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The Study of NT-PRO BNP Levels in Patients with Acute Decompensated Heart Failure

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Abstract

Background: Acute decompensated heart failure is a serious and common presentation in patients attending Emergency Departments. Diagnosis of this condition in this environment can be challenging and delay in diagnosis is associated with increased mortality. Hence this study is done to know the clinical utility of NT-proBNP levels in diagnosing the acute heart failure and severity. Study included 72 patients with acute decompensated heart failure. **Material and Methods:** Primary source from diagnosed cases of acute heart failure with confirmation on echocardiography, General Medicine department of tertiary medical centre and Research Institute. Secondary source of information from published articles, journals, books, case sheets, discharge summary, related websites. **Results:** The patients were clearly explained about the objectives and informed consent was obtained. Relevant investigations including NT-proBNP, Trop T, 2D-ECHO. Among 72 patients 58.33% were males and 41.67% were females. Majority of patients belonged to NYHA class 4. EF value among cases was ≥ 50 in 18% between 40-49 in 31% between 30-39 in 30% and <30 in 21%. The mean NT-pro BNP was 7365.97 pg/ml. Serum NT-pro BNP levels are significantly elevated making it a valuable diagnostic marker in acute decompensated heart failure. **Conclusion:** Majority of patients belonged to age group of 55 to 64 yrs. The mean age of study group was 57. Among 72 cases 37 had IHD, 11 had VHD, 13 had DCM and 9 had HHD and 2 had LVDD.

Keywords: Acute decompensated heart failure; N terminal pro brain natriuretic peptide; New York Heart Association; Ejection fraction

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INTRODUCTION

Heart failure is a complex clinical syndrome resulting from structural and functional impairment of ventricular filling or ejection of blood.1 Worldwide, HF affects almost 23 million people.[1] Estimates based both on data of established risk factors for heart failure (HF) as well as small studies suggest that the burden of HF in India is not less than 2–5 million patients with an estimated prevalence of 2–3/1000 population.[2] AHF is the new onset or recurrence of symptoms and signs of HF requiring urgent or emergent therapy and resulting in unscheduled care or hospitalization. It is one of the most common cause of dyspnea in patients presenting to emergency department which requires rapid diagnosis and prompt treatment. But patients will often have comorbidities that contribute to the symptoms, thereby making the diagnosis difficult.[3] Delay in diagnosing heart failure results in increased mortality, hospital stays and treatment costs.[4] However, prompt evaluation of cardiac function with imaging such as nuclear scans and cardiac catheterization is not feasible in most settings and echocardiogram is laborious intensive and thus expensive in comparison

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with biochemical markers. Furthermore, echocardiography if available can miss heart failure of diastolic origin.[4] To alleviate the cost of echocardiograms, investigators have been examining disease management strategies that rely on serum or plasma biomarkers that could be used to rule out HF. The most studied HF biomarkers are the natriuretic peptides that are synthesized by the left and right atriums in response to cardiomyocyte stretching.

METHODOLOGY

Primary source from diagnosed cases of acute heart failure with confirmation on echocardiography, General Medicine department of tertiary medical college and Research Institute. Secondary source of information from published articles, journals, books, case sheets, discharge summary, related websites.

In the present study, sample size was calculated using the formula n= 4pq/d2.

p = 2.2%, q = (100-p) = 97.8%, d = 2.5%.

It will come to 72.

Inclusion Criteria

1. Age: Above 18 years
2. Complains of sudden onset dyspnea suspected to be due to cardiac cause with confirmation with echocardiography.
3. Patients who signed the written informed consent.

Exclusion Criteria

1. Cor pulmonale
2. Sepsis
3. Lung cancer
4. Pulmonary embolism
5. ARDS
6. Liver cirrhosis
7. Renal failure
8. Patients not willing to participate in the study.

Institutional Ethical Committee approval has been taken after presenting the study to IEC. As per the inclusion and exclusion criteria subjects are enrolled in the study. All subjects included in the study has been explained the procedure and valid informed written consent was taken.

All patients fulfilling the inclusion criteria was interviewed as per proforma and a detailed clinical examination was done. Blood samples for Complete blood count, Urine microscopy, RFT, LFT, RBS, Serum electrolytes, Lipid profile, ECG, C-XRAY and 2D Echocardiography was done for all patients. Serum NT-proBNP levels were measured by ELFA (Enzyme Linked Fluorescence Assay) technique.

