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# Assessment of the Diagnostic and Prognostic Value of NT-Pro BNP in Heart Failure Patients Taking Sacubitril and Valsartan

**Syeda Ayeesha Fatima[1], Neha tabassum[1], Afsha Jabeen[1], Gollapalli Rajeev Kumar[1], Sashi K Srivastav[2], Vasudha Bakshi[1]***

[1] School of pharmacy, Department of Pharmacy Practice, Anurag University, Hyderabad, Telangana India.
[2] Department of Cardiology, Yashoda Hospital, Secunderabad, Telangana India.
**Corresponding Author Email:** vasudhapharmacy@cvsr.ac.in

**ABSTRACT**

*Congestive heart failure (CHF) is a complex physical disorder characterized with continuously inadequate heartbeat that impairs the circulatory system. An EF of lower to forty percent suggests heart failure with diminished EF. The present investigation aimed evaluating NT-Pro BNP and Ejection Fraction among individuals having heart failure reduced ejection fraction (HFrEF) prior to and following valsartan and sacubitril medication administered. Aside from that, the study's goals are to ascertain the patient features linked to a good NT-Pro BNP decrease response and impact with respective sacubitril and valsartan on NT-Pro BNP levels. Additionally, to evaluate the rise in the Ejection factor before and after starting Sacubitril and Valsartan during the 1-month trial period. This study, which lasted six months with a one-month follow-up, was a prospective observational one that involved 150 subjects where with HFrEF patients are 71with ages of 18 and 74. Males are more compared to females. NT pro-BNP shows decreased levels whereas LVEF shows increase levels. Hence, it fulfils the aim of prognostic and diagnostic tool in heart failure patients whereas values are highly correlating before and after the intervention. So, there is lack of drug efficacy seen. In conclusion, the study evidences that there is reduction in NT-pro BNP and an increased percentage in Ejection fraction at baseline which indicates a significant improvement in working of heart. Collectively indicate monitoring NT levels can provide valuable insights into patient prognosis and treatment effectiveness, paving the way for better management of cardiac conditions.*

**Keywords**: Heart Failure Patients, NT-Pro BNP, Ejection Fraction, Sacubitril and Valsartan.

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## INTRODUCTION

Congestive cardiac failure occurs when the muscular cells of the heart not capable pumping as efficiently they might [1-3]. Recurrent coagulation of blood combined having liquid buildup occurs pulmonary region causes dyspnea. Many conditions cause cardiac region gradually leading too weak or rigid in the way cope with stress and exhibit cardiac output effectively [4]. The estimated number of persons affected by HF globally is 56.2 million (95% CI] 46.4 to 67.8 million) [5]. Globally, prevalence rates vary between 1% to 3% of the total the number of people. As per research, heart failure cases increasing globally (with a 29.4% rise from 2010 to 2019 [95% CI 27.5–34.2]), but it varies widely by nation. According to reports, the number of cases of heart failure varies between 0.4% – 2.0% in nations including the Philippines, South Korea, Thailand, and Japan [5]. On the other hand, prevalence rates range from 4.4% to 6.8% and are highest in nations like Portugal, Taiwan, Indonesia, and Spain. A number of regions around the globe, notably northern and sub-Saharan Africa, do not have prevalent numbers published. Whenever cardiac system exhibits tougher action in pumping blood due to blood vessels get constrict. Coronary arteries disease inevitably loses the functioning of cardiac system. Heart attack, may be observed with scar where loss of function of the cardiac pumping seen [6,7]. The obstructions noticed, coronary artery system as basis in such cases. Having persistent rise in blood pressure often known as hypertension, may result in cardiac failure due to its greater impact on the arterial walls. An uneven pulse might impair the heart's pumping efficiency. Heart failure is characterized by the heart's inability to pump blood efficiently, leading to insufficient tissue perfusion [8,9]. It often arises from conditions like coronary artery disease,

