

Original article

Diabetic patients and Ramadan fasting: how they live it?

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Abstract

Objective: To quantify the prevalence of fasting during Ramadan month among diabetic patients and to observe the factors which were deferring between fasting and non-fasting diabetic patients. **Methods:** A cross-sectional study was carried out at primary health care clinics. The diabetic patients were interviewed with a structured data form by trained research assistants. Patients' age, gender, marital status, weight and height, diabetes type, medication, compliance, follow up, self monitoring and any complication faced during the fasting were collected. Cardiovascular risk factors including smoking habit, hypertension, dyslipidemia and pre-existing cardiovascular diseases were also recorded. **Results:** Out of 920 diabetic patients, 95% were suffering from DM type 2. Overall patients who fasted the whole month of Ramadan were 84%. The proportion of type 1 and type 2 was 71% and 85% respectively. About 63% of DM type 2 patients were treated with oral hypoglycemic agents (OHAs) alone and 2.4% with combination of OHAs and insulin. Only 42% of DM type 1 and 36% of DM type 2 patients has visited their physicians prior to their fast for advice. The significant differing factors which make non-fasting in diabetic patients, were medication (insulin), complications, hyperglycemia, retinopathy, neuropathy, nephropathy and vascular problems. **Conclusions:** This study has identified the factors in diabetic patients, were being compliant with medication, oral treatments and family support which lead to more likely to fast in Ramadan month. Factors which reduce fasting by these patients were acute and chronic complications, time since diagnosis and insulin treatment. Fasting would be acceptable for patients who are compliant with their diet and medication.

Keywords: Diabetes mellitus; Fasting, Ramadan; Hypoglycemic agents; Insulin; Saudi Arabia

INTRODUCTION

The prevalence of diabetes mellitus differs across the countries, but it is generally increasing due to changes in life styles. The estimate of World Health Organization (WHO) shows that around 100 million people are suffering with diabetes^[1, 2]. A community based national epidemiological health survey in

Kingdom of Saudi Arabia (KSA) has found the overall prevalence of diabetes mellitus in adult population to be 23.7%^[3].

Several of the world's religious authorities recommend a period of fasting or abstinence from certain foods. Of these, the Islamic fast during the month of Ramadan is strictly observed every year. It represents a recurring annual event in the life of a Muslim. Those observing the fast are required to abstain not only from eating and drinking, but also from consuming oral medication and intravenous nutritional fluids. Indeed fasting is one of the five main religious pillars of Islam. The majority of diabetic Muslims fast in Ramadan (one lunar month a year which contains 29-30 days). The fasting extends

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each day from dawn until sunset, a period which varies by geographical location and season. However, fasting may significantly affect the health of the faster, especially when the person is sick, but Islam exempts that person from fasting. However, a significant number of patients insist on fasting against the advice of their doctors and the permission of the religious authorities. A large multi-centre, population-based study has shown that diabetic patients fasted during Ramadan ranges from 42.8% to 78.7% among type 1 and type 2, respectively. The majority fasted at least for 15 days [1].

Islamic fasting during Ramadan should have, potentially, beneficial effects with regards to diabetic control. Fasting blood glucose level can be stabilized with good dietary control [4] or even fasting itself has better effect on glycemic control [5-7]. A study has shown that there was no significant increase in the number of hospitalization for stroke while fasting [8]. Treatment with oral anti-diabetic drugs, including glibenclamide, repaglinide and glimepiride could be used safely and effectively during Ramadan in type 2 diabetes [1, 2, 4, 9]. Insulin like glargine and lispro could also be used safely in type 1 and 2 DM [7, 10-13]. Studies have shown the safety of fasting during Ramadan in diabetic patients who follow their physician advice [14]. Patients with type 1 diabetes, who wish to fast, have been advised to take fastly absorption and short acting insulin like Lispro [15, 16]. On the other hand fasting may accelerate development of lipolysis and ketosis and increases glucagon level in type 1 diabetic patient which may lead to diabetic ketoacidosis (DKA) [17]. Major risks associated with fasting in patients with diabetes were to be hypoglycemia, hyperglycemia, DKA, dehydration and thrombosis. With good monitoring and physician advice, these complications could be avoided in most patients [18].