Statistical analysis

Data obtained from the study has been entered in excel sheets and analyzed using SPSS software version 22.0 and has been presented as descriptive statistics in the form of frequency, tables, figures and graphs. Results have been expressed as mean ± SD. Chi square test and Fischer test has been used to establish association. Correlation of parameters is done by Pearson's correlation formula. A 'p' value of <0.05 is considered statistically significant.

RESULTS

This study included 72 patients above 18 years who were cagtegorised into into 4 groups. Majority of patients belonged to age group of 55 to 64 yrs.

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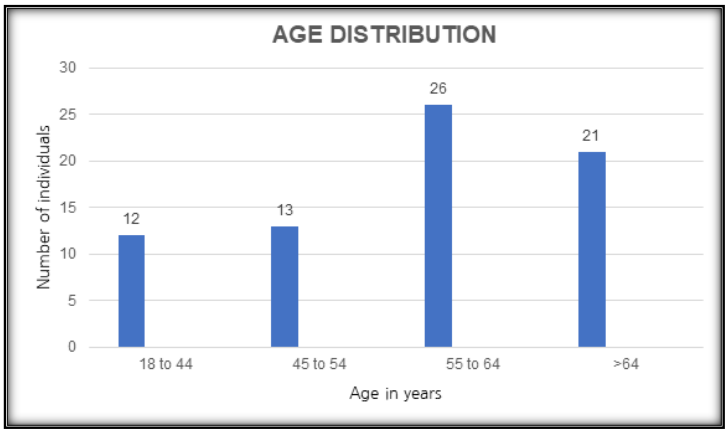

Figure 1: Age Distribution Among Study Groups

Table 1: Age Distribution Among Study Groups.

Age distribution	Number	Percentage
18 to 44	12	16.67
45 to 54	13	18.06
55 to 64	26	36.11
65 and above	21	29.17

Table 2: Mean Age of Study Group.

Number	Mean	Min	Max
72	57±12	35	85

The mean age of study group was 57.

Table 3: Gender distribution of Study Group.

Gender	Number	Percentage
Male	42	58.33
Female	30	41.67
Total	72	100

The study included 58.33% of males and 41.67% of females. Thus majority of individuals were males.

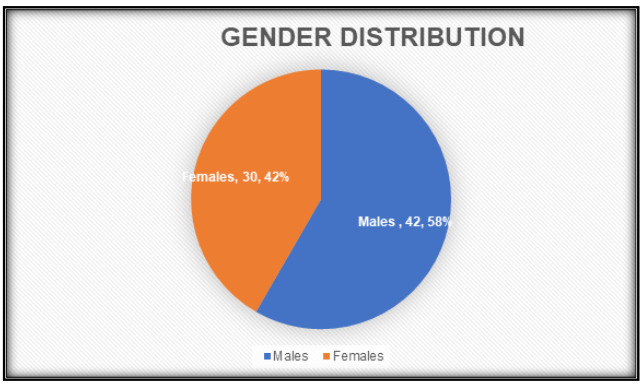

Figure 2: Gender distribution of Study Group

Table 4: Echo findings among study Groups

ECHO Findings	Number	Percentage
IHD	37	51.39
DCM	13	18.06
VHD	11	15.28
HHD	9	12.5

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LVDD	2	2.78
TOTAL	72	100

Among 72 cases 37 had IHD, 11 had VHD, 13 had DCM and 9 had HHD and 2 had LVDD. IHD was the commonest cause of acute heart failure in our study followed by dilated cardiomyopathy.