hypertension, cardiomyopathies or valvular diseases [10]. The pathophysiology involves either systolic dysfunction, where the heart cannot contract effectively (reduced ejection fraction) or diastolic dysfunction, where the heart has impaired relaxation and filling (preserved ejection fraction). Compensatory mechanisms, activation of the sympathetic nervous system, renin-angiotensin-aldosterone system (RAAS) [11] and antidiuretic hormone (ADH), initially help maintain perfusion but ultimately worsen heart failure by increasing cardiac workload, fluid retention and causing harmful remodeling [12]. This remodeling involves myocyte hypertrophy, fibrosis and structural changes that further impair heart function, leading to a vicious cycle of deterioration. One condition that affects the cardiac muscle and reduces the heart's ability for pumping blood efficiently is called cardiomyopathy. Cardiomyopathy may arise from a number of illnesses, such as sarcoidosis and amyloidosis. Congenital heart defects are heart structural issues that exist at development. Heart failure can result from negative outcomes related to diabetes. Endocarditis, myocarditis, or rheumatic fever are examples of past illnesses that can cause heart failure [13]. Emphysema, pulmonary embolisms (blood clots that block the lungs) are a few instances. Decreased amounts of oxygen are commonly caused by lung diseases. Insufficient oxygen supply may damage the heart and increase the risk of cardiac failure. The locations in the heart that identified the various forms of heart failure occur come with the names: left part of cardiac system, right part of cardiac system and both region of ventricles. Blood tests can assess a number of heart failure-related factors, including: Electrolyte abnormalities (sodium and potassium), Kidney function marker creatinine, B-type natriuretic peptide (BNP), hormone secreted by ventricular region in responses elevated stress associated alongside cardiac failure. Other tests illustrate the heart's function or offer images of the organ and its surroundings: Chest X-ray, ECG, Echocardiogram, Magnetic resonance imaging (MRI). When determining a stage, the New York Heart Association's (NYHA) functional categorization takes exercise-related heart failure symptoms into account and has. Patients may alternate across phases based on the degree of the management of symptoms they exhibit on any particular day. Stage 1: Although the patient has heart disease, there are now no symptoms or activities that is restricted; Stage 2: The individual's activities are only marginally restricted by minor symptoms; Stage 3: The individual's range of motion is severely restricted. He or she is only at ease while they are sleeping; Stage 4: The individual has significant limits and has manifestations while at resting. Heart failure complications might include: Arrhythmia, Blood clots, which may result in a stroke or pulmonary embolism, Liver or renal impairment, Muscular atrophy (loss of muscular mass throughout the body), Edema of the lungs, or excessive lung fluid, Difficulty breathing. The manifestations of heart failure might include: breathlessness when resting or during physical exertion, soreness in lower extremities, an irregular beat, a diminished ability with strenuous activity, breathing difficulties. Brain natriuretic peptide (BNP) are straightforward, objective indicators of heart health [14]. Analyses of BNP assist medical professionals for the management approach and diagnostical approach in heart failure (HF), a dangerous disease for which the body cannot compensate. Cardiovascular failure happens when the heart cannot pump blood properly due to weakness or stiffness; coronary artery disease with hypertension being particularly prevalent causes. The natriuretic peptide system affects how salt and water are handled, how pressure is regulated, and it may have an effect on the shape and functionality of the heart. The EF is an indicator with respective oxygen-rich blood heart delivers [15]. Healthy cardiac system, EF is higher. Decreased value means cardiac system isn't pumping fast keeping up with needs. The medical physician is likely to obtain ejection fraction when the cardiac failure or state at risk for it. Cardiac failure can be precipitated or worsened by a number of factors, including a buildup of sophisticated end products of glycation, cellular oxidative stress, impaired inflamed status, deteriorate of intracellular calcium, alterations in microRNA expression, atherosclerosis development, and coronary artery disease. Hypertension boosts the strain on the heart, causing both functional and structural modifications in the myocardium, including hypertrophy of the left ventricle. Diuretic medications to lower venous pressure as well as blood volume.

