



General Medicine

VALUE OF NEUTROPHIL COUNT, LYMPHOCYTE COUNT AND NEUTROPHIL LYMPHOCYTE RATIO IN ACUTE CORONARY SYNDROME PATIENTS.

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ABSTRACT **AIM:** The aim of this study was to quantify and determine the significance of neutrophil count, lymphocyte count and neutrophil lymphocyte ratio in acute coronary syndrome patients.
MATERIALS AND METHODS: This prospective study done in department of general medicine, Government Medical College, Omandurar Govt. Estate for period of one year from march 2016 to march 2017. All participants are subjected to detailed history, physical examination, bio chemical and radiological investigations as per the well-designed proforma. To categorize them to STEMI (ST-elevation myocardial infarction), NSTEMI (Non-ST-elevation myocardial infarction) or UA (Unstable Angina) and then calculated the neutrophil count, lymphocyte count and neutrophil lymphocyte ratio, in all groups. Statistical analysis was done using SPSS 16 software.
Results: Using multiple comparison by ANOVA, there was no statistically significant difference in neutrophil lymphocyte ratio among the study groups. But comparing the mean of neutrophil lymphocyte ratio of the patients who have expired and those who have survived, the difference in neutrophil lymphocyte ratio was statistically significant with a p value of 0.002.

KEYWORDS : neutrophil count, lymphocyte count, neutrophil lymphocyte ratio, acute coronary syndrome.

INTRODUCTION

Coronary artery disease continues to be the major health problem in the world and it has become an increasingly important disease in developing countries. Atherosclerosis is the main pathophysiological process that causes many events of clinical syndromes from chronic stable angina to ACS. Leucocytes and neutrophils have many important influence on formation of arterial thrombus and elevated leucocyte cause capillary plugging of micro vessels and causes direct vascular injury and thrombus formation and that ultimately leads to myocardial necrosis

AIM AND OBJECTIVES

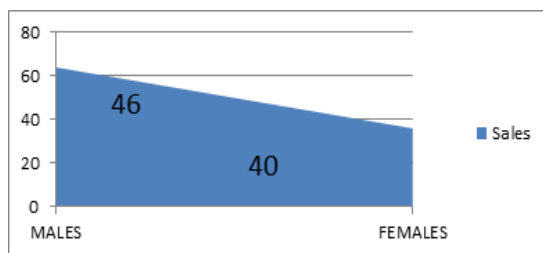
The aim of this study was to quantify and determine the significance of neutrophil count, lymphocyte count and neutrophil lymphocyte ratio, in acute coronary syndrome patients.

METHODOLOGY

This prospective study done in department of general medicine, Government Medical College, Omandurar Govt. Estate for period of one year from march 2016 to march 2017, was approved by our institutional review board. All participants are explained about the study and informed consent is obtained. Individuals are subjected to detailed history, physical examination, bio chemical and radiological investigations as per the well-designed proforma. To categorize them to STEMI (ST-elevation myocardial infarction), NSTEMI (Non-ST-elevation myocardial infarction) or UA (Unstable angina) and then calculated the neutrophil count, lymphocyte count and neutrophil lymphocyte ratio, in all groups. Statistical analysis was done using SPSS 16 software.

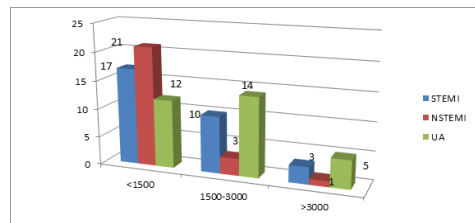
OBSERVATIONS AND RESULTS:

