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CORRELATION OF ST2 BIOMARKER WITH SEVERITY OF CORONARY ARTERY DISEASE IN PATIENTS WITH ACUTE CORONARY SYNDROME

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ABSTRACT

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels. Biochemical markers work side by side in order to detect early alterations of cardiovascular system. A new gene, called ST2 (Suppression of tumorigenicity 2) and its related protein was markedly induced in mechanically overloaded cardiac myocytes. The aim of this review is to explore the possible role of ST2 derived-protein level as an early marker of Coronary Artery Disease and to correlate ST-2 levels with Angiographic severity of Coronary Artery Disease. This current study was Single centre prospective cross-sectional validation study, based on coronary artery disease patients admitted Chettinad hospital & research institute, Chennai period of November 2019 to March 2022. Patients with chest pain and ECG findings consistent with ACS-STEMI/NSTEMI/UA are included in this study. In the present study we found that sST2 levels are significantly increased in patients with acute coronary syndrome. In this study the mean soluble ST2 value was 35.22 ng/ml, mean BNP value was 153.1 pg/ml, mean CK mB was 10.875 ng/ml and mean troponin value was 1840.092 pg/ml. Most of the cases were having ST2 value between 26-45 ng/ml (77%). soluble ST2 level was elevated significantly SVD, DVD and TVD group when comparing to the minimal CAD cases (p= <0.0001). We concluded that higher baseline sST2 values are associated to more severe CAD in patients with acute coronary syndrome. Measurements of sST2 in blood specimens might be used as a clinical predictive biomarker in the risk classification of myocardial infarction (MI) patients.

KEYWORDS: Acute Coronary Syndrome, Cardio Vascular Disease, sST2, Coronary Artery Disease

Cardiovascular disease (CVDs) is a broad term including disease of heart and blood vessel. (IHD) Ischemic heart diseases, often known as CAD, include stable angina and acute coronary syndrome (ACS) (Curry *et al.*, 2018). The Acute coronary syndrome (ACS) is divided in two types: non-ST-elevation ACS, which encompasses non-ST-elevation myocardial infarction (nSTEMI) and unstable angina, and ST-elevation ACS or myocardial infarction (STEACS/STEMI) (Fox *et al.*, 2004). The pathophysiology of unstable angina, NSTEMI, and STEMI is all linked to the formation, instability, or rupture of coronary plaques, which might have luminal thrombosis or may not have thrombosis in the lumen and vasospasm (Yusuf *et al.*, 2004).

Cardiovascular diseases considerably contribute to the expanding health crisis of the non-communicable diseases or the chronic diseases. Among deaths worldwide, CVDs accounts for the leading cause, with more people dying each year. 17.9 million persons died as a result of cardiovascular disease in 2015, a 12.5 percent increase since 2005 (Fox *et al.*, 2008).

Bio markers are used along with ultrasound technologies to detect early changes in the cardiovascular system. In coronary artery disease (CAD) patients including both acute and chronic CAD, Ciccone et al. emphasized the importance of osteoprotegerin. The most well-known indicators of heart failure (HF) are natriuretic peptides. There are two types of peptides namely brain natriuretic peptide [BNP] and N-terminal pro b-type natriuretic peptide [NT-proBNP] (Savji *et al.*, 2013). Despite these limits, research has been conducted to develop and discover fresh, more precise, and all-encompassing indicators of both heart failure and Coronary artery disease (McGill *et al.*, 2000). Early identification of CAD and HF could detect the beginnings of heart malfunction (Gerstein *et al.*, 2001).

The application of genomic technology has resulted in the discovery of additional genes, their pathway that are involved in the process. When cardiac myocytes were subjected to mechanical stress, researchers observed that a novel gene named ST2 known as Suppression of Tumorigenicity-2 and the associated protein were extremely active. This protein is capable of over-expression in the myocardium which is remaining viable as a result of sustained stress is revealed by this finding (Currier *et al.*, 2003). In this study, the aim is to measure ST-2 level in patients who are being admitted for

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ACS -STEMI/Non-STEMI/UA and to correlate ST-2 levels with Angiographic severity of Coronary Artery Disease.

