


Original Research Article

# Study of Neutrophil-Lymphocyte Ratio in Patients of Myocardial Infarction

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## Abstract

**Background:** Coronary artery disease (CAD) continues to be a major cause of morbidity and mortality in both Men and women not only in developed countries but also in developing countries.

**Objective:** To study the value of neutrophil lymphocyte ratio in patients of acute myocardial infarction in immediate post-infarct period and correlation between the value and the development of complications and mortality during hospital Stay in patients of AMI.

**Materials and methods:** Patients of acute myocardial infarction admitted in ICCU of a Civil hospital were included in the present study. Acute Myocardial Infarction was diagnosed in patients with ischemic chest pain by presence of ST- segment elevation of >1mm with or without T wave inversion and Q wave in more than two consecutive limb or chest leads in standard 12 lead ECG. Hemoglobin level, Total WBC count and differential count of patients were obtained by Abacus-3 hematology analyzer (Hungary).

**Results:** We found strong association of Neutrophil Lymphocyte ratio with Complications ( $p=0.004$ ). Mean admission N: L ratio in patients with Complicated MI ( $3.9\pm 1$ ) was found to be significantly higher than the mean level in patients with uncomplicated MI ( $3.4\pm 0.9$ ). Rate of complications among patients in range of 0 to 2 N: L ratio was found to be 12.5%, in range of 2 to 4 it was 33.33% while with N: L ratio above 4 almost 75% of patients had complications. We also found strong association of neutrophil Lymphocyte ratio with death, mean admission N: L ratio in patients who died ( $4.1\pm 0.5$ ) was found to be significantly higher than the mean level in patients who survived ( $3.6\pm 1$ ). ( $p=0.006$ ). Mortality among patients in range of 0 to 2 N: L ratio was nil, while in range of 2.1 to 4 it was 2.32% and in range above 4 was 50%.

**Conclusion:** From our study, we draw a conclusion that N: L ratio at the time of hospital do have a direct correlation with development of complication and/or mortality in early post-infarct period. We

also found that these markers are important not only for diagnosis but also have prognostic values and help in risk stratification and decision making regarding further early therapeutic intervention.

## Key words

Acute Myocardial infarction, Neutrophil Lymphocyte Ratio, ST Elevation, Coronary artery Disease, Acute LVF, Arrhythmia, Mortality.

## Introduction

Coronary artery disease (CAD) continues to be a major cause of morbidity and mortality in both Men and women not only in developed countries but also in developing countries. The extent of Myocardial damage after an acute myocardial infarction determines the prognosis for morbidity and mortality in early post-infarct period, and also the overall quality of life.

It has been reported by Ala, et al. [1] that leukocytosis and increase in neutrophils to lymphocytes ratio after an AMI has been associated with increased risk of in hospital heart failure and death. They also concluded in their study that both these markers are acting independently as risk predictors for early mortality. Measurement of release of these inflammatory process markers is quite a routine in day to day practice for early hospital, is cheap and does not require any sophisticated equipment [2, 3]. If these parameters are done in early infarct period may serve as prognostic indicators [4, 5].

## Aim and objectives

- To study the value of neutrophil lymphocyte ratio in patients of acute myocardial infarction in immediate post infarct period (as early as possible after the patients was admitted).
- To find out the correlation between the neutrophil lymphocyte ratio and the development of complications and mortality during hospital stay in patients of AMI.

## Materials and methods

Patients of acute myocardial infarction admitted in ICCU of Civil hospital were included in the present study.

Acute Myocardial Infarction was diagnosed in patients with ischemic chest pain by presence of ST- segment elevation of >1 mm with or without T wave inversion and Q wave in more than two consecutive limb or chest leads in standard 12 lead ECG. Detailed clinical examination of each patient was done and after initiating oxygen inhalation and pain relieving therapy, following investigations were sent:

Hemoglobin level, Total WBC count and differential count of patients were obtained by Abacus-3 hematology analyzer (Hungary).

Statistical analysis of data obtained was done with help of SPSS (Statistical Package for Social Science) Version 13.

