THE EFFECT OF RAMADAN FASTING ON BLOOD LEVELS OF LIPIDS AND GLUCOSE IN A SAMPLE OF FEMALE COLLEGE STUDENTS

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Abstract

The purpose of this study was to explore the effect of Ramadan fasting on blood levels of lipids of female college student. Seventeen female students were studied before and after Ramadan. Fasting blood was taken for analysis of total cholesterol (TC), low density lipoprotein cholesterol (LDL), high density lipoprotein cholesterol (HDL), very low density lipoprotein cholesterol (VLDL), triglycerides (TG) and glucose. TC was reduced from 184 ± 30 to 98 ± 2 5 mg/dl (p< 0.001). HDL, VLDL and TG remained unchanged. Fasting glucose dropped from 82±14 to 67 ± 8.9 mg/dl (p<0.001). Body weight (p<0.01) and total body fat (P<0.05) were reduced by 0.9 kg, 1.7% respectively.

Beside the effects of dietary modifications, the lowered body weight and the change in body composition seem to induce antiatherosclerotic changes in blood lipids in normolipemic women.

Introduction

The influence of Ramadan fasting on lipids has been investigated several times yielding controversial results. Most reports are on men; when women were included their results were not reported separately.

The reduced meals frequency (1) leads to a hypocaloric diet (2). In spite of a high intake in sweets a weight loss in frequently reported in other studies (2, 14).

Blood lipids, red and white blood cell counts and fasting glucose were investigated in a group of Muslim women before and after Ramadan.

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Methods

The study was conducted at Irbid, Jordan. At the time of the investigation the Ramadan month lasted from March 10 to April 6.

The subjects read the study protocol and informed consents was obtained.

Subjects

A total of 17 female college students volunteered to participate in the study. The mean age was 20.7±1.5 years (18-23), height 162±6.7 cm (152-174), weight 58.4±8.8 kg (table 1). They were free from known diseases.

The subjects did not engage in any sports and kept regular Middle Eastern diet. They were advised not to eat too many sweets together with the meals in order to avoid a rise in triglycerides (1).

Blood analyses

After an overnight fast of at least 12 hours, venous blood was taken on the first day of Ramadan between 9 and 10 a.m. The day before the subjects ate regular Middle Eastern food.

Cholesterol and triglycerides were analyzed enzymatically, (4) glucose was also enzymatically determined and the lipoproteins were estimated by precipitation (14). The analyses of HDL, VLDL, and LDL were performed with commercially available kits (bioMerieux, Mary-1 Eroile, France).

Red and white blood cell counts were carried out by conventional, non-automated methods. (Nikon Microscope-JaPan)

All measurements were repeated on the last day of Ramadan. The subjects did not eat an early morning meal the night before as instructed by the researchers.

Statistics

The parameters were calculated as means and standard deviation. The paired T-test was implemented to establish differences between pre- and post measurements. The relations between changes in skinfold thickness or body weight and lipids were calculated by linear regression analysis. The level of significance was set at P<0.05.
**Results**

The small reduction in body weight was significant (Table 1). Skinfold measurements revealed the weight loss to be due to a fat loss. The reduction was significant in abdominal, triceps and to smaller extent subscapular.

Total body fat was calculated from skinfold measurements (3) at three different sites with the Lange Caliper (Cambridge, MD, USA): triceps, subscapular, and abdominal. The mean body fat content was 16.2 ± 1%.

On day 28 total cholesterol had was decreased, Triglycerides, HDL and VLDL did not show any change. The drop in LDL was highly significant (Table 2).

Glucose was reduced to lower level.

Red and white blood count increased while packed cell volume did not change (Table 3).

