Original Article

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To Determine the Association of Neutrophil to Lymphocyte Ratio with Mortility and Outcome in Non St Elevation Myocardial Infarction, who Present to the Emergency Department of a Tertiary Care Hospital of Karachi, Pakistan

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ABSTRACT

Objectives: To determine the association of neutrophil to lymphocyte ratio with mortility and outcome in non st elevation myocardial infarction.
Study Design: Observational study.
Place and Duration of Study: This study was conducted at the Department of Emergency, Karachi institute of Heart Diseases and Dow University Health Sciences Karachi from 1st July 2016 to 31st December 2016.
Materials and Methods: This study consisted of two hundred thirty one patients. Detailed History was taken from all the patients with special regard to chest pain. Detailed Clinical examination of the patient was done. Systemic review was also done to see any co-morbidity. All patients underwent for base line and specific investigations. Patients aged 18 to 65 years, who have an NLR of >3.04 who present with signs and symptoms associated with NSTEMI and either gender were included in this study. Patients with a history of trauma, surgery, neoplasm, or infectious disease in the last 30 days prior to admissions. Patients currently using immunosuppressant (including corticosteroids) were excluded from study. Results were prepared with help of tables and graphs.
Results: Out of 231 patients included in this study 156(44.20%) males and 75(59.79%) females. Male : Female Ratio was 2.08:1. The mean age was 48.19+5.21 years. Most common risk factors were family history of CAD in 188(81.38%) cases and hypertension in 111(48.05%) cases. High Neutrophil to lymphocyte high ratio was present in 146(63.20%) patients while the low Neutrophil to lymphocyte ratio was in 85(36.79%) patients. Clinical outcome were observed hospital mortality were in 13(5.62%) and atrial fibrillation in 29(12.55%) cases and ST segment deviation were observed in 49(21.21%) cases.
Conclusion: We conclude that patients with Non ST Segment elevation Myocardial Infarction with high Neutrophil to lymphocyte ratio, is a good predictor of In hospital mortality, atrial fibrillation and ST segment deviation.
Key Words: Neutrophil To Lymphocyte Ratio, Non ST Elevation, Myocardial Infarction.

Citation of article: Qureshi MI, Kumar D, Qasim Am, Khan MU. To Determine the Association of Neutrophil to Lymphocyte Ratio with Mortility and Outcome in Non St Elevation Myocardial Infarction, who Present to the Emergency Department of a Tertiary Care Hospital of Karachi, Pakistan. Med Forum 2017;28(4):30-33.

INTRODUCTION

Cardiovascular disease are the most important cause of mortality and morbidity worldwide. It has been estimated that every 26 seconds one American suffers heart attack and every minute some one dies of heart attack [1]. WHO have estimated that the global number of coronary heart diseases will increase upto 11.1 million by 2020 [2].

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Received: February 03, 2017; Accepted: March 10, 2017

Acute coronary syndromes have been divided into three categories: STEMI, NSTEMI and unstable angina. NSTEMI and unstable angina have similar clinical presentaions however biochemical markers are absent in unstable angina and elevated in NSTEMI. Atherosclerosis leads to acute coronary syndromes via plaque disruption with platelet aggregation and thrombosis. Plaques vulnerable to disruption are rich in lipid and have a thin fibrous cap. What mechanisms predispose plaques to disruption are still not known.
Following infarction, neutrophils aggregate at the site of infarct and exacerbate vascular plug formation and promote further secretion of markers of inflammation. Inflammatory cytokines can activate endothelium and alter its adhesive and coagulant properties. Inflammatory mediators cause local vasoconstriction by mediating formation of endothelin in endothelium and macrophages increasing vascular smooth muscle hyper-reactivity to vasoconstrictors[3]. Neutrophil count raise following inflammation and lymphocytes decline due to

the action of stress hormones such as cortisol. This led to the development of neutrophil to lymphocyte ratio as a marker for predicting ongoing inflammation[4]. It is considered as an independent marker for predicting short and long term mortality following cardiovascular events such as NSTEMI, STEMI, advanced heart failure, arrhythmias or stable coronary artery disease [5,6]. High N/L ratio can predict the intensity of inflammatory response and this is the mechanism for predicting future mortality and morbidity following cardiac events. Inflammatory mediators should be taken into account apart from other modalities such as ECG, troponins etc. Another inflammatory marker of great significance is CRP however it is expensive than N/L ratio and is not readily available in many health care facilities.

The neutrocyte to lymphocyte ratio (N/L) is important in determining ongoing systemic inflammation via taking check of the balance between neutrophil and lymphocyte produuction [7]. N/L ratio is more important in predicting the over all mortality as compared to WBC count [8,9]. As atherosclerosis is the main phenomenon underlying acute coronary syndromes, inflammation is closely linked to underlying processes in atherosclerosis[10].

MATERIALS AND METHODS

This study was carried out department of Emergency, Karachi institute of heart diseases and Dow University Health Sciences Karachi, from 1st July 2016 to 31st December 2016.

This study consisted of two hundred thirty one patients. Detailed History was taken from all the patients with special regard to chest pain. Detailed Clinical examination of the patient was done. Systemic review was also done to see any co-morbidity. All patients underwent for base line and specific investigations. Patients aged 18 to 65 years, who have an NLR of >3.04 who present with signs and symptoms associated with NSTEMI and either gender were included in this study. Patients with a history of trauma, surgery, neoplasm, or infectious disease in the last 30 days prior to admissions. Patients currently using immune-suppressant (including corticosteroids) were excluded from study. Results were prepared with help of tables and graphs. The data was entered and analyzed using SPSS version 20.0.