An extensive internet-based literature review failed to show any local study in the Kingdom of Saudi Arabia (KSA) that investigated the prevalence of fasting during Ramadan among diabetic patients and its associated complications. Hence, this study was carried out with specific objectives; (i) to quantify the prevalence of diabetic patients who were fasting during Ramadan and their characteristics; (ii) and to observe the factors which were differing between fasting and non-fasting patients.

MATERIALS AND METHODS

A cross sectional study was conducted on Muslim diabetic patients who visited primary care clinics (PCC) affiliated to King Khalid University (teaching) Hospital (KKUH) from September to December 2006, just after the end of lunar month of Ramadan, (1427 Hijra year). The study subjects were all diabetic patients irrespective of types, and who were diagnosed before last month of Ramadan (2006; 1427H). Those patients who were diagnosed just after Ramadan were excluded.

The study subjects (diabetic patients) were interviewed by trained research assistants using a well structured data collection form. The data related to age, gender, weight and height, marital status, exercise habit, types of diabetes, medications used, compliance with medication and follow up, self monitoring and any acute complication faced during the fasting period were also collected. The data collection form also included cardiovascular risk factors such as smoking habit, hypertension, dyslipidemia and pre-existing cardiovascular diseases. The clinical data were collected from their respective records.

The study was approved by the Department of Family and Community Medicine Research Committee, which looks into all aspects of the research including ethical issues.

The data were entered in MS Excel and analyzed by using SPSS version 12.0 statistical software. Descriptive statistics (mean, standard deviation and proportion) were used to summarize the study and outcome variables. Student's *t*-test for independent samples which was used to compare the mean values of quantitative variables. Chi-square test and odds ratios (OR) were used to observe and measure an association between two categorical variables. The 95% confidence intervals (CI) for difference of mean and odds ratios were calculated. A "*P*" value of <0.05 was regarded as statistically significant.

RESULTS

The study constitutes 920 diabetic patients, 95.9% were type2 DM and 67% were male. Eighty four percent were fasting during Ramadan; (71.1% and 84.8% for type 1 and 2 respectively). Sixty three percent of type 2 DM patients were treated with OHAs alone, 22.2% with Insulin alone and 2.4% with combination of OHAs and insulin. The majority



of patients were on Metformin (43.2%), followed by Glimperide (20.5%) and Glibenclamide (18.1%). Other OHA which were used in small number were Gliclazide and Roziglitazone.

Only 42.2% of DM type 1 and 36% of DM type 2 patients has visited their physicians prior to their fast for advice. The majority of patients (93.7%) were compliant with their medications. Body mass index (BMI) of study population was 27.05 ± 4.6 (mean \pm SD). Very small number of the study population (7.2%) was doing regular recommended exercise daily even on non-fasting days.

The comparison of demographic characteristics and clinical features (age, types of diabetes, duration of the disease and medications) of fasting and non-fasting patients is shown in table 1. Time since diagnosis of DM was among the study variables which differ significantly between fasting and non-fasting patients, ($P < 0.0001$). Also marital status, type of diabetes, type of medication, and regularity of medication were statistically significantly associated with fasting.

The comparison of chronic complications of fasting and non-fasting patients shows that, a statistically significant lower proportion of fasting diabetic patients had retinopathy, nephropathy, neuropathy and vascular problems when compared to non-fasting diabetic patients. The risk of non-fasting was statistical-

ly significantly higher among the diabetic patients who had complications, retinopathy, nephropathy, neuropathy and vascular problems, whereas the prevalence of hypertension and dyslipidemia was not different between fasting and non-fasting diabetic patients (Table 2).

