The Relationship Between Serum Testosterone Level, Lipid Profile And Blood Pressure In Infertile Men

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Abstract
To examine the association between low testosterone activity & low blood pressure through the change in lipid profile parameters. A case control study. At al-batool infertility clinic in Mosul, during the period from October 2006-April 2007. One hundred four infertile men ,aged 20-70 years divided into two groups, group one consisted of 67 infertile men without replacement therapy. Group two, included 37 infertile men with replacement therapy. 100 men were apparently healthy, fertile, normotensive, attending outpatient clinic used as a control group. They were investigated by measuring serum triglyceride (TG), total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL) & very low density lipoprotein (VLDL), by using enzymatic colorimetric method. The blood pressure, body mass index measurement were done. Serum testosterone measurement was also done using ELISA. 47.2% of infertile men showed a decline in serum testosterone below normal level.42.3% showed high blood pressure above normal. There was a significant decrease in serum testosterone & HDL in group one as compared with control group, while they exhibit a significant increase in diastolic blood pressure, TC, LDL & atherogenic index. A significant negative correlation between testosterone & each of diastolic blood pressure, BMI, was noted. Also there was a significant positive relationship between testosterone & HDL concentration. This finding of positive correlation between testosterone & HDL are consistent with hypothesis that endogenous androgen has a vascular protective influence in men.

Key words: Infertile men, plasma lipids, testosterone, BMI, & blood pressure.

Introduction

The heart and blood vessels have a rich supply of testosterone receptors present in the aorta and peripheral blood vessels as well as in the arterial cells and in the normal male left ventricle (1,2).
Subjects with prevalent ischemic heart disease were reported to have significantly lower serum testosterone levels than subjects without ischemic heart disease (3,4).

However, natural androgens inhibit male atherosclerosis, further, there is increased evidence in the literature to show that low levels of androgens is associated with adverse cardiovascular risk factors including an atherogenic lipid profile, systolic and diastolic hypertension, obesity, insulin resistance and raised fibrinogen in humans (4).

Endogenous testosterone in males regulate the blood lipid metabolism, and the male with low plasma testosterone might be lead
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All data were expressed as mean ± S.D. ANOVA test, pearson correlation was used also.

**Result**
Forty seven percent (n = 49) of infertile men had low serum testosterone, forty two percent (n = 44) showed high blood pressure. Table (1 & 2) shows that there is a significant decrease in testosterone & HDL in those with & without replacement therapy compared with control group, while exhibit a significant increase in diastolic blood pressure, TC, LDL & atherogenic index, on the other hand non significant increases were recorded in systolic blood pressure, TG & VLDL in those without replacement therapy as compared to control group. Also a non-significant decrease in systolic blood pressure & VLDL in those with replacement therapy as compared to control group. The present result shows a significant negative correlation between testosterone & each of diastolic blood pressure & BMI (p< 0.001).

Also, there is a significant positive correlation between testosterone & HDL concentration in those with & without replacement therapy as compared to control group.

**Discussion**
In the present study there is a significant negative correlation between testosterone & diastolic blood pressure, this is in agreement with many reported studies (15,16,17,18), the heart, blood vessels & brain are rich in androgen receptors. It is possible in view of their location in the tunica media that steroid acting through these receptors modulating smooth muscle tone in some vascular beds (19).

Potassium conductance & potassium channels may be involved in the mechanism of testosterone inducing relaxation (20). Furthermore research findings (21) suggest that testosterone acts as a coronary vasodilator by calcium antagonistic action. A significant negative correlation is found between testosterone & TC & a similar correlation is found between testosterone & LDL. Our results were in agreement with the findings of previous studies (22,23). The cholesterol & the LDL receptors found in the liver & recent study had shown that testosterone effect on the liver X-receptor decreasing total cholesterol and atherogenic fraction of LDL cholesterol (9,10).

Other studies found that low dose supplemental testosterone treatment in men with chronic stable angina reduces exercise – induced myocardial infarction (11).

**Patients and Method**
The study was done on 204 men aged 20-70 years, out of these, 104 men were infertile men who attended male infertility clinic at Al –Batool Hospital for routine follow up visit from October 2006-April 2007. They were seen first by a urologist who conducted physical examination.

