Relation between elevated uric acid and Lipid panel

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Abstract: Background: Hyperuricemia is a very common metabolic disorder. Recently, A high uric acid noted that is associated with the risk of atherosclerotic cardiovascular diseases, inflammation and diabetes mellitus. The present study aimed to Relation between elevated uric acid and Lipid panel

Materials and Methods: A case-control study has been conducted on 70 hyperuricemia males with gout disease and 70 normal uric acid males as control aged between 41-70 years. Lipid profile was measured, statistically analyzed and compared with control.

Results: The results revealed significant differences between cases and control. The average levels of total cholesterol, triglycerides and LDL were significantly higher in cases compared to controls while HDL was significantly lower in cases compared to control. Pearson correlation showed that the absolute positive significant correlation between uric acid and cholesterol (r=0.935, P<0.001), triglycerides (r=0.915, P<0.001) and LDL (r=0.914, P<0.001) while the results showed that there is a positive significant correlation between uric acid and HDL (r= -0.834, P<0.001).

Conclusions: Hyperuricemia should be treated because it has closed link with dyslipidemia disorder, therefore, both hyperuricemia and dyslipidemia will enhance the risk for cardiovascular disease. In the clinical filed, the more comprehensive strategic management to decrease hyperuricemia and dyslipidemia among adult males and deserves further investigation.

Key Words: hyperuricemia, lipid profile, adult males, Gaza Strip.

Introduction
The prevalence of hyperuricemia is progressively increasing in the international communities; emerging evidence shows that hyperuricemia is now more frequent in the developing nations [1]. Serum uric acid is a strong predictor of cardiovascular disease and metabolic syndrome. However, the vital role of uric acid in the obesity and hyperlipidemia is still the subject of debate and discussion because it is always accompanied with other risk factors such as stress, diets and coronary heart diseases [2,3]. Hyperuricemia is the consequence of increased uric acid production or and decreased excretion. It is also associated with glucose intolerance, hypertension, and dyslipidemia, a cluster of metabolic and hemodynamic disorders which characterize the so-called metabolic syndrome [4]. The serum uric acid level was found to be increased in most nonalcoholic fatty liver disease (NAFLD) patients which were an independent risk factor for NAFLD [5,6]. In fact, data had confirmed the strong relationship between NAFLD and metabolic syndrome [7,8].

Materials and methods
1. Study population and Experimental design
Study design and samples: The present study is a descriptive case-control study. A total of 140 male. According to the present study were divided into two groups: group I (70 hyperuricemia male patients) and group II (70 apparently healthy
individuals of the same population matched for age were used as a control group). The study was conducted by using collecting research data in the main public hospitals in Gaza strip: Nasser Hospital, European Hospital, El-Shifa Hospital and Al-Najar Hospital. The study data was collected during the period of June 2018 to April 2019.

2. Inclusion criteria:
Inclusion criteria were between 41–70 years of age who had high uric acid

3. Exclusion criteria:
Exclusion criteria were patients with a history of smoke use, hypertension, diabetes mellitus, a cardiovascular disease, myeloproliferative disorder, in therapy with cytotoxic drugs, renal or hepatic disorders and those on antiguout therapy, the individuals who were less than 41 years and more than 70 years.

4. Ethical considerations and permissions:
Consent form to participate in the study was obtained from participants and freely participates in the study. Every participant had been provided with a full explanation of the intended study.

5. Data collection:
An interview was used for filling in questionnaires. All interviews were conducted face to face by the researchers

6. Blood Collection:
All blood samples were collected in and sent to the laboratory for analysis. Serum uric acid (UA) was determined quantitatively using DiaSys reagent kits regarding lipid profile. Cholesterol (Ch) and triglycerides (TG) were measured by the cholesterol oxidase/POD method and by the glycerol phosphate oxidase/POD method, respectively, using the BioSystems kit, Spain [9,10].

High-density lipoprotein cholesterol (HDL-C) was determined by the precipitating method using Labkit kit, Spain [11]. Low-density lipoprotein cholesterol (LDL-C) was calculated using the empirical relationship of [12].

Expected Values for total cholesterol: Desirable less than 200mg/dl, borderline 200-240mg/dl and high risk more than 240mg/dl

Expected Values for triglyceride:Desirable: < 200 mg/dL (fasting), borderline high: 200 – 400 mg/dL and elevated > 400 mg/dL

Expected Values for HDL-C: >35 mg/dL

Expected Values for LDL-C:Desirable130 mg/dl, borderline high risk 130 – 160 mg/dL and high risk > 160 mg/dL.

7. Statistical Analysis
Data were analyzed using SPSS version 23. Chi-square (X²) was necessary to compare the relationship between categorical variables, independent sample t-test (two-tailed) was done to assess the differences between case and control and Interrelationships between baseline variables and uric acid were assessed by Pearson’s correlation coefficient test. The values in tables were presented as mean ± standard deviation otherwise noted. P-value of < 0.05 was considered statistically significant.

Results
3.1. Distribution of studied sample according to socio-demographic data
Table (1) showed that 38.6% of cases and 40% of controls aged between 41-50 years, 32.9% vs. 34.3% aged between 51-60 years, and 28.6% vs. 25.7% aged between 61-70 years (P= 0.930).

Regarding employment status, 21.4% and 25.7% from the case and control respectively were working while 78.6% and 74.3% from case and control respectively were not working, the results showed there are no statistically non-significant differences between groups in working status (P-value= 0.691).

