Original Article

# THE PROPORTION OF NEUTROPHILS TO LYMPHOCYTES IN THE CORONARY ARTERY DISEASE: *AN OBSERVATIONAL RESEARCH USING A CROSS-SECTIONAL DESIGN*

**Dr. Anil Bhattad[1], Dr. S. T. Thorat[2]**

[1,2] Professor, Department of Medicine, Krishna Institute of Medical Sciences, Krishna Institute of Medical Sciences, Krishna Institute of Medical Sciences Deemed to be University, Karad.
**Email:** anilbhattad75@gmail.com

**DOI:** 10.47750/pnr.2022.13.S04.281

## Abstract

Thirty percent of all deaths are attributed to cardiovascular disease. Annually, 17.3 million lives are lost due to this illness. 40 percent of all deaths from cardiovascular causes are attributable to coronary heart disease. This study aims to examine the correlation between neutrophils and lymphocytes as an indicator of inflammation by analysing clinical and laboratory data from persons with coronary artery disease. Seventy-two patients who were reported to the Medicine Department and who met the inclusion criteria were analysed. Participants were interviewed using a questionnaire that probed them on demographics, substance abuse, and the clinical profile. Medical histories from the past, present, and even the far past were all requested in the questionnaire. Sputum, blood, CSF, PL, AC, and pus cultures were taken from all patients. There was an increase in neutrophils (+22.6), lymphocytes (+27.6), platelets (+3.89), and the neutrophil-to-lymphocyte ratio (+0.99) among the average white blood cell count of 9.4 (+1.6) among 72 patients with coronary artery disease. Therefore, neutrophils and lymphocytes may serve as surrogate markers of coronary artery disease severity.

**Keywords:** Coronary Artery Disease, Neutrophils, Lymphocytes, Atherosclerotic Plaques.

## Introduction

Thirty percent of all deaths are caused by cardiovascular illnesses, which are the leading cause of death worldwide. 1 An estimated 17.3 million fatalities each year are attributed to this illness. Coronary heart disease is responsible for about 40% of these cardiovascular deaths. Forecasts indicate that coronary heart disease will remain a major cause of morbidity and mortality for many years to come. Atherosclerosis is a long-term condition of the coronary arteries that takes years to manifest clinically. With a complex pathophysiology that includes immune and inflammatory mechanisms, atherosclerotic plaque development and progression are thought to be heavily dependent on these processes. 2 Luminal constriction and angina symptoms may be brought on by the chronic, slow progression of coronary atherosclerosis. But there is a more serious scenario when an abrupt change in plaque status causes a sharp decline in luminal patency. While non-ST elevation myocardial infarction (NSTEMI) is brought on by a platelet-rich, non-occluding (mural) thrombus, ST-elevation myocardial infarction (STEMI) is caused by the development of red thrombus, which frequently leads to abrupt arterial occlusion. This led us to determine that as part of our investigation, we should assess the association between coronary artery disease and the neutrophil-to-lymphocyte ratio. We examined the clinical and laboratory traits of patients with coronary artery disease to achieve this.

**AIM**

Using clinical and laboratory data from people who have coronary artery disease as subjects, the aim of this study is to investigate the relationship between Neutrophils and Lymphocytes as a measure of inflammation.

**SOURCE OF SAMPLE:**

The research was conducted at the outpatient department of Medicine at the Krishna Hospital and Research Center.

**INCLUSION CRITERIA**

1. Age>18 years
2. Both gender
3. Diagnosed with coronary artery disease
4. Willing to participate

**EXCLUSION CRITERIA**

1. Thepresenceofany activeorrecentinfections.
2. Patientswithotherhematopathology.
3. Patientswithsevereanaemia. (Hemoglobin<7g/dl)
4. PatientswithCerebrovascularAccident.
5. Patientswhohaverefusedconsentto thestudy.

**STUDY DESIGN:**

This study was an observational, cross-sectional investigation.

**STUDY PERIOD:**

Patients enrolled in the trial between October 2019 and October 2021.

## Material & method

The outpatient medical services of a large university hospital. In October of 2019, patients were able to begin registering. When they were admitted to the Medicine division, they were given identification numbers. Patients who did not meet the inclusion criteria were not included in the study. The major purpose of this research was to analyse clinical and laboratory information from people who have coronary artery disease. Henceforth, Baseline information, such as demographics and health records, was gathered during enrollment. We analysed the collected data to learn more about neutrophils and lymphocytes as inflammatory markers in chronic (long-term) coronary artery disease.

**SAMPLE SIZE**

SampleSizewascalculatedonthebasisofPrevalenceofcoronaryarterydiseaseis25%-30%inICU admitted patients.

**N**=42 pq/l2

**Z**=standard constant valueat 95%CI=1.96

P= proportional rate of sepsis in general population=25%

**Q**=no proportion=75%

**L=** allowable error= 10%

**N**= (1.96)2(25)(75)/(10)2 =3.84 x 1875/ 100 =7200/100 = **72**

**There were 72 people in the study as a whole.**

## Data collection

The usual protocol was used to evaluate each patient. Before the trial started, participants' signed informed consent was obtained. The study was open to patients who had appointments at the Medicine department and met the eligibility criteria. A questionnaire with usual questions regarding sociodemographic traits, addiction, the clinical profile, and other issues was used during the interviews, which were conducted in accordance with a predetermined timetable. The questionnaire also asked inquiries about the respondent's medical background, past and present health, and other relevant topics. “Sputum cultures, blood cultures, cerebrospinal fluid routine and culture, pleural fluid routine and culture, ascitic fluid routine and culture, and pus cultures were all utilised to examine each patient”.