Vasodilator medications to lower venous pressure as well as arterial afterload. Cardiovascular drugs that increase or decrease cardiac function [16-22]. This study is necessary because it is important to predict heart failure effectively in individuals with CAD who have been diagnosed with HFrEF. Even with improvements in cardiac care, many heart patients still find that mortality is a major and upsetting aspect of their medical condition, which affects their well-being and quality of life.

The present study is to evaluate the NT-Pro BNP levels among those with cardiac failure who have a low ejection fraction before and after intake of sacubitril and valsartan drug. Present work identifies Sacubitril and Valsartan (SV) effects on NT-Pro BNP levels. To determine the patient characteristics using NYHA with positive NT-Pro BNP reduction responses observed. To assess the improvement in the EF (%) during the study period of 1 month before and after initiating Sacubitril and Valsartan.

## MATERIAL AND METHODS

### Study Protocol

Following the Institutional Review Board (IRB)-Institutional Ethics Committee (IEC) permission, a prospective observational investigation is intended to be carried out for a period of six months. Patients are going to be enrolled in the trial if they fulfill the inclusion criteria. The patient's case papers, medication charts, and databases will be used to gather the necessary data. The data gathered is being examined to determine the patient's characteristics, the effectiveness of sacubitril and valsartan in treating individuals who have cardiovascular failure with decreased ejection fraction (HFrEF), including the prediction of heart failure employing the NT-Pro BNP biomarker.

### Study design

It is an Institutional-based prospective observational study. The study was followed up for 1 month for each subject.

### Study site

The study will be conducted at the Department of Cardiology, Yashoda Hospital, Secunderabad, Telangana.

### Study period:

This study has been conducted for six months from October, 2023 to March, 2024.

### Study population:

This study was conducted for 150 subjects diagnosed with Heart failure where 71 subjects were with HFrEF.

### Study criteria

### Inclusion criteria

- Patients of CAD with HFrEF (<40%)
- Patients of age 18-82 years.
- Outpatients and Inpatients
- Both male and female
- Having comorbidities except for CKD

### Exclusion criteria

- Pregnant and lactating women
- HFmrEF and HFpEF (>40%)
- Pediatrics
- Cases with CKD are excluded
- Cases with incomplete information of unknown cases of patient condition

### Statistical analysis:

- Software used: SPSS version 24
- The Confidence Interval is 95%, hence if the P<0.05, It is significant
  Test performed: Descriptive Analysis, Chi-Square test and Correlation

## RESULTS AND DISCUSSIONS

### Clinical characteristics of CHF patients

Out of 150 CHF subjects, 71 subjects with accurate data were included in the study. The work carried out in 71 subjects diagnose having HFrEF (<40%). This study mainly focuses on the assessment of the prognostical and diagnostical value of NT-pro BNP in HF patients taking sacubitril and valsartan in an outpatient setting.

Males (66%) are more prone to Heart failure than females (34%) which is much compared with Framigham study where incidence of HF in men is gradually rising by 0.3% per annum in men to 2.7% [23]. Heart failure patients diagnosed with HFrEF of which the combined risk factor of 23 patients was found to be Hypertension and Diabetes mellitus. SBP >= 140 vs <140 mm of Hg in diabetic patients has been strongly risk of developing CHF and stroke that has been supporting in a study [24]. The diagnosing factor HFrEF which is <40% using 2D-ECHO which describes moderate EF patients (69%) are more compared to severe EF (31%) in outpatient settings. A multi centered trial was conducted in different groups in different episodic hospitalization and majority were mildly decreased EF which shows contrast with a study [25]**.** The symptoms of HFrEF patients who are symptomatically positive (77%) and negative (23%) at baseline. After one month of follow-up, the symptoms of HFrEF patients declined in asymptomatic (73%) and symptomatically active (27%). In the positive symptoms of HF patients at baseline Breathlessness (55%) is the most common symptom followed by Loss of Appetite and General weakness (18%), Chest associated problems like chest pain, chest heaviness, chest burning (13%), Cough

