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## **Effect of Ramadan Fasting on Blood Glucose and Serum Lipid**

### **Profiles in Libyan Diabetic Patients**

**H. K. Momen<sup>1</sup>, A-N. Y. Elzouki<sup>2</sup>, S. J. Gatie<sup>1</sup>, A. M. El-Mansoury<sup>1</sup>, O.A. Tashani<sup>1</sup>**

*Zoology Department<sup>1</sup>, Faculty of Science and<sup>2</sup>Medicine Department, Faculty of Medicine, Garyounis University, Benghazi, Libya*

#### **ABSTRACT**

**Fasting blood glucose, total cholesterol, TG, LDL-C and HDL-C in 24 females and 16 males with type II diabetic Libyan patients, were measured after 10 – 14 hours of Ramadan fasting. Patient's age, sex, body mass index (BMI), duration of diabetes and treatment were recorded. There were no significant differences before and at the end of Ramadan fasting in BMI and mean serum lipid profile, although, there was a trend towards decreasing the mean serum levels of total cholesterol, LDL-C and TG and increasing the serum level of HDL-C, these changes did not approach the statistical significance level. The mean fasting plasma glucose levels were significantly increased at the end of Ramadan fasting in males diabetic patients ( from 177.2±82.5 mg/dl at the start of Ramadan to 224.7±103.6 at the end of it) and in female diabetic patients ( from 160.6±54.7 to 215.5±66.9 mg/dl). Fasting Ramadan may be safe for the majority of diabetic patients. However, diabetic patients must continue their regular daily activity, diet regiment and adjustment of their drug treatment during Ramadan fasting.**

***Key Words: HDL-C; Blood Glucose; Triglycerides; Libya ; Ramadan fasting.***

#### **INTRODUCTION**

Even during Ramadan fasting, which lasts more than 10 hours a day in Libya, maintenance of plasma glucose concentration is crucial for survival (Sulimani, Laajam,& Al-Attas, 1991). Blood glucose concentration (in normal fasting individuals) remains stable as a result of hepatic glucose output. The sources of glucose are liver glycogenolysis (80-90%) and gluconeogenesis (10-15%). Gluconeogenesis dominates when fasting continues beyond 12 hours. The increase in the glucagon-insulin ratio activates such mechanisms, so that a normal glucose concentration is maintained (Dattilo & Etherton, 1992). The present study was aimed to determine the effect of Ramadan fasting on serum lipid profiles in diabetic Libyan individuals.

#### **Materials and Methods:**

A prospective cross-sectional study was selected to investigate the effect of Ramadan fasting on lipid profiles in diabetic Libyans. The study was carried out in

Benghazi Diabetes Clinic during Ramadan. The number of fasting hours was approximately 10 hours.

A total of 40 adult diabetic patients were included in the study (24 males and 16 females). They were registered type II diabetic patients at the Benghazi Diabetic Clinic. Patients were diagnosed and classified diabetic type II according to the World Health Organization (WHO, 1985) criteria. Patient's age, sex, and body mass index (BMI) were recorded as well as, duration of diabetes and treatment (diet, oral hypoglycemic agents, insulin or combination of both oral agents and insulin). The BMI was recorded for all patients on the first and last day of Ramadan.

Ten ml of venous blood sample were collected after 12-14 hours overnight fast. Blood samples were then divided into two parts, first part was poured into anticoagulant tubes, the plasma was obtained and used for measurement of fasting blood glucose; the second part of the blood was poured into plain tubes, the serum was obtained after centrifugation at 4000 rpm for 5 minutes in a bench centrifuge and stored until analysis of lipid profile was performed. All biochemical tests (i.e. total cholesterol, triglyceride, LDL-C, HDL-C, and fasting plasma glucose ) were determined conventionally in duplicate and the mean of the two results was used. The student "t" test was used to compare mean values and to determine differences between samples. The p-value < 0.05 was considered statistically significant.

