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# Incidence of hypoglycemia among patients with type 2 diabetes who fasted during Ramadan

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## Abstract:

**Background and Objectives:** Fasting causes a major change in the dietary habits including the frequency, the timing, and the patterns which will result in a major change in the metabolic response of the body. Physicians should advise the patients about the complications of diabetes mellitus during fasting especially hypoglycemia, the aim of this study is to determine the relation between fasting Ramadan in type 2 diabetes and hypoglycemia risk.

**Methods:** This is a cross-sectional prospective study, which included 304 Muslim patients with type 2 diabetes mellitus who are receiving oral hypoglycemic agents as management were included in this study, while those on insulin were excluded. These patients had decided to fast Ramadan during 2019 in two cities, 122 patients were from Duhok city and 183 patients from Erbil city, Kurdistan region of Iraq. All patients' body mass index recorded and a blood sample was taken to measure HbA1c and lipid profile.

**Results:** Most patients had no attacks of hypoglycemia (86.20%), while 13.80% had one or more hypoglycemic attacks. The attacks of hypoglycemia confirmed clinically and biochemically that is by checking random blood sugar. There was no significant correlation between the hypoglycemic attacks and the variables studied in this article, such as the duration of diabetes, oral hypoglycemic agents, however, there was significant relation between hypoglycemic attacks and days of fasting in Ramadan and ready to break fasting (P value of 0.026 and 0.008 respectively).

**Conclusion:** There was no association between fasting Ramadan and development of hypoglycemic attacks, however physicians must warn patients about the possible risk of hypoglycemia during fasting and it's the patient's own decision to continue fasting or not.

**Keywords:** Ramadan, Diabetes,Hypoglycemia,Fasting.

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## Introduction:

Worldwide, there are more than 1.5 billion Muslims comprising about 23% of the whole world population. Fasting is one of the five pillars of the Islamic religion and normally Muslims fast during Ramadhan which is the 9th months in the Islamic calendar (The lunar calendar)[1]. The time of fasting varies according to the season of the year, and the geographical location, it ranges from few hours to more than 15 hours, when the fasting month of Ramadhan is in summer season, and the timing of fasting is longer while it is shorter in winter time. All healthy adults must fast the whole month during, fasting is not about making more hardship on the Muslim individuals but it is about following certain disciplines including dietary and behavior. During the fasting days, fasting Muslim consume mainly 2 meals, one at the sunset which involve breaking the fast, and the other is at the dawn time, between both they are allowed to eat and drink, but at the time of fasting at morning, nothings is allowed from the foods and drinks[1].

Some groups of people are exempted from fasting including the sick people, and those had long travels because both may increase the burden on the body[2].

There is a large number of Muslims who have type 2 diabetes mellitus and fasted during Ramadhan, although Islam exempted the sock people from fasting but still many diabetic patients still insist on fasting[1-3].

Fasting causes a major change in the dietary habits including the frequency, the timing, and the patterns which will result in a major change in the metabolic response of the body. The long duration of fasting is usually compensated by the consumption of large number of variable nutrients after sunset which may include the intake of high amount of sugary diets, this will negatively affect the blood glucose levels and the glycemic control[4-5].

Physicians should warn the patients about the complications of diabetes mellitus during fasting especially hypoglycemia and the importance of monitoring blood glucose level during fasting. The development of complications depends on many factors such as the duration of fasting, duration of diabetes, the presence of pre-existing diseases, the educational level of the patient, tobacco use, and obesity[3]. The aim of this study is to determine the relation between type 2 diabetes mellitus and hypoglycemia and to evaluate whether this correlation is significant or not and to study other possible co-factors that may be related to the development of hypoglycemia such as days of fasting, weight, age, sex and duration of diabetes.

