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Original Research Paper

An evaluation of Neutrophil Lymphocyte Ratio as a marker of COVID-19 PNEUMONIA in south indians

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ABSTRACT:

Introduction: Coronavirus is a highly communicable infectious disease and was declared as a pandemic in March 2020.[1] The severity of corona virus varies from individuals to individual due to the mutant strains. Various markersof severity was established. This study was done to determine the efficacy of neutrophil/lymphocyte ratio (NLR) asa marker of the severity of COVID-19 pneumonia in the South-indian population. **Methodology:** This is a retrospective cohort study and the study population was 70 COVID positive patients. **Results**: A total of 70 patients were studied. Majority of our study population belongs to the age group of 50 to 60 years. Those with age less than 50 years with an NLR < 3.13 was found to have less risk to develop critical illness and can be encouraged to undergo treatment in a primary health center or home isolation. Those with NLR ≥ 3.13 need to be treated in a covid general ward and closely monitored. Patients with age above 50 years and with NLR < 3.13 were less prone to develop critical illness and they were treated with covid ward admission and supportive care and monitoring. On the other hand patients aged ≥ 50 with NLR ≥ 3.13 carries a high risk of developing critical illness and they were transferred to ICU for respiratory support. In our study patients in severe category were found to have a high NLR ratio and patient in mild category had a low NLR ratio. **Conclusion:** Hence NLR is one of the most upcoming promising predictive factor for assessing the severity of patients with COVID-19 pneumonia.

keywords: COVID-19, Pneumonia, NLR ratio, Severity

INTRODUCTION:

The noval coronavirus disease 2019 (COVID-19) is caused by the virus SARS-CoV-2.[1] It is a highly communicable and infectious disease.[1] It was declared as a pandemic in March 2020 by the World Health Organization.[2] Since then despite the significant advances in medical science, data regarding COVID-19 infection severity and management is lacking. The severity of the disease is classified into mild, moderate and severe disease. Patients with moderate andsevere covid disease has long hospital stays, oxygen requirement, intensive treatment and a higher mortality rate.[3] Early identification and appropriate categorization is necessary to reduce this mortality rate. Early detection of the severity type mainly depends on the inflammatory markers.[4] If early warning signs of severe infection can be identified, we can give timely intervention and treatment to reduce the mortality and prevent the complications. Therefore, a clinical marker for assessing the severity which would be at low cost, with a quick reporting time and is both specific and sensitive. Markers of inflammation such neutrophils and lymphocytes can be seen in blood count. The neutrophils usually increased in bacterial infections and the lymphocytes during viral infections. By examining these two parameters and their ratio - neutrophil lymphocyte ratio (NLR) we can assess the COVID-19 infection severity. Hence this study aimed to retrospectively analyse the clinical details of COVID-19 patients in order to determine the risk factors and markers of inflammation, with particular focus on NLR, associated with severity of COVID-19 infection in the South-indian population

MATERIAL AND METHODS:

This was a retrospective cohort study conducted at sri venkateshwara medical college hospital and research centre, pondicherry. The sample size was 70. The study period was from march 2021 to June 2021.

Inclusion criteria:

Adult patients age ≥ 18 years. With clinical features such as fever, sore throat, cough, shortness of breath, chest pain. Imaging findings such as consolidation, ground-glass opacities (GGOs) either on chest X-ray or computed tomography thorax (CT). Real-time fluorescent reverse transcription- polymerase chain reaction (RT-PCR) test of respiratory samples - nasal/oropharyngeal swab or tracheal secretions which

was positive for SARS-CoV-2. After getting enrolled in the study, the eligible patients were further divided into the following two groups The "mild group" that includes asymptomatic and mild cases.The "moderate group" that includes moderate and severe cases.

Exclusion criteria:

The following patients were excluded from the study: Patients who tested negative for novel corona virus nucleic acid. Patients for whom monitoring of blood oxygen saturation (SpO2 or PaO2) was not feasible due to any reason. Patients who are suspected to have bacterial pneumonia (confirmed by sputum bacterial culture). Patients who have interstitial pneumonia (previously diagnosed based on radiological findings). Patients with heart failure associated with pulmonary oedema (non-COVID-19 heart disease). Patients with allergic pneumonia (acute or chronic eosinophilic pneumonia). Patients with active lung tumours. Patients on immunosuppressive drugs (including long-term steroids). Patients with incomplete chest computed tomography (CT) examination because of any reason. 10.Patient refusal to be enrolled in the study.

Data collection and procedure:

We analyzed the retrospective data of hospitalized COVID-19 patients. Patient's demographic characteristics (gender and age), comorbidities (hypertension (HTN), diabetes mellitus (DM), coronary heart disease (CHD), lung diseases such as asthma or chronic obstructive pulmonary disease (COPD)), clinical manifestations of COVID-19 (fever, chest pain, cough and shortness of breath), medication history (including the use of long-term steroid) and history of lung malignancy was recorded. General investigations such as complete blood count (CBC), liver function tests (LFTs), renal functional tests (RFTs) and serum electrolytes were reviewed. NLR ratio was calculated. The inflammatory markers such as C-reactive protein (CRP), serum albumin and serum fibrinogen and Chest X-ray, HRCT chest scan had been done based on the patients clinical status. Additional investigations such as D-dimer level and serum ferritin were also done based on clinical condition of patient. The data was analysed using Statistical Package for Social Sciences (SPSS) version 25. P values of less than .05 were considered statistically significant unless otherwise stated.

RESULTS:

Table 1: Demographic details of COVID 19 patients(72).