(10%), Oedema (Pedal and Ankle site) and fatigue (8%), Paroxysmal Nocturnal Dyspnea (PND) and Orthopnoea (7%), Giddiness and Body Pains (6%), Palpitations and Decreased Sleep(4%), tingling sensation and sweating(3%), and other minor symptoms (1%). In HF patients have comorbidities, leading with Anterior Wall Myocardial Infarction (AWMI) (31%) and followed by Dilated Cardiomyopathy (DCMP) (14%), Non ST- Elevation Myocardial Infarction (NSTEMI) and Acute Decompensated Heart Failure (ADHF) (8%), Ischemic Cardiomyopathy (ICMP) and Acute Left Ventricular Failure (LVF) (7%), Silent Myocardial Infarction (MI), Acute Coronary Syndrome (ACS), Unstable Angina (USA), and Atrial Fibrillation (AF) (3%), Inferior Wall Myocardial Infarction (IWMI), Myocarditis and congestive hepatopathy(1%). The presence of chronic kidney disease, diabetes mellitus and anemia has been associated with prolong HF hospitalization and mortality rate compared with stroke, COPD, sleep apnea, thyroid disorders in a study [26]. the past diagnosing factor which describes the severity of ejection fraction i.e. Mild LVD (8), Moderate LVD (36), and Severe LVD (27) in outpatient settings. Clinical characteristics of CHF subjects have been depicted in **table 1**.

**Table 1: Baseline characteristics of CHF patients**

| **GENDER** | **NO. OF PATIENTS** | **PERCENTAGE** |
|---|---|---|
| Male | 47 | 66% |
| Female | 24 | 34% |
| **RISK FACTORS DISTRIBUTION** | | |
| HTN + DM | 23 | 32.4% |
| DM | 12 | 16.9% |
| HTN | 5 | 7.04% |
| HTN + DM + Thyroid | 2 | 2.81% |
| HTN + DM + Hyperlipidaemia | 1 | 1.40% |
| HTN + DM + Dyslipidaemia | 1 | 1.40% |
| HTN + Asthma + Obesity | 1 | 1.40% |
| DM + Asthma | 1 | 1.40% |
| HTN + DM + Thyroid + Obesity | 1 | 1.40% |
| DM + COPD | 1 | 1.40% |
| HTN + DM + Thyroid + COPD | 1 | 1.40% |
| Asthma | 1 | 1.40% |
| **EJECTION FRACTION %** | | |
| Moderate | 49 | 69% |
| Severe | 22 | 31% |
| **HEART FAILURE SYMPTOMS** | | |
| Positive (Before) | 55 | 77% |
| Negative (Before) | 16 | 23% |
| Positive (After) | 19 | 27% |
| Negative (After) | 52 | 73% |
| **SYMPTOMS DISTRIBUTION** | | |
| Breathlessness | 40 | 55% |
| Loss of Appetite | 13 | 18% |
| General Weakness | 13 | 18% |
| Chest Associated Problems | 9 | 13% |
| Cough | 7 | 10% |
| Oedema (Pedal, Ankle) | 6 | 8% |
| Fatigue | 6 | 8% |
| PND | 5 | 7% |
| Orthopnoea | 5 | 7% |
| Giddiness | 4 | 6% |
| Pain (Leg, Body, Epigastric) | 4 | 6% |
| Palpitations | 3 | 4% |
| Decreased sleep | 3 | 4% |
| Tingling Sensation | 2 | 3% |
| Sweating | 2 | 3% |
| Decreased Urine Output | 1 | 1% |
| Decreased Food Intake | 1 | 1% |
| Cold and Fever | 1 | 1% |
| Vomiting | 1 | 1% |
| Constipation | 1 | 1% |