## Patients and methods:

This is a cross-sectional prospective study, which included 304 Muslim patients who had type two diabetes mellitus and fasted during Ramadan. Data were retrieved from two centers from two cities, 122 patients were from Duhok city and 183 patients from Erbil city, Kurdistan region of Iraq. Patients with type 1 diabetes and type 2 diabetes on insulin were excluded from this study. Type 2 diabetes patients on lifestyle, metformin and sulphonylureas were included in this study. An informed signed consent was taken from all the participants and ethical approval is gained from the ethical committee in Kurdistan Board of Medical Specialties.

Patients who developed attacks of hypoglycemia were included in this study; hypoglycemia was proved by blood glucose measurement and the development of clinical symptoms and signs of hypoglycemia. Hypoglycemia considered when blood glucose levels were below 3.9 mmol/L (70 mg/dL). Those patients with renal failure, malabsorption, gastroparesis and Addison's

disease were excluded from study. The descriptive data were shown in frequencies and percentages for categorical data and mean and standard deviation for continuous data. Correlations between the variables were done using the linear regression test, p-values of less than 0.05 is considered significant. Data are analyzed using the Statistical Package for Social Sciences (SPSS 25 IBM: USA).

## Results:

The study included 304 adult patients complained from type 2 diabetes mellitus, the mean age of the patients was 55.03±11.61 years, most of the involved patients were females, and the mean BMI of patients is 29.13±4.85 Table (1). Most patients were taking a combination of drugs including sulfonylureas, majority of patients fasted 14 days, while only 42% fasted more than 15 days. Most of patient were not ready to break fasting and only minority fasted in Shawal, as shown in Table (2).

**Table (1):** Clinical characteristics of diabetic participants

| Variables | Min-max | Mean±SD |
|---|---|---|
| Age(years) | 7-87 | 55.04±11.64 |
| Duration of diabetes(months) | 1-528 | 80.37±68.58 |
| BMI | 17-41 | 28.89±4.74 |
| HbA1c | 5-14 | 7.85±1.71 |

**Table 2**: Frequencies of variables between patients

| Variables | No. | % |
|---|---|---|
| Gender<br>• Male<br>• female | <br>89<br>215 | <br>29.3<br>70.7 |
| Ready to breakfast<br>• Yes<br>• No | <br>117<br>187 | <br>38.5<br>61.5 |
| Fast in Shawal<br>• Yes<br>• No | <br>46<br>258 | <br>15.1<br>84.9 |
| Oral hypoglycemic drugs<br>• Single oral hypoglycemic agent<br>• Combination of drugs including sulphonylureas | <br>134<br>170 | <br>44.1<br>55.9 |
| Days of Fasting<br>• 1-14<br>• 15-30 | <br>262<br>42 | <br>86.2<br>13.8 |

Most patients had no attacks of hypoglycemia 262 (86.20%), while 42 patients (13.80%) had one or more hypoglycemic attacks. Figure (1).

