Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

Serum NT-proBNP Levels in predicting severity of Covid19 infection.

Dr Navikala K[1] , Nandan K[2]. Dr Ashwin K[3]

Assistant Professor, Department of Biochemistry[1], Student of II MBBS [2], Associate Professor, Department of General medicine[3], Ramaiah Medical College, Bangalore .

Corresponding Author: Dr Vanitha Gowda M N, Professor and Head, Department of Biochemistry, Ramaiah Medical College, Bangalore.

Abstract :

Background - Patients with COVID commonly have mild symptoms or even be asymptomatic, a notable proportion of patients may develop severe pneumonia, acute respiratory distress syndrome, multiorgan failure and, death. NT-proBNP reflects haemodynamic stress and has proven useful for risk stratification in heart failure (HF) and other conditions such as pulmonary embolism and pneumonia. NT-proBNP is an important biomarker for the diagnosis and estimation of prognosis in cardiac insufficiency. Therefore, in the current study, we are aiming to investigate the association between the serum NT pro BNP levels in covid-19 patients and to correlate the same with the severity of COVID-19 infection. **Methods:** A cohort study involving 68 covid patients whose NT pro BNP levels was estimated at the time of admission and compared with other covid biomarkers. Patients classified as moderate and severe according to ICMR guidelines were included. Serum NT-proBNP levels & other covid biomarkers like CRP, IL6, Ddimer, Ferritin, LDH were estimated. **Results:** Serum NT pro BNP levels were high in severely ill covid patients compared to moderately ill covid 19 patients and was found statistically significant. Serum NT pro BNP levels was positively correlating with other biomarkers. Mortality rate of 4.41% was reported.

Conclusion: Serum NT-proBNP levels of COVID 19 patients can be used to predict the prognosis of covid which can help in early diagnosis and management of complications.

Keywords: NT-proBNT, COVID-19, CRP, IL6, D dimer, Ferritin, LDH.

Introduction:

The Coronavirus disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has stretched healthcare systems around the world to the limit. Though some patients with COVID-19presented with mild symptoms or may even be asymptomatic, a notable proportion of patients develop severe pneumonia, acute respiratory distress syndrome (ARDS), multiorgan failure and, death. Since the outbreak of COVID-19, cardiovascular complications have become an important cause of deterioration and death in many patients. Investigating prognostic markers for severity would provide insights for early therapeutic strategies. Cardiovascular complications of acute pneumonia, including myocarditis and exacerbation of cardiac insufficiency, have been well recognized during previous historical epidemics [1].

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

N-terminal pro B-type natriuretic peptide (NT-proBNP) reflects haemodynamic stress and has proven useful for risk stratification in heart failure (HF) and other conditions such as pulmonary embolism and pneumonia. An increase in the level of NT-proBNPindicates impairment of cardiac function and has shown to be an important biomarker for diagnosis and estimation of prognosis in cardiac insufficiency. Cardiac dysfunction may be masked by pneumonia symptoms, which may delay treatment. Plasma concentrations of B-type natriuretic peptides increase during the acute phase of pneumonia, and the magnitude of this increase is associated with the severity and outcome of the infection [2,3]. NT-proBNP is postulated to increase the risk of heart failure in patients with COVID-19.[4] Hypoxia-induced pulmonary hypertension in patients with pneumonia may increase ventricular wall stress and leads to the release of NT-proBNP.[5] The use of vasopressor in critically ill patients may also contribute further to the wall stress.[6]

Therefore, in the current study, we aimed at looking at the association between the plasma NT-proBNP levels and the severity of COVID-19 by comparing with other covid biomarkers like CRP, LDH, Ferritin, D dimer & IL6.

Objectives: To estimate serum NT pro BNP levels in covid-19 patients and to correlate the same with the severity of COVID-19 infection.

