Original Research Paper

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Pulmonary Medicine

PROGNOSTIC VALUE OF LEUCOCYTOSIS, LYMPHOPENIA & NLR IN COVID-19 SEVERITY

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ABSTRACT **Background:** Early detection of the COVID severity mainly depends on the inflammatory markers. Markers of inflammation such as neutrophils and lymphocytes can be seen in blood count. The study was conducted with a objective to compare the total leucocyte count, lymphocyte count & Neutrophil Lymphocyte ratio(NLR) in Mild, Moderate & Severe COVID-19 patients for the early decision of critical care management Methodology: A total of 300 COVID 19 patients whose diagnosis was confirmed by molecular analysis (RT-PCR) and who was above the age of 18 years admitted in the month of July 2020 to October 2020 were included in the study randomly. Clinical and laboratory data including age, comorbidities, leucocyte and lymphocyte blood count were collected. NLR was obtained by dividing absolute neutrophil count by lymphocyte count in complete blood count at presentation. Patients were divided into three groups as mild, moderate and severe according to the oxygen saturation on admission with ≥94%, 90-93% and ≤89% respectively. Results: The mean leucocyte counts for severe, moderate, mild cases were 11336.59, 9403.48, 7435.28 respectively. NLR values among mild, moderate and severe cases. NLR of < 5.13 is observed as 48% in mild cases. Among 300 people, 129 (43%) people were in lymphopenia. Among 129 people, 62% had severe disease as compared to mild cases (13%).Conclusion: Surveillance of total leucocyte count, neutrophil -lymphocyte ratio are helpful in the early screening of critical illness, diagnosis & treatment of COVID 19 and also to decide about critical care management.

KEYWORDS : NLR , covid-19 and triage

INTRODUCTION:

- Early detection of the COVID severity mainly depends on the inflammatory markers.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 as neutrophils and lymphocytes can be seen in blood count. Neutrophil to lymphocyte ratio (NLR), which is cheap and easily computed from a routine blood test by dividing the absolute neutrophil count by the absolute lymphocyte count, has great value in indicating a patient's overall systemic inflammatory status. By examining these two parameters and their ratio - neutrophil lymphocyte ratio (NLR) we can assess the COVID-19 infection severity .Its changes can not only reflect the role of neutrophils in infection but also reflect the changes of lymphocytes.
- Using a simple test like NLR for assessing the risk of mortality and early identification of severe cases will help in preventing life threatening complications in COVID-19 patients

AIM :

To study the prognostic value of leucocytosis, lymphopenia & nlr in covid-19 severity.

OBJECTIVES:

To study the comparison of total leucocyte count, lymphocyte count & Neutrophil Lymphocyte ratio(NLR) in Mild, Moderate & Severe COVID-19 patients for the early decision of critical care management.

MATERIALAND METHODS :

It is a cross sectional analytical study carried out among COVID-19 positive patients who were admitted in a tertiary care hospital, Visakhapatnam, Andhra Pradesh. A total of 300 COVID-19 patients whose diagnosis was confirmed by molecular analysis (RT-PCR) and who was above the age of 18 years admitted in the month of July 2020 to October 2020 were included in the study randomly. Patients who were referred from other centers after several days of hospitalization without an attached admission complete blood count (CBC) in the first center, those with solid malignancy on chemotherapy and hematological disorders like myeloma, leukemia and lymphoma and patients with documented glucocorticoids exposure before admission were excluded from the study.

PROCEDURE METHODOLOGY:

Clinical and laboratory data including age, comorbidities, leucocyte and lymphocyte blood count were collected. NLR was obtained by dividing absolute neutrophil count by lymphocyte count in complete blood count at presentation. Patients were divided into three groups as mild, moderate and severe according to the oxygen saturation on admission with ≥94%, 90-93% and ≤89% respectively.

STATISTICALANALYSIS:

Statistical analysis was performed using SPSS. The compliance of continuous variables to normal distribution was tested. Receiver Operating Characteristic (ROC) analysis was performed for NLR and the most appropriate cut-off value was determined by the Youden index. A cut off of 5.13 was obtained for NLR.

RESULTS:

Total of 300 patients were included. Table 1 shows the distribution of cases based on their severity. Most of the people were in severe group which accounts for 41% of cases. More than half of the participants (57%) of the patients were in less than 60 years and their severity as shown in table 2. Higher proportion of people who were less than 60 years had mild disease and people who were more than 60 years had severe disease.