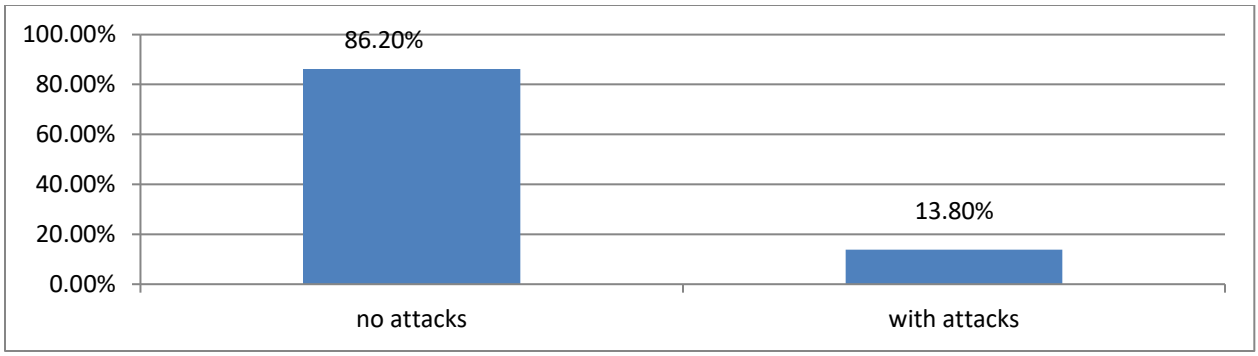


**Figure 1**: Showing the attacks of hypoglycemia

There was no significant correlation between the hypoglycemic attacks and many variables studied in this article, such as age, the duration of diabetes, BMI, and HbA1c. Table (3). Meanwhile there was no relation of hypoglycemic attacks and gender, oral hypoglycemic drugs, and fasting in Shawal, but there was significant relation between hypoglycemic attacks and days of fasting in Ramadan and ready to break fasting (P value of 0.026 and 0.008 consequently).Table (4).

**Table 3:** Comparison of variables between patients with and without hypoglycemic attacks.

| Variables | Patient with hypoglycemic attacks no.=42 Mean ± SD | Patient without hypoglycemic attacks no.=262 Mean ± SD | p value T-test |
|---|---|---|---|
| Age(years) | 56.19±12.28 | 54.86 ± 11.55 | 0.495 |
| Duration of diabetes(months) | 82.66±63.44 | 80.01±69.47 | 0.816 |
| BMI | 28.57±5.08 | 28.942±4.70 | 0.639 |
| HbA1c | 7.77± 1.70 | 7.86±1.71 | 0.749 |

**Table 4:** Frequency of different variables between patients with and without hypoglycemic attacks.

| Variables | Patient with hypoglycemic attacks no.=42 no (%) | Patient without hypoglycemic attacks No.=262 no (%) | p-value Chi-square |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Gender<br>• Male<br>• Female | 14<br>28 | 74<br>188 | 0.500 |
| Oral hypoglycemic drugs OHA<br>• Single OHA<br>• Combination of OHA including sulphonylureas | 20<br>22 | 111<br>151 | 0.523 |
| Days of fasting in Ramadan<br>• ≥15<br>• <15 | 16<br>26 | 148<br>114 | 0.026 |
| Fasting Shawal<br>• Yes<br>• No | 10<br>32 | 43<br>219 | 0.241 |
| Ready to break fasting<br>• Yes<br>• No | 16<br>26 | 157<br>105 | 0.008 |

## Discussion:

The mean age of our patients was 55.04 (SD 11.64) and most of our patients were female (71.1%), this age is considered higher than other comparative studies which showed younger age[3].

Till now there is no consensus regarding the most appropriate oral hypoglycemic drugs which must be used during Ramadan, in our study there was no relation between the development of hypoglycemia and the type of the oral hypoglycemic agent administration whether if single agent of combination is taken (p value 0.523), certain studies have shown that certain drugs when taken will reduce the incidence of symptomatic hypoglycemia and they advise modulation of the type of drug. Some authors suggest that patients with diabetes must be seen few days after the start of fasting[2-6].

Most of the health problems arise from overeating after fasting and the inappropriate diet and its consequences. Patients should maintain physical activity during the fasting month of Ramadhan to maintain the weight. In our study there was no any significant correlation between hypoglycemic attacks and the BMI (p value 0.639) [5].

About 86% of our patients developed no attacks of hypoglycemia during fasting, some studies proved that about 79% of diabetic patients fasted at least 15 days from the month of Ramadhan and there is a 7 fold increase of the development of hypoglycemia in relation to the previous months of fasting. Also we found a strong correlation between hypoglycemic attacks and days of fasting in Ramadan and ready to break fasting (P value of 0.026 and 0.008 respectively). In our study we did compare the hypoglycemic attacks to the previous non fasting months but we didn't find any significant correlation with the days of fasting (p value 0.241) although was a higher than other studies [2].

Some authors reported no significant increase in the incidence of hypo or hyperglycemia during fasting, they also reported no incidence of hospital admissions due to emergency events[7].