Methods: This was a cohort study involving 68 patients who were diagnosed with covid 19 infection by RT PCR and admitted for treatment to M S Ramaiah medical college hospitalfrom April 2022 to June 2022. These patients were categorized as mild, moderate and severe depending on their presentation.[7]Only Moderate and severe patients were included.
34 Moderately ill patients with 90-94% oxygen saturation and moderate symptoms such as cough, fever, cold were included in this group.
34 Severely ill patients who are admitted in ICU, are on ventilators or oxygen concentrators and oxygen saturation levels below 90% were included in this group.
Patients with previous history of heart disease, Chronic heart failure, chronic kidney disease& Stroke were excluded from the study.
After taking consent blood samples were collected from patientson admission in the triage before initiation of treatment. 5ml of blood was collected with due aseptic precaution in a plain vacutainer with gel, mixed and allowed to stand undisturbed for 5-8 mins and then centrifuged at 3800rpm for 10 minutes. The serum samples were analysed on Ortho clinical diagnostics Vitros 5600 Autoanalyser for covid biomarkers like CRP by Immunoturdimetric method , Ferritin by CLIA method , D Dimer by Immunoturbidimetric method, IL6 by ECLIA & Lactate dehydrogenase by lactate to pyruvate method. For serum and blood investigation parameters - external quality control measure - BioRad QC materials were procured and used as per NABL ISO 15189 GUIDELINES and by following Westgard rules of quality control. The samples collected were then stored at -20 °C till NT pro BNP analysis. The samples were then analysed for NTproBNPby ELISA method (manufactured by E labscience) in central research lab, M.S Ramaiah hospital .
Descriptive statistics of NTpro BNP, D dimer, CRP & IL6 was summarized in terms of Mean and SD. Pearson's correlation co- efficient was used to find the correlation between these.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

ROC curve was used to find the cut off point for severity of covid based on NTproBNP levels.

Data was entered into Microsoft excel data sheet and was analysed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation.

Independent t test was used as test of significance to identify the mean difference between two quantitative variables. Correlations were performed with **Pearson Correlation coefficient.**

Receiver operating characteristic curves (ROCs) was constructed for NT pro BNPin predicting severity.

Results:

The present study is a cohort_study that was undertaken to estimate serum NT pro BNP levels in covid-19 patients and to correlate the same with the severity of COVID-19 infection. The study involved 68 subjects aged 66 ±17 years). 41 were males and 27 were females.

Figure 1:-Distribution of subjects according to sex.

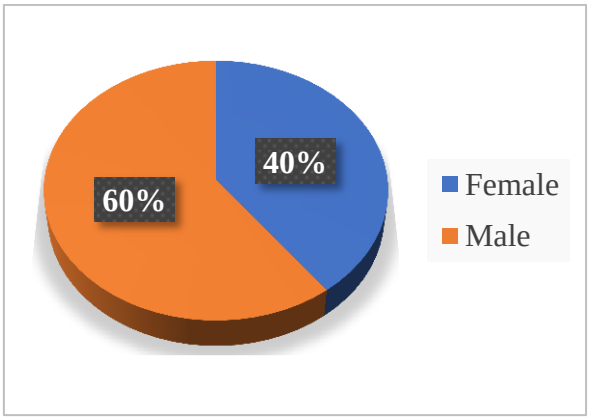


Table 1 shows descriptive statistics of various parameters

	Minimum	**Maximum**	**Mean**	**SD**
CRP(mg/dl)	0.03	31.56	11.70	9.96
D DIMER(µg/ml)	0.17	8.63	2.53	2.62
IL6(pg/ml)	5.36	5000	344.4	681.54
FERRITIN(ng/ml)	24.2	1000	403.6	325.90
LDH(U/L)	149	2278	397.3	294.76
NT pro BNP(pg/ml)	100.9	1098	497.1	340.90

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

There was a statistically significant difference found between CRP, IL6, NTproBNPand severity.

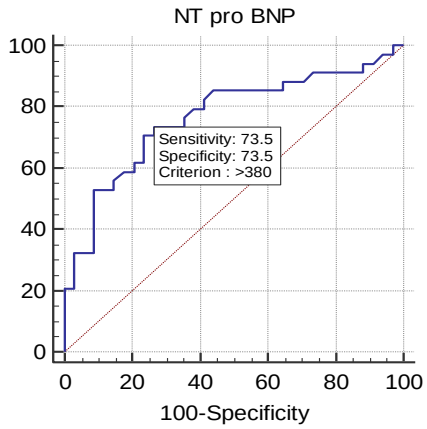
Table 2 shows correlation of various parameters with respect to NT pro BNP

		NT pro BNP
Age in years	Pearson Correlation	0.132
	P value	0.285
CRP(mg/dl)	Pearson Correlation	0.117
	P value	0.341
D DIMER(µg/ml)	Pearson Correlation	0.238
	P value	0.051
IL6(pg/ml)	Pearson Correlation	0.110
	P value	0.373
FERRITIN(ng/ml)	Pearson Correlation	0.025
	P value	0.841
LDH(pg/ml)	Pearson Correlation	0.244*
	P value	**0.045**

There was a positive weak correlation between Age, CRP, D Dimer, IL 6 ,Ferritinand NT pro BNP but in our study it was not statistically significant.There was a positive weak correlation between LDH and NT pro BNP which was statistically significant.

