Original Article

Plasma osteopontin level in ischemic heart disease

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Abstract

The aim of the present study was to evaluate the association between plasma Osteopontin (OPN) levels and ischemic Heart disease (IHD). OPN is a bone related protein present within the atherosclerotic plaque. OPN is 44kDa glycoprotein which is implicated in the regulation of biological phenomenon including atherosclerosis. Plasma OPN level was measured from 115 patients (age36 to 66 years) who underwent coronary angiography OPN level of patients with IHD is not significantly different than that of non IHD patients. Hence plasma OPN cannot be considered as an independent risk factor for development of IHD.

Keywords: Osteopontin, Ischemic Heart Disease, Diabetes Mellitus, Hypertension, Atherosclerosis.

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INTRODUCTION

Most patients with ischemic heart disease have coronary atherosclerosis. Myocardial ischemia is the result of an imbalance between myocardial oxygen supply and demand. Coronary atherosclerosis reduces the supply of oxygenated blood by obstructing the coronary arteries. Although the obstruction may not be enough to produce myocardial ischemia at rest, increase in myocardial oxygen demand during activities may lead to myocardial ischemia.[1] The major risk factors of ischemic heart disease include advancing age, tobacco smoking, D M, decreased HDL level, elevated LDL cholesterol level, hypertension. Whereas obesity, family history and sedentary lifestyle are the predisposing risk factors; elevated Homocysteine, Lp (a), C-reactive protein are considered as conditional risk factors of IHD. Osteopontin (OPN) is matricellular protein that mediates diverse biological functions and having role in the pathogenesis of diseases like cancer and several chronic inflammatory diseases.[2] OPN is involved in normal physiological process and is implicated in the pathogenesis of a variety of disease states including atherosclerosis and inflammatory disease. In human OPN is found to be expressed in smooth muscle cells (SMS) in the atherosclerosis lesion in angiogenic endothelial cells and macrophages.[3] Hence we planned to determine plasma OPN levels in patients with IHD. This study was undertaken to find correlation between OPN levels and IHD and to understand whether OPN is a potential risk factor for the atherosclerotic changes associated with IHD.

MATERIAL AND METHODS

The study included 115 patients under the treatment of cardiologist at the cardiac center .There were 84 males and 31 females of 36 to 66 years of age (84 male age 55.2 $\pm$ 11.4 years, 31 female 49.25 $\pm$ 13.6 years) .All the patients underwent coronary angiography as advised by cardiologist to rule out atherosclerosis and IHD. Routine investigations including Blood glucose level, Blood grouping, Hemogram, Bleeding time Clotting time, Serum Creatinine, HIV, HbSAg, ECG, 2D Echo, Blood pressure, Stress test were performed before angiography. After clinical examination and with help of laboratory

investigations some patients were found to be hypertensive and some of the patients were suffering from diabetes mellitus .Post angiography 61 patients out of 115 were diagnosed as IHD by the cardiologist and 54 patients without IHD were considered as control group in this study .61 IHD patients and 54 controls were sub grouped depending on presence of diabetes mellitus and hypertension as given in table no.1 Patients with heart failure, renal disease, cardiomyopathies were excluded from the study.

Table 1: Distribution of IHD patients and controls in subgroups

Sr. No.	Group	N	Percentage
1	Total subjects	115	
2	Total Control (without IHD)	54	46.91
2a	Control without DM	26	22.62
2b	Control without HTN	28	24.37
2c	Control without DM and without HTN	Nil	0
3	Total IHD patients	61	53.40
3a	Patients with DM	24	20.86
3b	Patients with HTN	29	25.21
3c	Patient with DM and HTN	08	6.9
3d	IHD Patient without DM andwithout HTN	Nil	0

Measurement of plasma OPN level

Heparinised venous blood samples were obtained by veni puncture of anticubital vein before the patient underwent coronary angiography .The blood samples were immediately centrifuged and the separated plasma was stored at -40^0 C until the measurement of OPN. Plasma Osteopontin levels were measured by using an enzyme-linked immunosorbent assay (ELISA) from commercially available kit (Human Osteopontin OPN) Quantikine Elisa kit M/S Rand D systems product.

Table 2: Plasma OPN levels in control group and IHD patients

Osteopontin level, t andp value and significance	Control	IHD patients		
		Total IHD	IHD with DM	IHD with HTN
N	54	61	24	29
Mean Plasma OPN ± SD ng/ml	40.31± 13.66	44.80 ± 20.24	42.30 ± 16.45	45.55±19.60
t/z value		1.407	0.428	1.201
p value		0.162	0.67	0.234
Significance		NS	NS	NS

NS = Not Significant.

RESULT

A peculiar finding was observed in our studies i.e. all the 115 subjects undergoing coronary angiography were either having hypertension or Diabetes Mellitus. In control group of the non IHD patients 26 patients had Diabetes Mellitus (22.6%) whereas 28 patients had hypertension (24.37%). In the IHD patient's group 29 had Hypertension (25.21%) where as 24 patients were Diabetes Mellitus (20.86%).Increased prevalence of HTN and DM especially in the selected age group (36 – 66 years) may be the reason of this observation. Lifestyle changes, stressful conditions may be the important influencing factors for such finding. A slight rise in plasma OPN levels was observed in IHD patients (44.8 ± 20.24 ng/ml) as compared to that of controls (40.31± 13.66 ng/ml). But this increase was statistically insignificant (p=0.162).

DISCUSSION

Fundamental role of OPN is in bone remodeling. Osteopontin is a glycoprotein with structural and functional characteristics of a matricellular protein. This protein is highly expressed in mineralized tissue including bone and teeth.[4] Osteopontin is a phosphorylated glycoprotein with known involvement in the formation and calcification of bone and is regulated by local cytokines. The protein involved in mineralization may play an important role in the onset and progression of calcific coronary atheroma in human coronary arteries.[5] Earlier studies have demonstrated association between plasma OPN levels with the presence and extents of coronary artery disease.[6] But the principal finding of this study is that plasma OPN levels are not associated with ischemic heart disease. Patient with IHD along with Diabetes Mellitus or Hypertension are also not having significantly different levels of plasma OPN. Hence plasma OPN cannot be considered as an independent risk factor for development of IHD. Osteopontin is used as a biomarker for measuring the severity of atherosclerosis, but the role of Osteopontin in the pathogenesis is not clear.[7] We plan to study the association between OPN levels and early atherosclerosis markers .Coronary atherosclerosis is frequently associated with coronary calcification .More detail studies involving assessment of OPN levels and calcium burden of coronary arteries is needed for understanding the role of OPN and its utility in development of atherosclerotic calcification.

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