

The Risk Impact and Benefits of Ramadan Fasting on Patients with Type 2 Diabetes in a Sample of Iraqi Patients

Nihad Abdallah Selman, Ali Hussein Alwan Albayati, Yasameen Alsaffar, Adil Hamid Farhan¹

College of Medicine-Department of Medicine, University of Babylon, ¹Diploma Aviation Medicine, Babylon Health Directorate, Babil, Iraq

Abstract

Background: Ramadan fasting is one of the five pillars of Islam. In it, Muslims abstain from eating, drinking, and having sexual intercourse from dawn to sunset every day for the whole holy (Ramadan) month. **Objectives:** This study was conducted to assess the risk impact and benefits of Ramadan fasting on patients with diabetes in a sample of Iraqi patients. **Materials and Methods:** This is a cross-sectional prospective study involving 106 patients with type 2 diabetes who decide to fast Ramadan enrolled in this study and parameters gathered before and after Ramadan to identify anthropometric and biochemical changes that develop throughout the whole month. **Results:** More than 96% of patients fasted for more than 25 days of Ramadan. Hypoglycemia developed in 17% of patients. It occurred significantly in those with a history of mild and severe hypoglycemia and hyperglycemia >300 mg/dL in the preceding 3 months before Ramadan and those with comorbidities especially, stroke, chronic kidney disease (CKD), and hypertension. Following Ramadan, there was a significant reduction in HbA1c, systolic and diastolic blood pressure, and significant weight reduction. **Conclusion:** Most patients with diabetes can fast for more than 25 days during the whole Ramadan month. Ramadan fasting can be considered as safe in patients with type 2 diabetes without comorbidities (like CKD, stroke). Ramadan fasting reduces the glycated hemoglobin, reduces body weight, and reduces blood pressure in patients with diabetes.

Keywords: DM, fasting Ramadan fasting, Muslims, Ramadan, type 2 diabetes

INTRODUCTION

Diabetes mellitus (DM) is a group of chronic metabolic diseases characterized by hyperglycemia that occurs due to a defect in insulin secretion (from pancreatic beta cells) or action or both.^[1] Diabetes can be classified into type 1, type 2, gestational, or secondary to other diseases including endocrine diseases such as acromegaly,^[2] hypothyroidism,^[3] or infectious conditions following COVID-19, for example.^[4,5] Type 2 DM occurs mainly in adults but can be noticed in young adults,^[6] adolescents, and pediatric.^[7] Ramadan fasting is one of the five pillars of Islam. In Ramadan, Muslims abstain from eating, drinking, and having sexual intercourse from dawn to sunset every day for the whole holy (Ramadan) month. It is obligatory for everyone with intact physical and mental health.^[8] Fasting Ramadan in patients with diabetes is considered a major issue to be managed by health care providers every year. Previous studies noticed that most patients with type 1 or type 2 diabetes will

choose to fast and they did so most days throughout the whole month.^[9] The normal body response to abstaining from eating is to reduce insulin secretion associated with glycogenolysis, gluconeogenesis, and ketogenesis to avoid hypoglycemia; however, these processes in patients with diabetes increase the suggestion of complications including hypoglycemia, hyperglycemia (because of increase stress hormones during fasting hours), dehydration, or ketoacidosis.^[10] This study was conducted to assess the risk impact and benefits of Ramadan fasting on patients with type 2 diabetes in a sample of Iraqi patients.

Address for correspondence: Dr. Nihad Abdallah Selman, College of Medicine-Department of Medicine, University of Babylon, Babil, Iraq.
E-mail: dr.nihad1977@gmail.com, dr.nihad2005@uobabylon.edu.iq

Submission: 24-Jan-2023 **Accepted:** 21-Feb-2023 **Published:** 02-Aug-2023

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Selman NA, Albayati AHA, Alsaffar Y, Farhan AH. The risk impact and benefits of Ramadan fasting on patients with type 2 diabetes in a sample of Iraqi patients. Med J Babylon 2023;20:352-6.