Fig.1 Gender Distribution Of The Total Sample



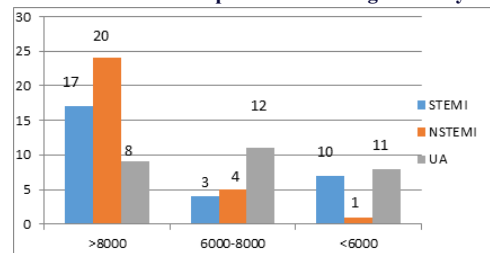
TOTAL SAMPLE SIZE -86

Fig 2 Distribution Of Lymphocyte Counts Among The Study Groups



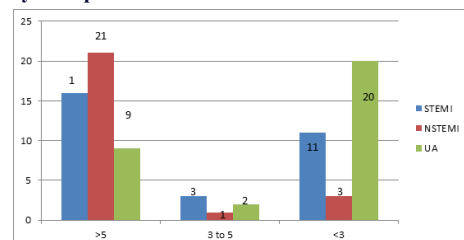
There was statistically significant difference in lymphocyte counts using multiple comparisons by ANOVA between NSTEMI and UA with p value of 0.006.

FIG.3 Distribution of Neutrophil counts among the Study Groups



There was statistically significant difference in the neutrophil counts between the three groups with a p value of 0.000.

FIG.4 Distribution of Neutrophil Lymphocyte Ratio among the Study Groups.

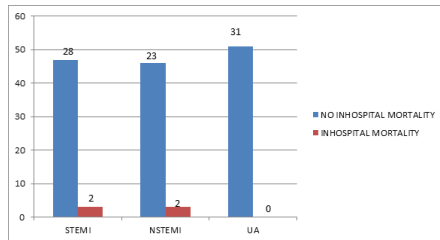


Using multiple comparison by ANOVA, there was statistically significant difference in neutrophil lymphocyte ratio between STEMI and NSTEMI with a p value of 0.002 and between NSTEMI and UA

with a p value of 0.000 but not between STEMI and UA (p value 0.152)

There was no statistically significant difference in neutrophil lymphocyte ratio among the study groups. But comparing the mean of neutrophil lymphocyte ratio of the patients who have expired and those who have survived, the difference in neutrophil lymphocyte ratio was statistically significant with a p value of 0.002

Fig 5. Distribution Of Inhospital Mortality Among Groups



In hospital mortality was 2.4% in the STEMI group and 2.4% in the NSTEMI group. There was no significant difference in the distribution of in-hospital mortality in the three groups with a p value of 0.200.

DISCUSSION:

Acute coronary syndrome (ACS) is associated with many hereditary and acquired predisposing factors. Especially inflammation may play a role in myocardial ischemia. Atherogenesis represents an active inflammatory process rather than simply a passive vascular injury with infiltration of lipids. NEUTROPHIL LYMPHOCYTE RATIO (NLR) is a readily available marker that conveys important information about the complex inflammatory activity in the vascular bed during the active phase of the syndrome. Simple ratio (N/L) obtained from a universally available low cost test (CBC with differential) provides relevant information regarding the risk of mortality in patients who are admitted with ACS.

In our study, patients with higher NLR showed an increased mortality, thus providing an additional level of risk stratification in patients with ACS. Neutrophils are the first leukocytes to be found in the damaged myocardial area. In contrast to neutrophils, lymphocytes infiltrating the ischemic myocardium represent the regulatory arm of the inflammatory and cytotoxic response and play a significant role in the healing process of the heart. In this study a total number of 86 patients with acute coronary syndromes were included. They were divided into 3 groups: 30 patients with STEMI, 25 patients with NSTEMI, 31 patients with unstable angina. Complete blood counts including differential count estimation done via an autoanalyser for all patients was analyzed. Neutrophils, lymphocyte and neutrophil lymphocyte ratio was assessed. The present study included a total of 46 males and 40 females, between 50-70 years of age group. This age of occurrence of ischemic heart disease in the population studied was comparable to the pattern of ischemic heart disease. When comparing the risk factors for acute coronary syndromes, 34 of the total patients were hypertensive and 52 patients were non hypertensive. Dividing among groups, patients with NSTEMI had more number of patients with hypertension than STEMI or unstable angina. There was no significant difference between the three groups in the occurrence of hypertension. Of the total subjects 28 were diabetics and 58 patients were non diabetics. Of these majority of the patients were in unstable angina than STEMI or NSTEMI. There was no statistically significant difference between the occurrence of diabetes between the three groups.