| | | |
|---|---|---|
| Facial Puffiness | 1 | 1% |
| Mouth Dryness | 1 | 1% |
| Blurry Vision | 1 | 1% |
| **CO-MORBIDITIES DISTRIBUTION** | | |
| AWMI | 22 | 30.98% |
| DCMP | 10 | 14.08% |
| NSTEMI | 6 | 8.45% |
| ADHF | 6 | 8.45% |
| ICMP | 5 | 7.04% |
| Acute LVF | 5 | 7.04% |
| Silent MI | 2 | 2.81% |
| ACS | 2 | 2.81% |
| USA | 2 | 2.81% |
| AF | 2 | 2.81% |
| IWMI | 1 | 1.40% |
| Myocarditis | 1 | 1.40% |
| Congestive hepatopathy | 1 | 1.40% |
| **PAST DIAGNOSIS HISTORY OF LVD** | | |
| Mild | 8 | 11.26% |
| Moderate | 36 | 50.70% |
| Severe | 27 | 38.02% |

**Cardiovascular drugs used in Heart failure patients and assessment of NYHA class at baseline and month-1**

**Table 2** shows the prescription pattern of drugs in HFrEF patients, where Beta-blockers (79%) are the most prescribed drug classes after Angiotensin Receptor Neprilysin inhibitors (ARNI). Cardiovascular Drugs used to treat HF patients along with ARNI (Sacubitril and Valsartan) are beta-blockers (79%), Diuretics (77%), SGLT2 inhibitors (66%), Antiplatelets (58%), Statins (49%), Anti Diabetics (31%), MRA'(27%), HCN blockers (17%), Digitalis glycosides(11%) and other classes. Similar findings in the study depicted beta blockers followed by Angiotensin Converting Enzyme inhibitors (ACEi), Angiotensin Receptor Blockers (ARB), ARNI and mineralocorticoid receptor antagonists [27]

At baseline, In the study population NYHA Class-2 (67.6%) is more predominant than NYHA Class-3 (32.4%). After 1 Month of follow-up, in the study population, we found NYHA decreased and increased to Class-2 (73.2%), Class-3 (23.9%), Class-1, and Class-4 (1.4%) %). The NYHA class I patients have mortality adjusted ratio more compared to class II, III and IV in a study conducted to estimate the association of NYHA to hospitalizations [28]. Out of 71 patients, 36 patients are taking 50mg /BD followed by 32 patients taking 50mg/OD, and 3 patients are on initial dose of SV (49mg+51mg).

**Table 2: Cardiovascular drugs used in Heart failure patients, study population depicts the assessment of NYHA class at baseline and month-1 and study population depicts the dose and frequency of SV drug**

| **DRUG CLASSIFICATION PRESCRIBED IN HEART FAILURE PATIENTS** | | | |
|---|---|---|---|
| **DRUGS** | | **FREQUENCY** | **PERCENTAGE** |
| ARNI | | 71 | 91% |
| Beta-blockers | | 56 | 79% |
| Diuretics | | 55 | 65% |
| SGLTZ inhibitors | | 47 | 57% |
| Anti-platelets | | 41 | 51% |
| Statins | | 35 | 45% |
| Anti-diabetics | | 22 | 22% |
| MRA's | | 19 | 19% |
| HCN blockers | | 12 | 12% |
| Digitalis Glycosides | | 8 | 8% |
| **FREQUENCY DISTRIBUTION OF NYHA** | | | |
| **BEFORE THE TREATMENT** | | | |
| NYHA Functional Class | Class-2 | 48 | 67.6% |
| | Class-3 | 23 | 32.4% |
| | Total | 71 | 100% |
| **AFTER THE TREATMENT** | | | |
| NYHA Functional Class | Class-1 | 1 | 1.4% |
| | Class-2 | 52 | 73.2% |
| | Class-3 | 17 | 23.9% |

| | | | |
|---|---|---|---|
| | Class-4 | 1 | 1.4% |
| | Total | 71 | 100% |
| **DOSE and FREQUENCY OF (Sac+Val)DRUG** | | | |
| 50mg (24mg+26mg) / OD | | 32 | 45% |
| 50mg (24mg+26mg) / BD | | 36 | 51% |
| 100mg (49mg+51mg) / BD | | 3 | 4% |