## RESULTS AND DISCUSSION

Table 1 shows the mean serum lipid profiles, fasting blood glucose, body weight and BMI in the diabetic patients before and at the end of Ramadan fasting. Apart from significant increase of mean fasting blood glucose at the end of Ramadan in both males and females diabetic patients ( $p < 0.05$  for both comparisons), there were no statistical significant differences in body weight, BMI, and mean serum lipid profile (i.e. total cholesterol, HDL-cholesterol, LDL-cholesterol, and triglyceride).

The mean fasting plasma glucose levels were significantly increased at the end of Ramadan fasting in normolipidemic diabetics (from  $177.2 \pm 82.5$  mg/dl at the start of Ramadan to  $224.7 \pm 103.6$  at the end of it) and hyperlipidemic diabetics (from  $160.6 \pm 54.7$  to  $215.5 \pm 66.9$ ) ( $p < 0.05$  for both comparisons). In the diabetic hyperlipidemic group, although there was a trend towards decreasing the mean serum levels of total cholesterol, LDL-cholesterol, and triglyceride, and increasing the serum level of HDL-cholesterol, these changes did not approach the statistical significance level.

Previous publications show controversy about weight changes in diabetic patients during Ramadan fasting. An increase (Rashed, 1992), no change (Laajam, 1990; Sulimani, Laajam, & AL-Attas., 1991), or a decrease in body weight (Mafauzy, Mohammed, Anum, Zulkifi, & Rubani, 1990) have all been reported. 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 (Laajam, 1990; Salman, Abdallah, & Al-Howasi, 1992). Furthermore, most diabetics reduce their daily activities (Laajam, 1990) during this period in fear of hypoglycemia.

In diabetic patients of the present study, it was noted that a trend towards the reduction in total serum cholesterol levels (in females but not in males), serum LDL-cholesterol levels (in both males and females), and serum triglyceride levels (in females but not in males), though this did not approach the significant levels. In contrast, a trend towards increase of serum HDL-cholesterol levels in both males and females was observed. These findings were associated with a trend towards reduction in the body weight. Same trend was noted when diabetic patients were divided according to the lipid status. There is some evidence indicating that body weight loss is associated with an increase in lipoprotein lipase activity, which may increase the hydrolysis of VLDL-cholesterol and transfer of lipid to HDL-cholesterol (Dattilo & Etherton, 1992). This is may be more obvious in diabetic patients. Lipid profiles are also, in addition to the gender, affected by other factors including age and smoking. Therefore, it is necessary to pay attention to the effects of these factors on lipid profiles in any Ramadan fasting study (Mahboob, Sattarivand, Nouri, & Arefhosseini, 1999). The lack of enough attention to these matters could be the reason for some controversy observed in some published results.

**Table 1. Mean serum lipid profiles and fasting blood glucose (mg/dl), body weight, and BMI in diabetic patients (male and female).**

	Male diabetics (n=24)		Female diabetics (n=16)	
	Baseline	End of Ramadan	Baseline	End of Ramadan
Triglyceride	170.1±120.8	182.1±194.7	153.8±70.5	133.7±55.2
Total Cholesterol	177.8±41.1	180.1±42.6	197.2±35.84	193.9±33.6
HDL-Cholesterol	46.0±6.6	52.2±21.8	44.5±8.82	46.9±16.13
LDL-Cholesterol	122.9±35.9	111.4±44.8	135.7±35.5	133.0±31.6
Fasting blood glucose	173.6±81.4*	223.7±104.2*	160.8±45.6*	214.2±47.1*
Body weight (Kg)	80.2±13.7	79.4±14.9	78.9±16.6	77.1±11.2
BMI (kg/m <sup>2</sup> )	28.2±4.2	27.4± 5.2	33.4±6.0	32.7±4.1

\*Differences between baseline and end of Ramadan are statistically significant (p<0.05). BMI = body mass index, n = number of patients.

## CONCLUSION

Fasting Ramadan may be safe for the majority of diabetic patients especially women and hyperlipidemic diabetic patients. However, diabetic patients must continue their regular daily activity and diet regimen and consult their doctors before fasting. It is also critical that diabetics should adjust their drug treatments during Ramadan fasting.

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