible case losses during the study, 300 fasting people were enrolled. During the project subjects who needed special medical and treatments or were not able to continue fasting (for example, women who fast less than 3 weeks due to the menstruation period) were excluded. Finally, 100 questionnaires from subjects who completed the fasting period were analyzed.

Dietary Intake and Physical Activity Assessment

A food frequency questionnaire (FFQ) with 168 items of current Iranian foods was used to assess food intake. Current foods consumed during the Ramadan fasting were also considered in this FFQ. Validity and reliability of this questionnaire have already been evaluated (6). Each item was answered based on the amount of serving person that consumed per day, or week. Options like “rarely” or “never” were chosen if the person consumed less than one serving per month or at all, respectively. The serving size of each food, as well as a food group, was fully explained to the participants before the project by an expert dietician. A 3-day food and physical activity record (included one holiday) were also taken before and during the third week of Ramadan to evaluate the energy and nutrient intakes. The average food records were expressed as dietary intake before and during the fasting period. To obtain energy and nutrient intakes, all dietary data were converted to the gram and entered into Nutritionist 4 software. This software is supported by the USDA food composition table and it has been modified for Iranian foods (7). Dietary patterns during Ramadan fasting and before were extracted from food intakes.

To assess physical activity, metabolic equivalent (MET) value (8) was multiplied by the duration of each activity ($\text{MET h}^{-1} \text{d}^{-1}$) and the average of 3-day physical activity records was reported.

Gastrointestinal Discomfort Assessment

GI discomforts were assessed by Gastrointestinal Symptom Rating Scale (GSRS) which is used to evaluate common GI problems (9). This questionnaire has 15 items which can evaluate 5 common categories of GI problems; (a) abdominal pain (abdominal pain, hunger pain, and nausea), (b) reflux (heartburn and acid regurgitation), (c) diarrhea (diarrhea, loose stools and an urgent need for defecation), (d) constipation (constipation, hard stool, and feeling of incomplete evacuation), and (e) dyspepsia (abdominal distension, eructation, and increased flatus). The answer spectrum to each item was from “no discomfort” to “severe discomfort”. Though, participants obtained 0 to 7 points for each item, respectively. The highest scores showed the highest severity of GI symptoms. This questionnaire has been

translated to Farsi and its validity and reliability have been verified (10).

Statistical Analyses

Quantitative data were expressed as mean ± SE and qualitative data were presented as number and percentage. Food patterns were recognized by the factor analysis method. The relationship

between dietary food patterns and GI symptoms were assessed by logistic regression analyses. Statistical analyses were conducted by SPSS version 21 (SPSS Inc., Chicago, IL, USA). *P* values<0.05 were considered statistically significant and *P* values<0.1 were considered marginally statistically significant.



