Study of Lipid Profile in Obese Persons with Type 2 Diabetes Mellitus

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ABSTRACT

Introduction: Diabetes is a universal endemic with fast increasing prevalence in both developing and developed countries. Obesity is an unnecessary accumulation of body fat and in its gross manifestation possesses a real hazard to health. It is well recognized that obesity is directly or indirectly associated with type 2 diabetes mellitus. The aim was to compare lipid profile in Type 2 diabetics with obesity and non-diabetic obese subject.

Materials and Methods: This study was conducted in Department of Physiology, S.P. Medical College and Hospital, Bikaner, Rajasthan during the period from March 2015 to February 2016. Weight was record in kilograms with the subject standing on the weighing machine without shoes and mini-mum clothing.

Results: Present study showed that the obese T2DM patients had significantly higher serum triglycerides, LDL-C levels and serum VLDL-C levels; with significant lower HDL-C levels when compared to obese non diabetic cases. Total cholesterol levels were increased without significant ‘p’ value.

Conclusion: We conclude that all the lipid fractions (except HDL-c) are strangely elevated in obese type 2 diabetics when compared with obese controls.

Keywords: Diabetes, LDL, VLDL, HDL.

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INTRODUCTION

In the prehistoric Sanskrit Literature, diabetes mellitus was described as “honey-urine disease,” connected with gross emaciation and wasting. Diabetes is a worldwide endemic with rapidly increasing prevalence in both developing and developed countries. Obesity is an extreme accumulation of body fat and in its gross manifestation possesses a real risk to health.² It is well established that obesity is directly or indirectly associated with type 2 diabetes mel-litus.³ In addition, alterations in body fat distribution are associated with changes in lipids and lipoproteins and with increased coronary heart disease (CHD).⁴ In addition, obesity is measured as part of the metabolic syndrome in the pathogenesis of type 2 diabetes.⁵ Different methods are used for the measurement of obesity including the determination of (i) body mass index⁶, (ii) skin fold thickness or waist hip ratio⁷, (iii) fat cell size and number, and (iv) body density.⁸ Body mass index has gained favor as a better measure for adiposity⁹, that is often used as a measure for body fatness in large epidemiological studies.¹⁰

The aim was to compare lipid profile in Type 2 diabetics with obesity and non-diabetic obese subject.

MATERIALS AND METHODS

This study was conducted in Department of Physiology, S.P. Medical College and Hospital, Bikaner, Rajasthan during the period from March 2015 to February 2016. Weight was record in kilograms with the subject standing on the weighing machine without shoes and mini-mum clothing. Weight of the patients and controls were recorded in the same weighing machine.

Height was record with the subject barefooted, feet together, back and heels against the upright bar of the height scale; head upright in Frankfort horizontal plane – look straight ahead. The height measuring equipment consisted of a vertical bar with a horizontal bar of wood which was brought down snugly on examinee’s head.¹¹

Body Mass index was calculated from the formula: BMI = weight in kilograms / (height in meters)² Patients were taken as obese if their body mass index was 27.8 and 27.3 for males and females respectively.¹² Randomly selected, 52 subjects out of them 26 were obese Type 2 DM patients and 26 were obese non diabetic
control were studied for following biochemical-cal parameters:
1. Blood Glucose by GOD-POD methods.13
2. Total Cholesterol (TC) by enzymatic end point CHOD-POD methods.14
3. Triglyceride (TG) by enzymatic glycerol phosphate oxidase/peroxidase methods.15
4. HDL-Cholesterol by direct enzymatic end point method.16,17
5. LDL-Cholesterol by Friedewald’s formula.18
6. VLDL-Cholesterol by Friedewald’s equation.

LDL-c = TC-HDL-c-TG/5

We used student t-test to locate the statistical significance. P-value <0.05 was to be considered statistically significant.

