ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 05 | May - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A STUDY OF NEUTROPHIL LYMPHOCYTE RATIO AS PREDICTOR OF DISEASE SEVERITY IN STABLE COPD PATIENTS

Medicine

Dr Somya Aggarwal* Resident Department Of Medicine , Sarswathi Institute Of Medical Sciences, Hapur*Corresponding Author

Dr Anil Kem Prof & HOD Department Of Medicine , Sarswathi Institute Of Medical Sciences, Hapur

ABSTRACT

Introduction COPD is characterized by airflow limitation with increased chronic inflammatory response. Assessment of disease severity and prognosis in COPD is traditionally done by GOLD staging and BODE Index. Various recent studies have evaluated NLR for its probable role in diseases such as myocardial infarction, breast carcinoma & COVID -19 etc. Objective To identify possible correlation between NLR and severity of COPD by BODE index. Method and materials A cross sectional observational study was conducted on 200 COPD patients. The participants were clinically examined and their disease severity and long term outcome assessed with respect to the BODE index. Neutrophil to Lymphocyte ratio was calculated. Data thus obtained was tabulated and analysed. Observation mean age of participants was 61.3± 9.596 years with male predominance. About 80% of the patients had a positive history of current or past smoking with a mean pack year of 21.7+/- 2.3 Mean NLR value was increased 4.3±1.8 along with increased ESR & CRP suggesting an ongoing inflammatory process. The higher NLR values were associated with poor performances on all clinical parameters such as FEV1, 6MWT, and the prognostic BODE index. A positive correlation was observed ($r = +0.681$, $p < 0.01$) between NLR & BODE index.Conclusion Positive correlation was observed between NLR and BODE index i.e. the NLR correlates with the disease severity in COPD & can be used as a prognostic marker.

KEYWORDS

COPD , NLR, BODE INDEX

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is characterized by progressive and permanent airflow limitation associated with increased chronic inflammatory response of lungs and airways against injurious gases and particles. The objective assessments of disease severity and prognosis in a patient of COPD have been traditionally done by GOLD staging and BODE Index1,2. It has been established in previous studies that various inflammatory markers like C- reactive protein (CRP), fibrinogen and leucocyte count increase in COPD patients & this increase is associated with the negative results of the disease[2,3].

Leucocyte count and its subtypes are well-known markers of inflammation. Since physiological response of leukocytes in circulation against stress precipitates an increase in neutrophil count and decrease in lymphocyte count, ratio of these two sub-groups i.e neutrophil lymphocyte ratio (NLR) is often engaged in intensive care practice3,4,5. Various recent studies have evaluated NLR for its probable role in inflammation periods of chronic diseases such as acute coronary syndrome, myocardial infarction, breast carcinoma & COVID -195,6,7 etc. Unlike other inflammatory biomarkers NLR is derived from routine complete blood count tests & does not need a special request3,4,5. An inexpensive and readily available biomarker like NLR could be of a great use in assessing prognosis of patients admitted with COPD, especially in the rural areas.

Objectives

The present study was planned to identify possible correlation between Neutrophil Lymphocyte Ratio and severity of COPD by BODE index.

Material And Methods

A cross sectional observational study was conducted after institutional ethical clearance on 200 COPD patients presenting in Medicine department of the hospital. A written informed consent was also taken from all participants.

Inclusion Criteria

1. Patients with confirmed diagnosis of COPD (diagnosed by spirometry according to GOLD criteria)
2. Age group 40-80 years.

Exclusion Criteria

1. History of chronic lung disease like Bronchial asthma, Bronchiectasis, Tuberculosis or Pulmonary Fibrosis etc.

2. Receiving systemic corticosteroids or antibiotics in preceding 8 weeks.

3. Any history of carcinoma, coronary artery disease, hepatitis, chronic alcoholism, thyroid disorders or autoimmune diseases.

4. Not free from an Exacerbation for at least preceding 8 weeks.

5. Patients with present or past history of COVID -19.

6. Any other acute infections at presentation.

A detailed history and clinical examination including duration of illness, smoking history and BMI were taken from all patients according to a predefined proforma . MMRC scale was used to grade dyspnea in all patients. PFT and 6 minute walk test were also performed as per recommended international guidelines8.The BODE index was thereafter calculated as follows.[3]

Calculating BODE index

	POINTS ON THE BODE INDEX			
VARIABLE	0	1	2	3
FEV_1 (% of predicted)	≥65	50-64	36-49	≤35
Distance walked in 6 min (m)	≥350	250-349	150-249	≤149
Medical Research Council dyspnea scale score (0-4)	0-1	2	3	4
Body mass index	>21	≤21		

Peripheral blood samples were collected within 24 hours of admission and sent for hematological assessment. The total leucocyte count, differential count of neutrophils and lymphocytes were obtained using automated Sysmex5 Hematology Analyser along with CRP & ESR. The NLR was thereafter calculated as the ratio between neutrophil & lymphocyte count.