Figure 1. flowchart of the study

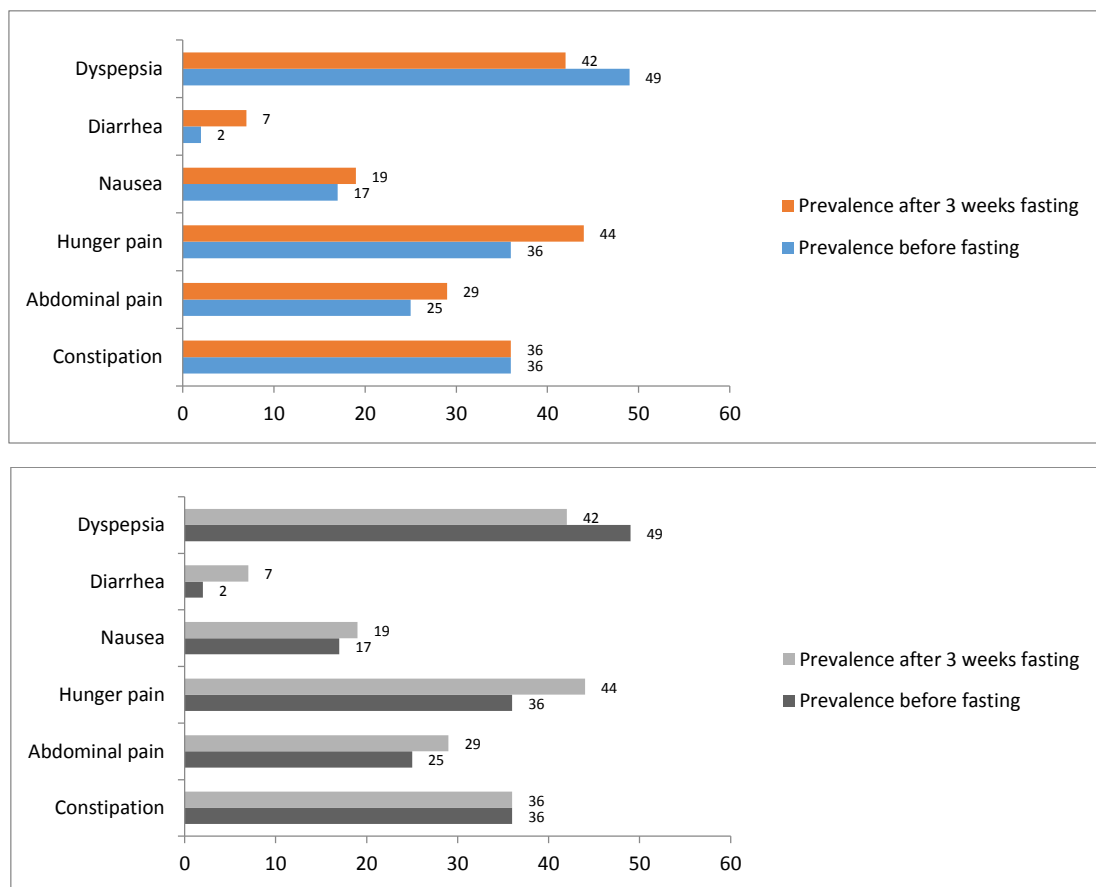


Figure 2. Comparison GI discomforts in participants before and during Ramadan fasting

Results

Data on food intakes, physical activity, and GI discomforts were collected from 100 adults who were able to fast 3 weeks or more (Fig. 1). The baseline characteristics of the participants are shown in Table 1. Subjects were 57 females and 43 males with an average age of 36.61±12.64 years old. The youngest subject was a 13-year-old girl and the oldest subject was a 72-year-old man. The mean body mass index (BMI=28) indicated that participants were overweight or obese in overall. Figure 2 shows the prevalence

of GI discomforts reported by the subjects before fasting and after 3 weeks of fasting during Ramadan. The frequency of each GI discomforts did not significantly change before and after 3 weeks of fasting. Table 2 represents the dietary intake of participants before and after 3 weeks of fasting. Consumption of total energy, protein, carbohydrate, and fat did not show significant changes while participants consumed a lesser amount of sodium and fiber during Ramadan compared to before fasting.

Table 1. Baseline characteristics of participants

Variable	n, mean±SD
Gender	57 female, 43 male
Age (year)	36.61±12.64
BMI (kg m ⁻²)	28.30 ±4.43
Total energy intake (kcal)	2199.82±775.80
Physical activity (Met h ⁻¹ d ⁻¹)	21.4±11.66

Table 2. Energy and nutrient intakes before and during Ramadan fasting

Variable	Before Ramadan fasting	During Ramadan fasting	P-value
Energy (kcal d ⁻¹)	3027.08±1055.56	2675.85±1187.00	0.166
Protein (g d ⁻¹)	102.68±49.19	108.52±161.94	0.862
Carbohydrate (g d ⁻¹)	465.49±199.97	305.13±166.64	0.362
Fat (g d ⁻¹)	70.86±28.58	70.64±39.80	0.579
Sodium (mg d ⁻¹)	2037.85±1042.93	1556.95±887.04	<0.001
Calcium (mg d ⁻¹)	1190.95±514.57	1184.97±575.54	0.484
Vitamin D (mg d ⁻¹)	.935±1.24	.817±1.18	0.825
Fiber (g d ⁻¹)	24.38±17.04	20.92±11.89	0.044

Table 3. Dietary patterns and adherence

	Dietary pattern	Adherence (n,%)		
		Low	Moderate	High
Before fasting	healthy dietary pattern	35	50	15
	high carbohydrate pattern	40	45	15
	high fat pattern	20	19	61
After 3 weeks of fasting	high fat and protein dietary pattern	20	59	21
	dairy dietary pattern	39	40	21
	relatively healthy dietary pattern	35	50	15

