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SERUM NT-PROBNP AND CRP AS A PROGNOSTIC MARKER IN ACUTE CORONARY SYNDROME IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Coronary artery disease (CAD) continues to be a leading cause of morbidity and mortality worldwide. Although NT-proBNP is the preferred biomarker for heart failure (HF), several studies have suggested that NT-proBNP is also a risk marker for major adverse cardiovascular events (MACE) in the general population and in CAD patients. Numerous studies have shown that CRP has independent prognostic relevance for the risk of cardiovascular events in patients with CAD as well as in the apparently healthy population. This study evaluates the prognostic value of CRP and NT-ProBNP in predicting cardiovascular outcomes in patients presenting with acute coronary syndromes. **Methods:** This single-centered hospital-based observational study was conducted at the Department of General Medicine and Dept of Cardiology, SMCH from 1st January 2022 to 31st June 2022 for a period of 6 months. We evaluated the prognostic value of NT-proBNP and CRP for adverse outcomes in patients with acute coronary syndromes (ACS). **Results:** 100 patients were included in the study, out of whom 42(42%) patients were having STEMI (28 male and & 14 female), 48(48%) patients had NSTEMI (36 male, 12 female), and 10(10%) patients had Unstable angina (6 male and 4 female). The elevated levels of NT-proBNP and CRP levels were correlated and found to provide important information for risk stratification across the entire spectrum of ACS. **Conclusion:** NT proBNP and CRP are more commonly elevated in STEMI than NSTEMI or Unstable Angina. NT proBNP and CRP are reliable prognostic biomarkers in ACS.

INTRODUCTION:

Coronary artery disease (CAD) continues to be a leading cause of morbidity and mortality worldwide. The ultimate clinical implication of ACS may therefore vary from assuredly benign to potentially fatal. The traditional clinical tools for risk stratification such as history, physical examination, and ECG, though undoubtedly important, may be inadequate in most cases. This has led to the search for circulating markers that better establish a diagnosis and thus aid in appropriate and rapid patient triage. Recent research has focused on identifying biomarkers that could be used to identify high-risk populations and predict prognosis with high accuracy. N-terminal pro-B-type natriuretic peptide (NT-proBNP) and C-reactive protein (CRP) are of particular interest in this regard.[1,2]

NT-proBNP is a good predictor of left ventricle dysfunction caused by myocardial necrosis or ischemic dysfunction. Recent research has shown that elevated NT-proBNP concentrations are secreted from hypoxic myocardium even when there is no left ventricular dysfunction. Although NT-proBNP is the preferred biomarker for heart failure (HF), several studies have suggested that NT-proBNP is also a risk marker for major adverse cardiovascular events (MACE) in the general population and in CAD patients.[3,4]

Inflammation is important in forming, propagating, and destabilizing plaques in the coronary arteries. CRP is a biomarker that has become a popular laboratory indicator of inflammation.[5] Numerous studies have shown that CRP has independent prognostic relevance for the risk of cardiovascular events in patients with CAD as well as in the apparently healthy population. C-reactive protein has also been shown to be useful in predicting risk in patients with ACS who undergo percutaneous revascularization, with higher levels associated with more events in the following months.

AIM AND OBJECTIVES

To evaluate the prognostic value of CRP and NT- ProBNP in predicting cardiovascular outcomes in patients presenting with acute coronary syndromes.

MATERIALS AND METHODS:

The study was conducted at the Dept of General Medicine and Department of Cardiology, SMCH from 1st January 2022 to 31st June 2022 for a period of 6 months. It was a single-centered hospital-based observational study. All patients that were included, were assessed by a detailed history and physical examination, and relevant laboratory investigations to document the presence of ACS. The patients presented with a history of typical chest pain and ST elevation or depression of >0.1 mV in two concordant ECG leads, or clinical pictures of unstable angina were also included. Those patients were excluded who had an acute myocardial infarction within the previous month, inflammatory or neoplastic conditions likely to be associated with an elevated CRP, and patients with valvular heart disease, hepatic failure, and renal failure.

RESULTS AND OBSERVATIONS:

Out of 100 patients 68(68%) were male and 32(32%) were female. Out of these 42(42%) patients were having STEMI (28 male and & 14 female), 48(48%) patients had NSTEMI (36 male, 12 female), 10(10%) patients had Unstable angina (6 male and 4 female). The most common age group was 36yrs-65years.