MI was divided in two category 1) complicated 2) Uncomplicated. All who developed complication like acute LVF, Arrhythmia, Cardiogenic shock, Stroke were considered to be complicated.

## Results and Discussion

Neutrophil Lymphocyte ratio measured in immediate post infarction period of all MI patients was as per **Table - 1**. 35 of Total 100 patients developed complication.

One hundred patients of acute myocardial infarction admitted in a general tertiary care civil hospital were included in present study.

More number of male patients was admitted with AMI with M: F ratio 7:3. Our youngest patient

was 29 years old, 3 male patients were above 80 years of age, while maximum number of patients were in the 5th decade of life (**Table – 2**).

and complications. Thus we studied 68 patients of Anterior wall MI, 28 patients of Inferior wall MI, 02 patients of global MI, and 02 patients of RV + Inferior wall MI.

In present study, we included all the patients admitted with AMI irrespective of site infarct

**Table – 1:** Neutrophil Lymphocyte ratio.

	Neutrophil Lymphocyte ratio		
	0-2	2.1-4	>4
Complicated MI (n=35)	01	28	06
Uncomplicated (n=65)	07	56	02
Death (n=10)	0	02(20%)	08(80%)

**Table – 1:** Age and sex distributions of patients.

Age group (years)	Male	Female	Total
21-30	01	00	01
31-40	06	03	09
41-50	20	05	25
51-60	21	14	35
61-70	15	04	19
71-80	04	04	08
>80	03	00	03
Total	70	30	100

At the time of admission, 12% of our patients had early complications of MI in the form of LVF (9 patients), arrhythmia (1 patient) and cardiogenic shock (2 patients), while 23% of our patients developed complication of MI during the course of the disease in the form of:

- LVF (4 patients)
- Cardiogenic shock (11 patients)
- Arrhythmia (5 patients)
- Unstable angina (2 patients)
- Acute cerebral stroke (1 patient)

In all the patients, immediately after primary treatment and before thrombolytic therapy, blood samples were collected to measure CPK-MB, CRP and Neutrophil Lymphocyte ratio along with other routine investigations.

In present study, we found strong association of Neutrophil Lymphocyte ratio with complications (p=0.004). Mean admission N: L ratio in patients with Complicated MI (3.9+/-1) was found to be

significantly higher than the mean level in patients with uncomplicated MI (3.4+/-0.9). Rate of complications among patients in range of 0 to 2 N: L ratio was found to be 12.5%, in range of 2.1 to 4, it was 33.3% while with N: L ratio above 4 almost 75% of patients had complications. We also found strong association of Neutrophil Lymphocyte ratio with death, mean admission N: L ratio in patients who died (4.1+/-0.5) was found to be significantly higher than the mean level in patients who survived (3.6+/-1). (p=0.006). Mortality among patients in range of 0 to 2 N: L ratio was nil, while in range of 2.1 to 4 it was 2% and in range above 4 was 8% out of 100 patients in present study, 10 patients (8 male and 2 female) died, thus mortality was 10%. Two of these patients died of acute LVF, one due to cardiogenic shock, rest of the patients had sudden cardiac arrest. Neutrophil lymphocyte ratio were comparatively higher than cut off values in all death cases.

## Conclusion

A study of 100 patients admitted with AMI was done and findings are summarized as follow:

- Age group of 51-60 years contributed the maximum number of patients (35)
- Male to female ratio of patients was 7:3
- Anterior wall was the commonest site of AMI.
- 35% of patients had complications.
- LVF was the commonest hospital complication whereas acute cerebral stroke were rarest.
- 10% (10 out of 100) of patients died. Majority of them died of arrhythmias and cardiogenic shock.
- Mean admission neutrophil lymphocyte ratio was 3.8. It was significantly higher in patients who died (4.1) than who survived (3.6). It was also significantly higher in patients with complicated MI (3.9) than in patients with uncomplicated MI (3.4).

From our study, we draw a conclusion that N: L ratio at the time of hospital do have a direct correlation with development of complication and/or mortality in early post-infarct period. We also found that these markers are important not only for diagnosis but also have prognostic values and help in risk stratification and decision making regarding further early therapeutic intervention.

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