RESULTS

Out of 231 patients included in this study 156(44.20%) males and 75(59.79%) females. Male : Female Ratio was 2.08:1. The mean age was 48.19+5.21 years. Most common risk factors were family history of CAD in 188(81.38%) cases and hypertension in 111(48.05%) cases. High Neutrophil to lymphocyte high ratio was present in 146(63.20%) patients while the low Neutrophil to lymphocyte ratio was in 85(36.79%) patients. Clinical outcome were observed hospital mortality were in 13(5.62%) and atrial fibrillation in 29(12.55%) cases and ST segment deviation were observed in 49(21.21%) cases.

Table No.1: Demographic Variable N=231

Variable	No.Patients	Percentage
Gender		
• Male	156	44.20%
• Female	75	59.79%
Age		
• 18-35 years	46	19.91%
• 36-50 years	128	55.41%
• 51-65 years	57	24.67%
Neutrophil to lymphocyte ratio		
• Low	85	36.79%
• High	146	63.20%

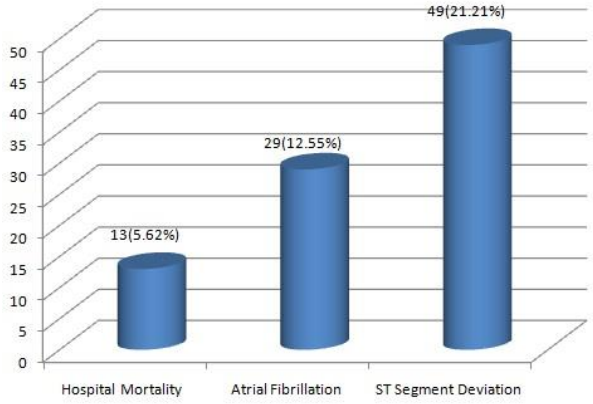

Chart No.1: Clinical Outcome

DISCUSSION

N/L ratio can be calculated at the time of admission, after PCI, average of all readings or maximum of all recordings. Park et al have concluded that NLR at the time of admission was more predictive of mortality than that measured 24 hours after admission [6]. Azab et al and Jingyu et al concluded that average N/L ratio was the best indicator for mortality as compared to N/L ratio at the time of admission, average or at the time of discharge [4,11]. Nunez et al reported that maximum value of N/L ratio during first 96 hours of admission is the best indicator [11]. Jingyu et al reported that high average N/L ratio is associated with cardiac dilation, hypotension and defibrillation.

Papa et al have shown in his study that clinically stable patients with increased N/L ratio have increased cardiac mortality. Cho et al suggested that neutrophil to lymphocyte ratio is an independant marker for six month mortality[12]. Ozturk et al also proved association of N/L ratio in young patients with NSTEMI and unstable angina. Other inflammatory markers associated with ongoing inflammation include CRP and fibrinogen levels [13]. Jingyu et al have concluded that average N/L ratio as predictor of all cause mortality.

Tamhane et al studied N/L ratio in hospitalized patients and upto 6 months following hospitalization. He concluded that N/L ratio is an independant predictor of all cause mortality in these patients[14]. In another study, 133 patients were studied and N/L ratio was found to be a preditor for mortality for upto one year [15]. Our study reports in-hospital mortality of 5.26% whereas atrial fibrillation occurred in 12.55% cases. ST segment deviation was found in 21.21% cases. Aguado-Romeo reports overall mortality of 8.3% [16]. Raza et al reports 5.9% deaths in males and 6.3% in females[17]. Ahmed et al showed mortality rate of 10.2% and atrial fibrillation was found in 11.5% cases [18]. Barron et al stated that the frequency of atrial fibrillation increases with rising leukocyte levels[19]. Azab et al and Ahmed et al that frequency of ST segment deviation increases with raised NLR ratio. Males predominated the number of cases presented to the emergency department. Our study reports 67.5% males. Raza et al reports 68% males whereas Iqbal et al reports 77.1% males [20]. Jafrey et al reports 68.1% males [21].

One study shows complete depletion of MPO enzymes in neutrophils following 4 hours after the onset of symptoms in patients with NSTEMI and STEMI. Myeloperoxidase is found in primary azurophilic granules in neutrophils. MPO depletion is associated with platelet activation and formation of aggregates of platelet with neutrophils and monocytes. As the condition resolves, MPO levels return nack to control levels[22].

Despite adequate treatment following acute coronary syndromes, the mortality reaches 3-8% [23]. 10-20% patients are readmitted following reinfarction or die within a month following acute coronary event and 5% patients develop congestive heart failure [24]. ECG and biochemical markers are less accurate in predicting mortality. This is where N/L ratio comes into play as inflammation is the key factor regulating these processes and is a better marker for future clinical outcome. However false elevation of neutrophil count can occur due to dehydration, repurfusion therapy or following catecholamine release [25].

Coronary care unit is not the only unit in which N/L ratio is predicting future prognostic outcome. Other diseases such as fatty liver disease, cancer chemotherapy patients, Alzheimer's disease, appendicits and many more offer predicting future outcome by measurement of N/L ratio[26]. There have also been association between high N/L ratio and cardiac calcium score which is a marker of vessel disease [27].

CONCLUSION

There are very few physicians in emergency care department taking into account the N/L ratio of patient in predicting short and long term mortality. It is therefore advised to take this factor into consideration as it can demonstrate ongoing systemic inflammatory changes and it much easily available and cheap than CRP levels.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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