Effect of total dietary fats on serum cholesterol, triglycerides and lipoprotein levels in rat

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Abstract- Effect of total dietary fats on serum cholesterol, triglycerides and lipoprotein levels were investigated in this study. For this purpose two different percentages (15% and 60%) respectively of fats were used. 25% dietary fat was chosen as control. Corn oil is used as a source of fat in this experimental protocol. Each treatment was carried out for 10 days. Cholesterol, HDL and LDL levels in animals receiving 15% fat (Group A) showed significant decrease. But Group B animals (received 60% fat) showed only significant increase in HDL level suggesting thereby 60% dietary fat intake does not affect cardiovascular risk factors adversely. Even HDL (good cholesterol) level increase indicates some cardio protective effect.

Keywords : Serum cholesterol, triglycerides, lipoproteins, cardiovascular risk factors.

Introduction
Fats are very essential energy producing macronutrient. The American Health Association reported that a daily diet containing less than 30% of total fat and less than 10% saturated fat will reduce the risk of coronary heart disease [1]. It will improve the tendency of obesity, cardiovascular and endocrine disorders [2 – 6]. However, fat is essential not only for cellular structures or energy expenditure, but also to provide sufficient nutrients including fat soluble vitamins [7]. Thus, it is necessary to optimize required amount of fat which must not affect our cardiovascular endocrine or other metabolic systems. But the required amount of dietary fat intake is a controversial matter. Different serum lipoproteins like High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Very Low Density Lipoprotein (VLDL); triglycerides and cholesterol; apolipoprotein A1 and apolipoprotein B are also affected by dietary total fat intake [8]. The effect of different dietary fats on serum lipoproteins, cholesterol and triglyceride levels may be reflected by body weight changes []. When total calorie intake is balanced with its expenditure, dietary fat intake does not affect serum lipoproteins, cholesterol and triglyceride levels [9]. In the present study we would like to investigate the effect of decreasing fat intake to 15% and increasing its intake to 60% compared to 25% fat intake on body weight, fat percentage, different lipoproteins, cholesterol and triglyceride levels.

Materials and Methods
Experimental animals
Eight week old male Sprague – Dawley rats (150 – 200 gm) were selected for this study. All the experimental animals were maintained according to the guide like as provided by the Indian National Science Academy. Three groups of rats (each group comprises 8 rats) were randomly selected for this study. Groups were marked as control (received corn oil equivalent to 25% of total dietary fat) Group A (received corn oil equivalent to 15% of total dietary fat) and Group B (received corn oil equivalent to 60% of total dietary fat). The corn oil administration was carried out for 10 days.

Estimation of Serum Parameters
Fasting blood was drawn from each of these animals after giving experimental diet for 10 days, and kept it in a heparinized vial and centrifuged at 3,000 rpm for 20 minutes. Plasma was collected and was subjected for lipoprotein analysis. Serum cholesterol, triglycerides, different lipoproteins namely HDL, apolipoprotein A1 and apolipoprotein B were estimated according to kit applications as provided by cognet clinical chemistry division of span diagnostic limited. VLDL = Triglycerides / 5. LDL = Total cholesterol – VLDL – HDL [10].

Statistical Analysis
All the date were expressed as mean ± SEM. Student’s t test were performed to examine statistical significance in various groups of animals. The values were considered significant at p < 0.05.

Discussion
Table 1 showed decrease in fat intake in Group A or increase its intake in Group B animals did not affect the body weight and body fat percentage significantly as compared to control group of animals. Table 2 expressed there was no significant variation (p > 0.05) in different lipoproteins and triglyceride levels except cholesterol, HDL and LDL among Group A and Group B animals compared to control. Cholesterol, HDL and LDL showed significant decrease (p < 0.05) in Group A animals as
compared to control. However, in Group B animals only HDL level showed significant increase (p < 0.05). Thus, low fat diet however decrease cholesterol and LDL levels leading to reduction in cardiovascular risk factors [16]. But simulataneous decrease in HDL (good cholesterol) will concomitantly increase the chance of cardiovascular diseases [12]. It is also depicted in the present study that significant increase (p < 0.05) in HDL level can be resulted without significant increase in serum cholesterol and LDL level by increasing dietary fat intake upto 60% (in Group B animals) compared to control. Thus, our present study claims that increase in dietary fat intake upto 60% can improve HDL levels without affecting cardiovascular risk factors adversely. However, in this study only total fats was considered. Studies on the effect of saturated fats is under way.

Acknowledgement
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References

Table 1 - Some anthropometnic parameters of control, Group A and Group B animals

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (gm)</td>
<td>176 ± 7</td>
<td>172 ± 5</td>
<td>177 ± 7</td>
</tr>
<tr>
<td>Body Fat %</td>
<td>16.6 ± 2.7</td>
<td>16.3 ± 1.9</td>
<td>16.8 ± 1.3</td>
</tr>
</tbody>
</table>

n = 8, values were expressed as mean ± SEM; # non significant when compared with control

Table 2- Serum Cholesterol, triglycerides and lipoprotein levels in control, Group A and Group B animals

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol (mg / dl)</td>
<td>174 ± 5</td>
<td>* 143 ± 11</td>
<td># 188 ± 8</td>
</tr>
<tr>
<td>Triglycerides (mg / dl)</td>
<td>146 ± 7</td>
<td>* 144 ± 3</td>
<td># 149 ± 9</td>
</tr>
<tr>
<td>HDL (mg / dl)</td>
<td>74 ± 3</td>
<td>* 54 ± 8</td>
<td>* 84 ± 6</td>
</tr>
<tr>
<td>LDL (mg / dl)</td>
<td>70.8 ± 7.8</td>
<td>* 60.2 ± 6.3</td>
<td># 74.2 ± 6.6</td>
</tr>
<tr>
<td>VLDL (mg / dl)</td>
<td>29.2 ± 2.2</td>
<td># 28.8 ± 1.7</td>
<td># 29.8 ± 3.6</td>
</tr>
<tr>
<td>Apolipoprotein A1(mg / dl)</td>
<td>119 ± 5</td>
<td># 113 ± 8</td>
<td># 122 ± 3</td>
</tr>
<tr>
<td>Apolipoprotein B(mg / dl)</td>
<td>56 ± 6</td>
<td># 53 ± 3</td>
<td># 59 ± 3</td>
</tr>
</tbody>
</table>

n = 8, values were expressed as mean ± SEM; * p < 0.05; # non significant when compared with control