**Pearson correlation between NYHA functional classification vs age and NT-pro BNP at baseline**

There is a moderate positive correlation between age and NYHA 2and3 functional class with a Pearson's correlation coefficient of (r=0.350). This correlation gives the result of statistical significance (P at 0.01 significance). Overall, this indicates that as the age of HFrEF patient increases, the severity of their symptoms NYHA Classification also increases at baseline studies. Weak positive correlation (r=0.256) among NYHA classification and NT-pro BNP test, which is statistically significant (P at 0.01 significance). This indicates that there is a slight meaningful relationship between NYHA and NTpro-BNP test at baseline studies. There is a moderate positive correlation between Age and NYHA 2and3 classification, with a Pearson's correlation coefficient of (r=0.350). This correlation is statistically significant (P=0.01). This indicates that as the age of heart failure patient increases, the severity of their symptoms NYHA Classification also improves. There is a weak positive correlation among NYHA classification and NT-pro BNP test, which is statistically significant (P=0.01). This states slightly meaningful relationship among NYHA and the NTpro-BNP test. It has been represented in **table 3.**

**Table 3: Pearson correlation between NYHA functional classification vs age and NT-pro BNP at baseline**

| CLASSIFICATION | PEARSON CORRELATION | SIGMA (2-TAILED) |
|---|---|---|
| Age and NYHA | 0.350** | 0.003 |
| NYHA and NT pro-BNP | 0.256* | 0.031 |

**Assessment of EF, NT-PRO BNP, SBP and DBP before and after SV treatment**

The sample size remains consistent at 71 patients for both before and after EF test for patients taking SV treatment. The increase in the mean values from 33.7606 to 35.9437 suggests that the treatment might have effectively improved the ejection fraction in the patient cohort. This could indicate an improvement in the clinical condition being measured by the 2D-ECHO. There is no change in minimum EF before and after treatment whereas the increase in maximum EF which on post-treatment suggests that the treatment could have contributed to increased EF values. The patient taking Sacubitril and Valsartan shows improvement in paired sample t-test, outcome of the test is a significant change in the EF before and after the SV intervention. The sample size remains consistent at 71 patients for both before and after the NT-proBNP test for patients taking SV treatment. The decrease in the mean values from 2341.0986 to 1882.6761 pg/mL suggests that the treatment might have effectively reduced the NT-proBNP levels in the patient cohort. This could indicate a prognostic factor of heart failure being measured by the NT-proBNP test. Paired sample t-test, statistically significant change in NT-pro BNP before and after SV. This concludes that NT-pro BNP is a prognostic biomarker in HF patients taking Sacubitril and Valsartan. In a paired sample t-test conducted to compare the mean systolic blood pressure (SBP) before and after treatment, the results indicated a statistically significant reduction from 119 mmHg to 114 mmHg. This 5 mmHg decrease in SBP suggests that the treatment is effective in lowering blood pressure. Paired sample t-test (p-value=0.05) the result is statistically significant demonstrates that is treatment is effective in lowering in SBP in HF patients. In a paired sample t-test compare the mean DBP before and after treatment, the results indicated an increase from 68.1690 mmHg to 73.9718 mmHg. This 5 mmHg increase in DBP suggests a potential adverse effect of the treatment on diastolic B.P clinical implications for patients with heart failure. Paired sample t-test, the result is the statistically significant difference in DBP before and after treatment (p-value=0.05), This finding demonstrates that the importance of monitoring blood pressure changes undergoing heart failure treatment and inform adjustments treatment protocols to optimize patient outcomes. Above data has been represented by **table 4.**

