



## A STUDY OF UTILITY OF PLASMA BNP IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE FOR DETECTION OF COR-PULMONALE.

### Cardiology

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### KEYWORDS

#### INTRODUCTION

COPD is a common, preventable and treatable disease that is characterised by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. COPD is the fourth largest killer disease in the world. It is estimated to climb to being the third largest killer by 2030.<sup>2</sup> It has some significant extra pulmonary effects that may contribute to its severity in individual patient. Among COPD patients, cardiovascular diseases (CVD) are responsible for approximately 50% of all hospitalizations and 20% of all deaths. Brain natriuretic peptide (BNP) was first described in 1988 after being isolated from porcine brain.<sup>3</sup>

Secondary pulmonary hypertension and cor pulmonale are also important causes of death and poor prognosis in COPD patients<sup>4,5</sup>, so early detection of pulmonary hypertension or cor pulmonale could be beneficial in managing patients with COPD. BNP has been shown to be useful for diagnosing patients suspected of having heart failure<sup>6</sup>. It is also well known that plasma BNP levels are elevated in patients with secondary pulmonary hypertension and chronic lung disease with right ventricular overload.<sup>7</sup> Secondary pulmonary hypertension and cor pulmonale are also important causes of death and poor prognosis in COPD patients<sup>4,5</sup>, so early detection of pulmonary hypertension or cor pulmonale could be beneficial in managing patients with COPD. BNP has been shown to be useful for diagnosing patients suspected of having heart failure<sup>6,7</sup>. It is also well known that plasma BNP levels are elevated in patients with secondary pulmonary hypertension and chronic lung disease with right ventricular overload. In view of the above said to investigate the use of plasma BNP levels as a prognostic marker of severe COPD for detection of cor pulmonale. To compare the BNP levels with cardiac dysfunction in COPD patients.

#### Materials and methods

The study was a prospective non randomized cross sectional study whose population consisted of consecutive consenting patients of both sexes of all ages who have established diagnosis of COPD attending the Pulmonology, cardiology, medicine OPD at father Muller tertiary care Hospital, 250 patients were recruited prospectively during a period of 24 months between January 2016 to December 2018. Two groups were done with and without acute exacerbation of COPD.

#### Results and observations

In the present study when we evaluated the age distribution of the cases in the study we found that most cases were in the age group 51 - 60 years (56.67%). The levels of BNP were higher in female COPD patients with mean (66.52 ± 30.58 pg/mL) male patients with mean (24.13 ± 6.61 pg/mL) and higher during exacerbation (166.52 ± 30.9 pg/ml) than during remission, BNP was significantly higher in grade (III, IV) with mean (196 ± 30.19 pg/ml) than grade II (166.86 ± 9.2 pg/ml) and grade II was significantly higher than grade I with mean (143 ± 7.81 pg/ml) and it was a significantly inversely related to post FEV1% and post FEF 25-75% and significantly direct correlated to paco2 and non significant negative correlation to pao2.

#### Discussion

It is also well known that plasma BNP levels are elevated in patients with secondary pulmonary hypertension and chronic lung disease with right ventricular overload<sup>12-14</sup>.

Few studies have assessed the diagnostic utility of NT-proBNP for determining COPD severity and identifying chronic respiratory failure with the possibility of progression to secondary pulmonary hypertension in patients with COPD<sup>8,9</sup>.

**Bando M et al** stated that the plasma BNP levels were significantly elevated in patients with chronic respiratory failure complicated by cor pulmonale (81.5 ± 13.1 pg ml<sup>-1</sup>) compared to patients without cor pulmonale (13.3 ± 2.7 pg ml<sup>-1</sup>, P < 0.001)<sup>10</sup>.

**Gökmen Gemici et al** stated that the plasma BNP standard deviation levels of the COPD and control groups before exercise were 21.3 ± 16 pg/ml and 13.4 ± 11 pg/ml, respectively (P > 0.05). Mean plasma BNP level measured immediately after exercise was 37.9 ± 31 pg/ml in the COPD group, reflecting a statistically significant increase when compared with the initial value (P < 0.05). The control group did not show any significant change in plasma BNP levels after the exercise test.<sup>11</sup>

**Koichi Nishimura et al** stated that the median plasma BNP level (interquartile range) was 55.4 (26.9–129.3) pg/mL and was higher than that of patients with stable COPD: 18.3 (10.0–45.3) for Global Initiative for Chronic Obstructive Lung Disease grade I; 25.8 (11.0–53.7) for grade II; 22.1 (9.1–52.6) for grade III; and 17.2 (9.6–22.9) pg/mL for grade I V, all P < 0.001. In 15 subjects studied prospectively, the median plasma BNP level was 19.4 (9.8–32.2) pg/mL before AECOPD, 72.7 (27.7–146.3) pg/mL during AECOPD, and 14.6 (12.9–39.0) pg/mL after AECOPD (P < 0.0033 and P < 0.0013, respectively). Median plasma BNP levels during AECOPD were significantly higher in ten unsuccessfully discharged subjects 260.5 (59.4–555.0) than in 48 successfully discharged subjects 48.5 (24.2–104.0) pg/mL (P = 0.0066).<sup>12</sup>

**Lang et al**, have shown that plasma BNP levels are elevated in patients with acute exacerbations of COPD.<sup>13</sup>

**Mukoyama et al** have shown that plasma BNP levels increase rapidly and markedly compared to ANP levels in congestive heart failure and within hours of the onset of increase rapidly and markedly compared to ANP levels in congestive heart failure and within hours of the onset of an acute myocardial infarction<sup>14</sup>.

#### Conclusion

COPD BNP levels were lower in stable compared to exacerbation of COPD, and significantly increased with concomitant left ventricular systolic dysfunction or cor pulmonale hence it can be used as a predictor or detecting cor pulmonale and the grade of cardiac dysfunction.

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