

Research Article

Effect of Ramadan Fasting on Blood Glucose, Serum Lipid Profiles levels in Sudanese Patients with Type 2 Diabetes Mellitus

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Abstract: Ramadan is the holy month of the Muslims where they are required to fast from dawn to sunset, with liberal access to food and fluid in the evening. The aim of this study was to measure the effect of Ramadan fasting on glucose and lipid profiles among patients with type 2 diabetes mellitus. Our study population was 58 adult diabetic patients (38females, 20males) of a mean age of 53.8±14 years. Three samples of blood were taken at three intervals (before, during and after Ramadan).the plasma glucose and lipids were measured by spectrophotometric methods. There was an increase in the glucose level during Ramadan compared to pre Ramadan value(170 ± 44 mg/dl versus208 ± 43 mg/dl).after Ramadan there was a decrease of blood glucose level(165 ± 23 mg/dl).the triglyceride concentrations in pre, during and after Ramadan respectively were(152 ± 23 mg/dl, 182 ± 31 mg/dl, 162 ± 19 mg/dl). The total cholesterol concentrations in pre, during and after Ramadan respectively were (184 ± 29 mg/dl, 224 ± 35 mg/dl, 193 ± 19 mg/dl). The HDL cholesterol concentrations in pre, during and after Ramadan respectively were (44 ± 9 mg/dl, 62 ± 11 mg/dl, 50 ± 7 mg/dl). The LDL cholesterol concentrations showed in pre, during and after Ramadan respectively were (143 ± 25 mg/dl, 163 ± 19 mg/dl and 50 ± 7 mg/dl).there were no significant differences in all parameters measured in this study. Our study showed slight increase in the concentration of glucose ,triglyceride and cholesterol during Ramadan fasting but with a return to the pre fasting levels after the end of Ramadan.

Keywords: Ramadan, lipid profile, blood glucose

INTRODUCTION

Ramadan is the ninth month of the Islamic (Hijri) Calendar. During this month all healthy adult Muslims, males or females are expected to abstain from foods, fluids, oral medications, smoking and sexual intercourse from dawn to sunset. The classic Islamic point of view is that Ramadan fasting is good for health and the spiritual purity of Muslims. Fasting is also necessary to obtain the rewards of God. For these reasons many Muslims who are religiously exempted from fasting insist on fasting (in many instances against a medical advice)[1]. In particular, the majority of the Muslims diabetic patients insist on fasting even those with poorly controlled diabetes or with serious complications [1]. Thus, we can understand the importance of scientific and clinical studies on the impact of Ramadan fasting on this group of patients.

Ramadan fasting is known to affect many metabolic processes in the human body)[2,4]. The

physiological aspects of Ramadan are influenced by the combination of food and water deprivation, the periodic nature of fasting and the modification of physical activities during the daytime hours. For healthy Muslims the reported physiological and biochemical changes during Ramadan, although significant, do not reach pathological proportions[1,4].The physiological indices return to normal after the fasting month is over, indicating safety of fasting for the healthy persons.

For sick Muslims, there are increasing number of studies on impact of fasting with varying results[1,5,6]. In particular, patients with metabolic diseases such as diabetes need a special attention to monitor any change that may affect their health in order to suggest the proper care for them during Ramadan.

Diabetes mellitus is a growing health problem in the Sudan, it accounts for some 10% of the total hospital admissions [7]. the aim of this study was to

measure the effect of Ramadan fasting on glucose and lipid profiles among patients with type 2 diabetes mellitus.

METHOD AND MATERIALS

This study was a cross-sectional descriptive study; This study was being carried out at Omdurman; in the clinic of internal medicine of El Inqaz Medical Center. The population of this study was the adult Muslims diabetic type 2 patients, who desire to fast Ramadan in the year 2008 ,in the period from (August to October2008).the fasting hours were 14-15 hours in moderately warm weather.

Sampling and Data Collection:

The total number of eligible patients covered gave their consent to participate in the study. 58 patients were included in the studies. A Questionnaire containing demographic and clinical data pertaining to study population was conducted. three sample of blood (5ml of each) were taken for each patient at three visits one before the start of Ramadan,another in third week of Ramadan and the third one month after the end of Ramadan. Sample were drawn by venipuncture under complete aseptic techniques in heparin tubes. The plasma was separated by centrifugation at 5000 rpm for 10 minutes. chemical tests were carried out. Fasting blood glucose, triglyceride, Total cholesterol, High density lipoprotein-cholesterol (HDL-C), Low density lipoprotein-cholesterol (LDL-C) were measured using enzymatic diagnostic kits obtained from(spin react,

Spain).each volunteer served as self-control by comparing his Ramadan with pre Ramadan results.