**Table 4: Assessment of EF, NT-PRO BNP, SBP and DBP before and after SV treatment**

| **ASSESSMENT OF EF BEFORE AND AFTER SV TREATMENT** | | | | | | |
|---|---|---|---|---|---|---|
| | Minimum | Maximum | Mean | Std. Deviation | 95% Confidence Interval of the Difference | |
| Before EF | 20 | 45 | 33.7606 | 5.75814 | Lower | -3.02643 |
| After EF | 20 | 55 | 35.9437 | 6.25617 | Upper | -1.33976 |
| | | | | | t | -5.163 |
| | | | | | df | 70 |
| | | | | | Sig.(2-tailed) | 0 |
| **ASSESSMENT OF NT-PRO BNP BEFORE AND AFTER SV TREATMENT** | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | |
| Before NT | | 2341.0986 | 3362.69 | 399.o779 | Lower | 147.2309 |
| After NT | | 1822.6761 | 3257.91 | 386.6428 | Upper | 889.614 |
| | | | | | t | 2.786 |
| | | | | | df | 70 |
| | | | | | Sigma (2-tailed) | 0.007 |
| **ASSESSMENT OF SBP BEFORE AND AFTER OVERALL TREATMENT** | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% confidence interval of the difference | |
| SBP Before | | 119.2817 | 23.41012 | 2.77827 | Lower | 0.21298 |
| SBP After | | 114.9718 | 18.6601 | 2.21455 | Upper | 8.40674 |
| | | | | | t | 2.098 |
| | | | | | df | 70 |
| | | | | | Sigma (2-tailed) | 0.04 |
| **ASSESSMENT OF DBP BEFORE AND AFTER OVERALL TREATMENT** | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% confidence interval of the difference | |
| DBP Before | | 68.169 | 12.35775 | 1.46659 | Lower | -8.84971 |
| DBP After | | 73.9718 | 14.13604 | 1.67764 | Upper | -2.75593 |
| | | | | | t | -3.798 |
| | | | | | df | 70 |
| | | | | | Sigma (2-tailed) | 0 |

Patients who initially started with low doses of sacubitril and valsartan have major adverse effects of "Hypotension". So, the patients are not started with the initial dose. We found differences NT-Pro BNP levels which is used as a prognostic and diagnostic parameter in HF patient in outpatient setting. In the study of Inpatient, NT PRO BNP, biomarker for the diagnosis and prognosis of HF in the elderly. Also, to correlate NT pro bnp values with echocardiographic ejection fraction. NTproBNP levels correlated well with lowered LVEF. It is most frequently utilized for preventing out heart failure in dyspneic individuals and is higher under settings with higher ventricular wall stress. In order to distinguish between alternative reasons for dyspnea among individuals who were dyspneic and to evaluate the back prognostic value of plasma NT proBNP level as a non-invasive indication of LV malfunction, this research was developed. Research assessed the predictive efficacy of plasma NT pro BNP level as a non-invasive measure left ventricular failure and distinguishes another possible reason of dyspnea in older adults. Additionally, to link the echocardiographic ejection fraction findings with the NT pro BNP readings. Age and gender have an impact on the NT pro BNP; levels rise observed age and higher in females to males. While reasons heart failure in older patients are typically similar as in younger people, there may be differences in the clinical presentation. Elderly HF individuals not shown progressive exertional dyspnea, thought to be hallmark sign LVHF in young individuals, due to their sedentary lifestyle. Pearson's correlation final Interpretation has been detailed in **table 5.**

