

**ORIGINAL RESEARCH****Assessment of N terminal pro BNP levels in congestive heart failure patients**<sup>1</sup>Aniket Avhad, <sup>2</sup>Dany John, <sup>3</sup>Abhijeet Shelke, <sup>4</sup>Ramesh Kawade<sup>1,2</sup>Cardiology Resident, <sup>3</sup>Professor, <sup>4</sup>Cardiology Department, Department of Cardiology, Krishna Institute of Medical Sciences, Karad, Maharashtra, India**Correspondence:**

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**ABSTRACT**

**Background:** Natriuretic peptides (NPs) have been found to be useful markers in differentiating acute dyspneic patients presenting to the emergency department (ED) and emerged as potent prognostic markers for patients with congestive heart failure. The present study was conducted to assess N terminal pro BNP levels in congestive heart failure patients.

**Materials & Methods:** 65 congestive heart failure patients of both genders were categorised into three groups: those with LVEF  $\geq 50\%$  were categorised as HFpEF (group I), those with  $< 40\%$  were categorised as HFrEF (group II) and patients with LVEF range of 40%–49% were defined as heart failure with midrange EF (HFmrEF) (group III). NT-proBNP was measured using the Roche Elecys proBNP assay.

**Results:** Out of 65 patients, males were 35 and females were 30. The mean age was 65.3 years in group I, 64.2 years in group II and 62.5 years in group III. Diabetes was seen in 10 in group I, 8 in group II and 7 in group III. Hypertension in 3 in group I, 6 in group II and 8 in group III and COPD in 1 in group I, 3 in group II and 5 in group III. The difference was non-significant ( $P > 0.05$ ). The mean SBP at admission (mm Hg) was 143.2, 138.5 and 134.2, DBP at admission (mm Hg) was 86.2, 80.4 and 78.6, heart rate at admission (bpm) was 92, 94 and 95, left ventricular ejection fraction was 56, 42 and 28. NT-proBNP at admission was 4423.5pg/mL, 5062.4pg/mL and 7126.4pg/mL and NT-proBNP at discharge was 2145.2pg/mL, 2762.4pg/mL and 3650.2 in group I, group II and group III respectively.

**Conclusion:** Absolute and percentage change in N-terminal proB-type natriuretic peptide (NT-proBNP) levels in patients hospitalised for acute decompensated heart failure is of prognostic significance.

**Key words:** heart failure, Natriuretic peptides, P roBNP

**INTRODUCTION**

Natriuretic peptides (NPs) have been found to be useful markers in differentiating acute dyspneic patients presenting to the emergency department (ED) and emerged as potent prognostic markers for patients with congestive heart failure (CHF).<sup>1,2</sup> The best-established and widely used clinical application of BNP and NT-proBNP testing is for the emergent diagnosis of CHF in patients presenting with acute dyspnea. BNP and NT-proBNP, as the

European Society of Cardiology recommended, are helpful in the diagnosis of HF and providing prognostic potential; as well at a low-normal concentration in untreated patients makes HF unlikely as the cause of symptoms.<sup>3</sup>

ProBNP (pro B-type natriuretic peptide) is secreted by cardiomyocytes in response to stretch and is quickly cleaved into 2 circulating fragments—the biologically active 32-amino acid C-terminal BNP (B-type natriuretic peptide) and the inert 76-amino acid NT-proBNP (N-terminal pro-BNP). Both fragments are routinely used to aid diagnosis of heart failure, predict outcomes, and to monitor the effects of therapy.<sup>4</sup> Despite their wide use, few studies have compared these 2 peptides in patients with chronic heart failure and although considered interchangeable, even things as fundamental as how their concentrations relate to each other in patients with heart failure are essentially unknown.<sup>5</sup> The present study was conducted to assess N terminal pro BNP levels in congestive heart failure patients.

## MATERIALS & METHODS

The present study comprised of 65 congestive heart failure patients of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Heart failure patients were categorised into three groups: those with LVEF  $\geq 50\%$  were categorised as HFpEF (group I), those with  $< 40\%$  were categorised as HFrEF (group II) and patients with LVEF range of  $40\% - 49\%$  were defined as heart failure with midrange EF (HFmrEF) (group III). Blood was collected, plasma was isolated and immediately frozen at  $-20^{\circ}\text{C}$ . NT-proBNP was measured using the Roche Elecsys proBNP assay. Parameters such as hypertension, COPD, diabetes, left ventricular ejection fraction, Atrial fibrillation at admission and heart rate at admission etc. was recorded. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

## RESULTS

**Table I Distribution of patients**

Total- 65		
Gender	Males	Females
Number	35	30

Table I shows that out of 65 patients, males were 35 and females were 30.