Data analysis was done using IBM SPSS 25.0. Mean, standard deviation were calculated & compared by one way ANOVA . A p-value of < 0.05 was taken as significant. Pearson correlation coefficient was also calculated to find correlation between NLR and BODE Index.

Result

As seen in table 1. The average age of participants in this study was 62.53 ± 9.59 years with male predominance. About 80% of the patients had a positive history of current or past smoking with a mean pack year of 27.71±2.3. with a mean BMI value of 20.51 kg/m2 Here a decrease in exercise capacity is also noted on 6MWT (mean242.12± 3.9 m) .

Table 1 Clinical Parameters in COPD Patients

PARAMETERS	
Age (yrs)	61.3 ± 9.59
Male (n)	146
Female(n)	54
Smokers (n)	159
Non smokers(n)	41
Mean pack years	21.7 ± 2.3
BMI (kg/m2)	20.56 ± 3.1
FEV1 %	64.32 ± 4.1
6MWT(in meters)	237.5 ± 3.9

In Table 2 showing hematological parameters, it can be seen that mean NLR value of the study group was increased (4.48±1.59). The mean ESR and mean CRP were also found to be elevated suggesting an ongoing inflammatory process.

Table 2 Hematological Parameters In COPD Patients

Parameter	Mean	±SD
Total Leucocyte Count (cells/mm^3)	9852.56	2359
Absolute Neutrophil Count (cells/mm^3)	5880.57	1280.25
Absolute Lymphocyte Count (cells/mm^3)	1434.28	800.55
Neutrophil to Lymphocyte Ratio (ratio)	4.1	1.59
C-Reactive Protein (mg/dl)	14.14	6.59
Erythrocyte Sedimentation Rate (mm/hr)	26.3	5.8

As seen in table 3 The patients were divided into 4 groups,based on NLR ratio viz. Group I 0-2.5, Group II 2.6- 5 , Group III 5.1- 7.5 and Group IV for NLR 7.6 and beyond. The higher NLR values were associated with poor performances on all clinical parameters such as FEV1, 6MWT, and the prognostic BODE index. On applying one way ANOVA among these groups this difference was found to be statistically significant. Pearsons's corelation cofficent was also calculted between BODE index and NLR A positive correlation ($r = +0.681$, $p < 0.01$) between the NLR values and the BODE index was also observed.

Table 3 Comparison Of NLR With Various Parameters In COPD Patients

Parameters	Group 1 (NLR 0-2.5)	Group 2 (NLR 2.6-5)	Group 3 (NLR 5.1-7.5)	Group 4 (NLR 7.6-10)
No of cases (n)	43	94	56	7
Mean BMI (kg/m2)	21.32	21.17	20.2	19.36
FEV1 (%)	70.52	64.546	56.654	48.852
6MWT (m)	305.85	250.08	220.34	192.05
BODE Index*	1.60*	3.32*	5.23*	7.243*
ESR (mm/hr)	25.74	26.38	26.57	26.51
CRP (mg/dl)	13.26	13.48	14.35	15.48
Pearson's correlation coefficient : +0.681**.				

*p -value<0.05 **p -value<0.01

Discussion

The participants were clinically examined and their disease severity and long term outcome was assessed by the BODE index. Male sex and smokers had higher incidence of COPD The similar findings have been reported previously with a established high risk of COPD in smokers directly related to the number of pack years 1,3,9. Most of the patients of COPD were underweight with only a small population being able to maintain normal body mass.Celli etal3 have previously demonstrated lower BMI in COPD patients and its association with poor prognosis.In similar studies on COPD patients these findings were also observed by Talyan etal 9and Farah etal10. in this study a decrease in exercise capacity is also noted on 6MWT with only a small percentage of patients able to walk 350 meters or more. Similarly, Farah et al10, Talyan et al9 and Yao et al11 have reported a decreased 6MWT value in COPD patients and these values further decrease as the disease severity increases.

