Pattern of Glucose and Lipid Profile in Obese Diabetic and Non-diabetic Subjects in the Population of Rawalpindi

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Abstract

Obesity is the fifth leading risk for global deaths, which may lead to type 2 diabetes mellitus. This study was planned to see the glucose and lipid profile in obese diabetic and non-diabetic subjects in the local population of Rawalpindi. We planned to study the variation of glucose and lipid profile in obese diabetic and non-diabetic subjects in the local population of Rawalpindi. This case control study was conducted at chemical pathology Laboratory, Holy Family Hospital and Benazir Bhutto Hospital, Rawalpindi. Non-probability purposive sampling was done on 100 subjects out of whom 50 were obese diabetic (21 males and 29 females), and 50 were obese non diabetic (23 males and 27 females) individuals from the general population of Rawalpindi. Blood sample was analyzed for estimation of FPG (fasting plasma glucose) and lipid profile. The t-test was applied and p-Value of <0.005 was considered significant. The study showed that the FPG of obese diabetics was higher than obese non-diabetic (164.7±29 and 92.9±10.5mg/dl) with a p-Value is <0.001. Total cholesterol was (204.3±17.4 and 161.6±38.1mg/dl) and a p-Value is <0.001. Triglycerides (TG) was (216±34 and 146±57mg/dl) and a p-Value is <0.001. HDL (high density lipoproteins) was (33±3.5 and 38±5.4mg/dl) and a p-Value is <0.001). LDL (low density lipoproteins) was (127±16 and 94±33mg/dl) and a p-Value is <0.001, respectively. No significant difference in BMI (body mass index) was observed between obese Diabetic and non-Diabetics and this was (29.2±6 and 30.3±4.5 kg/m²) and a p-Value is <0.279. It is concluded that difference in the levels of fasting plasma glucose and lipid profile is highly significant in both obese diabetic and non-diabetic individuals.

1 Introduction

Obesity is the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being obese. Overweight and obesity are linked to more deaths worldwide than underweight. According to World Health Organization (WHO) global estimation 2008 overall, more than one in ten of the world’s adult population was obese. The statistics of United States revealed that 64% of the population is falling in overweight or obese category. It was also observed that upon comparison with last four decades this percentage has increased. It was also identified that this predisposes to some non-communicable diseases.

Body mass index (BMI) is a tool that is often used to determine whether a person’s health is at risk due to his or her weight. BMI is a ratio of weight to height. In 1997, the WHO recommended the BMI for measurement of overweight and obesity in adults. The recommended cut-points for BMI for Asians is lower compared to Europeans. Asian population has a high percentage of body fat at low BMI, studies showed that the risk of having cardiovascular diseases and diabetes mellitus is high.
at lower BMIs. Nanay D, concluded that in Pakistan and other South Asian countries, the predisposing factors for this can be increasing urbanization, changing lifestyles, excessive use of energy drinks/diets, reduced physical activities, social and environmental changes.

Weighing too much may increase the risk for developing many health problems. If people are overweight or obese, they may be at risk for type 2 diabetes, hypertension, coronary heart disease, stroke, metabolic syndrome, certain types of cancer and sleep apnea. Hypertriglyceridemia and low levels of high density lipoprotein cholesterol (HDL-C) are the important cause of morbidity.

Therefore, the current study was planned to study the pattern of glucose and lipid profile in obese and overweight individuals to find out the persons at risk of developing complications.

2 Material and Methods

This case control study was conducted at Clinical Chemistry Laboratory, Department of Pathology, Holy Family Hospital and Benazir Bhutto Hospital, (Allied hospitals of Rawalpindi Medical College) Rawalpindi. Non probability purposive sampling was done. 100 individuals with age of 20-65 year out of whom 50 were obese diabetic (21 males and 29 females), and 50 were obese non diabetic (23 males and 27 females) were selected from the population of Rawalpindi. Obese persons having BMI of 23.0-27.4 kg/m² were included and Persons have BMI <23.0 kg/m² were excluded. 2.5ml blood was collected in a sodium fluoride tube for fasting blood glucose estimation and rest of blood poured into gel tube for lipid profile. All samples were analyzed on the same day. Statistical analysis was carried out on statistical software “statistical package for the social sciences” (SPSS, Version20). For each variable mean, standard deviation, and ranges were calculated.

The p-Values <0.05 were considered significant for comparison of age, FPG and lipid profile were determined in obese diabetic and non-diabetic subjects.