Subjects were classified into three groups:
Group 1: included 67 patients who were infertile men without replacement therapy (human chorionic gonadotropin or testosterone hormone).
Group 11: consisted of 37 patients who were infertile men with replacement therapy.
Group 111: consisted of 100 men who were apparently healthy fertile normotensive, they were selected from the outpatient clinic aged 20-70 years used as control group.

Complete history was obtained, questions concerning sexual habit, alcohol, smoking & drugs thought to affect fertility or antihypertensive drugs.

For all subjects, measurement of blood pressure on sitting position was done, blood was taken by antecubital venepuncture between 8.00 AM & 11.00 AM for serum testosterone & serum lipid profile including total serum cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL) & atherogenic index followed 12 hours fasting.

TC, TG, HDL & LDL were measured by enzymatic & colorimetric method using kits supplied by Syrbio (France). VLDL was measured using the formula: VLDL = TG/5(12). Atherogenic index was calculated using the formula: Atherogenic index= TC/HDL-c(13).

Serum testosterone was measured by ELISA using testosterone enzyme immunoassay test kit (Biocheck France).

Body mass index was also calculated using the formula: BMI = weight (kg)/height (m2) (14).

Normal BMI <25 kg/m2, overweight 25-30 kg/m2, obese >30 kg/m2.
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19. Horwitz KB, Horwitz LD. Canine vascular tissues are targets for androgens, oestrogen, progesterone and (LXR) which acts as a sensor of cholesterol metabolism & lipid biosynthesis(24). A significant positive correlation between testosterone & HDL agrees with the finding of other researcher (25). Testosterone may directly affect HDL by increasing the hepatic production of apolipoprotein A – 1 which is the major protein constituent of nascent high density lipoprotein particles (26).

The significant negative correlation between testosterone & BMI agrees with the finding of Osuna et al 2006 (27). The testosterone induced muscle cell hypertrophy is accompanied by an important increase fat mass & decrease in lean body mass.

References


8. Simon D , Marie AC, Khalil N, Genevieve Orssand, Jucyneline ,

**Table 1** The mean & standard deviation of blood pressure (mmHg) & testosterone (ng/dl) in control (100 subjects) & infertile men, with & without hormone replacement

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Without replacement (67 patients)</th>
<th>With replacement (37 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Bp</td>
<td>121.3 ± 12.6</td>
<td>125.3 ± 17.25</td>
<td>120 ± 17.16</td>
</tr>
<tr>
<td>Diastolic Bp</td>
<td>68.15 ± 9.2</td>
<td>84.78 ± 12.89 (** )</td>
<td>84.73 ± 14.38 (**)</td>
</tr>
<tr>
<td>Testosterone</td>
<td>6.3 ± 2.1</td>
<td>2.6 ± 1.94 (** )</td>
<td>5.12 ± 4.15 (**)</td>
</tr>
</tbody>
</table>

***P< 0.001, ** p<0.01
NS: non significant

**Table 2** The mean & standard deviation of lipid profile in control & infertile men

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Without replacement</th>
<th>With replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC mg/dl</td>
<td>183.55 ± 23.16</td>
<td>209.7 ± 47.54 (*** )</td>
<td>208.03 ± 50.61 (*** )</td>
</tr>
<tr>
<td>HDL-c mg/dl</td>
<td>75.23 ± 16.69</td>
<td>30.69 ± 7.79 (*** )</td>
<td>31.92 ± 9.11 (*** )</td>
</tr>
<tr>
<td>LDL-c mg/dl</td>
<td>82.06 ± 51.92</td>
<td>144.77 ± 48.81 (*** )</td>
<td>146.22 ± 44.82 (*** )</td>
</tr>
<tr>
<td>VLDL mg/dl</td>
<td>31.23 ± 8.5</td>
<td>32.2 ± 16.66 NS</td>
<td>29.95 ± 13.83 NS</td>
</tr>
<tr>
<td>Athero. Index</td>
<td>2.47 ± 0.56</td>
<td>7.29 ± 2.94 (*** )</td>
<td>6.92 ± 2.38 (*** )</td>
</tr>
</tbody>
</table>

***P< 0.001, ** p<0.01
NS: non significant