

Study on Neutrophil Lymphocyte ratio and Platelet lymphocyte ratio in COVID-19 from our prospective. A cross sectional study.

Syed Imran Ali¹, Farhana Tarannum¹, Rubiya Khan¹, M. Kanyakumari², Mujaheed Mohammad³, Mohammad Asgar Ali⁴

1,2,3Assistant Professor ,Department of Physiology, Mamata Academy of Medical Sciences ,Bachupally ,Hyderabad.

4 Professor Dept. of Pathology, Mamata Academy of Medical Sciences ,Bachupally ,Hyderabad.

Submission : 20-10-2020

Review : 5-11-2020

Acceptance 27-11-2020

5 Associate Professor, Department of Physiology, Mamata Academy of Medical Sciences ,Bachupally ,Hyderabad.

6 Professor Dept. of Physiology, Mamata Academy of Medical Sciences ,Bachupally ,Hyderabad.

Email ID: drsyedimranali2015@gmail.com Cell no. 9160162499 , 8074714701 .

DOI: 10.47799/pimr.0803.12

© 2020-21 Prathima Institute of Medical Sciences

Abstract

Background : Novel corona Virus disease 2019 has been declared as pandemic by WHO. It started from Wuhan, China and within less times spread has occurred through out the world .The whole world is facing a huge challenge to prevent the spread of the disease. Though there was a strong response and preventive measures taken at the onset of the pandemic but still its one of the fastest growing pandemic in India at present. Only a clear knowledge regarding the risk and complication of covid19 to the population helps in fighting out this pandemics.

Methods : A cross sectional study of 50 COVID 19 cases confirmed by Real Time Reverse Transcriptase Polymerase Chain Reaction. In the current study , prevalence and severity was assessed at 95% confidence interval. Independent statistical T test and chi-square were used to test significance ($p < 0.05$).

Result: Out of 50 cases 20 are severe and 30 are non severe. Lymphocytopenia is one of the most important cardinal hematological feature seen in 60% of patients. It was observed in the current study that NLR & PLR was increased in severe cases. The Neutrophil to Lymphocyte ratio (NLR). is higher in severe cases (5.87 ± 1.92) when compared to non severe cases (2.86 ± 1.20) was statistically significant ($p = 0.043$). Platelet to Lymphocyte ratio (PLR) was higher in severe cases (282.08 ± 57.85) as compared to non severe cases (216.24 ± 36.35) and is statistically significant (p value = 0.007).

Conclusion: Current study declares, Neutrophil to Lymphocyte ratio (NLR) and Platelet to Lymphocyte ratio (PLR) may be considered as good diagnostic and prognostic risk evaluators in assessing the severity and progression of the novel corona disease 2019.

Keywords: Novel Corona Disease 2019 (Covid 19) . Neutrophil to Lymphocyte ratio (NLR). Platelet to Lymphocyte ratio (PLR), Real time polymerase chain reaction (RT-PCR)

INTRODUCTION

The epidemic of 2019 novel coronavirus (COVID-19) has struck China in late December, 2019. A novel coronavirus was then