Dietary patterns of participants in Ramadan differed from before fasting. Using the factor analysis method, dominant dietary patterns were identified and each of them was named based on its most prominent food groups. The three dominant dietary patterns recognized before Ramadan were as follows; (a) *healthy dietary pattern* (in which consumption of meat, grain, fiber, and nut groups was more pronounced); (b) *high carbohydrate pattern* (in which consumption of cereal, dairy1 (cheese, yogurt, curd, and *Persian doogh*), and cookie groups were more pronounced); and (c) *high fat pattern* (in which consumption of fast food, cookie, butter, cream, and dairy 2 (milk and ice cream) groups were more pronounced). During

the Ramadan, three dominant dietary patterns were also as follows: (a) *high fat and protein dietary pattern* (in which consumption of meat, fast food, butter, cream, grain, dairy1, nut, and cookie groups was more pronounced); (b) *dairy dietary pattern* (in which consumption of dairy1 and dairy 2 groups were more pronounced); and (c) *relatively healthy dietary pattern* (in which consumption of meat, cereal, and fiber groups was more pronounced). The distribution of participants based on adherence to the dietary patterns was shown in Table 3. Culture, economic and medical factors were the main factors influencing the adherence of participants to the dietary patterns during and before Ramadan.

Table 4. Results of logistic regression analyses of the association between dietary patterns and the existence of GI disorders before Ramadan.

GI disorder	Dietary pattern	Adherence level	β	EXP(B)	P value
Hunger pain	Healthy	Low			
		Moderate	0.440	1.55	0.428
		High	-0.280	0.756	0.611
	High carbohydrate	Low			
		Moderate	-0.415	0.660	0.458
		High	-0.254	0.776	0.637
Full fat	Low				
	Moderate	-1.145	0.318	0.036	
		High	-0.575	0.563	0.266
Abdominal pain	Healthy	Low			
		Moderate	-1.142	0.313	0.061
		High	-0.021	-0.721	0.974
	High carbohydrate	Low			
		Moderate	-0.039	0.962	0.950
		High	0.094	1.099	0.878
Full fat	Low				
	Moderate	-0.255	0.775	0.676	
		High	0.240	1.272	0.679
Nausea	Healthy	Low			
		Moderate	-0.115	-0.982	0.866
		High	-0.369	0.691	0.591
	High carbohydrate	Low			
		Moderate	-1.08	0.365	0.188
		High	0.183	1.201	0.771
Full fat	Low				
	Moderate	0.030	1.030	0.962	
		High	-1.152	0.316	0.129
Diarrhea	Healthy	Low			
		Moderate	-0.209	0.901	0.989
		High	-0.322	1.942	0.996
	High carbohydrate	Low			
		Moderate	-3.301	0.301	0.982
		High	-4.946	0.024	0.131
Full fat	Low				
	Moderate	17.190	1.942	0.044	
		High	32.453	1.242	0.112
Dyspepsia	Healthy	Low			
		Moderate	-0.507	0.989	0.333
		High	-0.253	0.776	0.618
	High carbohydrate	Low			
		Moderate	-0.400	0.670	0.445
		High	-0.123	0.884	0.810
Full fat	Low				
	Moderate	0.534	1.584	0.291	
		High	0.224	1.091	0.658
Constipation	Healthy	Low			
		Moderate	-1.131	0.621	0.073
		High	-0.946	0.732	0.082
	High carbohydrate	Low			
		Moderate	0.434	1.544	0.451
		High	0.262	1.299	0.640
Full fat	Low				
	Moderate	-1.102	0.332	0.045	
		High	-0.476	0.621	0.036

Results of logistic regression analyses of the association between dietary patterns and the existence of GI discomforts in Ramadan (Table 5) represented that adherence to high fat and protein dietary pattern significantly reduced

dyspepsia and diarrhea ($P<0.05$) while adherence to relatively healthy dietary pattern had a marginally significant reduction on constipation ($P<0.1$).

Table 5. Results of logistic regression analyses of the association between dietary patterns and the existence of GI disorders in Ramadan.

