Neutrophil lymphocyte ratio in Coronary Artery Disease

SHAHEENA NAZ[1], ZAIMA ALI[2], BILQUIS AKHTAR[3]

ABSTRACT

Aim: To evaluate the neutrophil/lymphocyte ratio (NLR) in diagnosed cases of coronary artery disease.
Methods: It was a cross sectional analytical study. The participants included 40 cases with coronary artery disease and 20 normal healthy males. All the participants were in the age group of 35-55 years and were nonsmokers. Total and differential leukocyte count was checked by automated hemoanalyzer and neutrophil lymphocyte ratio was calculated.
Results: Neutrophil lymphocyte ratio was significantly raised in the diseased group.
Conclusion: Elevated N/L (Neutrophil/Lymphocyte) ratio support the role of inflammation in the pathogenesis of coronary artery disease.
Keywords: Coronary artery disease, Total leukocyte count, Neutrophil Lymphocyte ratio.

INTRODUCTION

Coronary artery disease is one of the leading causes of death. It accounts for more than 15 million deaths every year in the world.[1]A number of risk factors like hypertension, diabetes, smoking etc. have been identified. Both acute and chronic inflammation are known to have a role in the pathogenesis of the disease and generate interest in researchers to look forvarious inflammatory markers[2, 3].

Inflammation is thought to play a fundamental role in atherosclerosis. The emerging concept is that it initiates the disease and plays a role in progression as well[4]. Release of different cytokines by local inflammatory cells leads to activation of endothelial cells and changes their natural anticoagulant property. These inflammatory cytokines may also increase the release of endothelin by the endothelial cells resulting in local vasoconstriction. A number of cells, including neutrophils, monocytes, lymphocytes and eosinophil have been proposed to play a role in the pathogenesis of coronary artery disease[.5]. Although the relationship between high total leukocyte count and morbidity and mortality due to cardiovascular diseases was found by a number of researchers[6,7,] the data regarding differential leukocyte count and its relation to cardiovascular disease is insufficient[8]. Coronary vascular endothelium is damaged by Neutrophils through adherence-dependent mechanisms involving selectin molecules. They release free oxygen radicals and proteases and also aggregate to plug the capillaries[9]. There is evidence that neutrophils have a particular role in atherosclerosis and high neutrophil count may predict risk of coronary heart disease[10,11].

[1,2]Dept. of Physiology, Lahore Medical and Dental College,
[3]Department of Physiology, PGMI, Lahore
Correspondence to Dr. Shaheena Naz, Senior Lecturer. Email: shaheenakhaqan@live.co.uk Cell: 0333-6546492

Researchers studied the neutrophil lymphocyte ratio to predict the poor outcomes in coronary artery disease and concluded that high neutrophil lymphocyte ratio was an independent predictor of complications and mortality in coronary heart disease[12].

METHODS AND MATERIALS

It was a cross sectional analytical study, conducted in the department of physiology, Post-graduate Medical Institute in collaboration with Punjab institute of cardiology Lahore during July 2013 to October 2013. Study population consisted of 40 cases with coronary artery disease (CAD) and 20 normal healthy males. Age for both groups was 35-55 years. All the participants were nonsmokers and non-diabetic. Diagnosis of CAD was confirmed on ECG and angiography.Cases with history any acute inflammatory condition e.g. acute tonsillitis, acute appendicitis, acute hepatitis, acute glomerulo-nephritis, chronic medical ailments e.g. renal or pulmonary disease and any major surgery in past six months were excluded.

After approval from the Ethical Review Board, all the participants were briefed about the nature of the study and an informed consent was taken.1-1.5 ml of blood was collected using aseptic technique and added to EDTA coated vacutainers for estimation of Total leukocyte count. The samples were run in the automated Hemoanalyzer, Sysmax System, a compact hematology analyzer. It provides accurate and precise complete blood count, including a fully automated 5 part differential count. Fluorescent flow cytometer technology allowed rapid, highly reliable

test results.Neutrophil lymphocyte ratio (NLR) was calculated.Data was entered and analyzed by using SPSS version 20.0.Data normality was checked by Shapiro-Wilk's test and if p-value was ≤ 0.05, data was considered to be non-normally distributed.

RESULTS

The study consisted of two groups. The data was deviating from normality so Mann Whitney U test was applied for comparison between the two groups. Group1 consisted of 20 normal healthy males and group 2 of 40 diagnosed coronary artery disease cases. Mean±SD of TLC of group 1 was 7.40±1.02 per cu.mmand for the group 2 was 9.29±3.62(Table 1) Neutrophil Lymphocyte ratio was also distributed differently among the two groups. (Table.2). When the N/L ratio was analyzed by Mann Whitney U test it was significantly high in Group 2 with p-value <0.001. (table.3)

Table 1: Comparison of TLC between group 1 and group 2:

	Group 1	Group 2
Biochemical Parameters TLC/cu.mm	Healthy control (20)	Cases with coronary artery disease(40)
Mean ± SD Median Q1 Q3	7.49±1.16 7.05 6.65 8.67	9.29±3.62 8.20 6.95 10.67

P value: 0.039*

Table 2: Distribution of N/L ratio in both groups

N/L Ratio	Healthy controls	Cases with CAD
Mean ± SD	1.61	3.67
Median	1.27	2.48
Q1	1.03	1.72
Q3	2.16	3.91

Table 3: Comparison of neutrophil lymphocyte ratio between the two groups.

Variable	N/L Ratio
Healthy controls	
Mean rank	18.23
Sum of ranks	364.50
Cases with CAD	
Mean rank	36.64
Sum of ranks	1465.50
Mann Whitney U	154.50
P value	0.000

DISCUSSION

Inflammation has been proposed to play an important role at all the stages of coronary artery disease. Total and differential leukocyte count though very simple and inexpensive test, provides important information.

We found significantly high number of TLC in coronary artery disease cases, furthermore we found elevated N/L Ratio in the diseased group.

Our results are similar to the results of a number of studies who have proposed that local and systemic inflammation are involved in atherosclerosis and coronary heart disease.[4,5] Researchers have worked on the various subtypes of white blood cells and found a high neutrophil and a relatively low lymphocyte count in coronary artery disease.[12,13] Moreover the elevated N/L Ratio was found to be significantly related to severity of CAD.[14]High N/L Ratio has also been associated with increased mortality in clinically stable diagnosed CAD cases.[15]Gulcan Abali et al studied the effect of statins on N/L ratio and found that statin therapy lowered N/L Ratio, may be due to its anti-inflammatory effect[16].

The study has some limitations like small sample size and single N/L Ratio reading. Study of serial differential leukocyte counts and their relation to the complications in CAD is recommended. High N/L Ratio can help in stratification of high risk cases and can be used to predict complications in coronary artery disease.

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