(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

Assessment of correlation of neutrophil to lymphocyte with acute exacerbation in chronic obstructive pulmonary disease

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ABSTRACT:
Background: To assess correlation of neutrophil to lymphocyte with acute exacerbation in chronic obstructive pulmonary disease. **Material and Methods:** Eighty AECOPD and eighty patients of stable period of COPD of both genders were randomly divided into 2 groups. Parameters such as SES, symptoms, neutrophils, lymphocytes, GOLD stage and mMRC grade was recorded. **Results:** There were 50 males and 30 females in group I and 46 males and 34 females in group II. SES was upper in 4 in group I and 5 in group II, middle in 46 and 40 and lower in 30 and 35. Symptoms were breathlessness in 45 and 33, expectoration in 56 and 51, cough in 45 and 56, wheezing in 32 and 23 and chest pain in 17 and 34. GOLD stage A was seen in 8 and 6, B in 10 and 12, C in 28 and 30 and D in 34 and 32, mMRC grade 3 was seen in 32 and 36 and grade 4 was seen in 48 and 44 in group I and II respectively. The difference was significant (P< 0.05). The mean neutrophil count was 11.4 in group I and 6.5 in group II, lymphocytes was 2.3 in group I and 1.1 in group II and NLR was 5.4 in group I and 3.6 in group II. The difference was significant (P< 0.05). **Conclusion:** The neutrophil lymphocyte ratio on the day of presenting the illness was significantly higher in AECOPD. NLR is readily available and simple parameter, could also be used as a cost-effective marker of inflammation in AECOPD.
Keywords: Chronic obstructive pulmonary disease, GOLD stage, NLR.

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This article may be cited as: Baby TL, Ahmed Z. Assessment of correlation of neutrophil to lymphocyte with acute exacerbation in chronic obstructive pulmonary disease. J Adv Med Dent Scie Res 2016;4(3):171-173.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) can lead to persistent and somewhat irreversible airflow limitations by the development of systemic inflammation in the airways.[1] Acute exacerbation of COPD (AECOPD) is associated with worsening of patient dyspnea, worsening of the underlying pathology, deterioration in the patient's ability to function, deterioration in the respiratory status, and ultimately patient's death.[2]

The global initiative for chronic obstructive lung disease (GOLD) has classified COPD in four stages depending upon the spirometric findings.[3]Neutrophils play an important role in inflammatory conditions more than macrophages. Neutrophils are important source of proteases, especially reactive oxygen species and neutrophil elastase. They are the hallmark of acute inflammation.[4]Unlike other inflammatory biomarkers eg. ESR and CRP, the Neutrophil–lymphocyte ratio (NLR) is derived from routine complete blood count (CBC) tests. It does not need a special request. It is also a rapid, easy method and cost-effective.[5]The neutrophil to lymphocyte ratio (NLR), is a simple ratio that is obtained from the complete blood count of patient, which is found out by dividing absolute neutrophil count as numerator and absolute lymphocyte count as the denominator. High value of the ratio indicates there is some response to inflammation happening in the body.[6]We performed this study to assess correlation of neutrophil to lymphocyte with acute exacerbation in chronic obstructive pulmonary disease.

MATERIAL &METHODS

After considering the utility of the study and obtaining approval from ethical review committee, we selected eighty AECOPD and eighty patients of stable period of COPD of both genders. Patients' consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. Patients were randomly divided into 2 groups. Group I comprised of eighty AECOPD patients and group II had eighty patients of stable period of COPD. Parameters such as SES, symptoms, neutrophils, lymphocytes, GOLD stage and mMRC grade was recorded. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Table I: Patients distribution

Groups	Group I	Group II
Status	AECOPD	Stable COPD
M:F	50:30	46:34

There were 50 males and 30 females in group I and 46 males and 34 females in group II. (Table I).

Table II: Assessment of parameters

Parameters	Variables	Group I	Group II	P value
SES	Upper	4	5	0.17
	Middle	46	40	
	Lower	30	35	
Symptoms	Breathlessness	45	33	0.84
	Expectoration	56	51	
	Cough	45	56	
	Wheezing	32	23	
	Chest pain	17	34	
GOLD stage	A	8	6	0.65
	B	10	12	
	C	28	30	
	D	34	32	
mMRC grade	0	0	0	0.52
	1	0	0	
	2	0	0	
	3	32	36	
	4	48	44	

SES was upper in 4 in group I and 5 in group II, middle in 46 and 40 and lower in 30 and 35. Symptoms were breathlessness in 45 and 33, expectoration in 56 and 51, cough in 45 and 56, wheezing in 32 and 23 and chest pain in 17 and 34. GOLD stage A was seen in 8 and 6, B in 10 and 12, C in 28 and 30 and D in 34 and 32, mMRC grade 3 was seen in 32 and 36 and grade 4 was seen in 48 and 44 in group I and II respectively. The difference was significant (P< 0.05) (Table II).