MATERIALS AND METHODS

This current study was Single centre prospective cross-sectional validation study, on coronary artery disease patients admitted Chettinad hospital & research institute, Chennai period of November 2019 to March 2022. The inclusion criteria is as follows, Patients with chest pain and ECG findings consistent with ACS-STEMI/NSTEMI/UA, Patients older than 18 years and the exclusion criteria includes patients with out of hospital cardiac arrest, H/O major surgery in last 4 weeks, Pregnancy, Recent CABG within 1 week and Patients less than 18 years of age. Baseline characteristics including demographics, vitals, and basic history was collected, and the ST 2 levels were measured along with the Troponin at presentation was measured. Depending on the distribution, continuous variables were reported as mean and standard deviation (SD) or median. Categorical variables were summarised as counts and percentages, and chi-square or Fisher exact tests were used to compare them. When continuous variables were normally distributed, the Student's t-test was used, and when they were not, the Mann-Whitney-U test was utilised. When more than two groups were examined, ANOVA was used followed by Bonferroni-Holm multiple comparisons correction. The association between ST2 levels and cardiovascular risk variables was determined using the Spearman correlation. The Cox proportional hazard model was employed for multivariate analysis, with mortality as the dependent variable and possibly confounding baseline factors as independent variables. A statistically significant value of p, 0.05 (two-tailed) was used. The statistical software programme SPSS version 18.0 was used for all statistical analyses (SPSS, Inc., Chicago, Illinois).

RESULTS AND DISCUSSION

In the current study most of the patients were aged above 50 years. The mean age of the study groups was 57.77 years. In the study 35% of the cases were diagnosed for NSTEMI, 43% of the cases were diagnosed for STEMI and 21.7% were diagnosed for unstable angina. Most of the patients were having comorbidity of diabetes (58.3%) and HTN (51.7%) followed by dyslipidaemia (25%) and hypothyroidism (67%). CAG revealed most of the patients were having SVD (35%) followed by TVD (30%), DVD (23%) and minimal CAD (12%) (Figure1). In this study 50% of the cases were underwent PTCA followed by CABG 30%, Medical management 20%. The mean soluble ST2 value was 35.22 ng/ml, mean BNP value was 153.1 pg/ml, mean CK mB was 10.875 ng/ml and mean troponin value was 1840.092 pg/ml. The mean ST2 value was 35.22 ng/ml. Most of the cases were having ST2 value between 26-45 ng/ml (77%) (Figure 2). Soluble ST2 level was elevated significantly in SVD, DVD and TVD group when comparing to the minimal CAD cases (p= <0.0001)(Table 1)(Figure 3). In the current study the severity of CAD increases among the patients with higher ST2 value.