Exclusion criteria:

Any patient with any acute or serious intercurrent disease, or who was taking any medication that affect blood lipids (such as diuretics,thiazide or lipid modulating drugs) alcoholism ,obesity, smoking were excluded.

Inclusion criteria:

All adults type 2 diabetic patients who were insisting to fast Ramadan, and gave their consent to participate in the study, were included.

Ethical considerations:

The aims, nature and procedures of the study were being fully explained to our potential study population and a clear verbal consent was required. It was made clear to the study population that participation in the study was totally voluntary, and that their care in the clinic will not be affected any way in case of refusal to participate. All the required data was managed confidentially.

Statistical analysis

Results were expressed as(mean ± SD) and analyzed by students t-test. To determined the statically significance of the difference between the means for the preRamadan (control)and the Ramdan samples, with P≤0.05 a significant differences .

RESULTS

Table-1:Mean values of blood levels of glucose, triglyceride and cholesterol before and during Ramadan fasting among our patients

Parameter	Before Ramadan	During Ramadan	Significance of change
Glucose	170 ± 44 mg/dl	208 ± 43 mg/dl	Not significant
Triglyceride	152 ± 23 mg/dl	182 ± 31 mg/dl	Not significant
Cholesterol	184 ± 29 mg/dl	224 ± 35 mg/dl	Not significant
HDL - cholesterol	44 ± 9 mg/dl	62 ± 11 mg/dl	Not significant
LDL - cholesterol	143 ± 25 mg/dl	163 ± 19 mg/dl	Not significant

Table-2:Mean values of blood levels of glucose, triglyceride and cholesterol during and after Ramadan fasting among our patients

Parameter	During Ramadan	After Ramadan	Significance of change
Glucose	208 ± 43 mg/dl	165 ± 23 mg/dl	Not significant
Triglyceride	182 ± 31 mg/dl	162 ± 19 mg/dl	Not significant
Cholesterol	224 ± 35 mg/dl	193 ± 19 mg/dl	Not significant
HDL - cholesterol	62 ± 11 mg/dl	50 ± 7 mg/dl	Not significant
LDL - cholesterol	163 ± 19 mg/dl	142 ± 22 mg/dl	Not significant

Table-3: Means values of blood levels of glucose, triglyceride and cholesterol before and after Ramadan fasting among our patients

Parameter	Before Ramadan	After Ramadan	Significance of change
Glucose	170 ± 44 mg/dl	165 ± 23 mg/dl	Not significant
Triglyceride	152 ± 23 mg/dl	162 ± 19 mg/dl	Not significant
Cholesterol	184 ± 29 mg/dl	193 ± 19 mg/dl	Not significant
HDL - cholesterol	44 ± 9 mg/dl	50 ± 7 mg/dl	Not significant
LDL - cholesterol	143 ± 25 mg/dl	142 ± 22 mg/dl	Not significant

