



The effect of Ramadan fasting on well-being and attitudes toward diabetes in patients with diabetes

N Olgun*

Introduction

The prevalence of diabetes in several countries with large Muslim populations appears to be similar to the rates observed in Western countries, and is increasing by 10% per year as a result of urbanisation and socioeconomic development.¹ It is estimated that there are 1.1–1.5 billion Muslims worldwide, comprising 18–25% of the world population.^{2,3} Fasting during Ramadan, a holy month of Islam, is an obligatory duty for all healthy adult Muslims. A 4.6% prevalence of diabetes worldwide,⁴ coupled with the results of the population-based Epidemiology of Diabetes and Ramadan 1422/2001 (EPIDIAR) study (on 12 243 people with diabetes from 13 Islamic countries), which showed that 43% of patients with type 1 diabetes and 79% of patients with type 2 diabetes

Abstract

Background: Most Muslim patients with diabetes would like to fast, even though they are exempt from fasting due to their health condition.

Aims: This study was planned to assess the fasting condition of patients with diabetes and the effects of fasting on metabolic control, attitudes of the patients towards the disease, and their state of well-being.

Methods: 200 patients with type 2 diabetes who attended the diabetes clinic in the first week of Ramadan month were included in the study. The data was collected via a questionnaire form that contained sociodemographic characteristics, 'diabetes attitude measures' and 'WHO Measurement of Well-being' (22 questions). Three months after the first assessment, all participants were invited to attend for assessment of metabolic variables and were asked about their fasting situation.

Results: The percentage of patients with type 2 diabetes participating in the study was 40%. There was no significant difference in HbA_{1c} values of non-fasting patients with type 2 diabetes after three months ($t=1.16$; $p>0.05$). A statistically significant relationship was observed in HbA_{1c} values of fasting patients with diabetes (using insulin and fasting $t=2.77$; $p=0.006$, using oral antidiabetic drugs (OAD) and fasting $t=6.55$; $p=0.000$). The attitude scores of all patients with diabetes towards diabetes were identified to be negative ($2.05+0.30$) and state of well-being in the middle level ($59.66+14.10$).

Conclusions: The difference between fasting and non-fasting patients with diabetes groups in terms of attitude scores towards diabetes and state of well-being was not statistically significant ($p>0.05$).

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Key words

Diabetes mellitus; Ramadan; fasting; metabolic control; well-being; attitude toward diabetes

Authors

N Olgun, RN, PhD, Associate Professor, Marmara University School of Nursing, Istanbul, Turkey

*Correspondence to:

N Olgun, Marmara University School of Nursing, Dept of Medical Nursing, Tibbiye Cad 813 26 Hydarpassa, Istanbul, Turkey

Tel: +90 216 3302070

Fax: +90 216 4183773

e-mail: nerminolgun@superonline.com

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fast during Ramadan,⁵ leads to the estimation that approximately 40–50 million people with diabetes worldwide fast during Ramadan.⁶

Ramadan is a lunar-based month, and its duration varies between 29 and 30 days. Its timing changes with respect to the seasons. Depending on the geographical location and season, the duration of the daily fast may range from a few to more than 20 hours. Muslims who fast during Ramadan must abstain from eating, drinking, use of oral medications, and smoking from predawn to after sunset; however, there are no restrictions

on food or fluid intake between sunset and dawn. Most people consume two meals per day during this month, one after sunset, referred to in Arabic as Iftar (breaking of the fast meal), and the other before dawn, referred to as Suhur (predawn). Fasting is not meant to impose excessive hardship on the Muslim individual.⁶ However, when fasting may significantly affect the health of the individual or when a subject is sick, Islam exempts that person from fasting. The Koran specifically exempts the sick from the duty of fasting, especially if fasting might lead to harmful



consequences for the individual. Patients with diabetes fall under this category because their chronic metabolic disorder may place them at high risk for various complications if the pattern and amount of their meal and fluid intake is markedly altered.⁶ However, a significant number of patients insist on fasting against the advice of their doctors and the permission of religious authorities.⁵

There is still a lack of information about the standard management of diabetes in the Muslim world and there are no epidemiological data available on the ratio of patients with diabetes who fast during Ramadan.⁵ Some studies have looked at the biochemical changes occurring during Ramadan fasting both in normoglycaemic subjects⁷⁻⁹ and in subjects with diabetes.¹⁰⁻¹⁹ Most of these showed little change in glycaemic control, although blood lipid levels and body weight have sometimes been shown to be reduced.^{13,16-18} Moreover, it seems clear that fasting blood glucose levels can be stabilised with good dietary control.^{14,16-18} Certain OADs, including glibenclamide and repaglinide, may be used safely and effectively in type 2 diabetes during Ramadan,¹⁶⁻²⁰ and certain insulin derivatives may be of interest to subjects with type 1 diabetes who insist on fasting during Ramadan.²¹

The effect of lifestyle changes and changes in treatment regimen and the frequency of complications in patients with diabetes who fast during Ramadan are largely unknown.