TABLE 1: CLASSIFICATION INTO GROUPS ACCORDING TO SEVERITY

SEVERITY	NUMBER OF CASES(%)
MILD	108 (36%)
MODERATE	69(23%)
SEVERE	123(41%)

TABLE 2 : AGE DISTRIBUTION OF STUDY PARTICIPANTS BASED ON SEVERITY:

AGE	TOTAL	MILD	MODERATE	SEVERE
<60YRS	170	70 (41%)	40(24%)	60(35%)
≥60YRS	130	38(29%)	29(22%)	63(49%)

TABLE 3: COMORBIDITIES AMONG THE COVID-19 POSITIVE PATIENTS.

	MILD	MODERATE	SEVERE
WITH COMORBIDITIES	30(28%)	40(58%)	105(85%)
WITHOUT COMORBIDITY	78(72%)	29(42%)	18(15%)

Among 300 subjects, 175 (58 %) had comorbidities in which 85% people had severe disease whereas 28% had mild disease.

TABLE 4: MEAN LEUCOCYTE COUNT AMONG THE THREE GROUPS:

SEVERITY	MEAN LEUCOCYTE COUNT
MILD	7435.28
MODERATE	9403.48
SEVERE	11336.59

The mean leucocyte counts for severe, moderate, mild cases were 11336.59, 9403.48, 7435.28 respectively.

TABLE 5: PROPORTION OF LEUCOCYTE COUNT BASED ON SEVERITY:

LEUCOCYTE COUNT	MILD	MODERATE	SEVERE
< 10000	102(49%)	48(23%)	60(28%)
≥ 10000	6(6%)	21(23%)	63(71%)

Among 300 subjects, 210 (70%) had leucocyte count less than 10000. Table 5 shows patients with leucocyte count ≥ 10000 is observed higher in severe cases (71%) compared to mild cases (6%).

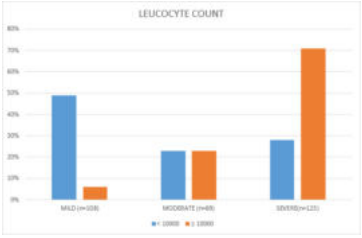


Figure1: Leucocyte count among the mild, moderate and severe cases

TABLE 6: NLR (NEUTROPHIL LYMPHOCYTE RATIO) AMONG THE GROUPS: NLR cutoff is calculated by ROC curve and found to be 5.13

NLR	MILD	MODERATE	SEVERE
<5.13	102(48%)	51(24%)	60(28%)
≥5.13	6(7%)	18(21%)	63(72%)

Among 300 participants, 213 (71%) had NLR of <5.13. Table 6 shows NLR values among mild, moderate and severe cases. NLR of < 5.13 is observed as 48% in mild cases. NLR of ≥5.13 is observed as 72% in severe cases as compared to mild cases (7%).

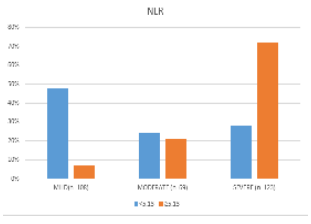
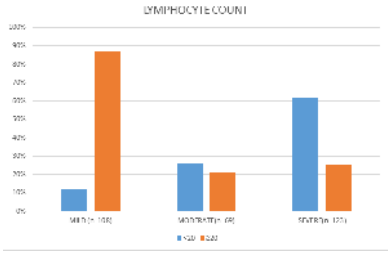


Figure 2 showed the NLR values among the mild, moderate and severe cases with NLR cutoff of 5.13

TABLE 7: LYMPHOCYTE COUNT AMONG MILD, MODERATE AND SEVERE CASES.

LYMPHOCYTE COUNT	MILD	MODERATE	SEVERE
<20	15(12%)	33(26%)	81(62%)
≥20	93(54%)	36(21%)	42(25%)

Among 300 people, 129 (43%) people were in lymphopenia. Among 129 people, 62% had severe disease as compared to mild cases (13%).



Graph 3 shows the lymphocyte count among the mild , moderate and severe cases.

DISCUSSION:

In our study, it was evident that complete blood count with total leucocyte and lymphocyte count with NLR can be a simple predictive marker for prognosis of covid-19 patients at presentation (4).It is inferred that leucocytosis, lymphopenia and high NLR is evident in severe & moderate cases compared to mild cases. As severity increases ,the above parameters are also increased. Proposed causes of lymphopenia in covid-19 patients are the inflammatory cytokine storm is likely a key factor, exhaustion of T cells,infection of T cells and interference with T cell expansion(5).In resource limited settings and during pandemic situations, NLR can be used as a marker for severity to triage the patients initially.

CONCLUSION:

Surveillance of total leucocyte count, neutrophil -lymphocyte ratio are helpful in the early screening of critical illness, diagnosis & treatment of COVID 19 and also to decide about critical care management as above parameters are easily measurable, available, cost-effective and reliable.The NLR was the most promising predictive factor for critical illness incidence of COVID-19 pneumonia. Early application of NLR will be beneficial for patient management and relief of medical resource shortage.

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