Research Paper

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Effect of Ramadan Fasting on Metabolic Profile in Healthy Adults of Aurangabad, India

Medical science

KEYWORDS : Ramadan fasting, cholesterol, triglycerides, low density lipoproteins, high density lipoproteins, blood glucose

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ABSTRACT

Introduction: Ramadan fasting, a radical lifestyle change for a period of one lunar month induces different metabolic effects. It provides unique fasting model of fast as intake of fluid also is restricted to more than 12 hours. Conflicting results due to variations in season, region wise diet pattern and physical activities have been reported. We analyzed metabolic changes in terms of lipid profile and blood glucose during Ramadan fasting in healthy individuals from single large joint family.

Material and methods: 33 healthy adults with similar dietary pattern and physical activity with Ramadan fasting were enrolled in the present study. On pre- Ramadan day dietary history, anthropometric measurements were recorded and fasting blood samples assayed for blood glucose and serum lipid profile. On the last day of Ramadan we again collected data from all participants.

Results: Significant reduction in body weight, BMI and waist circumference was observed among studied subjects due to Ramadan fasting. Blood glucose and serum total cholesterol levels were decreased to lower side of normal range. Serum triglycerides and low density lipoprotein decreased significantly in post Ramadan samples. Serum high density lipoprotein was raised significantly suggesting cardioprotective role of Ramadan fasting. Also serum triglycerides levels were reduced significantly in studied group.

Conclusion: Ramadan fasting seems to have beneficial effects on anthropometric and metabolic profile in healthy individuals. There are no detrimental effects and hence can be implemented as a tool for therapeutic lifestyle change.

Introduction:

Ramadan fasting is prescribed by Islamic religion for moral and spiritual purpose. It is characterized by periods of alternate fasting and feasting, separated by an interval of 12 hours. Period of fasting lasts from sunrise (Suhore) to sunset (Iftar) generally for 12- 14 hours. During this period individuals abstain from eating, drinking, smoking and medicating. At the time of breaking fast, an individual consumes fruits and dates followed by large meal. Then a light meal is taken before dawn in the morning. Along with eating pattern, type of diet consumed is significantly different from the routine diet [1]. Usually high carbohydrate and fats are consumed in this period.

Ramadan fasting is a radical change in the lifestyle for a period of one lunar month inducing different metabolic effects. Islamic fasting provides unique fasting model different from experimental fast as intake of fluid is also restricted up to more than 12 hours. Various studies have been published about effect of Ramadan fasting on clinical and biochemical characteristics with conflicting results. Variations in the results may be due to season, region wise diet pattern and physical activities. In the present study we aimed to analyze the metabolic changes in terms of lipid profile and blood glucose levels during Ramadan fasting in healthy individuals from a single and large family.

Material and methods:

Present study was carried out in the Department of Biochemistry at Government Medical College, Aurangabad Maharashtra in India as per the guidelines of Institutional Ethical Committee. 33 healthy volunteers aged 33.4 +/-13.4 years were enrolled in the study during Ramadan. All subjects had similar type of dietary pattern and physical activity. Subjects fasted from sunrise to sunset for 29 days during Ramadan. Informed consents were obtained from all the participants. We recorded dietary pattern by a semi quantitative food questionnaire on day 0 and 29th day during study. All the participants were healthy individuals, nonsmokers and nonalcoholic. We excluded cases of the type 2 diabetes mellitus, hypertension, cardiovascular disease and any other major illness. Controls were Islamic individuals who were not following fasting during period of Ramadan.

Blood samples were collected 2 days prior to the commencement of Ramadan and on the last day that is on the 29 th fast. Blood samples prior to Ramadan were collected after overnight fast of 12 hours whereas the post-Ramadan samples were collected before sunset. All the samples were analyzed in a single batch to avoid day to day laboratory variation. At the same time anthropometric measures were also recorded. On 29th day of Ramadan we recalled our subjects and recorded dietary pattern, anthropometric measurements. Blood samples were collected before sunset for biochemical assays.

For anthropometric measurements, we recorded weight (kilograms), height (centimeters), waist circumference (centimeters), hip circumference (centimeters). Then we calculated body mass index (BMI) as weight (kilograms)/ height (meters2) as a measure of obesity and waist: hip ratio as an index of abdominal adiposity.

Biochemical assay: After overnight fast 5 ml venous blood samples were collected. After clot formation, serum was separated and assayed for estimation of serum total cholesterol (TC), triglycerides (TG), High Density Lipoproteins (HDL). Blood glucose and lipid profile were assayed using fully automated blood chemistry analyzer from Transasia. Blood glucose was estimated by Glucose Oxidase Peroxidase end point method using commercial kits from ERBA Diagnostics.

Quantitative estimation of serum TC was done by Cholesterol Oxidase Peroxidase end point method using kits from RECKON Diagnostics. Serum TG were measured by Lipase/ Glycerokinase/Glycerophosphate oxidase end point method using commercial kits from RECKON Diangnostics. Serum HDL was estimated by Phosphotungstic Acid (PTA) end point method using commercial kits from RECKON Diagnostics. Serum LDL was estimated by Friedewalds formula LDL (mg/dl) = TC- (HDL + Triglycerides/5).