The chronic complications which were found in the study population, including cardiovascular (CV) risk factors, were smoking 11.8%, hypertension 51.7%, dyslipidemia 20.7%, retinopathy 21.7%, neuropathy 12%, nephropathy 7.9% and peripheral vascular disease 31.9%. Table 3 showed the eating habits and regularity with medication of study population. In general, small proportion (24.3%) of fasting patients felt that they have reduced the amount of the food they usually consume, and a large proportion (68.6%) of them did not make any specific changes. Eating sweets in Ramadan was avoided or reduced in quantity by 40.4%, and 43.7% respectively. The majority of the patients 74.8% did not change the drug regimen in Ramadan, and 92.8% of fasting patients had their medication regularly. Overall, only 52 (6%) of all fasting patients had acute complication, mainly hypoglycemic attacks, which were resolved by the patients themselves through breaking the fast without visiting any physicians.

Table 1 Comparison of socio-demographic and clinical features of fasting and non-fasting diabetic patients

| Variables | Fasting | | P-value | 95% Confidence intervals | OR * * * |
|--|-------------------|-------------------|----------|--------------------------|----------|
| | No (n = 146) | Yes (n = 774) | | | |
| Age (Mean \pm SD) | 59.50 \pm 16.00 | 58.10 \pm 13.10 | >0.05 | (-3.70, 1.10) * | - |
| BMI (Kg/m ²) (Mean \pm SD) | 26.30 \pm 5.60 | 27.00 \pm 4.60 | >0.05 | (-0.10, 1.60) * | - |
| Time since diagnosis (Mean \pm SD) | 12.80 \pm 8.90 | 9.50 \pm 7.90 | < 0.0001 | (-4.80, -1.90) * | - |
| Married (n, %) | 127 (87.00) | 734 (94.80) | < 0.001 | (0.19, 0.67) * * | 0.36 |
| Diabetes Type: | | | | | |
| Type-I (n, %) | 133 (91.10) | 742 (95.90) | 0.02 | (1.10, 4.60) * * | 2.26 |
| Type-II (n, %) | 13 (8.90) | 32 (4.10) | | (1.10, 4.60) * * | |
| Medication: | | | | | |
| OHA (n, %) | 58 (39.70) | 551 (72.10) | 0.02 | (1.10, 4.10) * * | 1.00 |
| Insulin (n, %) | 72 (49.30) | 142 (18.60) | | (1.10, 4.10) * * | |
| On regular medication (n, %) | 125 (85.40) | 723 (93.40) | 0.002 | (0.24, 0.75) * * | 0.42 |

* 95% Confidence intervals for difference of Mean

* * 95% Confidence intervals of Odd ratio

* * * Odd ratio

Table 2 Comparison of complications of fasting and non-fasting diabetic patient

| Variables | Fasting (n%) | | OR | P-value | 95% CI of OR |
|---------------|----------------|----------------|------|-----------|---------------|
| | No(n = 146) | Yes (n = 774) | | | |
| Complications | 99 (67.80) | 265 (34.30) | 4.00 | < 0.000 1 | (2.70, 6.00) |
| Retinopathy | 53 (36.30) | 168 (21.70) | 2.00 | 0.002 | (1.40, 3.00) |
| Neuropathy | 42 (28.80) | 93 (12.00) | 2.90 | < 0.000 1 | (1.90, 4.60) |
| Nephropathy | 35 (24.00) | 61 (7.90) | 3.70 | < 0.000 1 | (2.30, 6.00) |
| Hypertension | 80 (54.80) | 400 (51.70) | 1.10 | 0.54 | (0.80, 1.60) |
| Dyslipidemia | 40 (27.40) | 160 (20.70) | 1.40 | 0.08 | (0.90, 2.20) |
| Vascular | 18 (12.30) | 15 (1.90) | 7.10 | < 0.000 1 | (3.30, 15.30) |

