

“NEUTROPHIL LYMPHOCYTE RATIO (NLR) AS A PROGNOSTIC MARKER IN ADULTS WITH COMMUNITY ACQUIRED PNEUMONIA (CAP)”

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ABSTRACT

Background: Community acquired pneumonia is one of the most common infectious disease, and is an important cause of morbidity and mortality among the elderly worldwide Present study aimed to investigate the usefulness of Neutrophil Lymphocyte Ratio (NLR) as a biomarker of Community Acquired Pneumonia (CAP)

Material & Method: Present diagnostic comparative study was conducted among the patients more than 18yr of age with community acquired pneumonia, attending department of General Medicine of AVMC & H. After obtaining informed and written consent from the patients, detailed history, clinical assessments and laboratory investigations was done. The NLR ratio, CURB 65 score and PSI calculated and compared. All data were collected by the investigator and was analysed statistically to find the level of significance of the study.

Results: Two hundred and four patients included with mean age of 57.11 ± 16.35 yrs of age. Among them, 60.3% were male patients and 39.7% were female. On comparison of the scores with 1st mild risk group, 2nd moderate risk group and 3rd severe risk group, we found a significant difference in the mean, with the 3rd risk group the mean levels were significantly higher compared to group 2 and group 1. ($p < 0.05$) On pearson's correlation the NLR was significantly positively correlated with CURB 65 score and PSI score in the present study. ($p < 0.05$) On ROC analysis, the study found the AUC of 0.902 for NLR, 0.922 for CURB 65 score and 0.931 for PSI score. ($p < 0.05$)

Conclusion: study concludes that the Neutrophil Lymphocyte ratio is a important biomarker for community acquired pneumonia. Also the NLR is significantly correlated with the CURB-65 and PSI score positively. NLR is simple and useful tool to assess the outcome of the patients with CAP.

INTRODUCTION

Community Acquired Pneumonia is described as an acute respiratory infection characterised by Acute infection of the pulmonary parenchyma that is associated with at least some symptoms of acute infection, accompanied by the presence of an acute infiltrate or consolidation in a chest radiograph, or auscultatory findings consistent with pneumonia, in a patient not hospitalised for more than 48 hours and not residing in a long term care facility for greater than or equal to 14 days before the onset of symptoms. 3,4

Community Acquired Pneumonia is one of the most common infectious disease, and is an important cause of morbidity and mortality among the elderly worldwide. The main organisms involved in its causation are Streptococcal pneumoniae, Haemophilus influenzae, Moraxella catarrhalis. It happens approximately five times more frequently in underdeveloped countries than in wealthy countries.

This study aims to investigate the usefulness of Neutrophil Lymphocyte Ratio (NLR) as a biomarker of Community Acquired Pneumonia (CAP) and used predict the severity of the disease by comparing it with CURB-65, PSI Score. NLR predicts 30 days mortality, Severity and Outcome of Community Acquired Pneumonia (CAP). NLR ratio would encourage early discharge of patients.

MATERIAL & METHOD

Present diagnostic comparative study was conducted among the patients more than 18yr of age with community acquired pneumonia, attending department of General Medicine of AVMC & H. All patients above 18 years of age diagnosed with community acquired pneumonia are included, patients with Bronchial Asthma, Bullous lung Diseases, Active Tuberculosis, Pulmonary Fibrosis, Any Tumor, Hepatitis, Thyroid diseases, Autoimmune diseases, other acute infections, Dementia, Cancer, Immunocompromised individuals, Patients receiving Systemic Corticosteroid were excluded .After obtaining informed and written consent from the patients,

Study is conducted over a period of 2 years of both inpatient and outpatients with the diagnosis of Community Acquired Pneumonia confirmed by blood investigations, Chest Xray and meeting inclusion and exclusion criteria in the department of General Medicine of AVMC & H. After obtaining the patientsdetailed history, clinical assessments and laboratory investigations was done, The NLR ratio, CURB 65 score and PSI calculated by using their parameters and compared. All data were collected by the investigator and was analysed statistically to find the level of significance of the study.

STATISTICAL ANALYSIS

All the data was entered in excel sheet and analysed using SPSS v21 operating on windows 10. The demographic data of patient is summarized as mean, standard deviation, frequency and percentage. The summarized data were represented using table, figures, bar diagram and pie chart. The mean difference between the continuous variable is analysed using unpaired t-test and follow-up data paired t-test was used. The chi-square test was used to assess the significant difference between the categorical data. The diagnostic testing was used with help of ROC analysis to assess the AUC value and accuracy, sensitivity, specificity, positive predictive value and negative predictive value for the cutoff of markers in the study. A p-value of <0.05 was considered statistically significant.

RESULTS

In present study total of 204 patients included with mean age of 57.11 ± 16.35 yrs of age.

Table 3: Distribution of risk group among the study participants

		Frequency	Percent
Risk Group	1.0	31	15.2
	2.0	100	49.0
	3.0	73	35.8
	Total	204	100.0

On assessment of risk group, 35.8% in risk group 3, 49% in risk group of 2 and 15.2% in risk group 1.

