Elevated B-Type Natriuretic Peptide Levels (BNP) with Association between Unstable Angina and Non-ST-Segment Myocardial Infarction patients

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ABSTRACT

INTRODUCTION: To assess the elevation of B-type natriuretic peptide among angiographic findings with patient of unstable angina and non-ST elevated myocardial infarction. METHODS: This study population around 72 was carried out between 2018-2019 on patients who underwent coronary angiogram in Chettinad Super Specialty Hospital, Kelambakkam. RESULTS: Thousand coronary angiograms were performed in Chettinad hospital during the period of 2018-2019. There was totally 72 patients showed elevation of BNP. (47%) had BNP <80pg/ml and (52%) had BNP>80pg/ml. Elevation of BNP levels were affected in the age group of 50 to 60 yrs. Diabetic mellitus (17%) was most common risk factors affecting the B-type natriuretic peptide levels followed by hypertension(25%). Among study population Non-ST elevated MI (66%) is higher when compared with an unstable angina (33%). Among the study population mostly patients were affected single vessel disease (45%) and the culprit artery was LAD (27%) among patients with BNP>80pg/ml. CONCLUSION: Among 1000 patients who underwent coronary angiogram in Chettinad Hospital, the occurrence of elevation of BNP levels was 72. Most of the patients’ were males (63%), associate with diabetic mellitus (17%). Majority of patient have single vessel disease (45%) and the culprit artery is LAD (Left
Anterior Descending Artery 27%).

**Keywords**: B-Type Natriuretic Peptide Levels, Unstable Angina, Myocardial Infarction.


**Introduction**: Myocardial infarction is a most important cause of death and disability worldwide. A stable and unstable period with chronic disease is caused by the coronary atherosclerosis. Patients may develop myocardial infarction during the condition of unstable periods that activate the inflammation in the vascular wall. This myocardial infarction undergoes undetected under the minor even in lifelong chronic disease, but it may also lead to sudden deaths or severe hemodynamic deterioration in major calamitous event. First expression of myocardial infarction (coronary artery disease) occurs repetitively in various patients with traditional disease. Myocardial infarction leads to myocardial cell death due to the prolonged action of ischemia. The b-type natriuretic peptide is a hormone peptide ejected from cardiac ventricles. It is responsible for the stretch of myocardial infarction or increasing wall tension. Hormonal peptide consists of 32 amino acids which form by myocytes as a pro-hormone. An elevated level of BNP in heart failure patients shows more significance, also associated with ST-segment elevation in myocardial infarction (STEMI) with larger infarct size, increased mortality and progressive left ventricular (LV) remodeling [1]. Mainly, it is released in response to ventricular dilation and overloaded pressure. It has been verified that BNP and N-terminal pro-B-type natriuretic peptide also provide predictive information on acute coronary syndromes (ACS) [3]. Recent Studies shows association between elevated BNP levels and increased incidence of outcomes by opposing in cases with unstable angina and non–ST- elevation myocardial infarction (UA/NSTEMI)[10]. This evidential outcome suggests to the incremental phase which shows prognostic information provided by increased cardiac troponin. Though, the pathophysiological mechanism for this association between BNP and its outcome has not been well versed [9]. The hypothesis we proposed have been tested that increased BNP levels in cases with UA/NSTEMI would be closely associated with more severe CVD and results in higher abnormalities in coronary blood flow [16]. The risk markers of coronary artery disease (RM-CAD) study provide an assessment of non-invasive markers to the CVD population. Among CVD cases with UA/NSTEMI, increased BNP levels are strongly associated with stenosis, CTFC high and LAD contribution [2]. These clinical findings highlight the increase BNP level may results in association with severe myocardial ischemic territory and cardiac index event may partly shows adverse outcomes [18]. In this study, we investigate the level of B-type natriuretic peptide (BNP) with the association between the unstable angina and non-ST segment in myocardial infarction patients. Analysis of BNP levels in unstable angina with STEMI patients shows significant changes in retro prospective study conclude that most of the males were associated with hypertension. Particularly, the change in the levels of BNP in 72 patients with ≤ 80 or≥ 80 pg/ml and risk factors suggest that most of diabetic patients involvement in coronary artery disease. Overall, our results show the elevation of B-type natriuretic peptide levels leads to greater risk of myocardium severity. However, they also conclude that risk factors plays a major role in unstable patients with STEMI are hypertension.