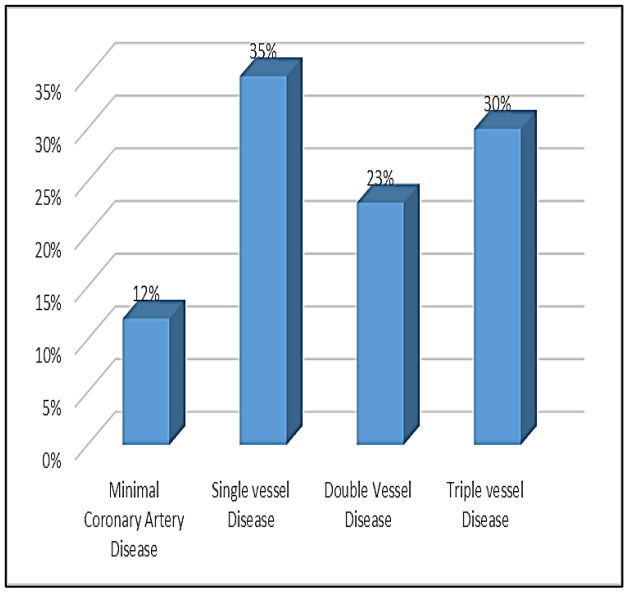

Figure 1: Distribution of CAG report

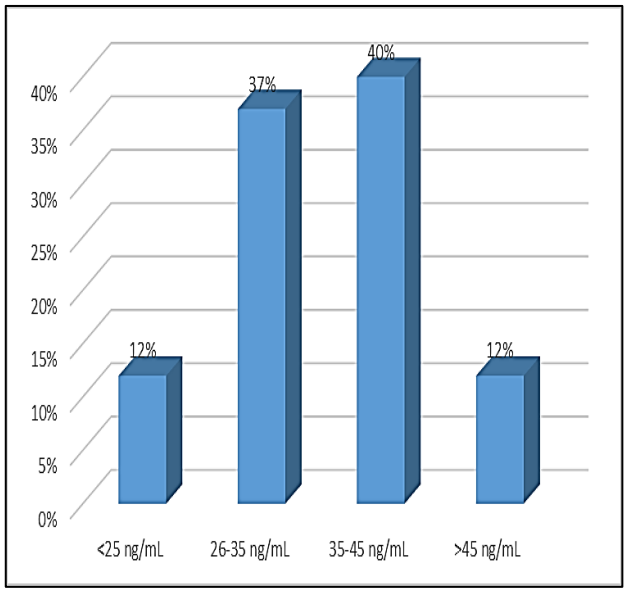

Figure 2: Distribution of Soluble ST2 marker values among study group

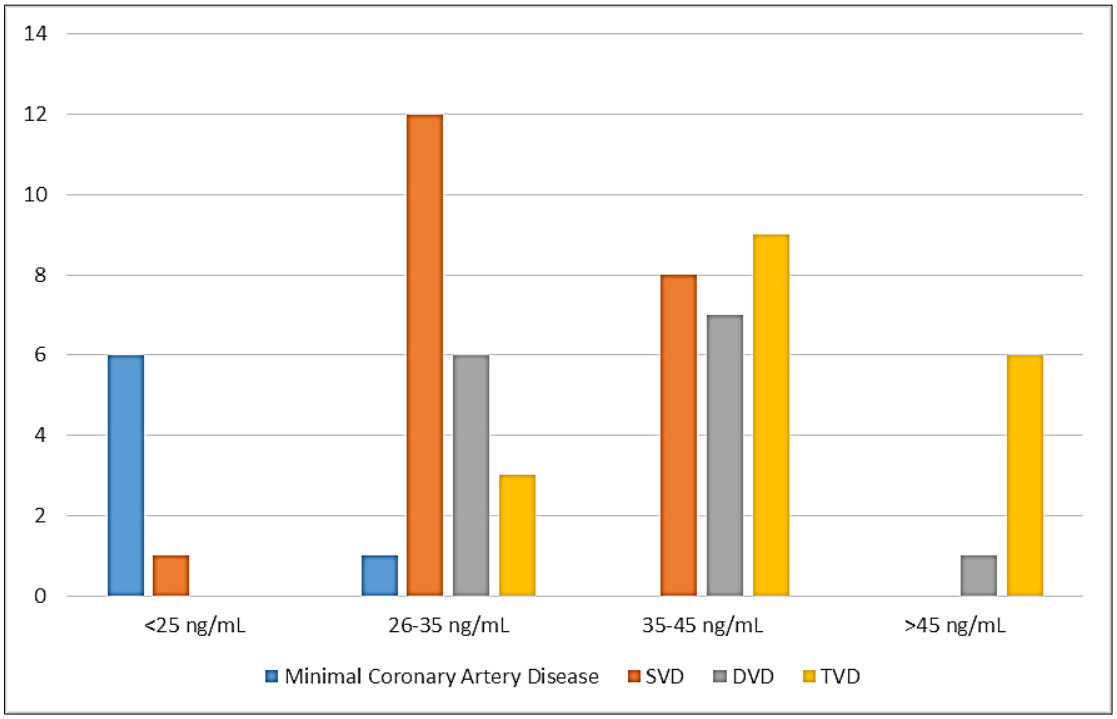

Figure 3: Correlation of ST2 value with CAG report

In the current study the severity of CAD increases among the patients with higher ST2 value.

Table 1: Correlation of ST2 value with CAG report

ST2 level	<25 ng/mL	26-35 ng/mL	35-45 ng/mL	>45 ng/mL
Minimal Coronary Artery Disease	6	1	0	0
SVD	1	12	8	0
DVD	0	6	7	1
TVD	0	3	9	6
P value	<0.0001			

CONCLUSION

From this study we came to the conclusion that higher baseline sST2 values are associated to more severe CAD in patients with acute coronary syndrome. Measurements of sST2 in blood specimens might be used as a clinical predictive biomarker in the risk classification of myocardial infarction (MI) patients. More research is needed to better highlight the evidence for routine usage of sST2 testing in the clinical assessment of a patient with a MI.

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