Access this article online

Quick Response Code:



Website:
www.medjbabylon.org

DOI:
10.4103/MJBL.MJBL_87_23

MATERIAL AND METHODS

This is a cross-sectional prospective study conducted on more than 300 Muslim patients with type 2 diabetes and followed them before and after fasting during the Holy Ramadan month. The patient who visited a consultation unit who chose to fast Ramadan. Some patients with incomplete data or those who lose their follow-up were excluded, whereas the remaining 106 patients who complete their follow-up were included in this study. The study was conducted over two successive Ramadan months over 2 years, starting from February 2021 (1–2 months before Ramadan month 1442 A.H.) to May 15, 2022 (after Ramadan month 1443 A.H.). The basal before-Ramadan data gathered from each patient include gender, age per year, height per centimeter, body weight in kg, body mass index (BMI),^[1] systolic blood pressure (SBP), diastolic blood pressure (DBP) (a mean of 2 readings after at least 15-min rest), type of diabetes (diagnosed according to the recommendation of American Diabetic Association (ADA) guidelines 2021),^[1] duration of diabetes, type of medication used, history of comorbidities (including hypertension, retinopathy, neuropathy, chronic kidney disease, ischemic heart disease, stroke, or DM foot), history of previous Ramadan fasting, any history of hyperglycemia > 300mg/dL or diabetic ketoacidosis, hypoglycemia, or severe hypoglycemia for the preceding 3 months before Ramadan, basal random or fasting blood glucose, basal HbA1c. Those patients who were unfit to fast were exempted from fasting during Ramadan especially type 1 DM on multiple daily insulin injections.

The second visit appointment was immediately after Ramadan month to follow their fasting days history, blood glucose monitoring sheets, history, and number of hypoglycemia, severe hypoglycemia, hyperglycemia > 300mg/dL or diabetic ketoacidosis, any hospitalization history due to either hypoglycemia or hyperglycemia, number of fasting days through the whole month, and the causes of each accidental breakfasting. The second after-Ramadan data were collected regarding their new weight, SBP, DBP, and thorough examination for any new complications or events throughout the Ramadan month in addition to requesting a new HbA1c test.

Continuous variables were expressed by mean $\pm$ Standard Deviation (SD) whereas categorical variables were expressed as a percentage. The relationship between two categorical variables was analyzed by using Pearson's Chi-square test. The differences between continuous variables were analyzed by Student's paired *t* test, whereas the Analysis Of Variance (ANOVA) test was conducted between categorical versus continuous variables. The *P*-value of <0.05 is considered statistically significant.

Ethical approval

All participant patients provide their verbal informed consent to participate in this study. This study approved by

the ethical committee of College of Medicine, University of Babylon (Reg: 10-1 at December 20, 2020). The procedures in this study adhered to the ethical guidelines of the Declaration of Helsinki.

RESULTS

The total final number of patients enrolled in this study was 106 patients. Almost all patients had type 2 DM including 54 women (50.9%) and 52 men (49.1%). The mean age of patients was 50 ± 10.8 years. The overall demographic and clinical features of the study patients are shown in Table 1. Around half of the patients were hypertensive and the overall diabetic complications were relatively high in study patients and the average weight was higher than normal.

Around half of the study patients were hypertensive; with significant reduction for both systolic blood pressure and diastolic blood pressure after Ramadan (137.36 ± 19.45 vs 127.64 ± 13.51 and 82.45 ± 8.76 vs 78.58 ± 6.43 respectively; *P*-value < 0.0001) [Table 2]. The glycated hemoglobin (HbA1c) was relatively high in study patients with significant reduction after Ramadan (9.15 ± 2.3 vs 7.6 ± 1.19 ; *P*-value < 0.0001). The patients in this study were relatively overweight with a BMI mean

Table 1: Demographic and clinical features of the study patients

Age per years		50 $\pm$ 10.8
Gender No. (%)	Male	52 (49.1)
	Female	54 (50.9)
Duration of DM No. (%)	<10 years	66 (62.3)
	>10 years	40 (37.7)
SBP before Ramadan (/mmHg)	(mean $\pm$ SD)	137.36 $\pm$ 19.46
DBP before Ramadan (/mmHg)	(mean $\pm$ SD)	82.45 $\pm$ 8.8
SBP after Ramadan (/mmHg)	(mean $\pm$ SD)	127.6 $\pm$ 13.5
DBP after Ramadan (/mmHg)	(mean $\pm$ SD)	78.58 $\pm$ 6.427
HbA1c before Ramadan	(mean $\pm$ SD)	9.09 $\pm$ 2.3
HbA1c after Ramadan	(mean $\pm$ SD)	7.55 $\pm$ 1.7
Height (/cm)	(mean $\pm$ SD)	169.6 $\pm$ 5.5
Weight before Ramadan (/kg)	(mean $\pm$ SD)	79.01 $\pm$ 8.85
Weight after Ramadan (/kg)	(mean $\pm$ SD)	76.64 $\pm$ 9.3
BMI (kg/m ²)	(mean $\pm$ SD)	27.5 $\pm$ 3.3
Retinopathy No. (%)		40 (37.7)
History of CKD No. (%)		20 (18.9)
Stroke No. (%)		26 (24.5)
IHD No. (%)		30 (28.3)
DM foot No. (%)		15 (14.2)
Heart failure No. (%)		12 (11.3)
Hypertension No. (%)		50 (47.2)
Advice not to fast No. (%)		38 (35.8)
Fasting days No. (%)	>25 days	102 (96.2)
	<25 days	4 (3.8)

