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PILOT STUDY TO FIND OUT THE ASSOCIATION OF TOTAL TESTOSTERONE WITH CORONARY ARTERY DISEASE AMONG THE SOUTH INDIAN POPULATION

Biochemistry

Dr.Santhini Gopalakrishnan.S*	Assistant Professor, Department of biochemistry,Chettinad Hospital And Research Institute Chennai. *Corresponding Author
Dr.E.Malligai	Prof & HOD, Department of biochemistry, Chettinad Hospital And Research Institute Chennai.
Dr.Sandeep U	Consultant Plastic Surgeon, Department of plastic surgery,Chettinad Super speciality Hospital Chennai.
Mr.S.K Murugavel	Assistant Professor, Department of Biochemistry,Chettinad Hospital And Research Institute Chennai.
Mr.Venkat Siddarth	Assistant Professor, Department of Biochemistry,Chettinad Hospital And Research Institute Chennai.
Dr.Pitcahai Ansar Khalifullah	Assistant Professor, Department of Biochemistry,Chettinad Hospital And Research Institute Chennai.
Mrs.KJ Christina	Tutor, Department of Biochemistry,Chettinad Hospital And Research Institute Chennai.
Mr. Vinoda Kumar H. R.	Msc (PhD), Department of Biochemistry,Chettinad Hospital And Research Institute Chennai.

ABSTRACT

Background: Atherosclerotic Coronary Artery Disease(CAD) is a leading cause of mortality and morbidity worldwide.Men have twice the risk of getting attacks of CAD than women.The role of testosterone in the pathogenesis of CAD has little been studied.My aim is to study the influence of testosterone among men and the occurrence of CAD.
Aim: The association between low testosterone levels and coronary artery disease in urban male population of Chennai.
Objective: To find out the effects of low testosterone levels in predisposing to CAD in males.
Study design: The study was a case control study conducted among 97 subjects(47cases and 50 controls) among the patients attending the cardiac OPD of Chettinad Hospital and Research Institute for a period of 6 months
Inclusion criteria:
Cases: Patients with CAD with significant lesion in the coronary arteries.
Controls: Normal healthy individuals.
Exclusion criteria: H/o hypogonadism,h/o radiation exposure, drug abuse,athletes.
Methodology: After obtaining consent, cases and controls are selected based on clinical history and angiographic findings.They are requested to give 5 ml of blood. Blood is collected in red topped vacutainer which should be centrifuged and the following parameters analysed.
Statistical Analysis:The statistical analysis was done using the SPSS version 21.
Result: Testosterone levels were lower in men with Coronary artery disease than normal healthy individuals and was found to be statistically significant($p<0.05$).
Conclusion: A low plasma testosterone level is associated with high percent risk of development of coronary artery disease suggesting the protective effect of testosterone on endothelium

KEYWORDS

Testosterone,Coronary artery disease

1.INTRODUCTION

India is having a long standing culture and its traditional food recipes have lot of medicinal properties helping people maintain good health. Not only the food, the epics preach us things to be followed in life, about sleep, emotions, physical activity etc, which protect us from a sundry of diseases.

Slowly this tradition is altered by globalisation, where late night work, junk foods, irregular food timings and stress in life make us vulnerable for number of diseases. Obesity is the common problem now which is the underlying cause for non communicable diseases and disorders due to low testosterone [1,4]. The prevalence of Coronary Artery Disease (CAD) tops the list. According to World bank estimates, CAD had 31% share in the total burden of disease and the prevalence of CAD was 3-4% and 8-10% among the rural and the urban population of India[1,2]. The (Chennai urban population) (CUPs) (no.5)[8]study found out the overall prevalence of CAD in native South Indian population to be 11%[3]. Studies are showing that India will have the burden of maximum number of coronary artery disease in the near future. [5,6,7,9,10]. Apart from that recent articles quote about the prevalence of low testosterone levels among Indian males. In a pilot study done among the working men in India, the prevalance of low testosterone was found to be 26.1% probably due to adiposity and chronic inflammation.[3]. All these data points a finger at lifestyle as a causative factor. Hence we thought of finding out a link between low testosterone and CAD since it will definitely help the clinician to be aware of the risks connected with CAD, the disease with highest mortality.

2.MATERIALS :

It is a case control study involving 50 male subjects who were angiographically proven for coronary artery blocks and 47 male subjects matched with CAD patients were selected as controls for whom cardiac problems are ruled out by Echo & ECG by Cardiologist). The study was conducted after obtaining permission from Institute ethical committee. Consent was taken from all subjects .The study was done between November 2013-june2014. Consent was taken from all subjects. Personal details and anthropometric measurements were recorded and 5 ml blood was drawn in fasting in red topped vacutainer for estimating HDL TGL testosterone and 5 ml in grey topped vacutainer for glucose. After centrifuging lipids and glucose were estimated in SEIMEN DADE BEHRING X-PAND and total testosterone in BECKMAN COULTER ACCESS 2 on the same day. Patients with known history of hypogonadism, patients not

willing for study, patients taking testosterone supplements, patients with hyperthyroidism were excluded from the study.

3.METHODOLOGY

Patient's height was measured in centimetres with shoes off and weight was measured in kilograms in indoor clothing .Body mass index (BMI) was calculated using the formula BMI=weight (kg) / height² (m).

4.RESULTS /STATISTICS:

The statistical analysis was done using the SPSS version 21.