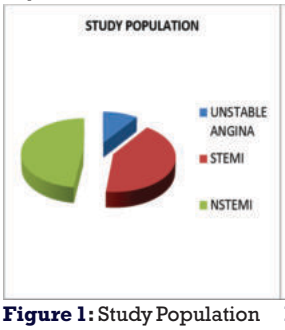

Figure 1: Study Population

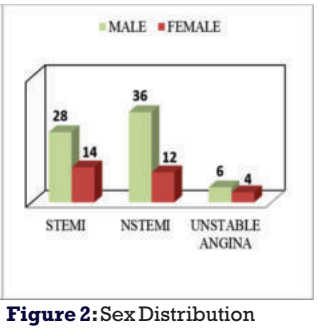

Figure 2: Sex Distribution

Table 1: Age Distribution

	Stemi	Nstemi	Unstable Angina	P-Value
Mean Age+Sd	50.61+5.26	55.70+5.59	41.2+ 5.75	.00001(By One Way Anova)

Table 2 : CRP in ACS

	Stemi	NSTEMI	Unstable Angina	P -value
Negative	6	12	6	.008498 (calculated by Chi-Square Test)
>1:96	16	8	1	
<1:96	20	28	3	

Table 3: NT pro BNP in ACS

	Stemi	NSTEMI	Unstable Angina	P-Value
<125	8	16	8	0.0018 (Calculated by chi square test)
126-1000	14	20	1	
>1000	20	12	1	

Table 4: NT proBNP in association with Mortality

NT-proBNP	<125	126-1000	>1000	P-value
Survived	31	34	25	0.0050 (Fisher exact test)
Mortality	1	1	8	
Total	32	35	33	

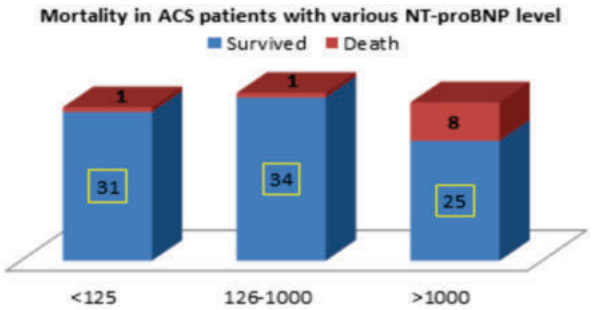

Figure 3: NT proBNP with Mortality

Table 5: CRP with Mortality

	Negative	<1:96	>1:96	p-value
Survived	23	48	19	0.038 (Fisher exact test)
Mortality	1	3	6	
Total	24	51	25	

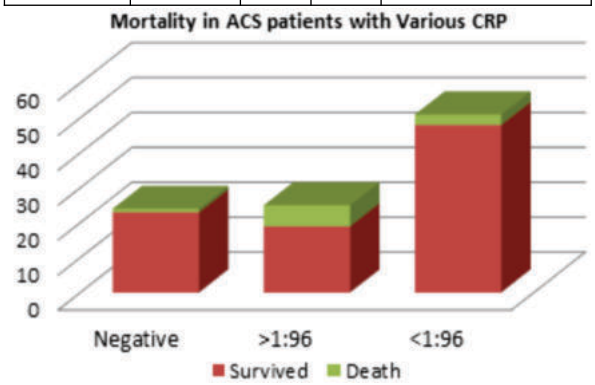

Figure 4: CRP in association with Mortality

DISCUSSION:

We studied the prognostic value of NT-proBNP and CRP for adverse outcomes in patients with ACS. The study subjects were patients with Acute Coronary Syndromes including Unstable Angina, NSTEMI, and STEMI. All the patients included were less than 66 years of age. Patients with prior history of cardiac problems or renal failure were excluded as they might already be having an elevated NT proBNP level. The results demonstrate that elevated NT-proBNP and CRP levels provide important and independent information for risk stratification across the entire spectrum of ACS.