Objectives

The objectives of this study were to assess the care and characteristics of patients with diabetes and to learn about the effects of fasting on characteristics of diabetes

during Ramadan in Turkey, where Muslims make up majority of the population. The study was targeted to assess:

- The fasting situation and changes in metabolic control
- Attitudes towards the disease and well-being in fasting and non-fasting patients with type 2 diabetes.

Materials and methods

The research was carried out at the diabetes outpatient clinic of a state hospital. The subjects were followed in this clinic at regular intervals of 3-4 months.

Participants and design

Two hundred patients with type 2 diabetes attending the diabetes clinic in the first week of Ramadan month were included in the study. Inclusion criteria included a diagnosis of diabetes over one year ago, at least a primary school education, and no serious complications or any hearing or comprehension problems. The purpose of the research was explained to the participants and their written consent obtained.

This study was carried out by a trainer who planned the research and by two nurses who work at the outpatient clinic where the research was performed. The questionnaires were filled out during face-to-face interviews with the individuals with diabetes after the questions were explained. Patients who were willing to participate were included in the study. The purpose of the research was explained and written informed consent was obtained. Approval from an ethics committee was not deemed necessary because there was no invasive procedure or any intervention.

The fasting period during Ramadan is usually 29-30 days; it was 30 days the year of this study. Those who fasted for 15 days

or longer during Ramadan and completed the non-fasted days in the following month were included in the 'fasting' group. The duration of fasting shows variation according to the year because it takes place between sunrise and sunset. It was at least 12 hours the year this study was carried out.

Measures and data collection

The data was collected via a questionnaire, which included 34 questions about sociodemographic characteristics, conditions related to fasting and metabolic control, 'diabetes attitude measure' which constitutes 34 questions and assesses attitude towards diabetes and 'WHO Measurement of Well-being' with 22 questions, which questions the positive or negative effects of changes in the treatment of patients on psychological state of well-being. Three months after the first assessment, we invited all the participant patients with diabetes to return, assessed their metabolic variables [HbA_{1c}, BMI (kg/m²), blood pressure (mmHg), total cholesterol, microalbuminuria and the existence of any complications] and asked about their fasting situation.

Questionnaire: The questionnaire, prepared by considering similar studies in which individuals with diabetes were assessed, included sociodemographic characteristics, fasting situation, metabolic and clinical parameters and definitive information of the individuals and disease-related chronic complications.

The sociodemographic characteristics of the patient with diabetes included gender, age, marital status, educational status, profession, health insurance, fasting situation, how many years he/she has been fasting, whether or not the patient received any education on fasting, whether he/she consulted health



or religious authorities, changes in usual practices, and complications at the time of fasting. Variables related to disease include duration of diabetes, family history of diabetes, the treatment of diabetes and reception of any education on diabetes.

The questionnaire was structured by the researcher after reviewing the literature and obtaining advice from experts. The questions are not in the form of a standard scale. Therefore, it has not been validated.

Diabetes Attitude Scale (DAS): DAS was developed by national diabetes commission in the USA and was translated into Turkish by Ozcan,²² and is used as a reliable measure of concordance in patients with diabetes. The measure includes 34 questions, and measure entries are scored via a Likert-type score which varies from 1 to 5. If the score is >3 it

shows a positive response and if it is <3, it shows a negative response. An increase to 5 or decrease to 1 in a score shows a strengthening in the trend to that direction. The general diabetes attitude score is calculated by adding up all entry scores in the measure and dividing the total by 34. As in all entries, if the score is >3, it shows positive attitude and if it is <3 it shows negative attitude, and an increase or decrease in a score strengthens the attitude in that direction. The measure is administered by the method of fulfilling by itself.

Well-being scale (W-BQ): W-BQ including four subscales were used to evaluate depression (six items), anxiety (six items), energy (four items), and positive well-being (six items). W-BQ has been designed to measure psychological well-being in subjects with chronic somatic illness and is recommended by

the World Health Organization (WHO) for widespread use.²³ W-BQ consists of 22 items scored on a Likert scale of 0–3. We used the Turkish version of WHO W-BQ. Reliability and validity of the Turkish version of W-BQ has been tested and approved by Sengül *et al.*²⁴ All the patients were asked to complete the W-BQ in the diabetes unit.