identified as the causative agent. Many countries and territories have been affected within two months [18–20]. As of October 21, 2020, nearly 40,665,438 confirmed cases of COVID-19 occurred, resulting in about 1,121,843 deaths as reported to WHO. Many cases were mild to moderate with common symptoms at onset of illness, including fever, cough, and fatigue or myalgia. Organ dysfunction included acute respiratory distress syndrome (ARDS), acute liver injury, acute cardiac injury, acute kidney injury, and death could occur in the severe cases [17]. Complete blood counts (CBC) are easily performed and inexpensive. Included in the CBC are values such as white blood count, neutrophil, lymphocyte and platelet count (PLT), mean platelet volume and certain ratios of these values such as NLR and PLR are used as inflammatory markers. Neutrophils are the most characteristic cell type among the white blood cells and is an important component of the immune system. Regulated by mast cells, epithelial cells and macrophages, neutrophils also take part in inflammatory processes. The role of lymphocytes in both inflammation and infections is evident. Additionally, thrombocytes also have importance in the regulation of various inflammatory processes. While these parameters are used as inflammatory markers by themselves, their ratios to one another may also be indicators of early inflammation [9–11]. Circulating leukocytes respond to stress by increasing neutrophils and reducing lymphocytes; the ratio of these two parameters is also used as an inflammatory marker [15–16]. Blood cell interactions play an important role in the pathophysiology of inflammation, immune responses, hemostasis, and oncogenesis. Numerous observational studies have suggested that the neutrophil-to-lymphocyte ratio (NLR), lymphocyte-to-monocyte ratio (LMR), lymphocyte proportion and the platelet-to-lymphocyte ratio (PLR) are inflammatory markers of immune-mediated, metabolic, prothrombotic, and neoplastic diseases, and are widely investigated as useful predictors for prognosis in many diseases [12–14].

Aim : To study to hematological parameters in covid-19 infection.

Objective : To evaluate the prognosis and severity of diseases by using hematological parameters.

MATERIALS AND METHODS

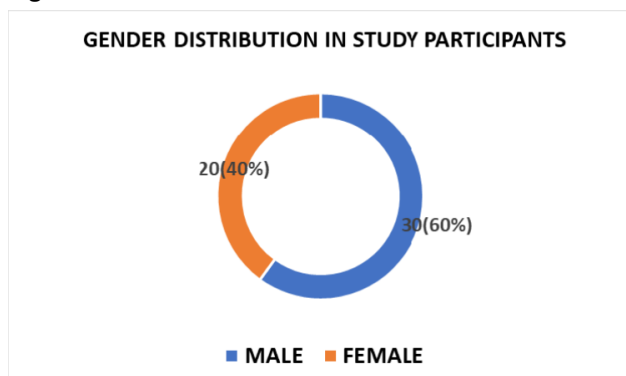
The cross sectional study was conducted at the Department of Research Mamata Academy of Medical Sciences and Hospital during August 2020. Informed Consent was obtained from the patients included in the study. 50 Novel Corona Disease patients both male and female, Age between 20-92 years admitted at Mamata Academy of Medical Sciences and Hospital were screened with diagnostic Real Time Polymerase Chain Reaction, Positive cases were enrolled for the study. Hematological parameters like compounded complete blood count that is NLR and PLR was done by using Auto Hematology Analyzer, Model : H33S 3parts (AVANTOR) to correlate the relations of the parameters with Covid 19 cases.

Statistical analysis was performed by SPSS 20.0 software. All demographic and clinical characteristics were expressed as frequencies and proportions for categorical variables, Mean± Standard Deviation for continuous variables were done keeping confidence interval of 95% with 80% power of the study. T-test was used to test statistically significant difference between severe and non severe cases for various laboratory continuous variables and chi square test for categorical variable. T-test was used to calculate the significance of Independent Statistic P value of < 0.05 was considered to be statistically significant.

Results

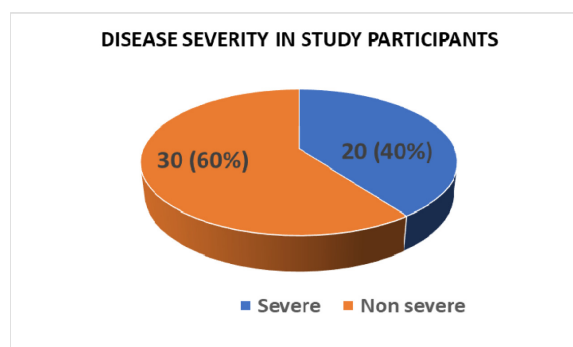
In the current study, out of 50 cases 60% were males and 40% were female cases. The male prevalence is more when compared to female. So maximum number of affected persons in our studies were males (Figure 1). The distribution of disease Severity in the study population was 40% Severe, 60% Non Severe cases (Figure 2). It was observed in the current study that gender severity is more (80%) in male, when compared to the female counter part (20%). Gender Non Severity is more (53.3%) in female, when compared to the male counter part (46.7%) and it was statistically significant, odd ratio 4.57 and P value of 0.01 (Table 1). The Neutrophil to Lymphocyte ratio (NLR) is higher in severe cases (5.87±1.92) when compared to non severe cases (2.86±1.20) was statistically significant (p = 0.043). Platelet to Lymphocyte ratio (PLR) was higher in severe cases (282.08±57.85) as compared to non severe cases (216.24±36.35) and is statistically significant (p value =0.007) (Table.2).