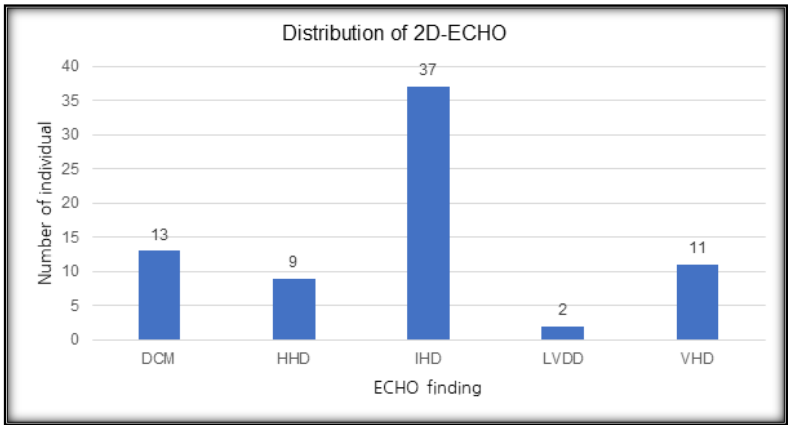

Figure 3: Echo findings among study Groups

Table 5: Distribution of NTproBNP levels among study group

NTproBNP	Number	Percentage
Less than 5000pg/ml	28	38.88
5000-10000pg/ml	27	37.5
More than 10000pg/ml	17	23.61

In our study 28 patients has NTproBNP levels of less than 5000pg/ml, 27 patients had NTproBNP levels between 5000-10000pg/ml and 17 patients has NTproBNP levels of more than 10000pg/ml. Thus majority of patients have NTproBNP levels below 5000pg/ml.

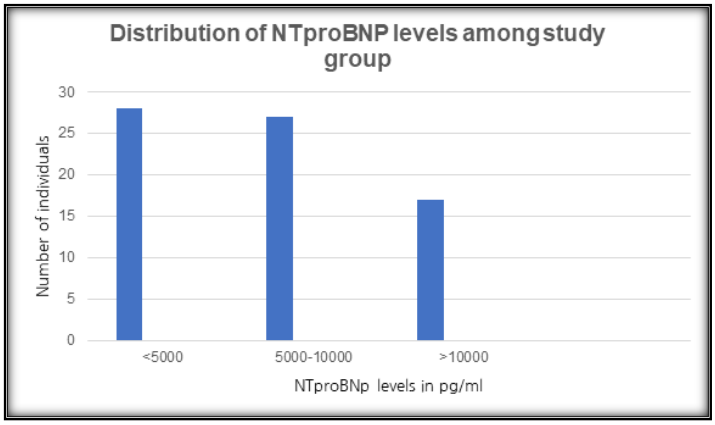

Figure 4: Distribution of NTproBNP levels among study group

Table 6: Mean NT-proBNP values among study group

Cases	Mean	Max	Min
72	7365.97±5023.03pg/ml	21956pg/ml	890pg/ml

In our study mean NT-pro BNP was 7365.97 pg/ml.

DISCUSSION

In our study a total of 72 patients (patients presenting with acute onset dyspnea suspected to be due to congestive cardiac failure) of age group more than 18 years were studied. Among cases and controls 58.33% were males and 41% were females.

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	Present study	Y.Seino et al,[5]	Lainchbury et al,[6]
Cases	72	172	205
Males	58.33%	80%	48%
Females	41.67%	20%	52%

In our study among the 72 cases 37 had IHD, 11 had VHD, 13 had DCM, 9 had HHD and 2 had LVDD.

	Present study	Y. Seino et al,[5]	Bayes-genis et al,[7]
IHD	51.39%	33.3%	52.5%
DCM	18.06%	18%	9.7%
VHD	15.28%	6.6%	11.78%
HHD	12.5%	28.7%	9.3%

In our study cut off levels for NT-proBNP was > 450 pg/ml for those aged < 50 years and > 900 pg/ml for those aged 50-70 years. In our study the mean NT-proBNP value among the cases was 7365 pg/ml.

	Present Study	A.A. Chen et al8	A.C. Belagavi et al9
MEAN NT-PRO BNP	7365pg/ml	4054pg/ml	2345.07pg/ml

CONCLUSION

Majority of patients belonged to age group of 55 to 64 yrs. The mean age of study group was 57. Among 72 cases 37 had IHD, 11 had VHD, 13 had DCM and 9 had HHD and 2 had LVDD. IHD was the commonest cause of acute heart failure in our study followed by dilated cardiomyopathy. In our study mean NT-pro BNP was 7365.97 pg/ml. Thus Serum NT-pro BNP levels are significantly elevated making it a valuable diagnostic marker in congestive cardiac failure.

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