DM: diabetes mellitus, SBP: systolic blood pressure, SD: Standard Deviation, DBP: diastolic blood pressure, BMI: body mass index, CKD: chronic kidney disease, IHD: ischemic heart disease, kg: kilogram

(of 27.46 ± 3.4) and had significant weight reduction after Ramadan fasting (from 79.40 ± 8.66 to 76.83 ± 9.169 ; P -value < 0.0001).

The majority of patients enrolled in this study; 92 (86.79%) patients fasted almost all Ramadan days (30 days), in addition to 10 (9.43%) patients fasted between 25 and 29 days. However, a total number of 102 (96.2%) patients fasted more than 25 days throughout the whole month; while only 4 (3.77%) patients fasted less than 25 days [Figure 1].

Patients in this study were subdivided according to their history of hypoglycemia during Ramadan as shown in Table 3. Hypoglycemia developed in 18 (17%) of patients without a significant relationship to both genders or the duration of diabetes. As well as it developed significantly in those with a history of both mild and severe hypoglycemia in the preceding 3 months before Ramadan (P -value < 0.0001 in both). Again, Ramadan

hypoglycemia occurred significantly in those patients with Ramadan severe hypoglycemia (P -value < 0.0001) and even in those with a history of hyperglycemia in the preceding 3 months before Ramadan (P -value = 0.01). As well as hypoglycemia developed significantly in those with a previous history of comorbidities like stroke (P -value = 0.001), hypertension (P -value = 0.004), and chronic kidney disease (P -value = 0.02). In contrast, the study failed to find any statistical relationship between hypoglycemia on one side and ischemic heart disease, heart failure, retinopathy, or diabetic foot on the other side. The important point; hypoglycemia developed significantly in most patients advised not to fast on the first visit before Ramadan but they insist to fast against our advice (P -value = 0.003).

DISCUSSION

Almost all of the study patients were type 2 DM because most type 1 DM patients were advised not to fast according to Diabetes And Ramadan (DAR) guidelines^[12] and the possibility of either hypo or hyperglycemia development during Ramadan as well as risks of diabetic ketoacidosis or thrombosis. However, some patients with

Table 2: Variable changes before and after Ramadan

Variables	Before Ramadan mean $\pm$ SD	After Ramadan mean $\pm$ SD	Variable changes	P -value*
Systolic blood pressure/mmHg	137.36 $\pm$ 19.46	127.64 $\pm$ 13.51	-9.71 $\pm$ -10.70	<0.0001
Diastolic blood pressure/mmHg	82.45 $\pm$ 8.76	78.58 $\pm$ 6.43	-3.86 $\pm$ -5.22	<0.0001
HbA1c	9.15 $\pm$ 2.30	7.60 $\pm$ 1.69	-1.55 $\pm$ -1.19	<0.0001
Weight/kg	79.40 $\pm$ 8.66	76.83 $\pm$ 9.169	-2.56 $\pm$ -4.18	<0.0001

*By t -test

SD: Standard Deviation

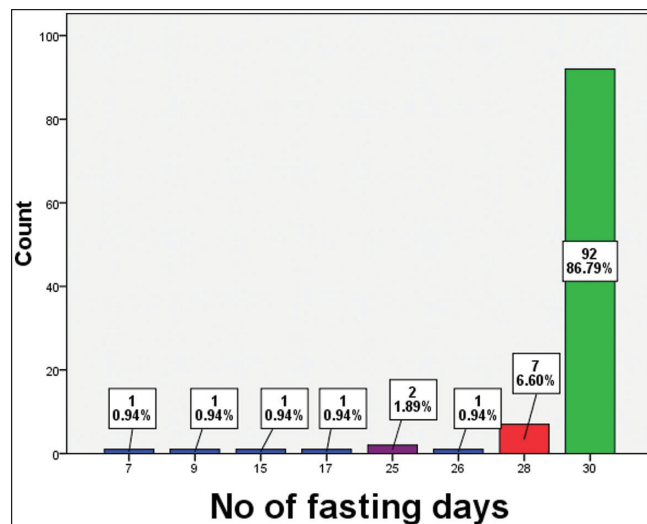


Figure 1: The distribution of patients according to their number of fasting days

Table 3: The comparison between patients who developed hypoglycemia from those without hypoglycemia