Verma et al showed that C-reactive protein (CRP) actively participates in both atheromatous lesion formation and plaque disruption.[6] In addition, it has been recently reported that the level of CRP may correlate with the number of vulnerable atherosclerotic plaques with superficial foam cells, large necrotic cores, and thin-capped atheroma. Furthermore, CRP was found to correlate significantly with the extent and severity of coronary artery disease.[7,8]

The NT-proBNP is a circulating cardiac hormone that is mainly released from the ventricle in response to increased stretch or wall tension. Therefore, NT-proBNP has been widely used as a simple and useful marker for LV overload, such as LV dysfunction or LV hypertrophy, and for prognosis in patients with CHF. Recently, NT-proBNP has been shown to provide significant prognostic information across the entire spectrum of ACS and the present result proved it.[9,10]

CONCLUSION:

NT proBNP and CRP are more commonly elevated in STEMI than NSTEMI or Unstable Angina. NT proBNP and CRP are reliable prognostic biomarkers in ACS.

Declaration:
Funding: No funding sources

Conflict Of Interest: None declared.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

REFERENCES:

1. Lindahl, B., Toss, H., Siegbahn, A., Venge, P., & Wallentin, L. (2000). Markers of myocardial damage and inflammation in relation to long-term mortality in unstable coronary artery disease. FRISC Study Group. Fragmin during Instability in Coronary Artery Disease. *The New England Journal of Medicine*, *343*(16), 1139–1147. https://doi.org/10.1056/NEJM200010193431602
2. Galvani, M., Ferrini, D., & Ottani, F. (2004). Natriuretic pepetides for risk stratification of patients with acute coronary syndromes. *Eur J Heart Fail*, *6*, 327–333.
3. Bettencourt, P., Ferreira, A., & Pardal-Oliveira, N. (2000). Clinical significance of brain natriuretic peptide in patients with postmyocardial infarc¬tion. *Clin Cardiol*, *23*, 921–927.
4. Jernberg, T., Stridsberg, M., & Venge, P. (2002). N-terminal pro brain natriu¬retic peptide on admission for early risk stratification of patients with chest pain and no ST segment elevation. *J Am Coll Cardiol*, *40*, 437–445.
5. De Beer, F. C., Hind, D., Fox, J., Allan, R. M., Maseri, A., & Pepys, M. B. (1982). Measurements of serum C-reactive protein concentration in myocardial ischaemia and myocardial infarction. *Br Heart J*, *47*, 239–243.
6. Verma, S., Li, S.-H., Badiwala, M. V., Weisel, R. D., Fedak, P. W. M., Li, R.-K., Dhillon, B., & Mickle, D. A. G. (2002). Endothelin antagonism and interleukin-6 inhibition attenuate the proatherogenic effects of C-reactive protein. *Circulation*, *105*(16), 1890–1896. https://doi.org/10.1161/01.cir.0000015126.83143.b4
7. Burke, A. P., Tracy, R. P., Kolodgie, F., Malcom, G. T., Zieske, A., Kutys, R., Pestaner, J., Smialek, J., & Virmani, R. (2002). Elevated C-reactive protein values and atherosclerosis in sudden coronary death: association with different pathologies: Association with different pathologies. *Circulation*, *105*(17), 2019–2023. https://doi.org/10.1161/01.cir.0000015507.29953.38
8. Lagrand, W. K., Visser, C. A., Hermens, W. T., Niessen, H. W., Verheugt, F. W., & Wolbink, G. J. (1999). Gene expression of brain natriuretic peptide in isolated atrial and ventricular human myocardium: Influence of angiotensin II and diastolic fiber length. *Circulation*, *100*, 3074–3079.
9. Wiese, S., Breyer, T., Dragu, A., Wakili, R., Burkard, T., Schmidt-Schweda, S., Füchtbauer, E. M., Dohrmann, U., Beyersdorf, F., Radicke, D., & Holubarsch, C. J. (2000). Gene expression of brain natriuretic peptide in isolated atrial and ventricular human myocardium: influence of angiotensin II and diastolic fiber length: Influence of angiotensin II and diastolic fiber length. *Circulation*, *102*(25), 3074–3079. https://doi.org/10.1161/01.cir.102.25.3074
10. Yasue, H., Yoshimura, M., Sumida, H., Kikuta, K., Kugiyama, K., & Jougasaki, M. (1994). Localization and mechanism of secretion of Btype natriuretic peptide in comparison with those of A-type natriuretic peptide in normal subjects and patients with heart failure. *Circulation*, *90*, 195–203.