GI disorder	Dietary pattern	Adherence level	β	EXP(B)	P value
Hunger pain	High fat and protein	Low			
		Moderate	-0.544	0.625	0.290
		High	-0.422	0.581	0.403
	Dairy	Low			
		Moderate	-0.336	0.715	0.505
		High	-0.568	0.685	0.267
	Relatively healthy	Low			
		Moderate	-0.265	0.765	0.598
			High	-0.405	0.667
Abdominal pain	High fat and protein	Low			
		Moderate	-0.748	0.473	0.197
		High	-0.062	0.946	0.907
	Dairy	Low			
		Moderate	0.135	1.145	0.810
		High	0.158	1.171	0.779
	Relatively healthy	Low			
		Moderate	-0.136	0.873	0.803
			High	-0.617	0.540
Nausea	High fat and protein	Low			
		Moderate	0.544	1.723	0.405
		High	0.322	1.380	0.634
	Dairy	Low			
		Moderate	-0.215	0.806	0.729
		High	0.404	0.668	0.542
	Relatively healthy	Low			
		Moderate	-0.857	0.424	0.178
			High	0.675	0.509
Diarrhea	High fat and protein	Low			
		Moderate	-0.772	0.486	0.443
		High	-1.348	0.213	0.018
	Dairy	Low			
		Moderate	0.439	1.552	0.660
		High	0.194	1.201	0.856
	Relatively healthy	Low			
		Moderate	-0.354	0.702	0.660
			High	-19.222	0.826
Dyspepsia	High fat and protein	Low			
		Moderate	-1.135	0.321	0.036
		High	-0.611	0.548	0.236
	Dairy	Low			
		Moderate	-0.216	0.806	0.679
		High	-0.471	0.624	0.371
	Relatively healthy	Low			
		Moderate	0.813	2.255	0.257
			High	0.748	2.112
Constipation	High fat and protein	Low			
		Moderate	-0.105	0.900	0.542
		High	-0.333	0.842	0.848
	Dairy	Low			
		Moderate	-0.390	0.845	0.461
		High	-0.381	0.677	0.941
	Relatively healthy	Low			
		Moderate	-0.445	0.641	0.071
			High	-0.383	0.682

Comparison of before, and after 3-week fasting variables between women and men are shown in Table 6 and Table 7. Daily energy intake was significantly higher in men compared to women before fasting and also men were significantly

more active than women (Table 6, $P < 0.05$) while after 3 weeks fasting there was no significant difference between the daily energy intake of women and men. However, our results showed that men were significantly more active than

women during fasting (Table 7). To show the differences between women and men in adherence to dietary patterns, participants in the highest category of each dietary pattern were compared. Results represented that there

were no statistically significant differences between women and men in adherence to each dietary pattern before and after 3 weeks of fasting (Table 6, and 7, $P > 0.05$).

Table 6. Comparison of variables between male and female before fasting

Variable sex	Energy intake mean \pm SD	P value	Physical activity mean \pm SD	P value	healthy dietary pattern (n)*	P value	high carbohydrate pattern (n)*	P value	high fat pattern (n)*	P value
female	2063.5 \pm 700.5	0.043	30.4 \pm 2.5	0.035	14	0.083	16	0.732	17	0.778
male	4304 \pm 689.5		32.9 \pm 2.4		19		17		16	

* n, participants in the highest category of adherence to each dietary pattern are compared.

Table 7. Comparison of variables based on gender after 3 weeks of fasting

Variable sex	Energy intake mean \pm SD	P value	Physical activity mean \pm SD	P value	high fat and protein dietary pattern (n)*	P value	dairy dietary pattern (n)*	P value	relatively healthy dietary pattern (n)*	P value
female	2781.5 \pm 593.1	0.793	30.4 \pm 2.4	0.045	18	0.936	22	0.364	16	0.446
male	2535.8 \pm 192.8		33.0 \pm 3.3		14		11		118	

* n, participants in the highest category of adherence to each dietary pattern are compared.

Discussion

To our knowledge, few studies are evaluating the effect of Ramadan fasting on GI problems. Our study showed that the prevalence of GI discomforts was not different during Ramadan fasting compared to the other months in apparently healthy subjects. The dietary patterns tended toward more protein and fat consumption in Ramadan. This was also approved in a systematic review by Sadeghpour et al. on 23 studies (11). Considering that the tradition of Muslim fasting is based on the lunar calendar that can be found in different seasons each year, the pattern of food intakes varies greatly. Although the role of customs, culture, and food access status is very clear (4).