Figure 1: Distribution of Gender



Percentage of distribution of gender and frequency in COVID19

Figure2: Distribution of disease severity in study participants



Percentage and frequency distribution of disease severity in COVID19

Table 1: Distribution of disease severity across gender

GENDER	SEVERE	NON-SEVERE	TOTAL	P Value
MALE	16 (80.0%)	14(46.7%)	30(60.0%)	0.01
FEMALE	4 (20.0%)	16(53.3%)	20(40.0%)	

Percentage distribution of severity of disease data presented as %. Odds ratio is 4.57 and P=0.01.

Table 2: Hematological laboratory findings in Covid19

Lab Findings	Severe cases SD±M	Non-severe cases Mean±SD	P-value
Totalleucocytes count	1.87 ± 6.7	9.1 ±1.003	0.316
Neutrophils	77.20 ±9.6	70.86 ±8.45	0.01
Lymphocytes	14.4 ±4.75	20.60 ±8.41	0.004*
Platelets	2.70 ±0.89	2.86 ±0.68	0.485
ALC	9.38 ±2.56	1.73 ±4.68	0.00*
NLR	5.87 ±1.92	2.86 ±1.20	0.043*
PLR	282.08±57.85	216.24 ±36.35	0.007*

Data presented as Mean±SD, t-test, P<0.05, * statistically significant.

Discussion

In the present scenario this pandemic is a major concern and threat to public health. This cross sectional study included 40% severe and 60% non severe case. It is different from the study in Wuhan, China (1,2). There are more number of males (30) as compared to females (20) out of total 50 covid19 cases. MERS-CoV and SARS-CoV have also been found to infect more males than females (3,4) these studies are in compromise with our studies. The reduced susceptibility of females to viral infections could be attributed to the protection from X chromosome and sex hormones, which play an important role

in innate and adaptive immunity (5). Severity is also found more in males as compared to females and the result was statistically significant ($p=0.01$). Patients with severe COVID-19 disease present with increased leukocytosis, neutrophilia, lymphopenia, and thrombocytopenia than those with non-severe disease (6). These patients were more likely to develop ARDS and require intensive care unit (ICU) level of care (7-9). There is a significant difference in NLR and PLR of severe and non-severe cases. The NLR was higher in severe cases than in non-severe cases which is consistent with recent studies (10,11). Various studies have suggested that the NLR, LMR, lymphocyte proportion and the PLR are inflammatory markers of immune-mediated, metabolic, prothrombotic, and neoplastic diseases, and are widely investigated as useful predictors for prognosis in many diseases (12-14). NLR and PLR can be easily obtained from a complete blood count with a differential profile. Hence laboratory values like NLR, PLR, Lymphopenia are important indicators in deciding high risk cases of covid19.

Conclusion

Current study declares, Neutrophil to Lymphocyte ratio (NLR) and Platelet to Lymphocyte ratio (PLR) may be considered as good diagnostic and prognostic risk evaluators in assessing the severity and progression of the novel corona disease 2019.