Further it was observed that mean NLR value of the study group was increased along with other inflamatory markers, mean ESR and mean CRP . The findings are similar to those reported by Gunay et al12 and Farahet al10 with elevated NLR ratio of 5.2 and 4.9 respectively in COPD patients. It is further noted that the higher NLR values were associated with poor performances on all clinical parameters such as FEV1, 6MWT, and the prognostic BODE index. This rise in NLR ratio also appears to be associated with a rise in the other markers of inflammation ESR & CRP this suggests an ongoing inflammatory process in these patients. but the difference for ESR and CRP values was not found statistically significant. These findings are similar to those reported by Lee et al13, Yao et al11and Furarte et al14 in respective studies. A positive correlation ($r = +0.681$, $p < 0.01$) between the NLR values and the BODE index was also observed. Duman et al15 also reported similar finding in a multivariate analysis as well as Gazzar et al16 observed a significant prognostic value of NLR in COPD patients. Therefore it can be said that the NLR is a good prognostic indicator similar to the traditional BODE index.

Conclusions

The higher Neutrophil Lymphocyte Ratio was associated with higher values of other inflammatory markers such as CRP and ESR. A positive correlation was observed between NLR and BODE index i.e. the NLR correlates with the disease severity in COPD. Therefore, NLR can be used in COPD patients as a simple, cost-effective prognostic marker obtained from routine complete blood count .

Limitations

This is a single centre observational study& further requires large scale population based studies

REFERENCES:

[1] Vogelmeier C, Augusti AG, Anzuneto et al; Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: 2019 report ; 5-40

[2] Celli BR, Cote CG, Marin JM et al; The body-mass index, airflow obstruction, dyspnea, and exercise capacity index in chronic obstructive pulmonary disease; New England Journal of Med 2004 (350), 1005-101

[3] MacNee W; Systemic inflammatory biomarkers and co-morbidities of chronic obstructive pulmonary disease; Ann Med 2013 (45)291- 300.

[4] Hurst JR, Donaldson GC, Perera WR, et al; Use of plasma biomarkers at exacerbation of chronic obstructive pulmonary disease; American Journal of Respiratory Critical Care Med 2006 (174)867-874

[5] Núñez J, Núñez E, Bodí V et al; Usefulness of the Neutrophil to Lymphocyte Ratio in Predicting Long-Term Mortality in ST Segment Elevation Myocardial Infarction; American Journal of Cardiology; 2008,101(6) 747-752

[6] Chen J, Qiwen D, Yuqin P et al; Prognostic value of neutrophil-to- lymphocyte ratio in breast cancer; Federation of European Biochemical Societies (FEBS Open); 2015(5); 502–507

[7] Yang AP, Liu JP, Tao WQ, Li HM. The diagnostic and predictive role of NLR, d-NLR and PLR in COVID-19 patients. Int Immunopharmacol. 2020;84:106504.

[8] ATS Statement: Guidelines for the Six-Minute Walk Test, American Thoracic Society Am J Respir Crit Care Med 2002 (166) 111–117

[9] Taylan M, Demir M, Kaya H, et al. Alterations of the neutrophil- lymphocyte ratio during the period of stable and acute exacerbation of chronic obstructive pulmonary disease patients. Clin Respir J. Epub 2015

[10] Farah R, Nseir W, Kagansky D, Khamisy-Farah R. The role of neutrophil-lymphocyte ratio, and mean platelet volume in detecting patients with acute venous thromboembolism. J Clin Lab Anal. 2020 Jan;34(1):e23010.

[11] Yao C, Liu X, Tang Z. Prognostic role of neutrophil-lymphocyte ratio and platelet-lymphocyte ratio for hospital mortality in patients with AECOPD. Int J Chron Obstruct Pulmon Dis. 2017;12:2285– 2290.

[12] Günay E, Sarınç Ulaşlı S, Akar O, et al. Neutrophil-to-lymphocyte ratio in chronic obstructive pulmonary disease: a retrospective study. Inflammation. 2014;37(2):374–380

[13] Lee SJ, Lee HR, Lee TW, et al. Usefulness of neutrophil to lymphocyte ratio in patients with chronic obstructive pulmonary disease: a prospective observational study. Korean J Intern Med. 2016;31(5):891–898

[14] Furutate R, Ishii T, Motegi T, et al. The neutrophil to lymphocyte ratio is related to disease severity and exacerbation in patients with chronic obstructive pulmonary disease. Intern Med. 2016;55(3):223–229.

[15] Duman D, Aksoy E, Agca MC, et al. The utility of inflammatory markers to predict readmissions and mortality in COPD cases with or without eosinophilia. Int J Chron Obstruct Pulmon Dis. 2015;10:2469–2478 Gazzar AG, Kamel MH, El Bahnasy OKM, El-Naggar ME. Prognostic value of platelet and neutrophil to lymphocyte ratio in COPD patients. Expert Rev Respir Med. 2020 Jan;14(1):111-116.