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Platelet to Lymphocyte Ratio (PLR) To Predict Severity in COVID-19

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Abstract:
Background: *SARS-CoV2 virus is a beta corona virus and the disease caused by this is the COVID-19 .The disease was declared as a pandemic on March 11 2020 by WHO .Platelet to lymphocyte ratio is a novel marker of inflammation .The purpose of this marker is to determine the prognosis of COVID-19 patients especially in resource limiting setting.*
Materials and methods: *It is a cross sectional study , 84 patients were included based on the inclusion and exclusion criteria. A complete blood picture is done at the time of admission and patient is followed to assess the severity of the disease.*
Results: *Among 84 recruited patients,61.9% are males, the common age group affected was between 31-45 years (30.9%). Among 84 patients 46 had severe disease and 38 had non severe disease. The mean platelet to lymphocyte ratio was higher in >60 years age group . The mean platelet to lymphocyte ratio was higher in patients with severe disease (293.6) than non severe disease patients(148.2).*
Conclusion: *Males were predominant than females . The mean platelet to lymphocyte ratio is higher in severe patients than non severe patients . PLR is a novel , cost effective biomarker in determining the severity of COVID-19 patients . It may help to divert the attention to patients with poorer prognosis.*
Key words: SARS CoV2, COVID-19, Platelet to Lymphocyte Ratio(PLR)

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I. Introduction

The world is amidst a pandemic that is presenting one of the greatest public health challenges of the twenty-first century. Since its emergence the new corona virus has resulted in 43.7 million infections and over 1 million deaths as of October 25, 2020, among these 20% of the deaths have occurred in the United States followed by Brazil (14%), India (10%), Mexico (7.8%) and the United Kingdom (4%)[1] . The virus was officially named the Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) and the disease caused by this as Coronavirus Disease 2019, or COVID-19[2] . In less than two months, SARS-CoV-2 went from a public health emergency to a disease of pandemic status, declared such on March 11, 2020, by WHO[3].Severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) is a beta corona virus, given the mortality rate of this disease, physicians should be aware of the potential risk factors associated with a fatal outcome. The disease has a geographical impact on 213 countries (two international conveyances), with an incubation period ranging from 2-14(5.2) days. The patient can be asymptomatic or pre-symptomatic during the infectious period. The speed of transmission of the disease is high compared to SARS and MERS. Prognostic predictors are of paramount interest for prompt intervention and optimal utilisation of health care system. Platelet-to-lymphocyte ratio (PLR) is a novel marker of inflammation, which is inexpensive and readily available in clinical settings. PLR has been used in various diseases, such as cardiovascular diseases and autoimmune diseases, as a predictor of inflammation and mortality [4,5]. Due to the rapid involvement of inflammatory processes in COVID-19, severe COVID-19 patients have demonstrated elevated PLR levels on admission [6,7]. This suggests the potential of this inflammatory marker to determine the prognosis of COVID-19 patients, especially in resource-limited settings.

II. Materials And Methods

This observational study was carried out on the patients admitted in the Department of Pulmonary Medicine at Andhra Medical College, Visakhapatnam, Andhra Pradesh from the month of August 2020 to October 2020. A total 84 patients of aged ≥ 18, years were included in the present study.

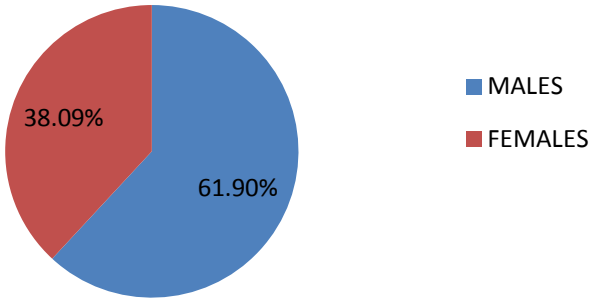
Study Design: cross sectional study
Study Location: This was a tertiary care teaching hospital based study done in Department of Pulmonary Medicine at Andhra Medical College, Visakhapatnam, Andhra Pradesh.
Study Duration: Three months (August 2020 to October 2020)
Sample size: 84 patients.
Subjects & selection method: The study population is drawn from the patients admitted in the isolation wards and ICU care settings in the Department of Pulmonary Medicine, Andhra Medical College from the month of August 2020 to October 2020.
Inclusion criteria:
1. Patients who were nasopharyngeal swab positive for covid-19.
2. Who were consenting to the study.
3. Patient's age more than 18 years
Exclusion criteria:
1. Patients who were not consenting for the study
2. Whose age <7 years
Procedure methodology:
After written informed consent was obtained, the patients were included based on the inclusion and exclusion criteria. All the patients were subjected to complete blood picture and platelet to lymphocyte ratio is caluculated for each patient and severity of disease is assessed. Severe COVID-19 is defined as patients with respiratory rate >30/min, spo2 <93%, pao2/Fio2 <300, and/or lung infiltrates >50% of lung field.
Statistical analysis:
Data was analyzed using Microsoft EXCEL sheet.