**Methods**: The study involves Cardiac patients diagnosed as Unstable angina and Non-ST elevated MI (N=72) at Chettinad Hospital and Research Institute, a multi-specialty care centre in South India, were included in the study. The centre has state-of-art facility for CVD and its complications. Patients were selected for the study those who have
unstable angina and Non-ST elevated MI undergoing coronary angiogram and risk factors like hypertension and diabetes mellitus [4-6]. All patients with medication such as aspirin, heparin and tirofiban. The purpose of this study, cases with randomized to the conservative phases, and doesn’t undergo regular early angiography [17]. Patients with eligible criteria has been categorized into two groups based on their First visit of admission and BNP levels of ≤ 80 or ≥ 80 pg/ml. The clinical, biochemical and angiographic characteristics association between two groups were analyzed [7-8].

Inclusion Criteria: Patient undergoing coronary angiogram, Patients diagnosed as unstable angina and Non-ST elevated MI and Risk factors like hypertension, diabetes mellitus. Exclusion Criteria: Patient with MI, Patient with heart failure, major surgical procedure or liver or kidney disease., Previous MI, CABG patients.

**Measured demographic and clinical variables:** Various demographic data were taken according to their hospital number, name, age, gender, presenting complaints, family history, etc. Some of the clinical measurements for measuring B-type natriuretic levels. Clinical parameters such as dyslipidemia, diabetes mellitus, hypertension and thyroid and social- economical statuses such as smoking and alcoholic are included in this study. All the clinical parameters and other data were stored and analyzed by using an excel sheet. Statistical analysis was performed using an EXCEL sheet. Baseline characteristics of the study population for about 72 patients diagnosed as unstable angina and Non-ST elevated by using Chi square test.

**Statistical Analysis:** The statistical analysis was done using SPSS for windows version 21 software by IBM Inc., Armonk, New York US. For compare the association between high and low level B-type Natriuretic Peptide [16]. Diabetes mellitus and hypertension are the Risk factors of the study, so it’s calculated by relative risk estimate (odds ratio). To find out the elevation of BNP level among the patients of unstable angina and Non-ST elevated myocardial infarction Chi-square test was used for categorical variables and for continuous variables Wilcoxon rank-sum test and the significant value is obtained [18]. The critical value of ‘’p’’ indicating the probability of significant differences was taken as <0.05 for comparison. Pie chart were used for graphical representations in figures 1, 2 and 3 to shows the coronary finding with weight and other risk factors among those patients.

**TABLE 1: AGE-WISE DISTRIBUTION**

<table>
<thead>
<tr>
<th>GENDER</th>
<th>COUNT</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>46</td>
<td>63</td>
</tr>
<tr>
<td>FEMALE</td>
<td>26</td>
<td>36</td>
</tr>
</tbody>
</table>

Out of 72 patients, 46 male patients having elevation of BNP levels. 26 female patients having elevation of BNP levels. So compared to female, male are very prone to get highly elevation of BNP levels.
### TABLE 2: DISTRIBUTION OF BNP LEVELS BASED ON SCORING METHOD

<table>
<thead>
<tr>
<th></th>
<th>SCORE 0</th>
<th>SCORE 1</th>
<th>SCORE 2</th>
<th>SCORE 3</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNP (HIGH)</td>
<td>3</td>
<td>22</td>
<td>6</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>BNP (LOW)</td>
<td>3</td>
<td>11</td>
<td>14</td>
<td>10</td>
<td>38</td>
</tr>
</tbody>
</table>

Figure 1: BNP levels in the participants

The chi-square statistic is 10.4459. The p-value is .015132. The result is significant at p < .05. According to statistical value there is greater myocardium risk with the elevation of B-type natriuretic peptide. The result is proved that p value should be less than .08 and the data collected shows that the p value is significant and is less than .08 and the result obtained is that p value is < .05.