Our study demonstrated that adherence to high carbohydrate dietary patterns as well as dairy dietary patterns did not significantly affect GI discomfort while adherence to a full fat dietary pattern before Ramadan fasting was associated with a significant reduction in constipation (OR=0.62). There are controversial comments about the effect of a high-fat diet on constipation. A high-fat diet seems to have laxative effects but some studies demonstrated that a high-fat diet exacerbates constipation via an increase in oxidative stress and inflammation (12). Keshteli et al. reported that Ramadan

fasting increased the frequency and severity of constipation in healthy subjects while the other GI symptoms did not show significant alteration (2). They mentioned a decrease in fluid intake and physical activity to explain their findings.

We found that adherence to healthy dietary patterns reduced dyspepsia and other GI problems like abdominal pain, constipation, and diarrhea before and during Ramadan. Whole grains and fiber as the main indicators of a healthy diet are considered as regulators for movement, secretion, and function of the GI system (13). However, our study did not show the beneficial effects of a healthy diet on constipation. It seems that other factors like inactivity and dehydration should have a more dominant effect.

A higher incidence of peptic ulcers after Ramadan fasting is reported in some studies (2, 14, 15) while Emami and Rahimi showed that the prognosis of peptic ulcers in Ramadan did not have significantly different compare to the other months (16). Sadeghpour et al. in their systematic review noted that Ramadan fasting did not hurt healthy people however it could be harmful to patients with a history of peptic ulcers and GI bleeding (11).

Dietary intakes of participants in Ramadan showed that most of the fasting people did not

have proper diets based on medical-nutritional principles. Despite the religious and medical recommendations to avoid overeating and high-sugar and high-fat foods, people consume high calorie-dense meals in Sahari and Iftari to eliminate hunger during fasting. Fedail et al. also reported that Muslims tend to eat more sugary foods during Ramadan fasting (17). As our study showed, total energy intake during Ramadan fasting did not significantly change compared to before. Also, especially when Ramadan fasting is in hot months, taking ice water and cool syrups are very common. These habits can worsen GI problems.

Results of subgroup analyses represented that the total daily energy intake of men was higher than women in non-fasting conditions. Men tended to reduce their total energy intake during the Ramadan fasting while the total energy intake of women did not significantly change before and during Ramadan. Subgroup analyses also represented that men were more physically active than women before and during Ramadan fasting.

Identification of the dominant dietary food patterns using food frequency questionnaires and several food-recalls and calculation of total energy and nutrient intakes before and during Ramadan fasting were the strengths of our study. The number of studies evaluates the relationship between dietary patterns and GI discomfort is negligible. Our study also had some limitations, for example, it was not possible to provide a larger sample size for the study according to the inclusion criteria and because we had to remove those who thought were not able to complete fasting for at least 3 weeks. Also, women were not allowed to fast during their menstrual period.

Conclusion

This study showed that total energy intake during Ramadan fasting did not differ compared to before while the dietary patterns changed significantly. The full-fat diet reduced hunger pain and constipation but increased diarrhea while a healthy diet reduced dyspepsia and diarrhea during the fasting period. More precise research in the future and with a different population with a larger sample size can show the effects of Ramadan fasting on digestive problems. We strongly recommend that future research focus on dietary habits and dietary patterns during fasting.

Funding

This study was funded by Vice Chancellor for Research, Shahrekord University of Medical Sciences, Shahrekord, Iran.

Acknowledgment

This study was extracted from the MD dissertation which was performed in Shahrekord, Chaharmahal, and Bakhtiari province of Iran and approved by the Medical Research Committee of Shahrekord University of Medical Sciences (in.skums.rec.1395.49). We wish to thank all colleagues and participants for their valuable cooperation.