III. Results

Among the 84patients recruited in the present study, 61.9% were males and 38.09% were females with preponderance to males.

GENDER	NUMBER	PERCENTAGE
MALES	52	61.9%
FEMALES	32	38.09%
TOTAL	84	100%

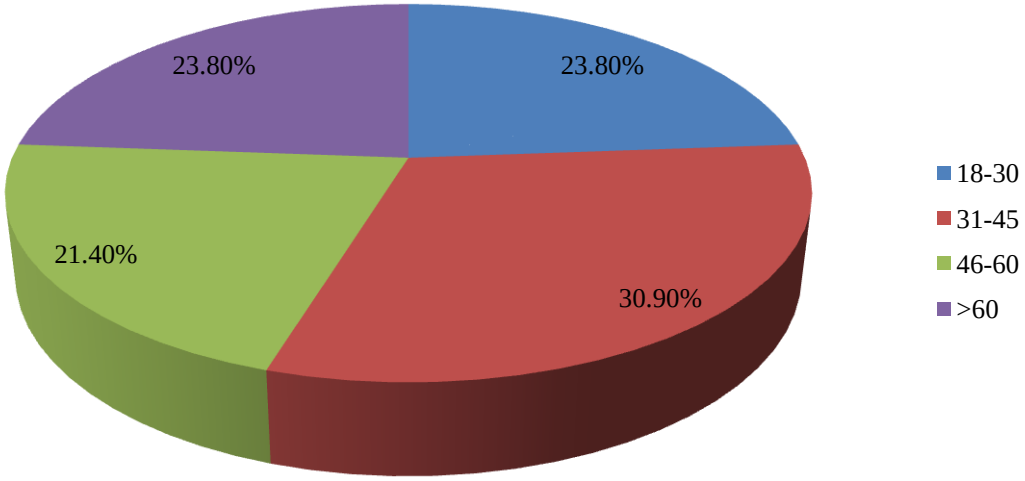
GENDER DISTRIBUTION



The common age group affected in the study population was among the 31-45 years age group accounting upto 30.9%

AGE	NUMBER	PERCENTAGE
18-30	20	23.8%
31-45	26	30.9%
45-60	18	21.4%
>60	20	23.8%

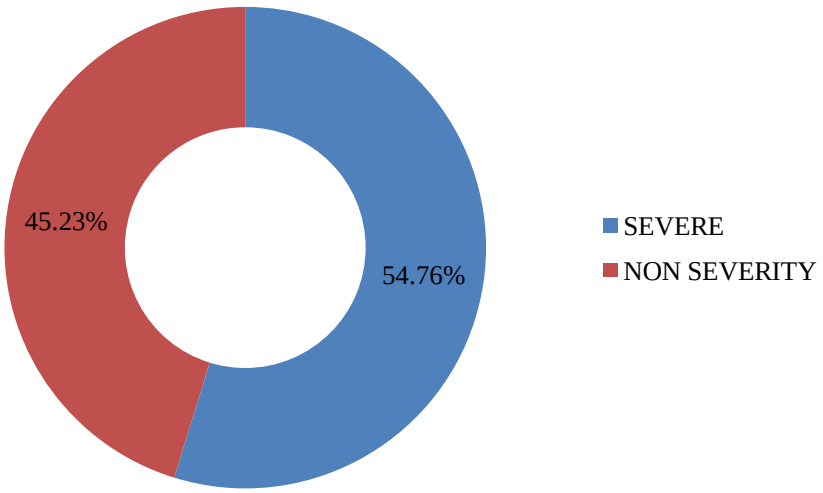
AGE DISTRIBUTION



Among 84 patients 46 (54.76%) had severe disease and 38(45.23%) had non severe disease.