		Hypoglycemia attacks		P -value
		Hypoglycemia	No hypoglycemia	
No. (%)		18 (100)	88 (100)	
Gender	Male	8 (44.4)	44 (50)	0.6
	Female	10 (55.6)	44 (50)	
Before Ramadan hypoglycemia		18 (100)	2 (2.3)	0.000
Ramadan severe hypoglycemia		3 (16.7)	0 (0)	0.000
Before-Ramadan severe hypoglycemia		6 (33.3)	0 (0)	0.000
Ramadan hyperglycemia		4 (22.2)	14 (15.9)	0.5
Before Ramadan hyperglycemia		6 (33.3)	10 (11.4)	0.01
Advice not to fast	Yes	12 (66.7)	26 (29.5)	0.003
	No	6 (33.3)	62 (70.5)	
Stroke		10 (55.6)	16 (18.2)	0.001
Hypertension		14 (77.8)	36 (40.9)	0.004
History of CKD		8 (44.4)	12 (13.6)	0.002
IHD		8 (44.4)	22 (25)	0.09
Heart failure		4 (22.2)	8 (9.1)	0.1
Duration of DM	<10 years	10 (55.6)	56 (63.6)	0.5
	>10 years	8 (44.4)	32 (36.4)	
Retinopathy		8 (44.4)	32 (36.4)	0.5
DM foot		2 (11.1)	13 (14.8)	0.6

DM: diabetes mellites, CKD: chronic kidney disease, IHD: ischemic heart disease

type 1 DM who were insisted to fast against our advice have been excluded from the study as their sample size was small in comparison with type 2 DM patients and to avoid statistical bias. As a whole, there was significant metabolic profile improvement after Ramadan fasting. The glycated hemoglobin (HbA1c) was relatively high in study patients which was similar to other study that noted poor glycemic control in most of their patients.^[13] In this study we found significant reduction in glycated hemoglobin (HbA1c) in participants after Ramadan fasting which is considered as an important parameter for diabetic control; and these results agree with the previous studies carried out on Muslim patients with diabetes following Ramadan^[14] these findings may be explained due to decrease nutrient intake during fasting hours (day-time), regular blood glucose monitoring by participants that kept the blood glucose within the target as well as due to decrease in insulin resistance that improve the overall metabolic profile and body composition as a results of fasting.^[15] Moreover, for the same previous explanations, the study noticed significant weight reduction in comparison with that before Ramadan, these results are consistent with other studies that show significant weight loss and fat loss secondary to Ramadan fasting especially in obese or overweight patients.^[16] In the current study, the significant decrease in both systolic and diastolic blood pressure agrees with a previous study that showed a significant reduction of both systolic and diastolic blood pressure after Ramadan fasting irrespective of the weight change.^[17]

As many as more than 96% of the study patients fasted more than 25 days from the whole Holey month while the major cause for breakfasting was day-time hypoglycemia that significantly correlated with the history of mild or severe hypoglycemia in the preceding 3 months before Ramadan; these results match with the previous study results that document the significant correlation between Ramadan hypoglycemia with mild and severe hypoglycemia history in a year before Ramadan.^[9] In addition to that, this study showed a significant relationship between hypoglycemia attacks from one side and a history of stroke, chronic kidney disease, and hypertension from the other side; these results agreed with results concluded in another study regarding the risk of fasting during Ramadan to patients with CKD, especially in hot weather.^[18] However, there was no evidence to document the increase in the risk of stroke occurrence in patients with diabetes during Ramadan fasting but may cause major health impacts in a patient with stroke.^[19] These results collectively explain the role of guidelines that exempt such a patient from fasting.^[13]