**Table II Assessment of parameters**

Parameters	Group I	Group II	Group III	P value
Mean age (years)	65.3	64.2	62.5	0.91
Diabetes	10	8	7	0.82
Hypertension	3	6	8	
COPD	1	3	5	

Table II shows that mean age was 65.3 years in group I, 64.2 years in group II and 62.5 years in group III. Diabetes was seen in 10 in group I, 8 in group II and 7 in group III. Hypertension in 3 in group I, 6 in group II and 8 in group III and COPD in 1 in group I, 3 in group II and 5 in group III. The difference was non-significant ( $P > 0.05$ ).

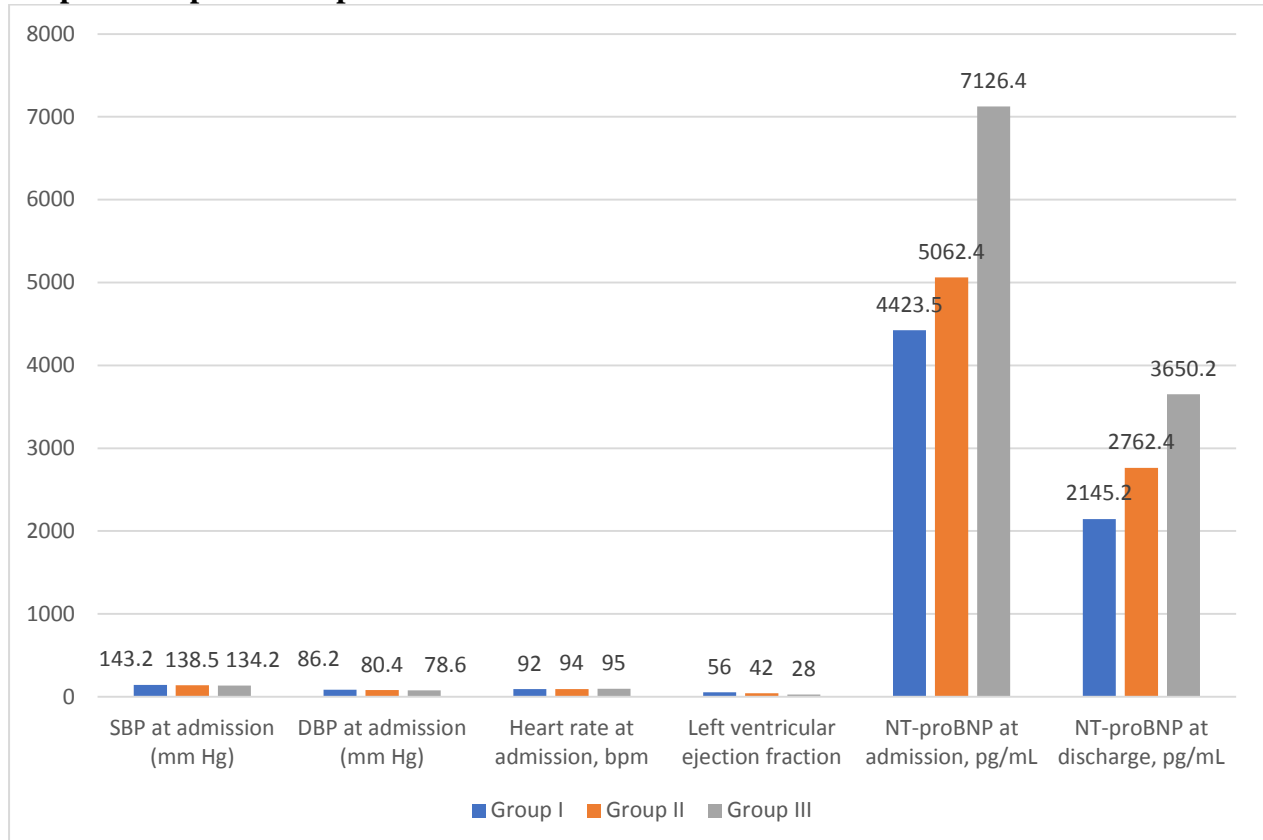
**Table III Comparison of parameters**

Parameters	Group I	Group II	Group III	P value
SBP at admission (mm Hg)	143.2	138.5	134.2	0.91
DBP at admission (mm Hg)	86.2	80.4	78.6	0.12
Heart rate at admission, bpm	92	94	95	0.84

Left ventricular ejection fraction	56	42	28	0.04
NT-proBNP at admission, pg/mL	4423.5	5062.4	7126.4	0.05
NT-proBNP at discharge, pg/mL	2145.2	2762.4	3650.2	0.02

Table III, graph I shows that mean SBP at admission (mm Hg) was 143.2, 138.5 and 134.2, DBP at admission (mm Hg) was 86.2, 80.4 and 78.6, heart rate at admission (bpm) was 92, 94 and 95, left ventricular ejection fraction was 56, 42 and 28. NT-proBNP at admission was 4423.5 pg/mL, 5062.4pg/mL and 7126.4pg/mL and NT-proBNP at discharge was 2145.2pg/mL, 2762.4pg/mL and 3650.2 in group I, group II and group III respectively.

