Research Article

To Study Rheumatoid Factor and Lipid profile in Type 2 Male Diabetes Mellitus Patients in Bangladesh

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Abstract

Aims and objectives: The present study was planned to see the associations of serum lipid profile with positive Rheumatoid factor in type 2 male diabetes mellitus patients. Material and methods: In present case control study, 110 males type 2 diabetes mellitus patients were taken as case and age and sexmatched healthy male controls were included as study material. Lipid profile and Rheumatoid factor measured with automatic biochemistry analyzer. Observation and results: We found significant difference in mean of age, duration of DM, exercise time, waist hip ratio, systolic blood pressure and diastolic blood pressure within case and control (P<0.05) but no significant differences of mean BMI. This study also shows that significant differences in mean of FBS, ABF, HbA1C and S. Uric acid between case and control (P<0.05), but there was no significant differences of mean TG, Cholesterol, HDL and LDL. There was significant difference in mean of total cholesterol in rheumatoid factor positive and negative individual’s (P<0.05) whereas no significant differences in mean of triacylglycerol, HDL-cholesterol, and LDL-cholesterol level of rheumatoid factor positive and negative individuals of type-2 male DM. Also we found no significant differences of body mass index of rheumatoid factor positive and negative individuals of type-2 male DM. Conclusion: Rheumatoid factor is positively associated with total cholesterol which may related to the development of type 2 diabetes. Rheumatoid factor individually may increase the risk of developing type 2 diabetes.

Keywords: Fasting blood sugar, glycated hemoglobin, uric acid, lipid profile, Rheumatoid Factor
INTRODUCTION
Rheumatoid arthritis (RA) is a systemic, autoimmune disorder that primarily manifests as chronic synovial inflammation of multiple joints. Over the last few decades it has become increasingly apparent that chronic activation of the immune system, as observed in the pathogenesis of RA, is associated with corollary changes in intermediary metabolism, potentially leading to increased risk of cardiovascular disease (CVD). Several reports have discussed the association between chronic inflammatory disease states and disorders in intermediary metabolism, particularly peripheral insulin resistance (IR). In addition, numerous independent studies have implicated the association of multiple immune regulatory components (including tumor necrosis factor [TNF] and interleukin-6 [IL-6]) in RA, IR, and type 2 diabetes mellitus (DM). Disease-associated reduction in lean muscle mass and sedentary lifestyle likely further contributes to IR in patients with RA. Although the prevalence of type 2 DM might be expected to be increased among patients with RA, large cross-sectional studies have not definitively established an association between these two conditions. Because type 2 DM and IR are important risk factors for CVD, a common co morbidity in patients with RA, a review of the literature to examine factors associated with glucose regulation and type 2 DM in RA patients is warranted. Diabetic individuals maintained on insulin therapy are perforce subjected to repeated 'immunization' by a foreign protein. Production of anti-insulin-antibodies by many such individuals appears likely. In view of the findings cited above, as well as the possibility that circulating antigen-antibody complexes may also stimulate Rheumatoid factor production, it was considered that individuals receiving injections of exogenous insulin might exhibit an increased frequency of RF activity as compared to control groups. Formation of RF-like antibodies has been noted in rabbits after hyper immunization with bacterial antigens or ovalbumin.

MATERIALS AND METHOD
The present study was carried out at the department of Biochemistry, Ibrahim Medical College & BIRDEM OPD, Dhaka. Total one hundred ten (110) of type 2 male diabetes mellitus patients as cases and one hundred (100) healthy male controls were included in this study. The patients were selected from BIRDEM, OPD. The controls were selected from the healthy male workers of BIRDEM and IMC. Subjects who have not willing to participate and patients associated with infections, arthritis, cardiac and renal failure were excluded from the present study. Subjects with a current or previous history of rheumatoid arthritis or other diseases known to be associated with a significant frequency of RF activity were excluded. A detailed patient information was filled in proforma contains patients name, age, sex, diet (fast food habit), clinical history, family history of diabetes etc. All the patients and controls were asked to attend BIRDEM OPD with overnight fasting. Blood pressure and height, weight, body mass index, waist and hip circumference were measured. 2 ml blood sample was collected in fluoride vaccutainer for estimation of fasting blood sugar and 4 ml blood was collected in plain vaccutainer for estimation of serum uric acid and serum lipid profile. All the patients were asked to fast overnight for a period of minimum 10 hours. The blood samples which were taken for analysis were obtained from the antecubital vein. The analysis of plasma glucose was done by the glucose oxidase method, while the serum uric acid, cholesterol, HDL-C, LDL-C and triglycerides were evaluated by enzymatic methods. Two hours after breakfast blood was collected for estimation of blood sugar from all
type 2 male diabetes mellitus patients and healthy male controls. Estimation was done by Tulip corolyzer fully autoanalyzer for uric acid and lipid profile estimation. Tested for Rheumatoid factor activity in their serum was done by means of the slide latex test (SLT) and the tanned sheep cell test (TSC). Positive sera were taken as those exhibiting a 1 + or higher degree of agglutination in the SLT and a titer of 1:20 or more in the TSC test. Sera examined with the TSC test were first adsorbed overnight with an equal volume of packed washed tanned un sensitized sheep cells to remove heterophil activity. Serological results were grouped in two categories: (1) Those from patients who had received multiple injections of insulin; (2) Those from patients who had neverreceived insulin and who were instead maintained on dietary or oral hypoglycemic drugs.