Significance of Lymphocyte Counts in Acute Coronary Syndromes

Lymphocyte counts in the study groups were divided into 3 groups. Of the total patients 50 had counts of <1500, 27 had counts between 1500-3000 and 9 had counts of more than 3000. The difference in the lymphocyte counts between the groups was statistically significant with a p value of 0.006. Comparing between the groups, NSTEMI had more number of patients, 21 numbers with counts <1500 than STEMI or unstable angina which had 17 and 12 respectively. Comparing the lymphocyte counts between the groups on mortality there was no significant difference (p value 0.304). The relative lymphopenia observed in patients with acute myocardial infarctions is considered to be a stress response mediated because of increased endogenous cortisol and was shown to be an early marker in acute myocardial infarction in previous studies. Lymphopenia in relation to lymphocyte apoptosis indicates the process of a highly inflammatory process and lymphopenia occurs in acute conditions due to lymphocyte apoptosis,

thereby releasing proinflammatory cytokines due to the apoptotic cells. In a study conducted by Blum et al it was demonstrated that a decrease in CD4 Count and the CD4/CD8 ratio in patients with acute coronary syndromes. Also it was found that patients with the lowest CD4 counts and those CD4 counts did not return to normal in subsequent days were more likely to develop reinfarction and to die. Lymphocyte subsets such as CD4 are decreased after MI and are correlated with a low ejection fraction and small infarct size (reference 8).

Significance of Neutrophil Counts in Acute Coronary Syndrome

In the present study, neutrophil counts were divided into 3 groups. And of which 45 patients had neutrophil count of >8000. Comparing between groups, patients with NSTEMI had more number of patients with neutrophil count of >8000 than STEMI and unstable angina. The difference between the groups was statistically significant with a p value of 0.000. Comparing the neutrophil count on mortality, 3 groups had no statistically significant difference in counts. The finding of more number of patients with STEMI with counts of >8000 than STEMI was unexpected. Also previous studies have shown STEMI patients to have marked inflammatory response than NSTEMI.

Comparing with the previous studies, in the Hiroshima and Nagasaki adult health study, the total leukocyte count correlated positively with the incidence of CAD in a large proportion of individuals free of disease at baseline, when differential cell counts were considered, a correlation was found between moderately elevated eosinophil count and increased risk of disease as well as between neutrophil, eosinophil, and monocyte counts and the incidence of disease (reference 9)

Kawaguchi et al (reference 12) in retrospective study of patients who had undergone coronary angiography found out that both the total leukocyte count and band neutrophil count correlated significantly with coronary atherosclerosis

Significance of Neutrophil Lymphocyte Ratio in ACS

In this study, patients were divided into 3 groups on the basis of neutrophil lymphocyte ratio. Neutrophil lymphocyte ratio was classified into 3 groups. Patients with neutrophil lymphocyte ratio of >5, 3-5 and <3. Of the total sample of 86, 46 patients had N/L ratio of >5. Dividing between groups patients with NSTEMI had more number of patients with N/L of >5 than patients with STEMI or unstable angina as shown in table 4. N/L ratio as previous studies have shown would be influenced by both increase in neutrophils and decrease in lymphocytes. As it takes into 2 variables simultaneously, it would be better than looking into single variable. Also in the study, although N/L ratio between groups had no statistically significant difference on mortality patients who had expired had higher value of N/L ratio than patients who had survived which was statistically significant with a p value of <0.05.

Various studies like study by Demir et al, which included a study population of 225 patients, a control group (n=75) a coronary artery disease group and a chronic total occlusion group. NLR was compared in the three groups. Multivariate logistic analysis found that NLR was an independent predictor of chronic total occlusion group.

CONCLUSION

Determining neutrophil and lymphocyte count, neutrophil lymphocyte ratio in acute coronary syndrome patients offered additional information in assessing the outcome of acute coronary syndrome patients and may be incorporated in Thrombolysis in Myocardial Infarction (TIMI) scoring to assess short term mortality. Also NSTEMI having more number of patients with elevated N/L ratio which may be due to thrombolysis in patients with STEMI. Thus, N/L ratio calculation should be routinely done in all patients with ACS.

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