VARIABLES	Group				Independent Samples t-test	
	Cases		Control			
	Mean	SD	Mean	SD	t-value	Significance.
AGE	56.36	10.11	51.74	10.53	2.239	.027
HDL	38.40	9.01	43.46	9.00	-2.810	.006
TGL	140.18	59.72	169.46	45.47	-2.758	.007
BMI	25.97	3.72	22.73	3.10	1.818	.002
Testosterone	3.42	1.34	5.10	1.41	-6.129	.000
CARDIAC MASS	97.34	33.85	93.47	36.63	-.563	.875
Systolic Pressure	135.72	28.00	128.60	28.95	1.250	.214
Diastolic Pressure	84.76	12.22	79.68	12.04	2.094	.039

Table 1: SHOWING THE INDEPENDENT SAMPLE T TEST OF BETWEEN VARIABLES OF CASES AND CONTROL

Metabolic Syndrome		Group				Independent Samples t-test	
		Control		Cases			
		Mean	SD	Mean	SD	t-Value	Sig.
Present	AGE	48.94	11.04	56.59	10.09	-2.323	.025
	HDL	41.00	10.16	35.33	4.38	2.543	.015
	TGL	194.75	43.61	159.15	66.69	1.903	.064
	BMI	26.69	3.35	26.83	4.26	-.115	.909
	TESTOSTERONE	4.83	1.08	3.34	1.25	3.957	.000
Absent	AGE	53.06	10.18	55.60	9.17	-.918	.363
	HDL	44.62	8.31	41.40	11.58	1.185	.241
	TGL	157.56	41.83	122.50	41.76	2.976	.004
	BMI	23.81	2.53	25.31	2.73	-2.040	.046
	TESTOSTERONE	5.23	1.54	3.43	1.44	4.245	.000

TABLE 2 . SHOWING THE RELATIONSHIP BETWEEN CASES & CONTROLS WITH AND WITHOUT METABOLIC SYNDROME

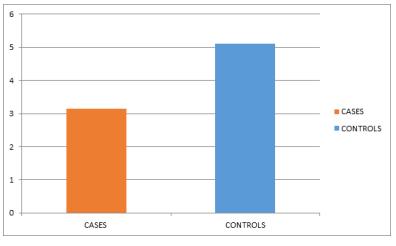

Figure 1: SHOWING THE LEVELS OF TESTOSTERONE AMONG THE CASES AND CONTROLS

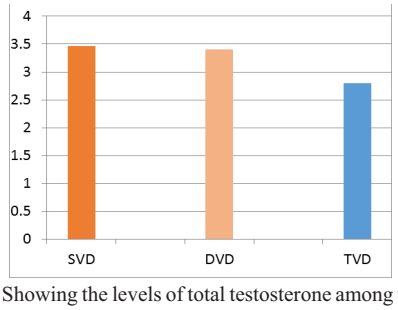

Figure 2 : Showing the levels of total testosterone among the patients with different grades of Coronary artery blocks(SVD(Single vessel disease)-3.47ng/ml;DVD:Double Vessel Disease-3ng/ml;TVD:Triple Vessel Disease-2.8ng/ml)

5.Discussion

The current study was a case control study involving 50 Coronary artery disease patients (Angiographically proven) and 47 Case matched Control subjects (control group includes diabetics and hypertensive subjects but cardiac problems were ruled out by Echo & ECG by Cardiologist). Exposure to risk factors was equal among two groups in this study hence widely differing from other studies where Control subjects were totally healthy.

Independent 't' test analysis of the data of two groups showed highly significant p value for age, HDL, TGL, BMI, Total testosterone, and Diastolic pressure which indicated the definite association of all the above variables with coronary artery disease.[Table1]. Except testosterone rest of the parameters were already proved to have a role in the pathogenesis of CAD[11,12]. Though Age and BMI give highly significant P value the actual numbers don't differ much between the two groups. (Mean of Age 56 & 51 and BMI 25.9 & 23.7). Testosterone has got a direct effect on the myocardium which is proved by studies where IV administration of testosterone in patients with proven CAD improved myocardial ischemia[13,14].Pugh et al had evaluated the effect of acute testosterone administration and have found that it increases the cardiac output acutely apparently via reduction of left ventricular after load[15]. The animal studies done by Larsen et al[16] and Alexander et al[17] gives conflicting results about the relationship between cholesterol deposition on aorta wall, which reflects the existence of many different mechanisms in the pathophysiology of atherosclerosis that could be influenced by testosterone .

According to the study Masayoshi Hashimoto [18], it shows that low testosterone level was associated with endothelial dysfunction independent of other risk factors using the % FMD(percent flow mediated dialatation of brachial artery) a surrogate marker of clinical atherosclerosis that reflects endothelial dysfunction. So from these finding we would like to postulate that endothelial dysfunction leading to atherosclerosis may affect the testicular vessels which may be responsible for the testicular dysfunction and testosterone deficiency .In this study low testosterone is associated with low HDL cholesterol indicating the inflammatory process in the cells.

Analysis of CAD and Control group based on the Metabolic Syndrome status revealed that Total testosterone shows a significant 'p' value again conforming its dissociation with Metabolic Syndrome.[Table 2] Though it differs from the study done on hypogonadism and metabolic syndrome done in Nigerian people done by Akinloye O, Blessing Popoola B et al[19] we think it is the significant since our Control Subjects were equally exposed to the risk factors like patient group. Any way, we like to accept here that our study group was of small size and it should be reproduced in larger prospective study.

6.CONCLUSION:

In sum, a low plasma testosterone level is associated with high percent risk of development of coronary artery disease suggesting the protective effect of testosterone on endothelium

LIMITATIONS:

This study has got some limitations like small study group, limited number of tests because of cost of these tests and time duration of the project.. Since it was difficult to obtain angiographically proven CAD negative cases ,we opted for case matched control where control group had equal exposure to chronic diseases like diabetes mellitus, hypertension like CAD patients..

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Conflict of interest
There are no conflict of interest

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