Table III: Variables in both groups

Variables	Group I	Group II	P value
Neutrophil	11.4	6.5	0.02
Lymphocyte	2.3	1.1	0.04
NLR	5.4	3.6	0.03

The mean neutrophil count was 11.4 in group I and 6.5 in group II, lymphocytes was 2.3 in group I and 1.1 in group II and NLR was 5.4 in group I and 3.6 in group II. The difference was significant (P< 0.05) (Table III).

DISCUSSION

COPD and AECOPD can be considered as the third leading cause of mortality worldwide and the most common cause of hospitalization and mortality among COPD patients, respectively.[7]Half of the AECOPD cases are caused by a bacterial or viral infection. In addition, environmental factors such as environmental pollution can also trigger this condition.[8] Repeated AECOPD results in not only a persistent inflammation and irreversible changes in the patient's pulmonary tissue but also the progression of COPD.[9] The inflammatory status involves various factors such as immune cells including neutrophils and lymphocytes, whose activity results in a permanent damage to the pulmonary tissue.[10] We performed this study to assess correlation of neutrophil to lymphocyte with acute exacerbation in chronic obstructive pulmonary disease.

There were 50 males and 30 females in group I and 46 males and 34 females in group II. SES was upper in 4 in group I and 5 in group II, middle in 46 and 40 and lower in 30 and 35. Symptoms were breathlessness in 45 and 33, expectoration in 56 and 51, cough in 45 and 56, wheezing in 32 and 23 and chest pain in 17 and 34. Ritumbharaet al[11] in their study 100 patient of AECOPD and 100 patients of stable period of COPD were studied. Socio-demographic variable in both groups were comparable. BMI was significantly lower in AECOPD patients. The mean PACK/YR in AECOPD group was 29.52±3.70 and in Stable COPD was 23.50±2.05. FEV1was significantly lower in AECOPD patients. Mean admission per year was significantly higher in AECOPD patients. Mean neutrophil count was significantly higher in AECOPD patients (11.49±2.32) as compare to stable COPD patients (6.47±2.01). Mean lymphyocytes count was

significantly higher in AECOPD patients (2.07±0.05) as compare to stable COPD patients (1.71±0.07). Mean NLR was significantly higher in AECOPD patients (5.54±2.12) as compare to stable COPD patients (3.77±0.22). The difference in both groups was found statically significant. 5.00% hospital mortality in AECOPD patients. Mean neutrophil count was significantly higher in death as compare to survived patients. Mean NLR was significantly higher in death as compare to survived patients.

Our results showed that GOLD stage A was seen in 8 and 6, B in 10 and 12, C in 28 and 30 and D in 34 and 32, mMRC grade 3 was seen in 32 and 36 and grade 4 was seen in 48 and 44 in group I and II respectively. determine the predictive value of the neutrophil to lymphocyte ratio (NLR) in patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD). Tenget al[12] studied 906 cases (525 males, 381 females, mean age 81.86±9.75 years) diagnosed with AECOPD. The NLR was calculated from their white blood cell (WBC), neutrophil (NEU), and lymphocyte (LYM) counts. After treatment, 698 patients with AECOPD improved. The NLR was higher at admission (6.89±6.82) than after treatment (4.19±5.11) (P = 0.000). The area under the receiver operating characteristic curve (AUC) of the NLR for predicting the 28-day mortality rate was 0.737. Using 8.130 as the critical NLR value, the sensitivity was 60.5%, and the specificity was 74.8%. The AUC of the NLR for predicting the frequency of the need for invasive mechanical ventilation was 0.732. Using 10.345 as the critical NLR value, the sensitivity was 54.3%, and the specificity was 84.8%. The AUC of WBC, NEU and LYM for predicting 28-day mortality and the need for invasive mechanical ventilation in these patients were all less than 0.7. An increased NLR was an independent risk factor for 28-day mortality, intensive care unit occupancy and the need for invasive mechanical ventilation. Compared with those patients without comorbidities, patients with renal dysfunction or upper gastrointestinal bleeding had an increased risk of death within 28 days ICU admission respectively and the need for invasive mechanical ventilation

Our results showed that the mean neutrophil count was 11.4 in group I and 6.5 in group II, lymphocytes was 2.3 in group I and 1.1 in group II and NLR was 5.4 in group I and 3.6 in group II. Emamiet al[13] evaluated the diagnostic value of NLR and PLR in the prognosis of the in-hospital mortality in AECOPD patients. The results of the present study revealed that NLR with the cut-off value of 6.90, sensitivity of 60.87%, and specificity of 73.29% had a significant diagnostic value in the prognosis of in-hospital mortality in AECOPD patients.

CONCLUSION

The neutrophil lymphocyte ratio on the day of presenting the illness was significantly higher in AECOPD. NLR is readily available and simple parameter, could also be used as a cost-effective marker of inflammation in AECOPD.

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