CONCLUSION

Most patients with diabetes can fast for more than 25 days of the whole Ramadan month. Ramadan fasting

can be considered as safe in patients with type 2 diabetes without comorbidities (like CKD, stroke). Ramadan fasting reduces the glycated hemoglobin, reduces body weight, and reduces blood pressure in patients with diabetes.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. American Diabetes Association. 2. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2021. *Diabetes Care* 2020;44(Suppl_1):S15-S33.
2. Selman N, Rahma AM, Hussain A. Prevalence of glucose intolerance and hypertension of patients with acromegaly in Iraq. *Ann Trop Med Public Heal* 2021;24:71-82.
3. Ali A, Allehibi K, Al-Juboori N. Glycemic status in patients with primary hypothyroidism and its relation to disease severity. *Mustansiriya Med J* 2020;19:20-4.
4. Abd Al-Zahra IS, Selman NA. Prevalence of glucose intolerance and new-onset diabetes in COVID-19 infected patients in Babylon province, Iraq. *J Commun Dis* 2022;2022:150-6.
5. Adil Z, Chabuck G, Abed TA. The interrelationship between diabetes mellitus and COVID-19. *Med J Babylon* 2022;19:1-4.
6. Selman NA, Albayati AHA, Alsaffar Y. Role of antiGAD65 Ab, C-peptide level and clinical characteristics in classification of newly diagnosed diabetes in patients aged 20–40 years. *Ann Trop Med Public Heal* 2020;23:133-8.
7. Alsaffar Y, Hussain AMA, Selman NA. Prevalence of type 2 diabetes in pediatrics and adolescents newly diagnosed with diabetes in Babylon governorate, Iraq. *Arch Venez Farmacol y Ter* 2020;39:839-43.
8. Quran in English and Arabic, with Recitations. with Easy Translation. Available from <https://www.corequran.com/2/#184> [Last accessed January 23, 2023].
9. Salti I, Bénard E, Detournay B, Bianchi-Biscay M, Le Brigand C, Voinet C, *et al.* A population-based study of diabetes and its characteristics during the fasting month of Ramadan in 13 countries. *Diabetes Care* 2004;27:2306-11.
10. Bonakdaran S. Physiology of Ramadan fasting. *J Nutr Fast Health* 2016;4:64-9.
11. Calculate Your BMI—Standard BMI Calculator. Available from https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm [Last accessed July 23, 2022].
12. Hassanein M, Afandi B, Yakooob Ahmedani M, Mohammad Alamoudi R, Alawadi F, Bajaj HS, *et al.* Diabetes and Ramadan: Practical guidelines 2021. *Diabetes Res Clin Pract* 2022;185:109185.
13. Al-Bayati HF, Al-Diwan JK. Dietary pattern assessment and body composition analysis of adult patients with type 2 diabetes mellitus attending diabetes and endocrine center in Mirjan Teaching Hospital, Babil/ 2021. *Med J Babylon* 2022;19:250.
14. Saada DA, Selselet Attou G, Belkacemi L, Ait Chabane O, Italhi M, Mohamed Ali BA, *et al.* Effect of Ramadan fasting on glucose, glycosylated haemoglobin, insulin, lipids and proteinous concentrations in women with non-insulin dependent diabetes mellitus. *Afr J Biotechnol* 2022;9:87-94.
15. Albosta M, Bakke J. Intermittent fasting: is there a role in the treatment of diabetes? A review of the literature and guide for primary care physicians. *Clin Diabetes Endocrinol* 2021;7:1-12.
16. Fernando HA, Zibellini J, Harris RA, Seimon RV, Sainsbury A. Effect of Ramadan fasting on weight and body composition in

- healthy non-athlete adults: A systematic review and meta-analysis. *Nutrients* 2019;11:1-4.
17. Al-Jafar R, Themeli MZ, Zaman S, Akbar S, Lhoste V, Khamliche A, *et al.* Effect of religious fasting in Ramadan on blood pressure: Results from Lorans (London Ramadan study) and a meta-analysis. *J Am Heart Assoc* 2021;10:21560.
18. Habas E, *et al.* Fasting Ramadan in chronic kidney disease (CKD), kidney transplant and dialysis patients: Review and update. *Cureus* 2022;14:e25269.
19. Almulhem M, Susarla R, Alabdulaali L, Khunti K, Karamat MA, Rasiah T, *et al.* The effect of Ramadan fasting on cardiovascular events and risk factors in patients with type 2 diabetes: A systematic review. *Diabetes Res Clin Pract* 2020;159:107918.