Data analysis

Group comparisons were performed by Student's *t* and χ^2 tests. DAS and W-BQ subgroups comparisons were conducted using one-way analysis of variance (ANOVA), followed by Least Significant Difference. Statistical analysis was performed using the statistical package SPSS version 10.0 (SPSS, Chicago, IL). Data are presented as the mean \pm SD unless otherwise indicated. The differences were considered significant if $p \leq 0.05$.

	All (n=200)	Fasting (n=80)	Not fasting (n=120)	p-value
Age (years)	56 \pm 7	55 \pm 7.3	57 \pm 7	0.22
Female sex (%)	69.0	71.0	67.0	0.46
Education (%)				0.12
< High school	5.0	4.5	5.5	
High school	10.5	12.0	9.0	
>High school	84.5	83.5	85.5	
Diabetes duration (%)				0.91
1-5 years	35.0	34.5	35.5	
6-10 years	32.5	32.0	33.0	
11-20 years	32.5	33.5	31.5	
Treatment (%)				0.06
Tablets	66.0	75	60	
Insulin	34.0	25	40	
Metabolic variations				
BP (mmHg)				
Systolic	132.5 \pm 11.3	131.8 \pm 12.5	133.3 \pm 12.3	0.92
Diastolic	78.9 \pm 9.5	79.3 \pm 9.5	78.5 \pm 9.8	0.88
BMI (kg/m ²)	31.4 \pm 4.7	32.2 \pm 4.5	30.6 \pm 4.9	0.94
HbA _{1c} (%)	7.4 \pm 1.9	7.2 \pm 1.8	7.6 \pm 1.8	0.06

Table 1. Characteristics of fasting and non-fasting subjects during Ramadan



Results

Mean age of the patients with type 2 diabetes participating in the study was 56 ± 7 years and 69% of them were women, most of whom were housewives (47%). A total of 35% had diabetes for 5–10 years; 34% used insulin and 66% used OAD. The rate of fasting was 40% in our study group. A total of 75% of patients with diabetes who fasted were on OAD and 25% were on insulin treatment. All of those on insulin used mixed-type insulin twice daily.

There were no significant differences in age, education level, diabetes duration, type of treatment and metabolic variables (BP, BMI, HbA_{1c}) between subjects in fasting and non-fasting groups (Table 1).

After three months, there was not a significant difference in HbA_{1c} values of non-fasting patients with diabetes ($t=1.16$; $p>0.05$). In fasting patients, a statistically significant change was observed in HbA_{1c} (using insulin and fasting: $t=2.77$; $p=0.006$; using OAD and fasting: $t=6.55$; $p=0.000$) (Table 2). All patients with diabetes were mildly obese ($BMI=31.4 \pm 4.7$) (Table 1) and there were no statistically significant relationships between those who do and do not fast and before and after fasting. A statistically significant relationship was not observed among other variables.

The attitude scores of all patients with diabetes towards diabetes were identified to be negative (2.05 ± 0.30) (Table 3) and state of well-being in the middle level (59.66 ± 14.10) (Table 4). In the comparison of fasting and non-fasting groups of patients with diabetes, the difference between them in terms of attitude scores towards diabetes and state of well-being was not considered to be significant ($p>0.05$).

	OAD			Insulin		
	During Ramadan	After Ramadan	p-value	During Ramadan	After Ramadan	p-value
Fasting	6.8 ± 1.4	7.6 ± 1.6	0.000	8.1 ± 1.8	8.4 ± 1.8	0.006
Not fasting	6.5 ± 1.2	6.6 ± 1.2	0.25	7.6 ± 1.7	7.5 ± 1.8	0.44

Table 2. Changes in HbA_{1c} during Ramadan and after Ramadan

	All (n=200)	Fasting (n=80)	Not fasting (n=120)	p-value
Attitudes toward diabetes scores	2.05 ± 0.30	2.09 ± 0.32	2.02 ± 0.29	0.47

Table 3. The attitudes toward diabetes scores of fasting and non-fasting subjects during Ramadan

	All (n=200)	Fasting (n=80)	Not fasting (n=120)	p-value
Depression	38.93 ± 13.15	40.40 ± 12.76	37.46 ± 13.55	0.54
Anxiety	47.25 ± 18.20	47.20 ± 19.33	47.31 ± 17.07	0.68
Energy	53.82 ± 20.99	54.38 ± 22.44	53.27 ± 19.55	0.88
Positive well-being	68.75 ± 19.96	69.96 ± 19.38	67.55 ± 20.54	0.37
General well-being	59.66 ± 14.10	59.64 ± 14.10	59.69 ± 14.10	0.51

Table 4. Well-being subscale scores of fasting and non-fasting subjects during Ramadan