Independent samples t-test performed on age, BMI, FPG and lipid profile to compare means of obese Diabetics and non-Diabetics subjects.

3 Results

The baseline characteristics of 100 subjects are given below in table 1, the factors include age, BMI and biochemical profile include FBG, total cholesterol (T.Chol), TG, HDL and LDL.

No significant difference is found in BMI in both groups. Obese diabetic’s individuals who do exercise regularly are 3% and 47% people never done exercise. While 8% obese non-diabetic people do exercise, and 42% do not do exercise at all.

Other related variables such as socioeconomic status indicate subjects related to middle class were 69%, lower class 28% and upper class 3%. Educational status reveals 66% literate and 34% illiterate individuals. In the obese diabetic group, females showed more irregularity found in menstrual cycle (12% and irregular 8%) than obese non-diabetic group irregular 3% Highly significant difference found in life-style of obese diabetic and non-diabetic people showing 90% sedentary, 10% active, 50% sedentary, and 50% active life style respectively (figure 1 and 2).

4 Discussions

The National Cholesterol Education Program (USA) has suggested that total cholesterol less than 200 mg/dl and LDL cholesterol less than 130 mg/dl are desirable levels for any individual. The incidence of such lipid derangement increases poorly / uncontrolled diabetes mellitus. Furthermore, this hypertriglyceridemia predisposes to complications like cardiovascular disorders and acute pancreatitis.

Kholoud M et al, assessed that more than 85% of overweight people have type 2 diabetes mellitus. Hypertriglyceridemia i.e levels more than 5.2 mmol/l (200 mg/dl) is a common finding in diabetes mellitus and in obese patients.

Our study showed the significant difference in 5 parameters (FPG, T-Chol, TG, HDL and LDL) of obese diabetics and obese non-diabetics. There was only one study in reviewed literature
found matching with our study that was conducted in Western Nepal where Yadav et al, 2012 found that there was a significant rise in levels of total cholesterol, Triglycerides and LDL cholesterol and regarding HDL cholesterol, and reported no significant differences in both groups. Their finding of total cholesterol and triglycerides was in agreement with our findings, while in the findings of our study, LDL and cholesterol were in the desirable range in most of the subjects, and the differences of both groups were significantly different. Hence, this point was in opposition with these findings. There were no further studies searched in literature review matching with the study, and the studies published relevant to ours are being discussed here and are as follow14.

Table 1: Comparison of baseline characteristics in both groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Obese diabetic (N=50)</th>
<th>Obese non-diabetic (N=50)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ±SD</td>
<td>Range</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>Age</td>
<td>41.5 ±9.6</td>
<td>21-60</td>
<td>36.6 ±11.8</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>29.2 ±6.0</td>
<td>24-43</td>
<td>30.3 ±4.5</td>
</tr>
<tr>
<td>FBG (mg/dl)</td>
<td>164.7 ±29</td>
<td>68-108</td>
<td>92.9 ±10.5</td>
</tr>
<tr>
<td>T. Chol (mg/dl)</td>
<td>204.3 ±17.4</td>
<td>87-256</td>
<td>161.6 ±38.1</td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>216.4 ±33.5</td>
<td>64-281</td>
<td>146.4 ±57.3</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>33.3 ±3.5</td>
<td>17-48</td>
<td>37.9 ±5.4</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>127.3 ±15.9</td>
<td>17-160</td>
<td>94.1 ±32.8</td>
</tr>
</tbody>
</table>

A significant p-value <0.001 found in FBG, T-Chol, TG, HDL and LDL

5 Conclusion

The difference in the levels of FPG and lipid profile was highly significant in both obese diabetic and non-diabetic individuals.

6 Recommendations

The abnormal Cholesterol levels can improve with good glyemic control. Reducing BMI, changing life style from sedentary to active, regular exercise and periodic checkups of lipids and blood glucose is recommended for all obese diabetics in order to avoid complications.

7 Conflict of interests

There are no conflicts of interests regarding the publication of this manuscript in UKJPB

8 Author’s contributions

- KA initiated the idea of this study and supervised all laboratory technicalities for quality assurance of results.
- NM was involved in sample collection and processing, SPSS data recording and result analysis.
- ZH is the Corresponding Author. Involved in abstract / discussion writing, final formatting of references as per Vancouver style and entire manuscript.
- BKT wrote the Introduction and adjusted the table for interpretation of results.
- LNK wrote the discussion and recommendations.

9 References