### Graph I Comparison of parameters



## DISCUSSION

ProBNP (pro B-type natriuretic peptide) is secreted by cardiomyocytes in response to stretch and is quickly cleaved into 2 circulating fragments—the biologically active 32-amino acid C-terminal BNP (B-type natriuretic peptide) and the inert 76-amino acid NT-proBNP (N-terminal pro-BNP).<sup>6,7</sup> Both fragments are routinely used to aid diagnosis of heart failure, predict outcomes, and to monitor the effects of therapy.<sup>8,9</sup> Despite their wide use, few studies have compared these 2 peptides in patients with chronic heart failure and although considered interchangeable, even things as fundamental as how their concentrations relate to each other in patients with heart failure are essentially unknown.<sup>10</sup> The present study was conducted to assess N terminal pro BNP levels in congestive heart failure patients.

We found that out of 65 patients, males were 35 and females were 30. Rorth et al<sup>11</sup> found that the median baseline concentration of NT-proBNP was 2067 (Q1, Q3: 1217–4003) and BNP 318 (Q1, Q3: 207–559), and the ratio, calculated from the raw data, was ≈6.25:1. This ratio varied considerably according to rhythm (atrial fibrillation 8.03:1; no atrial fibrillation 5.75:1) and with age, renal function, and body mass index but not with left ventricular ejection fraction. Each peptide was similarly predictive of death (all-cause, cardiovascular,

sudden and pump failure) and heart failure hospitalization, for example, cardiovascular death: BNP hazard ratio, 1.41 (95% CI, 1.33–1.49) increase.

We observed that mean age was 65.3 years in group I, 64.2 years in group II and 62.5 years in group III. Diabetes was seen in 10 in group I, 8 in group II and 7 in group III. Hypertension in 3 in group I, 6 in group II and 8 in group III and COPD in 1 in group I, 3 in group II and 5 in group III. We observed that mean SBP at admission (mm Hg) was 143.2, 138.5 and 134.2, DBP at admission (mm Hg) was 86.2, 80.4 and 78.6, heart rate at admission (bpm) was 92, 94 and 95, left ventricular ejection fraction was 56, 42 and 28. NT-proBNP at admission was 4423.5pg/mL, 5062.4pg/mL and 7126.4pg/mL and NT-proBNP at discharge was 2145.2pg/mL, 2762.4pg/mL and 3650.2 in group I, group II and group III respectively. Salah et al<sup>12</sup> assessed the prognostic significance of absolute and percentage change in N-terminal proB-type natriuretic peptide (NT-proBNP) levels in patients hospitalised for acute decompensated heart failure with preserved ejection fraction (HFpEF) versus heart failure with reduced ejection fraction (HFrEF). Patients with left ventricular ejection fraction  $\geq 50\%$  were categorised as HFpEF (n=283), while those with  $< 40\%$  as were categorised as HFrEF (n=776). Prognostic values of absolute and percentage change in NT-proBNP levels for 6 months all-cause mortality after discharge were assessed separately in patients with HFpEF and HFrEF by multivariable adjusted Cox regression analysis. Discharge NT-proBNP levels predicted outcomes similarly in HFpEF and HFrEF: for any 2.7-factor increase in NT-proBNP levels, the HR for mortality was 2.14 for HFpEF (95% CI 1.48 to 3.09) and 1.96 for HFrEF (95% CI 1.60 to 2.40). Mortality prediction was equally possible for NT-proBNP reduction of  $\leq 30\%$  (HR 4.60, 95% CI 1.47 to 14.40 and HR 3.36, 95% CI 1.93 to 5.85 for HFpEF and HFrEF, respectively) and for  $> 30\%$ – $60\%$  (HR 3.28, 95% CI 1.07 to 10.12 and HR 1.79, 95% CI 0.99 to 3.26, respectively), compared with mortality in the reference groups of  $> 60\%$  reductions in NT-proBNP levels. Prognostically relevant comorbidities were more often present in patients with HFpEF than patients with HFrEF in low ( $\leq 3000$  pg/mL) but not in high ( $> 3000$  pg/mL) NT-proBNP discharge categories.

The limitation the study is small sample size.

## CONCLUSION

Authors found that absolute and percentage change in N-terminal proB-type natriuretic peptide (NT-proBNP) levels in patients hospitalised for acute decompensated heart failure is of prognostic significance.

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