**Table: 5 Pearson's correlation final Interpretation**

| PEARSON'S CORRELATION(r) | VALUE (r at 0.01 sig) | INTERPRETATION |
|---|---|---|
| Baseline EF and Baseline NT-proBNP | -0.279262832 | In this study, the correlation between EF and NT-pro BNP before the treatment is weak, it states that NT-pro BNP is inversely related to EF. This concludes that NT-pro BNP can be a useful biomarker for assessing heart failure severity in patients but for a comprehensive evaluation, other factors should also be monitored. |
| Month-1 EF andMonth-1 NT-proBNP | -0.15960296 | In this study, the correlation between EF and NT-pro BNP after the treatment is also weak, it states that there is an inverse relationship between EF and NT-pro BNP. This concludes that NT-pro BNP still provides information about heart function, it should be used in conjunction with other diagnostic tools and clinical assessments to evaluate heart failure severity in patients comprehensively. |
| Baseline EF andMonth-1 EF | 0.827246042 | In this study, the correlation between EF before and after the treatment is a strong positive correlation. This concludes a high degree of consistency or valuable outcome in heart function measurements over time. This suggests that it can help in predicting, diagnosing, and evaluating the effectiveness of treatments for heart failure or other cardiac conditions in period of study. |
| Baseline NT-proBNP andMonth-1 NT-proBNP | 0.888258405 | In this study, the correlation between NT-proBNP levels before and after the treatment is very strong positive correlation. This concludes a high degree of consistency in NT-proBNP measurements over time. This suggests that the changes in NT-proBNP levels are closely aligned, making it a reliable parameter for long-term studies can predict Heart Failure and monitor heart failure progression or regression. |

## CONCLUSION AND LIMITATIONS

In conclusion, the heart failure study has shown that the prevalence of males is higher compared to females. The common risk factors found in HF patients are Hypertension and Diabetes mellitus. The most common symptom in HF patients is breathlessness. AWMI, DCMP, and a history of CAD are pre-existing comorbidities in HF. Beta-blockers are the main class of drugs used in HFrEF patients. Low Hb levels are commonly found in patients. Whereas Hypotension, Hyponatremia, and Hypokalemia are shown as adverse effects. eGFR is in normal ranges CKD and AKI are not found. Some patients found tachycardia and B-blocker-initiated bradycardia. The NYHA functional class with NT-pro BNP does not differ much in 1 month of study. However, we found in this study the reduced levels of NT-pro BNP and an increased percentage in Ejection fraction which indicates a significant improvement in cardiac function. The study of NT-proBNP levels highlights the importance as a prognostic and diagnostic marker for heart health function. This shows better efficacy of the treatment by reduced mortality and absence of hospitalization. Hence, we can conclude that the patient taking Sacubitril and Valsartan is observed by Hypotension as an adverse effect. This is the reason for administering a low dose of the SV drug in heart failure patients. These outcomes collectively suggest predicting patient insights and treatment effectiveness, by monitoring NT-proBNP levels and Blood pressure which can provide to get result for the better management of cardiac conditions. The overall positive outcomes reinforce the need for continued research and a long study period, and applying these markers in clinical practice can enhance patient care and reduce adverse events. Even COVID-19 has brought an impact in the population [29]. There are some limitations to consider in this prospective observational study of heart failure patients. The study may not represent the entire population of heart patients as it only included specific inclusion criteria. This study was conducted only for 6 months and a long-term study may show varied responses. The present study is confined to a minimum sample size of 71 patients and may not reflect the entire population. Furthermore, the study's focus on a single hospital rather than a multicentric hospital may limit the findings' applicability to larger populations. There may be comorbid biases in patient selection, such as omitting patients with CKD or AKI or those who declined to participate, which could influence the study's findings. Participants were asked to recall and report their symptoms and follow-up, which can be subject to inaccuracies or memory lapses. This leads to a loss of data reliability. It's possible that only patients with accessibility to healthcare services or individuals who were interested in taking part were taken into account in the research [30-32]. This might result in bias and restrict how far the results can be applied. Availability of participants and willingness to participate in the study. Participants who are not fluent in the language used for the study may struggle to fully express themselves or understand the instructions given. This could impact their ability to accurately convey their thoughts or experience.

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**Competing Interest**
None

**Ethical Approval**
The study was approved by the Institutional Review Board of Anurag university bearing the research proposal number: IRB-AU/2023-2024/02.

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