Table 1: Anthropometric Measurement of the Study Population

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obese type 2 DM (n=26)</th>
<th>Obese control (n=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>46.7+/-.4.12</td>
<td>48.4+/-.4.01</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>79.5+/-.9.07</td>
<td>77.03+/-.5.0</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>78.04+/-.7.9</td>
<td>80.03+/-.8.13</td>
</tr>
<tr>
<td>BMI</td>
<td>33.02+/-.4.1</td>
<td>32.06+/-.3.2</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>103.21+/-.9.43</td>
<td>96.76+/-.7.24</td>
</tr>
</tbody>
</table>

Table 2: Comparison of lipid profile Between Obese type-2 DM & Obese Control

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Obese type 2 DM (n=26)</th>
<th>Obese control (n=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>245.36+/-.35.72</td>
<td>154.06+/-.10.06</td>
</tr>
<tr>
<td>TG</td>
<td>203.97+/-.56.04</td>
<td>117.56+/-.21.9</td>
</tr>
<tr>
<td>HDL-c</td>
<td>43.4+/-.9.02</td>
<td>46.25+/-.4.33</td>
</tr>
<tr>
<td>LDL-c</td>
<td>165.61+/-.14.5</td>
<td>136.2+/-.34.7</td>
</tr>
<tr>
<td>VLDL-c</td>
<td>42.52+/-.10.9</td>
<td>22.02+/-.4.46</td>
</tr>
<tr>
<td>FBS</td>
<td>142.50+/-.37.61</td>
<td>110.21+/-.20.2</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION
In this study we assess the lipid profile in type 2 diabetes mellitus with obesity. Table 1 shows the age and anthropometric characteristics of the study population. Table 2 shows the estimated levels of lipid profile in obese type 2 diabetes and obese non diabetic cases along with fasting blood sugars of obese type 2 DM. Table-2 shows the mean TC, TG, HDL-c, LDL-c, VLDL-c, and FBS. In our study, the levels of TC, TG, LDL-c, VLDL-c were significantly increased while HDL-c levels did not show statistically significant difference in the two group.

Obesity, Dyslipidemia and Diabetes were considered as independent risk factors for coronary vascular disease and is associated with high amount of morbidity and mortality. Even though they were independent risk factors, the three entities were closely related i.e. obesity leads to insulin resistance which in turn causes type 2 diabetes and both together leads to dyslipidemia. Diabcare Asia-India study conducted nationwide survey of patients attending tertiary diabetes care centers and re-reported a mean age of onset of diabetes as 43.6years with a mean duration of diabetes of 10.0years and 90.6% having T2DM (Raheja BS, Kapur A-2001). This study showed that there was not much sex variation in the prevalence of T2DM with obesity; with only a slight increase in female group, a study made by Nalchjavanai and others found that all types of dyslipidemia were significantly more prevalent in females.19 Women had higher HDL-C compared to men, high prevalence of hypertriglyceridemia in females due to their higher BMI. It showed that disease status was high in unemployed or employed with sedentary jobs.

The findings in this study showed that the obese T2DM patients had significantly higher serum triglycerides, LDL-C levels and serum VLDL-C levels; with significant lower HDL-C levels when compared to obese non diabetic cases. Total cholesterol levels were increased without significant ‘p’ value. Similar results had been observed by some.20,22 Similar results were also seen in others but their HDL-C levels did not differ significantly.23,24 The studies of Santen et al (1972) and Peret al (1974) observed mean serum triglyceride levels higher in obese diabetics in comparison to obese control subject.25,26 Hypercholesterolemia and hypertriglyceridemia were seen in this study.27 Hypertri-glyceridemia predisposes the patients to life threatening complications like diabetic ketoacidosis, coronary artery disease and lipaemia retinalis.28 Sharma (1970) and Jain (1980) observed increase in the levels of serum total cholesterol, serum triglycerides, and serum phospholipids in diabetic subjects when compared to normal controls.29,30 Bijlani et al (1984) found HDL-C to be significantly lower in obese diabetics when compared to normal weight diabetics. Gambhir et al found that low HDL-C were independent risk factor for premature coronary artery disease.31 In a study at Joslin clinic also showed an inverse correlation of HDL-C with adiposity and triglyceride levels.

CONCLUSION
Our conclusion was that all the lipid fraction (except HDL-c) is unusually elevated in obese type 2 diabetics when compared with obese controls. There are studies which appear to suggest that the lipoprotein distribution in Type 2 diabetes mellitus is not significantly changed by the degree of metabolic control. Thus Lipid profile analysis must be ended a vital part of Type 2 DM patients’ clinical re-views and treatment. Type 2 DM and other diabetes must be educated on the risk they face as a result of their state and the necessary steps they need to supervise it.

REFERENCES

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