Statistical analysis was performed using the SPSS data analysis system. Demographic and biochemical data of all subjects was analyzed as mean+/-S.D and paired 't' test used to compare pre and post Ramadan variables. P values less than 0.05 were considered as significant, less than 0.001 as highly significant and more than 0.05 as nonsignificant.

Results:

Thirty three healthy volunteers were included in the present study. The mean age of the subjects was 33.4 +/-13.4 years 9 (ranging from 18-48). Table 1 shows effect of Ramadan fasting on anthropometric measurements. A significant reduction was observed in all anthropometric measures. Body weight, BMI, WC and waist hip ratio (p=0.032, 0.03, 0.028, 0.023) were significantly reduced in post Ramadan measurements.

Table 1: Anthropometric measures and blood pressures of participants before and after Ramadan fasting.

Variables	Pre-Ramadan values	Post-Ramadan values	P value
Body weight (Kg)	61.5 +/- 6.7	58.7+/- 2.5	<0.05
Body Mass Index (Kg/m^2)	24.3+/- 2.4	23.8+/-2.3	<0.05
Waist circumference (cm)	83.5+/- 4.6	81.2+/- 3.2	<0.001
Waist : Hip	0.98+/- 0.13	0.89+/- 0.12	<0.05

Table 2 demonstrates effect of Ramadan fasting on blood glucose level and lipid profile. Serum triglycerides were significantly reduced (p=0.018) whereas HDL was increased (p=0.04) in post Ramadan samples. No significant changes were observed in values of TC and LDL cholesterol.

Table 2: Effect of Ramadan fasting on biochemical parameters.

Biochemical variables	Pre-Ramadan	Post-Ramadan	P values
Blood glucose level (mg%)	85.3+/- 11.5	75+/- 8.4	<0.05
Serum TC (mg%)	189.8 +/- 21	167.3 +/- 15	< 0.05
Serum triglycerides (mg%)	126+/- 25	110+/- 12	<0.001
Serum HDL (mg%)	45.6+/- 8	51.4+/- 6	< 0.001
Serum LDL (mg%)	119.5+/- 12	87+/- 10	< 0.001

Discussion:

Ramadan fast is an excellent model to study the effects of fasting and altered dietary pattern on metabolic profile. Because of changed eating pattern, frequency and sleeping pattern biochemical and physiological parameters are affected.

Present study was aimed to study the effect of Ramadan fasting on metabolic profile of normal healthy individuals. In study group, anthropometric measures body weight and so BMI reduced significantly (p<0.05). The mean difference between pre and post-Ramadan body weights was 2.4 Kg. One Saudi Arabian study reported weight gain during the month of Ramadan [2] and some did not observed change in body weight [3]. Waist circumference, a major of abdominal adiposity and hence waist: hip (W: H) reduced significantly after Ramadan fasting of 29 days. These results are in accordance with previous studies [4, 5].

No studies have been reported association of hypoglycemia with Ramadan fasting. In present study there was slight change in blood glucose level towards lower limit but the difference was not significant. Various studies reported significant decrease in blood glucose level after Ramadan fasting [2, 6].

Studies reported in the literature about effects of Ramadan fasting on lipid profile are conflicting and inconsistent. In the present study no significant change was found in serum TC level in pre and after Ramadan fasting. Serum HDL increased significantly (p< 0.05). The mechanism of rise in HDL levels is not clear but weight loss may result in increased HDL. In line with previous reports we observed significant reduction in TG and TC. TG may be reduced because of changed fat intake or inherent metabolic changes during fasting [7]. Changed lipid profile pattern are favorable as protective factor against cardiovascular diseases. Effect on lipid profile depends on food quality and quantity consumption and weight loss during Ramadan fasting. Hadi Abdul and colleagues studied impact of Ramadan fasting on lipid profile, hs-CRP and Leptin in stable cardiac patients. They observed decreased HDL, increased LDL with no reflection on overall clinical status [8].

Temizhan A et al found role of Ramadan fasting promising one by increasing levels of protective HDL [9]. Kamal reported Ramadan fasting associated with significant decrease in body weight, LDL, and significant not statistically reduction in the average TC and significantly increasing in HDL was noted during Ramadan. There was a non-significant rise in the TG, and blood sugar value at the end of fasting [5]. Murat Unalacak studied effect of Ramadan fasting in healthy and obese individuals and concluded its beneficial role in improving inflammatory status, anthropometric and metabolic profile [10].

To conclude, results of our study reflect beneficial effect of Ramadan fasting in healthy individuals on carbohydrate and lipid metabolic profile as well as on anthropometric measures. As per the Islamic religion, fasting during Ramadan is followed for spiritual and moral purpose. But in addition seems to be a healthy remedy to improve cardiovascular health also. We included only 33 subjects from the single large family so as to avoid dietary and socioeconomic variations. Still in depth large scale coordinated studies are required to explore effect of Ramadan fast on different metabolic parameters.

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