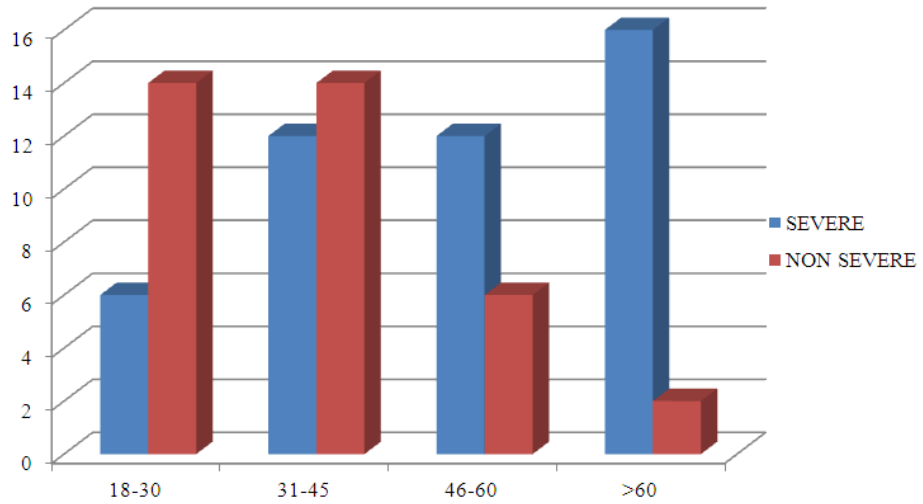
	NUMBER	PERCENTAGE
SEVERE DISEASE	46	54.76%
NON SEVERE DISEASE	38	45.23%

SEVERITY AMONG STUDY POPULATION

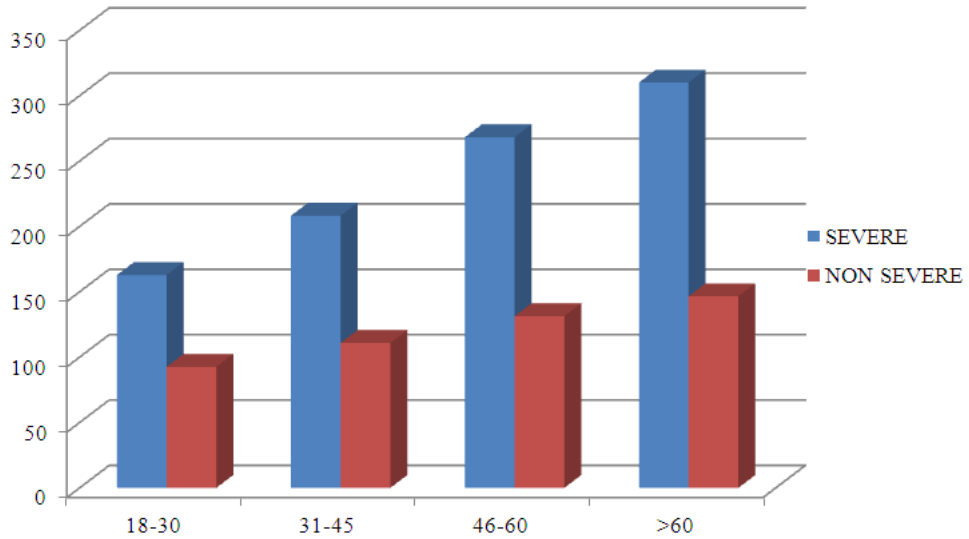


Among 84 patients 10 patients are in the age group of 18-30 among them 6 had severe disease and 14 had nonsevere disease. 26 belong toage group of 31-45 among which 12 had severe disease and 14 had non severe disease . 18 belong to age group of 46-60 among them 12 had severe disease and 6 had non severe disease.20 patients belong to age group of >60 years and 16 had severe disease and 4 had non severe disease

