

Abstract

Association of testosterone and CRP with severity of coronary artery disease among male patients: a case control hospital based study

Epidemiological studies have found an inverse association between testosterone and coronary artery disease (CAD) in men, but the relationship is inconsistent. The study aimed to investigate, whether serum levels of total testosterone (TT) and high sensitivity C-reactive protein (hs-CRP) differ in men with coronary artery disease from those without CAD and to evaluate the relationship of serum TT and hs-CRP with the severity of CAD.

Three hundred and nine males (103 patients with ST-elevation myocardial infarction (STEMI), 103 patients with angiographically-proven CAD, 103 controls without having a history of CAD) were recruited. Serum TT, hs-CRP, lipids, cardiac troponin I (cTnI) and plasma glucose were estimated. Three angiogram-based severity scores (Gensini, Leaman and vessel score) were used in the severity assessment of angiographically-proven CAD. In STEMI patients, Killip classes, TIMI (Thrombolysis In Myocardial Infarction), GRACE (Global Registry of Acute Coronary Events) and modified Selvester ECG (electrocardiographic) QRS scores were used in assessing the severity of myocardial infarction.

Mean basal serum TT in patients with angiographically-proven CAD was significantly lower than controls ($p = 0.001$) and mean basal (on admission) serum TT in STEMI patients was significantly lower than controls ($p = 0.001$). The difference remained statistically significant after adjustment for confounding variables.

Serum TT was found to be an independent predictor of both angiographically-proven CAD ($p = 0.001$, OR = 0.68, CI = 0.58-0.79) and STEMI ($p = 0.001$, OR = 0.75, CI = 0.66-0.85). Low testosterone level showed high adjusted (age, BMI, smoking) odds ratio as a risk factor for angiographically-proven CAD ($p = 0.007$, OR = 3.4, CI = 1.41-8.61) and STEMI ($p = 0.001$, OR = 5.6, CI = 2.32-13.84).

The mean basal hs-CRP concentration in patients with angiographically-proven CAD was significantly higher compared to controls ($p = 0.001$) and mean basal (on admission) hs-CRP concentration in STEMI patients was significantly higher compared to controls ($p =$

0.001). Total testosterone showed a significant negative correlation with hs-CRP and LDL-Ch, while a significant positive correlation was seen between TT and HDL-Ch.

In angiographically-proven CAD patients, the TT levels were not significantly different according to the severity categories of vessel score ($p = 0.373$), Leaman score ($p = 0.694$) and Gensini score ($p = 0.329$), but hs-CRP level showed a significant difference among the severity categories estimated by the respective scores ($p = 0.001$, $p = 0.028$, $p = 0.015$). In STEMI patients the TT level did not show a significant association with the severity of STEMI assessed by cTnI ($p = 0.129$), Killip classes ($p = 0.864$), TIMI ($p = 0.783$), GRACE ($p = 0.342$) and ECG score ($p = 0.659$), but it showed a significant association with left ventricular ejection fraction ($p = 0.049$). However, hs-CRP level showed a significant positive association with the severity assessed by Killip classes ($p = 0.025$), TIMI ($p = 0.017$), GRACE ($p = 0.002$) and ECG score ($p = 0.044$).

In conclusion, TT levels were low in patients with angiographically-proven CAD and in patients with STEMI compared to controls, while hs-CRP levels were higher in both groups of patients compared to controls. Testosterone was an independent predictor of CAD and low TT concentration was a risk factor of CAD. Total testosterone did not show a significant correlation with the angiographic severity of CAD, while hs-CRP did show a significant positive correlation. Severity of myocardial infarction graded by clinical risk scores and ECG score was not correlated with the testosterone concentration, but positively correlated with hs-CRP. Total testosterone was negatively correlated with hs-CRP. A significant positive association was found between testosterone and HDL-Ch, while a negative association was found between testosterone and LDL-Ch. Low levels of testosterone, high levels of hs-CRP and abnormal lipid profile play a role in the development of coronary artery disease. The precise mechanisms underlying these observations and any clinical applications require further studies.