Although all the patients with diabetes in the study group had record charts about glycaemic control at home, their glycaemic records before the month of Ramadan were not regular. Evaluations after the month of Ramadan showed that the frequency of previous measurements had decreased even more. 16% (32 patients) stated that they wanted to fast but did not because they feared hypoglycaemia, and 12% (24 patients) tried to fast but quit after experiencing some symptoms, for fear of getting worse. Subjects with diabetes in the fasting group stated that they fasted for 16–23 days during the 30-day period of Ramadan. Only four patients noted mild hypoglycaemia (50–60 mg/dl) in parallel to what they felt and only three patients noted

hyperglycaemia (300–350 mg/dl). None of the patients in the study were admitted to hospital during or after Ramadan.

A total of 38% of patients with diabetes participating in the study consulted health professionals when deciding whether or not to fast, while 21% consulted religious officers. A total of 75% of fasting patients reported a change in their practices related to the use of medicines, exercises, nutrition and blood sugar.

Discussion

A total of 40% of patients with type 2 diabetes participating in the study fasted. The fasting percentage was higher in those taking OAD than in those taking insulin (Table 1).

The fasting patients with diabetes in our study stated that



they experienced hypoglycaemia and hyperglycaemia symptoms more frequently during their fasting periods. Four subjects with diabetes who had experienced hypoglycaemia very rarely previously recorded hypoglycaemic values and three subjects who previously had good glycaemic control recorded hyperglycaemic values.

In this study, comparing fasting and non-fasting patients, statistically no significant difference was identified in other metabolic variables, except HbA_{1c}. The reason for finding no differences in BMI of patients with diabetes between the fasting and non-fasting groups may be due to the mild obesity in all participants.

A review of literature shows controversy about weight changes in patients with diabetes during Ramadan.^{16–26} While no food or drink is consumed between dawn and sunset during the month of Ramadan, there is no restriction on the amount or type of food consumed at night.²⁵ Furthermore, most patients with diabetes reduce their daily activities^{25,26} during this period in fear of hypoglycaemia. These factors may result in not only a lack of weight loss, but also a weight gain in such patients.²⁷ Most patients show no significant change in their glucose control.^{14,16,25} In some patients, serum glucose concentration may fall or rise.^{10,12} This variation may be due to the amount or type of food consumption, regularity of taking medications, gorging after the fast is broken, or decreased physical activity. In most cases, no episodes of acute complications (hypoglycaemic or hyperglycaemic types) occur in patients under medical management,^{26,27,28} and only a few cases of biochemical hypoglycaemia without clinical hazards have been reported.^{17,29,30}

In general, HbA_{1c} values show no change or even improvement during Ramadan.^{10,25,26,27,31} Only two studies have reported slight increases in glycated haemoglobin levels.^{17,20} Most patients with type 1 and type 2 diabetes show no change or a slight decrease in concentrations of total cholesterol and triglyceride.^{10,17,26}

Although some of the patients with diabetes participating in the study stated that they had consulted health professionals and/or religious authorities about fasting, we noted that there was no planned education or consultancy in the clinic where we performed the study. Literature review showed extensive recommendations about the subject. People with type 1 diabetes and type 2 diabetes who insist on fasting should be given a few recommendations about fasting.²⁸ They should be advised against skipping meals, taking medication irregularly or gorging after the fast is broken.²⁷

The principles of pre-Ramadan considerations are:³²

- Assessment of physical well-being
- Assessment of metabolic control
- Adjustment of the diet protocol for Ramadan fasting
- Adjustment of the drug regimen, e.g. change long-acting hypoglycaemic drugs to short-acting drugs to prevent hypoglycaemia)
- Encouragement of continued proper physical activity
- Recognition of warning symptoms of dehydration, hypoglycaemia and other possible complications.

It is clear that more work needs to be carried out on Ramadan fasting to evaluate physiological and pathological changes with proper research methods.³³

To our knowledge, there are no studies assessing the attitudes of fasting patients with diabetes

towards the disease and their state of well-being.

Recommendations

We noticed that controlling patients' blood sugar levels during and after Ramadan was very difficult. Therefore, we believe that educating patients on fasting and providing more information to diabetes care team members is very important.

The results of our study and the bulk of literature indicate that fasting in Ramadan is safe for the majority of patients with diabetes with proper education and diabetes management. Most people with type 2 diabetes can fast safely during Ramadan. Occasionally people with type 1 diabetes who insist on fasting during Ramadan can also do so if they are carefully managed. Strict attention to dietary control, daily activity and drug regimen adjustment are essential for successful Ramadan fasting.^{14,34}

Conflict of interest:

None

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