REFERENCES

- Zhang, Ting & Huang, Shaoping & Liu, Min & Li, Xiaolu & Shang, Zhiyin & Lu, Hongzhou. (2020). Significance of neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio for predicting clinical outcomes in COVID-19. 10.21203/rs.3.rs-34983/v1.
- Li X, Xu S, Yu M, Wang K, Tao Y, Zhou Y, Shi J, Zhou M, Wu B, Yang Z, et al: Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan. *The Journal of allergy and clinical immunology* 2020.
- Badawi A, Ryoo SG. Prevalence of comorbidities in the Middle East respiratory syndrome coronavirus (MERS-CoV): a systematic review and meta-analysis. *Int J Infect Dis* 2016; 49: 129–33.
- Channappanavar R, Fett C, Mack M, Ten Eyck PP, Meyerholz DK, Perlman S. Sex-based differences in susceptibility to severe acute respiratory syndrome coronavirus infection. *J Immunol* 2017; 198: 4046–53.
- Jaillon S, Berthenet K, Garlanda C. Sexual dimorphism in innate immunity. *Clin Rev Allergy Immunol* 2019; 56: 308–21.
- Henry BM, de Oliveira MHS, Benoit S, Plebani M, Lippi G. Hematologic, biochemical and immune biomarker abnormalities associated with severe illness and mortality in coronavirus disease 2019 (COVID-19): a meta-analysis. *Clin Chem Lab Med*. 2020;58(7):1021-1028.
- Wu C, Chen X, Cai Y, Xia J, Zhou X, Xu S, Huang H, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med*. 2020.
- Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, Wang B, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020.
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497-506.
- Liu Y, Du X, Chen J, Jin Y, Peng L, Wang HX, Luo M, Chen L, Zhao Y: Neutrophil-to-lymphocyte ratio as an independent risk factor for mortality in hospitalized patients with COVID-19. *The Journal of infection* 2020.
- Qin C, Zhou L, Hu Z, Zhang S, Yang S, Tao Y, Xie C, Ma K, Shang K, Wang W, et al: Dysregulation of immune response in patients with COVID-19 in Wuhan, China. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America* 2020.
- Gasparyan AY, Aivazyan L, Mukanova U, Yessirkepov M, Kitis GD. The Platelet-to-Lymphocyte Ratio as an Inflammatory Marker in Rheumatic Diseases. *Annals of laboratory medicine*. 2019;39(4):345–57.
- Ha YJ, Hur J, Go DJ, Kang EH, Park JK, Lee EY, Shin K, Lee EB, Song YW, Lee YJ. Baseline peripheral blood neutrophil-to-lymphocyte ratio could predict survival in patients with adult polymyositis and dermatomyositis: A retrospective observational study. *PloS one*. 2018;13(1):e0190411.
- Ying HQ, Deng QW, He BS, Pan YQ, Wang F, Sun HL, Chen J, Liu X, Wang SK. The prognostic value of preoperative NLR, d-NLR, PLR and LMR for predicting clinical outcome in surgical colorectal cancer patients. *Medical oncology*. 2014;31(12):305.
- Li Q, Guan X, Wu P et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N. Engl. J. Med*. 382(13), 1199–1207 (2020).
- Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan, China: the mystery and the miracle. *J. Med. Virol*. 92(4), 401–402 (2020).
- Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med*. 2020;382(8):727–33.
- Chang, Lin M, Wei L, Xie L, Zhu G, Dela Cruz CS, Sharma L: Epidemiologic and Clinical Characteristics of Novel

Coronavirus Infections Involving 13 Patients Outside Wuhan, China. *Jama* 2020.

19. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, Wang J, Liu Y, Wei Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395(10223):507–13.
20. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, Ren R, Leung KSM, Lau EHY, Wong JY, et al: Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *The New England journal of medicine* 2020

How to cite this article : Ali SI, Farah T, Khan R, Kanyakumar M, Mohammad M, Mohammad AA. Study on Neutrophil Lymphocyte ratio and Platelet lymphocyte ratio in COVID-19 from our prospective. A cross sectional study. *Perspectives in Medical Research* 2020; 8 (3):56-59.

DOI: 10.47799/pimr.0803.12

Sources of Support: Nil, **Conflict of interest:** None declared