Poorly controlled diabetes has a negative impact on the development of complications including the development of hypoglycemia during fasting, in our study the mean level of the glycosylated hemoglobin was 7.86 which considered elevated but showed no significant correlation with the development of hypoglycemic attacks during fasting (p value was 0.749) [8-9].

It is recommended that fast should be broken when the level of the blood glucose reduce to less than 70 mg/dl (3.9 mmol/l), especially if the patient is receiving insulin or sulfonylureas or combination of oral hypoglycemic drugs, it is also recommended to break the fasting when the blood glucose level exceeds 300 mg/dl(16.7 mmol/l), this fact should be supported by both the religious persons and the health professionals to educate the patients with diabetes to accept to break the fast or avoid fasting when there is a major concern on the patient's health[5,10-11].

## Conclusion and Recommendations:

There was no association between fasting Ramadan and development of hypoglycemic attacks. Physicians must warn patients about the possible risk of hypoglycemia during fating and it's the patient's own decision to continue fasting or not, however the high risk group should be advised against fasting. The other role of physician is to adjust the dose of anti-diabetic drugs during fasting in order to minimize the risk of hypoglycemia. Previous experience of the patients with fasting may also help to avoid or to reduce the incidence of hypoglycemia during fating. The management plan should be largely individualized including regular and health dietary habits, modification of the medical treatment and educating patients about the possible adverse events.

**Conflict of Interest**

The authors had nothing to declare.

## References:

1. Bashir M, Pathan F, Raza S, et al. Role of oral hypoglycemic agents in the management of type 2 diabetes mellitus during Ramadan. Indian J Endocrinol Metab. 2012; 16(4): 503–7.

2. Aravind S, Ismail S, Balamurugan R, et al. Hypoglycemia in patients with type 2 diabetes from India and Malaysia treated with sitagliptin or a sulfonylurea during Ramadan: a randomized, pragmatic study. Curr Med Res Opin. 2012; 28(8): 1289-96.

3. Fatim J, Karoli R, Chandra A et al. Attitudinal determinants of fasting in type 2 diabetes mellitus patients during Ramadan. J Assoc Physicians India. 2011;59: 630-4.

4. Siaw M, Chew D, Dalan R et al. Evaluating the effect of Ramadan fasting on muslim patients with diabetes in relation to use of medication and lifestyle patterns: a prospective study. Int J Endocrinol. 2014:308546

5. Chamsi-Pasha M, Chamsi-Pasha H, The cardiac patient in Ramadan. Avicenna J Med. 2016. 6(2): 33-8.

6. Ahdi M, Malki F, van Oosten W et al. Diabetes and Ramadan. Nederlands tijdschrift voor geneeskunde, 2008. 152(34): 1871-4.

7. Pinelli NR, Jaber LA. Practices of Arab American patients with type 2 diabetes mellitus during Ramadan. J Pharm Pract. 2011; 24(2):211-5

8. Incani M, Sentinelli F, Perra L et al. Glycated hemoglobin for the diagnosis of diabetes and prediabetes: Diagnostic impact on obese and lean subjects, and phenotypic characterization. J Diabetes Investig, 2015. 6(1): 44-50.

9. Patel P, Mirakhur A, Abo El-Magd K, Abo El-Matty A, Al-Ghafri D. Type 2 Diabetes and its characteristics during Ramadan in Dhahira region, Oman. Oman Med J, 2007; 22(3):16-23.
10. Babineaux S, Toaima D, Boye K, et al. Multi-country retrospective observational study of the management and outcomes of patients with Type 2 diabetes during Ramadan in 2010 (CREED), Diabet Med, 2015;32(6):819-28.
11. Salti I, Bénard E, Detournay B, et al. A population-based study of diabetes and its characteristics during the fasting month of Ramadan in 13 countries: results of the epidemiology of diabetes and Ramadan 1422/2001 (EPIDIAR) study, Diabetes Care, 2004;27(10):2306-11.