Furthermore,47.1% from case are single while 52.9% from case are married (P-value= 0.393)Moreover, 45.7% and 52.9% from case and healthy individuals respectively are primary education while 14.3% and 8.6% from case and healthy individuals respectively are secondary education while 40% and 38.6%from case and healthy individuals, respectively are university education (P-value= 0.500). These results indicated statistically no significant differences among groups in socio-demographic characteristics studied that indicate good matching between groups.
Table (1): Distribution of studied sample according to socio-demographic data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Case n (%)</th>
<th>Control n (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>41 – 50</td>
<td>27 (38.6)</td>
<td>28 (40)</td>
<td>0.930</td>
</tr>
<tr>
<td></td>
<td>51 – 60</td>
<td>23 (32.9)</td>
<td>24 (34.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>61 – 70</td>
<td>20 (28.6)</td>
<td>18 (25.7)</td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td>Yes</td>
<td>15 (21.4)</td>
<td>18 (25.7)</td>
<td>0.691</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>55 (78.6)</td>
<td>52 (74.3)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>33 (47.1)</td>
<td>27 (38.6)</td>
<td>0.393</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>37 (52.9)</td>
<td>43 (61.4)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Primary</td>
<td>32 (45.7)</td>
<td>37 (52.9)</td>
<td>0.500</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>10 (14.3)</td>
<td>6 (8.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University</td>
<td>28 (40)</td>
<td>27 (38.6)</td>
<td></td>
</tr>
</tbody>
</table>

The significance of difference was checked by chi-square test (compare study group and control), significant at P <0.05.

3.2. Distribution of lipid profile parameters among the study population.

Table 2 shows the distribution of lipid profile parameters among the study population. The results showed that there are higher statistically significant in cases compared to controls for cholesterol (273±14.31 vs 167±15.09), TG (270±30.43 vs 127±7.93), LDL-C (184±15.57 vs 97±15.59), respectively (P<0.001). In contrast, the results showed that there are lower statistically significant in cases compared to controls for HDL-C (35±2.68 vs 45±2.93; P<0.001).

Table (2): Comparison of lipid profile between the two groups

<table>
<thead>
<tr>
<th>Lipid profile level (mg/dl)</th>
<th>Case (N = 70) Mean±SD</th>
<th>Control (N =70) Mean±SD</th>
<th>% mean different</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td>273±14.31</td>
<td>167±15.09</td>
<td>63.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Triglyceride</td>
<td>270±30.43</td>
<td>127±7.93</td>
<td>112.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HDL</td>
<td>35±2.68</td>
<td>45±2.93</td>
<td>-22.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LDL</td>
<td>184±15.57</td>
<td>97±15.59</td>
<td>89.7</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

HDL; high density lipoprotein, LDL; low density lipoprotein, TC; total cholesterol. Values expressed as mean ± standard deviation (SD) of 140 participants. *independent t-test

3. Correlation between uric acid and lipid profile among the study population

Correlation between uric acid and lipid profile among the study population pointed out in table 3. Pearson correlation showed that the positive significant correlation between uric acid and cholesterol (r=0.935, P<0.001), triglycerides (r=0.915, P<0.001) and LDL (r=0.914, P<0.001) while the results showed that there is a positive significant correlation between uric acid and HDL (r= -0.834, P<0.001).

Table (3): correlation between uric acid and lipid profile among the study population

<table>
<thead>
<tr>
<th>Lipid profile level (mg/dl)</th>
<th>Uric acid (mg/d)</th>
<th>r</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td></td>
<td>0.935</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Triglyceride</td>
<td></td>
<td><strong>0.915</strong></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LDL</td>
<td></td>
<td>0.914</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HDL</td>
<td></td>
<td>-0.345</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
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Discussion

To date, there is no published study on hyperuricemia among adult males in Gaza Strip. In the present study is the first to assess of association between hyperuricemia and lipid profile among adult males in Gaza Strip. In our study the results showed that there is an association between uric acid and elevated of cholesterol, TG, LDL-C while has lower levels. Also, UA levels were positively negative with serum TG, TC, LDL cholesterol while HDL negative correlation with uric acid. This results agree with other reported study that showed the agreement of dyslipidemia and hyperuricemia has been reported in a few studies. In India, a significant association was found between UA and lipid profile in the adult population [13]. By same away in Italy, Lippi et al., (2010) were illustrated the same results [14]. Peng et al., (2015) illustrated that there is a significant positive correlation between serum LDL-C, TG, total cholesterol and they showed that strongly positive correlation between cholesterol, TG, HDL with serum uric acid levels, whereas serum HDL-C levels were a significant inverse correlation with UA [15]. Our results are in line with previous studies that showed pathogenesis overlap among hyperuricemia and dyslipidemia [14,15,16]. Also, the previous study showed that UA levels were positively associated with serum TG, TC, LDL cholesterol [17,18] and these results demonstrated that serum uric acid associated with CVD risk additionally to lipid elevated and HDL-C may be a protective factor for CVD. Our study showed strong A linear correlation was found between lipid profile and UA and this agreement with some previous studies and are also in agreement with the results of the present study [19,20]. The previous study reported that elevated UA increases the risk of developing high LDL-C, as well as hypertriglyceridemia [21]. A vast number of clinical studies have reported a positive association of UA with circulating levels of triglyceride, cholesterol, and uric acid [22]. In brief, the result showed the strong agreement of elevated lipid profile with hyperuricemia, it is urgent to develop good guidelines to treatment hyperuricemia such as modification in diet and lifestyle and improve to found the new pharmacologic strategy to improving hyperuricemia in order to prevent CVD occurrence.

Conclusion: The present study showed a strong association between UA and lipid profile among adult males in Gaza strips. Early prevention of hyperuricemia and dyslipidemia can reduce the incidence of associated CVD among Gazan adult males.

Reference


9. Meaiatti F, Prencipe L, Bardelli F, Giannini G, Tarli P. The 4-hydroxybenzoate/4 aminophenazone chromogenic system used in