References

- 1- Tourkmani AM, Alharbi TJ, Rashed AMB, AlRasheed AN, AlBattal SM, Abdelhay O, et al. Impact of Ramadan focused education program on medications adjustment for patients with type 2 diabetes in a primary health care institution in Saudi Arabia. *Diabetes Metab Syndr*. 2019; 13(1):161-5.
- 2- Keshteli AH, Sadeghpour S, Feizi A, Boyce P, Adibi P. Evaluation of self-perceived changes in gastrointestinal symptoms during Ramadan fasting. *J Relig Health*. 2017; 56(5):1620-7.
- 3- Adibi, P, Keshteli AH, Esmailzadeh A, Afshar H, Roohafza H, Bagherian-Sararoudi R, et al. The study on the epidemiology of psychological, alimentary health and nutrition (SEPAHAN): overview of methodology. *J Res Med Sci*. 2012; 17(5):S292-8.
- 4- Trepanowski JF, Bloomer RJ. The impact of religious fasting on human health. *Nutr J*. 2010; 9(1):1-9.
- 5- Darwish Moghadam S, Hagh-Dost A, Bahraini F. Gastrointestinal symptoms in healthy people and its relationship with food consumption pattern during ramadan in Kerman - 1377. *J Mashhad Uni Med Sci*. 2000; 59(75):45-56.
- 6- Esfahani FH, Asghari G, Mirmiran P, Azizi F. Reproducibility and relative validity of food group intake in a food frequency questionnaire developed for the Tehran Lipid and Glucose Study. *J Epidemiol*. 2010; 20(2):150-8.
- 7- Jafari T, Faghihimani E, Feizi A, Iraj B, Javanmard SH, Esmailzadeh A, et al. Effects of vitamin D-fortified low fat yogurt on glycemic status, anthropometric indexes, inflammation, and bone turnover in diabetic postmenopausal women: a randomised controlled clinical trial. *J Clin Nutr*. 2016; 35(1): 67-76.
- 8- Ainsworth BE, Haskell WL, Herrmann SD, Meckes N, Bassett Jr, Tudor-Locke C, et al. 2011 Compendium of Physical Activities: a second update of codes and MET values. *Med Sci Sports Exerc*. 2011; 43(8):1575-81.
- 9- Kulich KR, Madisch A, Pacini F, Piqué JM, Regula J, Van Rensburg CJ, et al. Reliability and validity of the Gastrointestinal Symptom Rating Scale (GSRS) and

- Quality of Life in Reflux and Dyspepsia (QOLRAD) questionnaire in dyspepsia: a six-country study. *Health Qual Life Outcomes*. 2008; 6(1): 1-12.
- 10- Mazaheri M, SadatKhoshouei M. Comparison between Psychometric Characteristics of Persian Version of the Gastrointestinal Symptoms Rating Scale in Functional Gastrointestinal Disorders and Normal Groups. *Govaresh*. 2012; 17(1):18-24.
- 11- Sadeghpour S, Keshteli AH, Daneshpajouhnejad P, Jahangiri P, Adibi P. Ramadan fasting and digestive disorders: SEPAHAN systematic review . *J Res Med Sc*. 2012; 17(4): 150-8.
- 12- Mukai R. High-fat diet and constipation. *Free Radic Biol Med*. 2018; 120: S134-5.
- 13- Zito FP, Polese B, Vozzella L, Gala A, Genovese D, Verlezza V, et al. Good adherence to mediterranean diet can prevent gastrointestinal symptoms: A survey from Southern Italy. *World J Gastrointest Pharmacol Ther*. 2016; 7(4): 564.
- 14- Özkan S, Durukan P, Akdur O, Vardar A, Torun E, İkizceli I. Does Ramadan fasting increase acute upper gastrointestinal haemorrhage?. *J Int Med Res*. 2009; 37(6): 1988-93.
- 15- Gokakin AK, Kurt A, Akgol G, Karakus BC, Atabey M, Koyuncu A, et al. Effects of Ramadan fasting on peptic ulcer disease as diagnosed by upper gastrointestinal endoscopy. *Arab J Gastroenterol*. 2012; 13(4):180-3.
- 16- Emami M H, Rahimi H. Effects of Ramadan fasting on acute upper gastrointestinal bleeding due to peptic ulcer. *J Res Med Sci*. 2006; 11(3):170-5.
- 17- Fedail SS, Murphy D, Salih SY, Bolton CH, Harvey RF. Changes in certain blood constituents during Ramadan. *Am J Clin Nutr*. 1982; 36(2):350-3.