Table 6: Comparison of the mean score with risk groups using ANOVA test

	Risk Group						p-value
	1.0		2.0		3.0		
	Mean	SD	Mean	SD	Mean	SD	
NLR	1.29	.75	3.02	2.14	6.29	3.38	0.01*
CURB65	1.0	.0	2.0	.0	3.4	.6	0.01*
PSI score	38.4	7.7	61.9	5.8	79.5	4.9	0.01*

On comparison of the scores with Risk group, we found a significant difference in the mean, with the 3rd risk group the mean levels were significantly higher compared to group 2 and group 1. ($p < 0.05$)

Table 7: Pearson's correlation of NLR with CURB 65 and PSI score

		CURB65	PSI score
NLR	r	.646**	.503**
	Sig	.001	.001

On Pearson's correlation the NLR was significantly positively correlated with CURB 65 score and PSI score in the present study. ($p < 0.05$)

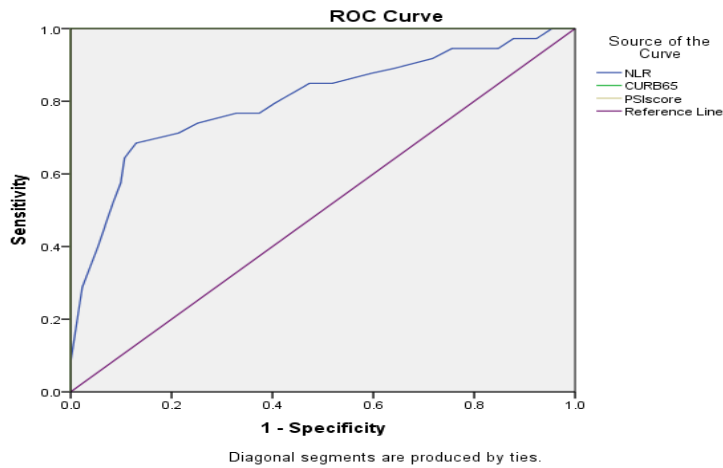


Figure 9: ROC analysis showing prediction of disease

Table 8: ROC analysis showing prediction of disease

Test Result Variable(s)	Area	Sig.
NLR	.902	.001*
CURB65	.922	.001*
PSI score	.931	.001*

On ROC analysis, the study found the AUC of 0.902 for NLR, 0.922 for CURB 65 score and 0.931 for PSI score. ($p < 0.05$)

DISCUSSION

In present study total of 204 patients included with mean age of 57.11 ± 16.35 yrs of age. Among them, 60.3% were male patients and 39.7% were female patients. On assessment of risk group, 35.8% in risk group 3, 49% in risk group of 2 and 15.2% in risk group 1. The overall mean of NLR was 3.88, CURB 65 was 2.36 and PSI score was 64.94.

Most studies found that NLR with a cutoff value greater than 10 predicted mortality better than C-reactive protein levels, white blood cell count, neutrophil count, lymphocyte level, Pneumonia Severity Index (PSI) level, PSI class, procalcitonin, and CURB-65 (Confusion, Respiratory rate, Blood pressure, 65 years of age and older). NLR was shown to be a simple, readily quantified, yet promising marker for predicting outcomes in CAP patients.¹ Univariate and multivariate analyses revealed that neutrophils and NLR might be used as a proxy for PSI III or above (OR: 1.05 and 1.14 respectively). A NLR of 7.2

indicated that likelihood (AUC 0.65; IC 95 percent 0.53-0.78). According to PSI, NLR is beneficial in identifying people with severe pneumonia and a high risk of sequelae.¹³

Yan L et al., documented the results of a multivariate logistic regression model analysis revealed that CURB-65 scores and NLR were independent predictors of adverse outcomes ($p < 0.05$). NLR had an area under the ROC curve (AUC) of 0.81 (95 percent CI 0.73 to 0.89), a sensitivity of 81.00 percent, and a specificity of 72.8 percent. In terms of forecasting negative outcomes, NLR outperforms CURB-65. CURB-65 with NLR has higher sensitivity and specificity (89.40 percent versus 91.30 percent). NLR is a simple, inexpensive, and quickly available blood test that has been linked to poor clinical outcomes in adult CAP patients.⁹

On comparison of the scores with Risk group, we found a significant difference in the mean, with the 3rd risk group the mean levels were significantly higher compared to group 2 and group 1. ($p < 0.05$) On Pearson's correlation the NLR was significantly positively correlated with CURB 65 score and PSI score in the present study. ($p < 0.05$) On ROC analysis, the study found the AUC of 0.902 for NLR, 0.922 for CURB 65 score and 0.931 for PSI score. ($p < 0.05$) Similarly study found that NLR showed a significant correlation to PSI in predicting disease severity.³⁵

CONCLUSION

Study concludes that the Neutrophil Lymphocyte ratio is an important biomarker for community acquired pneumonia. Also the NLR is significantly correlated with the CURB-65 and PSI score positively. NLR is a simple and useful tool to assess the outcome of the patients with CAP.

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