Statistical Analysis
Statistical Methods-Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups Inter group analysis) and chi square test has been used to analyze the data having ordinal variables. Significant figures were analyzed, Suggestive significance (P value: 0.05<P) Statistical software The Statistical software namely EPI Info 7.0 and Vassar stats (www.vassarstats.net) for the analysis of the data and Microsoft word were used. A p value of <0.05 was considered as significant.

RESULTS
Table 1 shows comparison of base line characteristics of study subjects. It shows that there were significant differences in mean of age, duration of DM, exercise time, waist hip ratio, systolic blood pressure and diastolic blood pressure within case and control but no significant differences of mean BMI was found between case and control. This table also shows that significant differences in mean of FBS, ABF, HbA1C and S. Uric acid between case and control, but there was no significant differences of mean TG, Cholesterol, HDL and LDL.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Case (Type-2 DM) N=110</th>
<th>Control (Healthy individual) N=100</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>51.83 ±9.911</td>
<td>44.81 ±9.66</td>
<td>.000</td>
</tr>
<tr>
<td>Duration of diabetes (years)</td>
<td>6.87 ±5.54</td>
<td>00</td>
<td>.000</td>
</tr>
<tr>
<td>Body mass index (kg/m2)</td>
<td>25.43 ±3.19</td>
<td>24.96 ±3.02</td>
<td>.274</td>
</tr>
<tr>
<td>Exercise time (hours)</td>
<td>1.94 ±.831</td>
<td>1.12 ±.327</td>
<td>.000</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>94 ±7.06</td>
<td>90.95 ±9.51</td>
<td></td>
</tr>
<tr>
<td>Hip circumference (cm)</td>
<td>102 ±6.19</td>
<td>98.48 ±8.24</td>
<td></td>
</tr>
<tr>
<td>Waist: Hip</td>
<td>.92 ±.03</td>
<td>.91±.03</td>
<td>.035</td>
</tr>
<tr>
<td>Systolic BP (mm of Hg)</td>
<td>128 ±16.75</td>
<td>122 ±11.28</td>
<td>.002</td>
</tr>
<tr>
<td>Diastolic BP (mm of Hg)</td>
<td>85 ±8.41</td>
<td>81 ±6.18</td>
<td>.000</td>
</tr>
<tr>
<td>Fasting blood sugar (mmol/l)</td>
<td>8.19 ±2.48</td>
<td>7.31 ±3.13</td>
<td>.025</td>
</tr>
<tr>
<td>2hours ABF (mmol/l)</td>
<td>11.29 ±3.47</td>
<td>10.19 ±3.95</td>
<td>.033</td>
</tr>
<tr>
<td>HBA1C (mg%)</td>
<td>7.96 ±6.04</td>
<td>7.93 ±2.01</td>
<td>.026</td>
</tr>
</tbody>
</table>
TG(mg%) 189.72 ±111.36 200 ±104.49 .468
Cholesterol(mg%) 179 ±43 183 ±42.25 .495
HDL-C(mg%) 38.38 ±13.77 38.14 ±5.52 .870
LDL-C(mg%) 102.10 ±35.79 110 ±33.23 .088
Uric acid(mg%) 8.39 ±2.61 5.14 ±.84 .000

P value <0.05 is statistically significant.

Table 2 shows that Rheumatoid factor positive in 9 study subjects among the cases and in control it was 0 which demonstrated that Rheumatoid factor is significantly associated with the risk of developing type 2 diabetes.

Table 3 shows that there was a significant difference in mean total cholesterol level in rheumatoid factor positive or negative individuals among type 2 male DM.