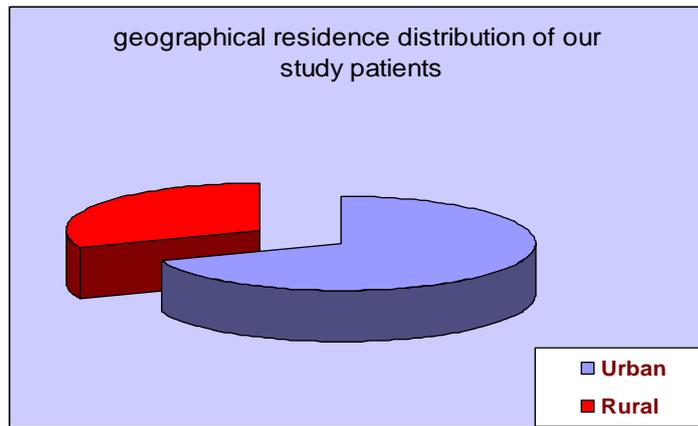


Fig-1: Geographical residence distribution of our study patients

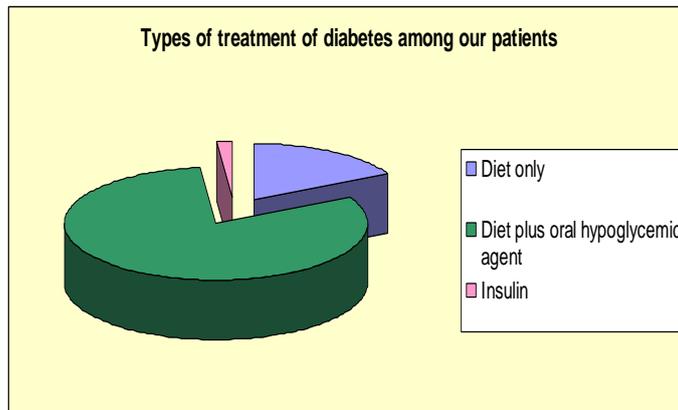


Fig -2:Types of treatment of diabetes among our patients

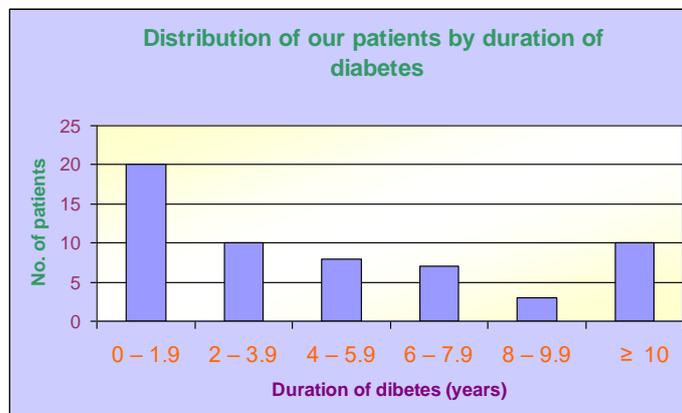


Fig-3: Distribution of our patients by duration of diabetes

DISCUSSION

Our study showed an increase in the values of blood levels of glucose, cholesterol and triglyceride during Ramadan but with return to the preRamadan levels a few weeks after the end of the fasting. This confirms the finding of previous studies that the biochemical changes during Ramadan are temporary and of no pathological consequences. For healthy subjects, during the 12-14 hours of fasting, the blood glucose remains stable as a result of hepatic glucose output (glycogenolysis) which occurs at a rate of 0.10-0.16 mmol/kg/hour. In our study we reported a significant reduction in the level of glucose after the end of the fasting month. This is different from previous studies on healthy subjects which indicate a slight increase of blood glucose[8]. The changes in glucose levels may vary according to type of food taken, and engorging on breaking the fast, differences in metabolism, irregularity in taking anti-diabetic medications and the level of glycaemic control before Ramadan[1]. Of these, the dietary factor is important. The Muslims, classically, tend to consume large amounts of sugar, dates and sweets during Ramadan. At the same time, many fasting Muslims tend to be less active during Ramadan (often sleeping or watching television).

An important factor that deserves discussion is the intense fear of hypoglycemia among diabetic patients intending to fast (and even some of their caretakers). Even more, some patients tend to stop their medications or break their fast with large amounts of sweets or sucrose-rich fluids. These patients should be reminded that fasting in uncomplicated Type II diabetes, per se, does not lead to hypoglycemia. They can be advised to avoid strenuous or unaccustomed exercise during the fasting hours, and perform self-monitoring of their glucose to get assured of their normoglycaemia.

The levels of triglycerides and cholesterol showed no significant difference. The comparison with previous studies is a difficult task due to their contradicting results. Nevertheless, our results are similar to Sulimani *et al* [6]. Some researchers found a reduction in cholesterol and triglycerides, while others found an increase in one parameter and a decrease in the other [2,5]. The main drawback of these studies is that they did not consider some factors that may affect lipid levels such as age, sex and dietary patterns[1]. This may explain some of the differences in the results of these studies. To reach productive results, the future studies must match the investigated groups with these risk factors.

The most common lipid abnormality in Type II diabetes is hypertriglyceridaemia[9]. The association between hyperglycemia and hypertriglyceridaemia can be explained by the decrease in adipose tissues and muscle lipoprotein lipase activity[10]. On the other

hand, the hepatic lipase plays a central role in Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL) remodeling. High activity of hepatic lipase is associated with small dense LDL particles and with reduced HDL cholesterol levels[11]. The metabolic changes associated with Ramadan fasting might affect all or some of these processes leading to the lipid changes reported in different studies. Some researchers claim that the dietary pattern of Muslims during Ramadan underlies the lipid changes i.e. the sucrose content of meals. El-hazmi *et al* stated that the intake of very large meals after many hours of fasting might lead to increase synthesis of endogenous cholesterol[12]. However, our results showed that the lipid changes in Ramadan among the diabetic patients are temporary and of no morbid effects, yet, the caring doctors should be cautious in advising diabetic patients with dyslipidaemia to fast.

CONCLUSION

The investigated metabolic changes associated with Ramadan fasting among our diabetic group are slight and not statistically significant; temporary and of no pathological consequences. For diabetic patients with prior fair glycaemic control and no complications or co-morbidities, fasting does not seem to involve added risk, should they adhere to their prescribed medications and dietary restrictions (as before Ramadan). Patients should be encouraged to continue their follow up and adjustment of medications.

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