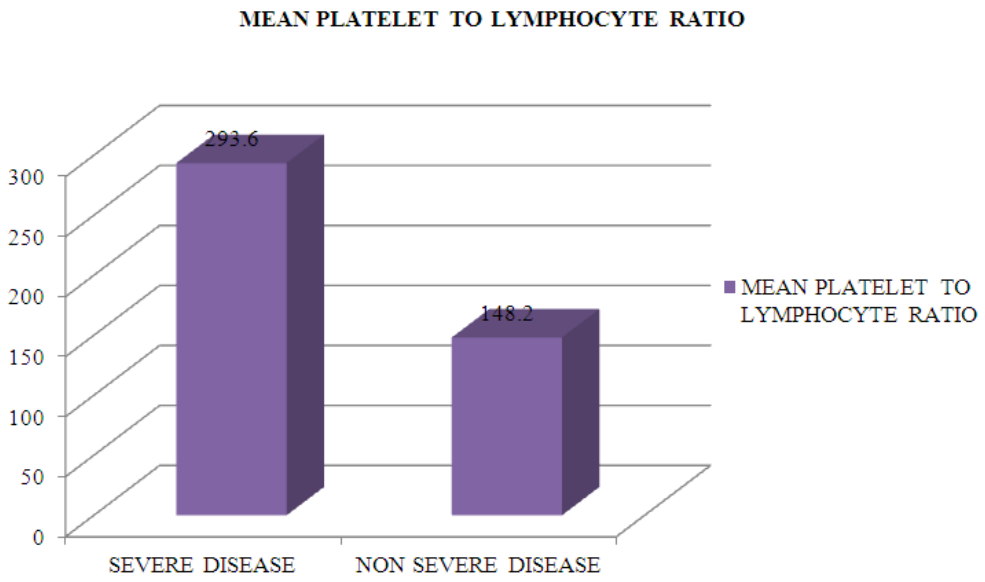
AGE DISTRIBUTION	SEVERE DISEASE	NON SEVERE DISEASE
18-30	6 (30%)	14 (70%)
31-45	12 (46.1%)	14 (53.8%)
46-60	12 (66.66%)	6 (33.34%)
>60	16 (80%)	4 (20%)



AGE DISTRIBUTION	MEAN PLR IN SEVERE DISEASE	MEAN PLR IN NON SEVERE DISEASE
18-30	162.8	92.6
31-45	208.2	110.9
46-60	268.3	131.4
>60	310.1	146.6



The mean PLR in severe disease patients is 293.6 and non severe patients is 148.2



IV. Discussion

PLR has been initially suggested as a great candidate marker for determining the severity and mortality of COVID-19. First, PLR is an established marker of inflammation . Inflammation plays a considerable role in the pathophysiology of COVID-19, with cytokine storm as a hallmark condition in severe disease and poorer prognosis [8] Thus, elevated PLR value suggests an overactive inflammatory response and subsequently worse prognosis. Second, PLR is sensitive to natural and acquired immune response [9]. Third, PLR is an inexpensive and readily available measurement that can be used in resource-limited settings. Therefore, our systematic review aims to review the validity of PLR level on admission as a prognostic indicator in COVID-19 patients.

In our study among 84 cases predominant cases are males accounting to 61.9% and mostly are in the age group range of 31-45 years.Among 84 study population 46 has severe disease and 38 had nonsevere disease .As the age is increasing severity of the disease is increasing so the cause may be due to associated comorbidities and decreased immunity. In our study population severity is high among age group of 45-60(66.66%) and more than 60 years (80%). The mean platelet to lymphocyte ratio is high in severe disease in all age groups.In 18-30years the mean PLR ratio in severily diseased is 162.8 and those with non severe disease is 92.6.The mean PLR ratio in 31-45 years age group is 208.2 in patients with severe disease and 110.9 in patients with non severe disease.The mean PLR ratio in 46-60 years age group is 268.3 in severe patients and those with non severe disease is 131.4.The mean PLR ration in >60years is 310.1 in patients with severe disease and 146.6 in non severe patients.The mean PLR ratio in severe disease is 293.6 and nonsevere disease is 148.2 which indicates the PLR ratio is high in severe disease. Daniel Martin Simadibrata et al showed a statistically significant higher PLR value on admission in severe COVID-19 in comparison to non-severe COVID-19 patients. Therefore, further research still needs to be conducted to determine an optimal cut-off value for PLR value for the prediction of severity in COVID-19.

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