Table 2: Distribution of Rheumatoid factor in the study population

<table>
<thead>
<tr>
<th>Rheumatoid factor (RF)</th>
<th>Case N=110</th>
<th>Control N=100</th>
<th>P value</th>
<th>Relative risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>101</td>
<td>100</td>
<td>&lt;0.01</td>
<td>1 (Ref.)</td>
</tr>
<tr>
<td>Negative</td>
<td>9</td>
<td>0</td>
<td></td>
<td>1.99 (1.38 –2.30)</td>
</tr>
</tbody>
</table>

P<0.05 was considered as level of significance.95% CI, 95% Confidence Interval.

Table 3: Comparison of biochemical parameters between Rheumatoid factor positive and negative cases among type 2 male DM

<table>
<thead>
<tr>
<th>Biochemical parameters</th>
<th>Rheumatoid factor positive individuals in cases (Mean ±SD) N= (09)</th>
<th>Rheumatoid factor negative individuals in cases (Mean ±SD) N= (101)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>140.31±13.71</td>
<td>183.4±4.18</td>
<td>.003</td>
</tr>
<tr>
<td>Triacylglycerol</td>
<td>189.70±83.88</td>
<td>189.7±9.15</td>
<td>.998</td>
</tr>
<tr>
<td>HDL-C</td>
<td>38.78±1.81</td>
<td>38.35±1.424</td>
<td>.0896</td>
</tr>
<tr>
<td>LDL-C</td>
<td>84.44±8.96</td>
<td>103.7±3.59</td>
<td>.122</td>
</tr>
<tr>
<td>BMI</td>
<td>26.86±1.33</td>
<td>25.31±3.09</td>
<td>1.39</td>
</tr>
<tr>
<td>FBS</td>
<td>8.533±0.961</td>
<td>8.162±2.245</td>
<td>.435</td>
</tr>
<tr>
<td>HBA1C</td>
<td>7.11±0.611</td>
<td>8.069±6.262</td>
<td>.4530</td>
</tr>
</tbody>
</table>

P value <0.05 is statistically significant.

DISCUSSION
Previous studies based on healthcare utilization data have reported an increased risk of type 2 diabetes in patients with RA. In contrast, our study showed that male patients with type 2 diabetes were associated with a significantly increased risk for incident RA. The increased risk of type 2 diabetes in patients with RA was proposed to be due to the long-term use of steroids during RA treatment. Nevertheless, a Canadian study using a population-based health insurance database demonstrated a similar risk of incident type 2 diabetes in patients with RA, with or without adjusting for the use of oral or topical glucocorticoids. Conversely, decreased insulin sensitivity was reported in patients with RA upon long-term exposure to steroids. Thus, the role of long-term steroid use among patients
with RA in the development of type 2 diabetes still requires further investigation. Furthermore, lifestyle changes after diagnosis of RA (rheumatoid arthritis)\(^6\) might also contribute to an increase in the risk of developing type 2 diabetes. One health insurance database study performed in the United Kingdom concluded that the observed association between patients with RA (rheumatoid arthritis) and incident type 2 diabetes could substantially have explained by obesity and lifestyle factors\(^7,8\). Our findings also showed that between Uric Category and Rheumatoid Factor category and Cross tabulation (overall) study population was done and showed the significant correlation between Uric Category and Rheumatoid Factor positive cases. This result is inconsistent with the preceding study. Furthermore, in patients with inflammatory polyarthritis, insulin resistance was closely associated with the presence of rheumatoid factor (RF) and anti-citrullinated protein antibody (ACPA)\(^9,10\). These findings suggest an important role for chronic systemic inflammation in the pathogenesis of both RA and type 2 diabetes. Our study showed that distribution of rheumatoid factor and drugs of diabetes and their association and it shows that 5 rheumatoid factor positive cases are taking insulin among 9 of that positive case and shows the association between them it was statistically significantly associated. It is possible that the association between RA (rheumatoid arthritis) and type 2 diabetes might be partially explained by the confounding effect of obesity. Nevertheless, although obesity is a well-established risk factor for type 2 diabetes\(^11\), previous research on the association between body mass index and RA generated inconsistent results. Early studies had indicated a moderate increase in the risk of RA with obesity but newer studies generally reported that obesity was not a predisposing factor for RA\(^12,13\).

**CONCLUSION**

Rheumatoid factor is positively associated with total cholesterol which may related to the development of type 2 diabetes. Rheumatoid factor individually may increase the risk of developing type 2 diabetes.

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