		Number	Percentage
Age category	≤40 years	9	12.5%
	41-50 years	16	22.2%
	51-60 years	23	31.9%
	61-70 years	10	13.9%
	>70 years	14	19.4%
Gender	Female	34	47.2%
	Male	38	52.8%

From the above table, Majority of the patients were in the age group of 50 to 60 years and wereof male sex.

Table 2: Hematological details of COVID 19 patients(72).

	Severity of COVID19, mean (SD)			**p value***
	Mild	**Moderate**	**Severe**	
l White BloodCell Count	8490.63 (3492.31)	12198.46 (4810.17)	17344.67 (7689.02)	**<0.001^**
Platelet Count	2.37 (.60)	2.14 (.79)	2.04 (.68)	0.326
Neutrophil Count	80.9 (5.25)	83.2 (7.13)	88.1 (7.88)	**0.004^**
Lymphocyte Count	13.1 (3.07)	14.0 (12.25)	8.0 (7.83)	**0.044^**

p value by one-way ANOVA; ^-p<0.05

From the above table, we can see that Patients with severe disease had significant changes intheir hematological values with elevated total count and elevated neutrophil count with low lymphocyte count and these values were

statistically significant.

Table 3: NLR of COVID 19 patients(72).

		Severity of COVID19			p value*
		Mild	Moderate	Severe	
phil/Lymphocyteratio (NLR)	Mean (SD)	6.7 (2.6)	11.1 (8.8)	20.4 (14.3)	
	Median(IQR)	6.5 (4.8-7.5)	6.5 (4.4-15.2)	17.8 (7.9- 29.20)	**0.001**^

p value by Kruskal Wallis test; ^-p<0.05

The above table shows that NLR was high as the severity of covid increases. Patients with severedisease had high NRL and was found to be statistically significant.

Table 4: Association of hematological profile with outcome of the patients.

	Outcome		
	Death	Recovered	p value
Total White Blood Cell Count	16444.62 (5564.1)	12874.07 (7019.1)	0.059
Platelet Count	2.13 (.6)	2.15 (.7)	0.900
Neutrophil Count	88.8 (7.9)	83.8 (7.3)	**0.030**^
Lymphocyte Count	7.5 (8.9)	12.2 (9.4)	0.108

p value by independent t test; ^-p<0.05

From the above table it was found that, patients with high total count and high neutrophil count had poor outcome (death) compared to patients with low values. Patients with high neutrophil count had statistically significant relationship to the mortality.

Table 5: Association of NLR with outcome of the patients.

		Outcome		p value*
		Death	Recovered	
phil/Lymphocyteratio (NLR)	Mean (SD)	20.6 (10.9)	12.5 (11.9)	
	Median(IQR)	23 (14.8-23.5)	7.2 (4.9-16.4)	**0.011**^

p value by Mann Whitney U test; ^-p<0.05

The above table shows that high NLR ratio was significantly associated with death than COVIDpatients with low NRL.

DISCUSSION:

Neutrophils are one of the human body's integral immune cells. When pathogenic microorganisms invade the body, immune cells have a tendency to swiftly chemotactically acquire to the contamination website online and play the position of host defence and immune regulation. When the body's neutrophils are considerably reduced, the body's immunity is compromised and for that reason the danger of contamination is appreciably increased. In our physique lymphocytes are the predominant effector cells enjoying a pivot position in immune response forming a protection gadget towards the pathogenic microorganisms and is commonly negatively correlated with the diploma of inflammation. NLR displays the physique stability of the neutrophil and lymphocyte count number levels. It additionally tells about the diploma of systemic inflammation. More accurately, it displays the stability between the severity of the irritation and the body's immune status, and is as a consequence viewed as an essential marker of inflammatory response.5 Hence NLR may additionally have a function in predicting the COVID-19 infection's severity. The chance stratification of NLR in accordance

to age enables affected person management. Patients aged < 50 years with an NLR < 3.13 noticeably not likely to increase a vital sickness and can be handled in a neighborhood sanatorium or domestic isolation;patients with NLR ≥ 3.13 have a low risk of growing a necessary sickness want to be dealt with in a standard isolation ward and carefully monitored. Patients aged ≥ 50 and having an NLR < 3.13 have a reasonable threat of creating a necessary illness, and admitting to isolation ward with respiratory monitoring and supportive care used to be wanted for these patients; sufferers aged ≥ 50 and having an NLR ≥ 3.13 have a excessive danger of growing a crucial sickness and want to be organized for switch to ICU for invasive respiratory guide equipment. A latest systematic evaluate and metanalysis by means of Man et al related to immune- inflammatory parameters in COVID-19 contamination concluded that neutrophil/lymphocyte ratio (NLR) is related with the development of the contamination and can be utilised by way of the medical doctors to become aware of excessive threat or deteriorating sufferers at an early stage.6 Similar consequences had been acquired by way of the studies finished with the aid of Maddani et al, Imran et al, Qu R et al.1,4,7 Several different research have stated their findings that NLR can be used as an early warning sign of extreme COVID-19 infection,and regarded as an impartial marker for negative medical results and mortality in COVID-19 infection.

In summary, our study found that there was a significant difference in NLR between general and heavy group COVID-19 patients with heavy group patients tending to have significantly higher NLR. Hence in a covid patient, a rising trend of NLR should be considered as a warning signal for severe infection and it allow us to be prepared for the exploration of subsequent treatment mechanisms. However, we had certain limitations, such as a small sample size and being a single-centre study. For more accurate and precise results, and wider generalisability of the findings, multicentred and larger sample size clinical studies are required to validate our results.

CONCLUSION:

The NLR has been the most promising predictive component for sever sickness in COVID-19 pneumonia. The early software of NLR and age will be really helpful to affected person classification administration and alleviation of clinical aid shortage.

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