**Results:** Clinical and angiographical characteristics shows the associated risk factors are reported in Table 1. From the statistical analysis BNP levels shows higher significant (P-value < 0.05) in NSTEMI cases. Gender wise analysis in increased BNP levels with male 64% and female 36%. The age wise analysis with increased BNP levels have been categorized into 4 subgroups such as <40 years (6%), 40-50 years (21%), 50-60 years (28%), 60-70 years (35%) and 70-80 years (11%) (Table 1). The high risk factors such as Hypertension (25%) and Diabetes mellitus (17%). Risk factor such as Hypertension and Diabetes mellitus of about 35% marked as risk in unstable angina patients. The Acute coronary syndrome (ACS) has two major classes’ unstable angina (33%) and NSTEMI (67%). Further, angiographic findings such as MM (8%), SVD (46%), DVD (28%) and TVD (18%) were recorded respectively (Table 2) shows extended CAD categories such as LAD (28%). Among 72 patients (0.47%) had <80pg/ml low level of B-type natriuretic peptide and (0.52%) had >80pg/ml high level of B-type natriuretic peptide. The chi-square analysis is 10.4459 and P-value shows significance with < 0.05. The statistical analysis shows the greater myocardium risk with the elevation of B-type natriuretic peptide (Table 2). Most of the patients in this study state that the unstable angina patients are more prone with some of risk factors that are related to them. According to statistical value there is greater myocardium risk with the elevation of B-type natriuretic peptide. Measurements of BNP levels in unstable angina with non-STEMI patients can be measure by the score wise manner from score 0 to score 4. According to statistical value there is greater myocardium risk with the elevation of B-type natriuretic peptide. The result is proved that p value
should be less than .08 and the data collected shows that the P value is significant and is less than .08 and the result obtained is that p value is <.05. Mostly the above 60 age they prone to have high level of B-type natriuretic peptide leads to some coronary arterial disease. This B-type natriuretic peptide further leads to the cause angina (unstable angina) results in non-STEMI patients.

Discussion: Several Studies have shown the elevation of BNP levels, as well as NT-pro BNP levels, obtained after the acute phases in patients with high ranges of ACS predicts mortality rate independently [11-13]. Though, most of the reports doesn’t supports or distinguish between cases with low ejection fraction and LV enlargement [4]. Due to its essential release in response to increased ventricular chamber pressure or wall tension, in ACS patients with low LV ejection rate as well as elevated BNP levels shows a higher degree of myocardial dysfunction, with a high risk of congestive heart failure and death rate [6]. The aim of study is that BNP levels are associated not only to the Left ventricular dysfunction and also for the coronary atherosclerosis on severe condition eventually, subjects with multi vessel disease shows elevated BNP levels than the subject with one and double vessel involvement. Thus, elevations of BNP levels are strongly related to coronary dysfunction or heart failure. As we demonstrate that BNP levels thresholds of 80 pg/ml appears to be predict the extension of CVD independently from LV systolic dysfunction[7-10]. Among 1000 patients, there is total of 72 (7.2%) patients were found to have elevation of B-type natriuretic peptide levels with patients of unstable angina and Non- ST elevated MI. Out of 72 patients, majority is males (63%) were patients having elevated BNP levels. In age group, <40 yrs (55%) were mostly patients who had elevation of BNP levels when compared with age group of 50 to 60 (28%), 50 to 60 yrs(21%), 60 to70 yrs(35%) and 70 to 80 yrs (11%). In this study 25% patients with elevation of BNP were suffering from hypertension. The Common clinical presentation in elevation of BNP levels among angiographic findings were patients of unstable stable angina (33%) and NSTEMI (66%). Among the angiographic findings the patients were advised according to the significance of stenosis like Medical Management(8%) and Single vessel disease (46%) and Double vessel disease(28%) and Triple vessel disease (13%). Mostly patients were single vessel disease and the culprit artery was Left anterior descending artery. Among 72 patients (0.47%) had <80pg/ml low level of B- type natriuretic peptide and (0.52%) had >80pg/ml high level of B-type natriuretic peptide. According to statistical method it is proven that the: The chi-square statistic is 10.4459. The p-value is .015132. The result is significant at p <.05. According to statistical value there is greater myocardium risk with the elevation of B- type natriuretic peptide. The result is proved that p value should be less than .08 and the data collected shows that the p value is significant and is less than .08 and the result obtained is that p value is <.05.

CONCLUSION: In this retro prospective study conclude that most of the males were associated with hypertension (25%). Majority of patient have Single vessel disease (46%) and the culprit artery to be mostly affected is LAD (Left anterior descending artery (28%). According to high levels of BNP levels and it is proven that the elevation of B-type natriuretic peptide levels leads to greater risk of myocardium severity. However, they also conclude that risk factors plays a major role in unstable patients with STEMI are hypertension.

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