Table 3 Descriptive statistics of variables during fasting of diabetic patients (n = 774)

| Variables | n (%) |
|--|------------|
| Food consumption | |
| Decrease | 188 (24.3) |
| Increase | 55 (7.1) |
| No change | 531 (68.6) |
| Sweets consumption | |
| Do not eat | 313 (40.4) |
| Eat a lot | 58 (7.5) |
| Eat little | 338 (43.7) |
| No change in Ramadan | 51 (6.6) |
| Only in Ramadan | 14 (1.8) |
| Dosage change in Ramadan | |
| Yes | 579 (74.8) |
| No | 195 (25.2) |
| Regularity with medication | |
| Yes | 718 (92.8) |
| No | 56 (7.2) |
| Specific advice was taken regarding fasting from doctors | |
| Yes | 353(45.6) |
| No | 421(54.4) |
| Acute complication (hypoglycemia) | |
| Yes | 52 (6.7) |
| No | 722 (93.3) |



DISCUSSION

A total of 84.1% of the study population fasted during Ramadan which is slightly higher compared to a multi-centered population based study, but similar if looked locally in the same study^[1]. About ninety six percent of diabetic patients were type 2, which is slightly higher than the national figure^[3]. This could be explained on the basis of setting where the study was conducted, usually type 2 diabetic patients are followed up in PCC while type 1, are in special diabetic clinics. Also some discrepancies have been seen in sex distribution as male were exceeding female but this could be a selection bias as the enrolled patients were selected by research assistants who attended the clinics.

An important finding of this study was that a high proportion of patients were able to fast without any significant complication. Only a small number of patients (6%) had acute complication mainly hypoglycemia, which is lower compared to other study where 14% of patients had hypoglycemic attacks^[18]. This positive achievement could be attributed to the good health education effort by the physician and patients compliance, also could be explained by the low consumption of sweet and no much increase in the amount of food consumed as well as the modification of drug regimen in Ramadan. A study in Turkey has shown that patients with diabetes presenting to emergency department in Ramadan were found significantly younger than their peers in the rest of the year^[19]. However such finding was not observed in our study.

Longer the duration since diagnosis the more likely that the patient will not fast. This could be due to the presence of complications which become more evident as the disease progresses.

Interestingly, marriage increases the likelihood of fasting during Ramadan, this demonstrate the role of family support in the management of diabetes.

A similar effect was observed in Somalian immigrants as several participants fasted Ramadan and did not see the diabetes as an obstacle^[20]. When patients are using insulin they are more likely not to fast Ramadan. This could be attributed to the severity of the disease or other factors, but unfortunately this study did not address this issue and further studies are needed to be conducted to explore this relation. However, a study compared the glycemic effect

of some OHA and insulin glargine in type 2 DM during Ramadan fasting found no significant difference between them regarding glucose metabolism and the rate of hypoglycemia^[10].

Chronic complications of DM were found less in patients who fast Ramadan than those who did not. This is expected as these patients were more fit to fast than those who did not fast. Also being regular on the medication as well as the duration of the disease itself may have an effect.

This is the first local study which looked over the different factors for diabetic patients who fasted in Ramadan. But the study has a number of limitations. The study is based on retrospective recall of patients by interview, questionnaire and reviewing patients' records. Also the sample is collected from well organized teaching centre, so the participants may differ from general population. With all these limitations, we have come up with some important information which could be utilized by diabetic patients who want to fast. Diabetes mellitus is not a contraindication to fasting in Ramadan. Fasting during Ramadan is appeared to be relatively safe. Muslim diabetic patients can, safely fast Ramadan month provided they could follow their physicians advice, and being regular on their medications. Family support is also found to be an important positive factor. On the other hand, patients with chronic complications should be monitored carefully.

ACKNOWLEDGMENT

The authors would like to thank all our patients who participated in the study, and the research assistants who were very enthusiastic and professional in their contribution with data collection.

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