**Discussion**

The most important result of the study was reduction of total cholesterol and LDL. Several studies on Ramadan fasting showed a reduction in weight, which was due to a reduction in meal frequency to two per day and to a reduction in caloric intake (1, 2). The reduction in weight was frequently accompanied by a regression of total cholesterol and LDL. In contrast, a reduction in weight and total cholesterol induced by physical activity was followed by a reduction in VLDL and LDL and by an increase in HDL; (15) thus, the results of the present study might not be influenced by a change in life style. (1, 2)

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The participants had a normal ratio of LDL. HDL did not change, but the ratio of LDL/HDL was lowered from 2.7 to 2.0, more clearly expressing the beneficial effect of a reduction of LDL.
The finding of lowered total cholesterol is contrary to the results of other investigations which found a rise (5, 6, 7, 8) or no change (9, 10), but in agreement with one study (11).

The triglycerides increased in some studies (9, 11) and in others no change was observed (8), a decrease was also reported (10, 12). An explanation might be the different base line values: at higher base line levels a decrease was more often observed and at low values an increase.

Most studies on effects of Ramadan fasting on lipids have been performed with male subjects. Studies including male and female subjects did not list the results separately (8, 12).

Menstruating females have a favorable lipid distribution in the blood. Lower LDL and higher rate of lipolysis, which is at the same level as in highly endurance trained men.(16)

The reduction in body weight has been documented quite often, but the connection to a loss of subcutaneous fat and thus of body fat was seldom demonstrated before in women. The loss in skinfold thickness did not correlate with the drop in total cholesterol or LDL, and the reduction in body weight did not correlate with the reduction in total cholesterol and LDL.

No change in total cholesterol. Men seem to react differently than women during Ramadan fasting since different effects were observed. One reason might be that fasting blood was collected at 6P.m. In addition, shifts in day and night rhythm be of importance as reported in the change of cortisol level during Ramadan (13).

In conclusion, Ramadan fasting seems to yield beneficial effects on the levels of blood lipids and fasting glucose and on skinfold measurements. Further studies including dietary protocols are needed to substantiate the present study.
Table (1)

Anthropometric Data (n = 17)

<table>
<thead>
<tr>
<th></th>
<th>weight [Kg]</th>
<th>Skinfold Triceps [mm]</th>
<th>Skinfold Subscapular [mm]</th>
<th>Skinfold Subscapular [mm]</th>
<th>Fat [%]</th>
</tr>
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<tbody>
<tr>
<td>Begin of Ramadan Range</td>
<td>[44.4-77.7]</td>
<td>[7-25]</td>
<td>[10-31]</td>
<td>[12-33]</td>
<td>[8.2-34.0]</td>
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<tr>
<td>SD</td>
<td>4.4</td>
<td>7.2</td>
<td>6.6</td>
<td>5.1</td>
<td></td>
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<tr>
<td>End</td>
<td>[43.4-76.4]</td>
<td>[5-23]</td>
<td>[8-31]</td>
<td>[9-30]</td>
<td>[6.1-32.0]</td>
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<tr>
<td>SD</td>
<td>8.3</td>
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<td>6.4</td>
<td>5.4</td>
<td>4.3</td>
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### Table (2)

Lipids and Glucose

<table>
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<tr>
<th></th>
<th>Cholesterol [mg/dl]</th>
<th>Triglycerides [mg/dl]</th>
<th>HDL-Cholesterol [mg/dl]</th>
<th>VLDL-C. [mg/dl]</th>
<th>LDL-C. [mg/dl]</th>
<th>Glucose [mg/dl]</th>
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<tr>
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<td>60</td>
<td>46</td>
<td>11.9</td>
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<td>82</td>
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<td>Ramadan Range</td>
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<td>16</td>
<td>14</td>
<td>3.2</td>
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<tr>
<td>SD</td>
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<tr>
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<td>62</td>
<td>48</td>
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<td>98</td>
<td>67</td>
</tr>
<tr>
<td>Ramadan Range</td>
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<td>20</td>
<td>17</td>
<td>3.8</td>
<td>25</td>
<td>8.9</td>
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<td>n.s.</td>
<td>n.s.</td>
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**Table (3)**

<table>
<thead>
<tr>
<th></th>
<th>Erythrocytes</th>
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<th>Leucocytes</th>
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<tr>
<td></td>
<td>mill/cm³</td>
<td>g/dL</td>
<td>%</td>
<td>1/mm³</td>
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<td>n.s.</td>
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References