Figure 2:- ROC curve for NT Pro BNP in predicting severity

As shown in Figure 2 Area under curve for serum NT pro BNP is 0.767. Serum NTproBNP levels is correlating with the severity of the disease with sensitivity & specificity of 73.53.



ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

Area under the ROC curve (AUC)	**0.767**
P Value	**<0.0001**

Cut off	**Sensitivity**	**Specificity**	**+PV**	**-PV**
>380	73.53	73.53	73.5	73.5

Mortality Rate:

	Total	**Survivors**	**Non survivors**
Moderate	34	33(97.06%)	1(2.94%)
Severe	34	32(94.2%)	2(5.8%)
	68	65 (95.59%)	3(4.41%)

In total of 68 patients who were hospitalized for treatment of covid 3 cases of death(4.41%) was reported.

Discussion –The present study was undertaken to determine the relationship between NT proBNP and severity of COVID-19 infection. Study conducted by Wang et al showed that plasma NT-proBNP level of COVID-19 patients was significantly related to the severity of pneumonia, indicating that HF needs to be assessed in this disease. Study conducted by Gao L et al found that NT-proBNP might be an independentrisk factor for in-hospital death in patients with severe COVID-19. In our study also we found serum NTproBNP levels done at time of admission were statistically elevated among the patients with severe covid 19 illness as compared with moderate covid 19 illness. Hence, serum NTproBNP levels are correlating with the severity of the disease. Also, Area under curve for serum NT pro BNP is 0.767 hence, In our study Serum NTproBNP levels is correlating with the severity of the disease with sensitivity & specificity of 73.53.

In our study Serum NT-proBNP levels was positively correlating with other covid biomarkers like IL6, CRP, LDH, Ferritin& DDimer. But only LDH correlation was statistically significant.

Study conducted by Lan et al reported 2.3 % mortality rate out of 91 hospitalized patients. In our study among 68 patients who were hospitalized for treatment of covid 3 cases of death(4.41%) was reported.

Conclusion: The clinical course and severity of covid-19 infection is unpredictable. NT-pro BNP levels on admission will help in the prediction of poor outcome/prognosis. NT-proBNP may be used for risk stratification of patients with COVID-19 in order to determine treatment

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

strategies. Plasma NT-proBNP levels of COVID 19 patients can be used to predict the prognosis of covid which can help in early diagnosis and management of complications.

References

1. Lan Wang, Fei Chen, Lin Bai, Lang Bai, Zhixin Huang, Yong Peng, "Association between NT-proBNP Level and the Severity of COVID-19 Pneumonia", Cardiology Research and Practice, vol. 2021 Article ID 5537275.
2. Gao, L., Jiang, D., Wen, Xs. *et al*. Prognostic value of NT-proBNP in patients with severe COVID-19. *Respir Res* **21,** 83 (2020).
3. Caro-Codón J, Rey JR, Buño A, Iniesta AM, Rosillo SO, Castrejon-Castrejon S, Rodriguez-Sotelo L, Martinez LA, Marco I, Merino C, Martin-Polo L, Garcia-Veas JM, Martinez-Cossiani M, Gonzalez-Valle L, Herrero A, López-de-Sa E, Merino JL; CARD-COVID Investigators. Characterization of NT-proBNP in a large cohort of COVID-19 patients. Eur J Heart Fail. 2021 Mar;23(3):456-464.
4. Pranata R, Huang l, Lukito AA et al. Elevated N terminal Pro-brain Natriuretricpapetide is associated with increased moratality in patients with COVID-19: systematic review and meta analysis. Postgrad Med J 2020;96:387-391
5. Shi S, Qin M, Shen B, et al. Association of cardiac injury with mortality in hospitalized patients with COVID-19 in Wuhan, China. *JAMA Cardiol* 2020;5:802-10.
6. Ibrahim NE, Januzzi JL Jr. Established and emerging roles of biomarkers in heart failure. *Circ Res* 2018;123:614–29.
7. AIIMS/ ICMR-COVID-19 National Task Force/Joint Monitoring Group (Dte.GHS). Clinical guidance for management of adult COVID-19 patients. [Jan; 2022];https://www.icmr.gov.in/pdf/covid/techdoc/COVID_Clinical_Management_14012022