Serum levels of testosterone and atherosclerosis: A study in middle-aged men from the general population

Introduction:

Testosterone, the end product of the hypothalamic-pituitary-gonadal axis is not only essential for male reproduction and virilisation, but also for general health and well-being. Cardiovascular mortality is a major problem worldwide with atherosclerosis being an important pathogenic factor. This part of our study aimed to investigate the association between testosterone levels and biomarkers of atherosclerosis as well as between testosterone and risk factors for atherosclerosis in order to increase our knowledge about the role of testosterone level in the process of atherosclerosis.

Material and Methods:

The study is based on data from 119 middle-aged men from the general population. All study subjects underwent a health assessment with special emphasis on the cardiological and urological status. Each subject was asked to deliver a blood sample for analysis of testosterone, HbA1c, fasting blood glucose, 2-hour glucose tolerance, Factor VIII, von Willebrand factor antigen, von Willebrand factor activity, Apolipoprotein A-1 (ApoA-1), Apolipoprotein B (ApoB), Apolipoprotein B-to-Apolipoprotein A-1 ratio (ApoB-to-ApoA-1 ratio), high sensitive C-reactive protein (hsCRP), and fibrinogen levels. Data were also gathered regarding age, BMI, waist circumference, smoking, alcohol consumption, and family history of cardiovascular diseases. Men were classified into two groups based on serum levels of testosterone: hypogonadal and eugonadal.

Results:

ApoB, ApoB-to-ApoA-1 ratio, and hsCRP were significantly higher in hypogonadal men compared to eugonadal men (1.1 g/L vs. 1.0 g/L, p=0.03), (0.8 vs. 0.7, p=0.03), (3.3 mg/L vs. 2.0 mg/L, p=0.01), respectively. Moreover, Body mass index, systolic pressure, and fasting blood glucose were higher in hypogonadal compared to eugonadal men (28 kg/cm2 vs. 26 kg/cm2, p = 0.01), (129 mmHg vs. 123 mmHg, p=0.03), (5.9 mmol/L vs. 5.5 mmol/L, p=0.03), (1.1 g/L vs. 1.0 g/L, p=0.03), (0.8 vs. 0.7, p = 0.03), respectively. In adjusted multivariate regression analysis model, testosterone showed negative associations with body mass index (β=-1.832, p= 0.030), fasting glucose (β=-0.394, p=0.011), glucose tolerance test (β=-0.957, p=0.045), ApoB (β=-0.157, p=0.017), and ApoB-to-ApoA-1 ratio (β=-0.118, p=0.046).

Conclusions:

Testosterone level is inversely related to the biomarkers and risk factors for atherosclerosis. These findings support the hypothesis that low testosterone levels play a role in the pathogenesis of atherosclerosis.
**List of publications:**

1. Association between serum levels of testosterone and biomarkers of subclinical atherosclerosis.
   Rezanezhad B, Borgquist R, Willenheimer R, Elzanaty S.
   The Aging Male. 2018 Sep; 21(3):182-186.

2. The association between serum testosterone and risk factors for atherosclerosis
   Babak Rezanezhad, Rasmus Borgquist, Ronnie Willenheimer, Saad Elzanaty
   Accepted in Current Urology  2019