## Stastical Analysis

Excel was used to compile all the data. Using openepi version 2.3.1 and IBM SPSS statistics version 21.0, all statistical analyses were performed. The percentage, mean, range, and SD were among the descriptive statistics used to describe the data. Student t was used for quantitative data and chi square for qualitative data; significance was set at >0.05.

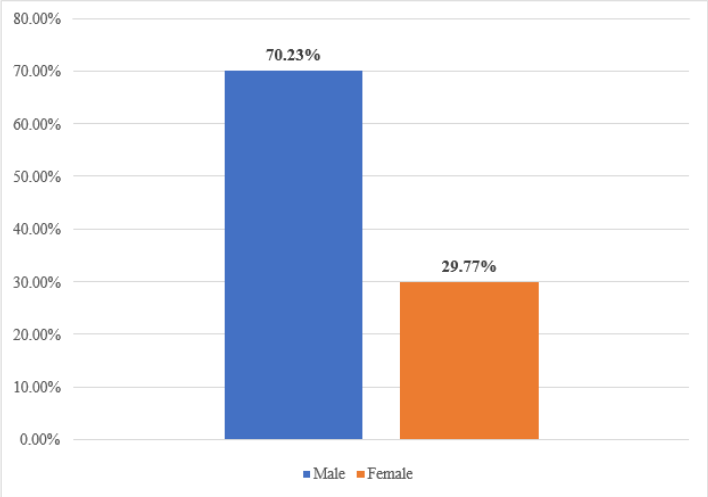
## Result

There was a total of 72 participants with coronary artery disease; 51 men (71.83%) and 21 women (29.17%) were included.

Table 1: Distribution of the study population based on gender

| Gender | Subjects with CAD (n = 72) | Percent |
|---|---|---|
| **Male** | 51 | 70.83 |
| **Female** | 21 | 29.17 |
| **Total** | 72 | 100 |

Graph 1: Distributionofthestudypopulationbasedon gender

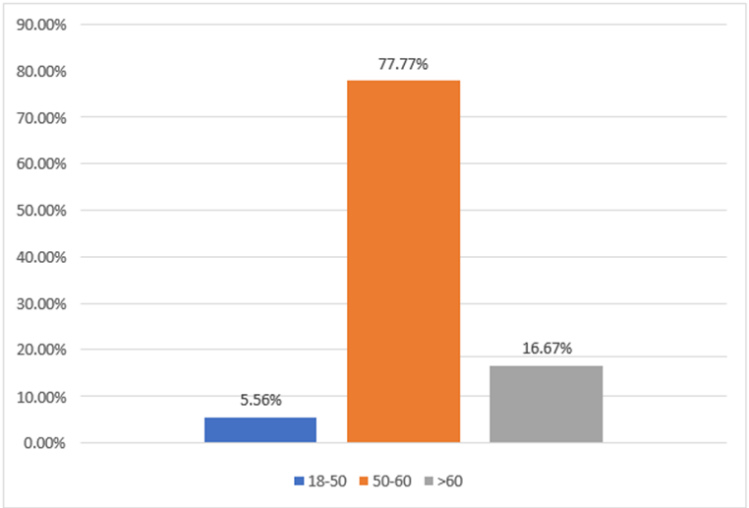



This study includes 72 patients with coronary artery disease. Of the 72 participants, 4 (5.56%) were 18 to 50, 56 (77.77%) were 50 to 60, and 12 (16.67%) were > 60. The mean age was 56.72 years old, with a standard deviation of +5.5 years. 77% were 50–60 years old.

Table2:Distributionofstudypopulationbasedonage.

| Age In Years | Subjects with CAD (n=72) | Percent |
|---|---|---|
| 18-50 | 4 | 5.56 |
| 50-60 | 56 | 77.77 |
| >60 | 12 | 16.67 |
| Total | 72 | 100 |
| Mean Age± SD | 56.72 ±5.5 | |

Graph 2: Distributionofstudypopulationbasedonage

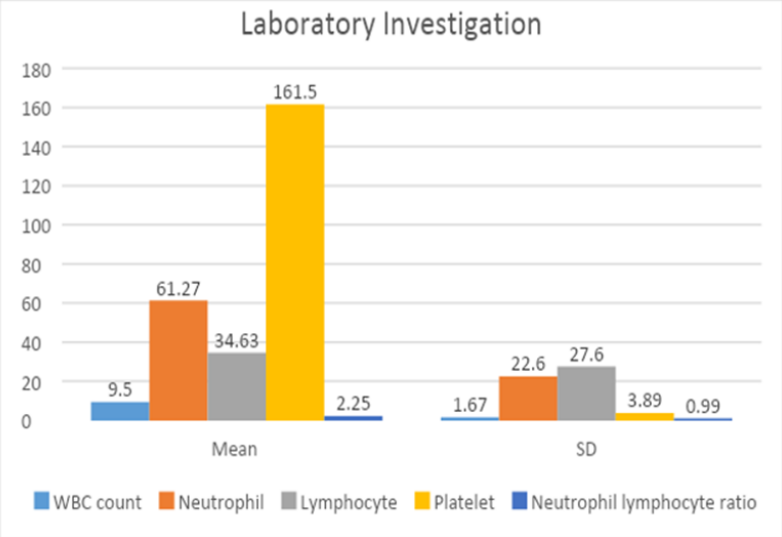


The average white blood cell count was 9.4 (+1.6) in 72 people with coronary artery disease; the average neutrophil count was 61.27 (+22.6); the average lymphocyte count was 34.63 (+27.6); the average platelet count was 161.5 (+3.89); and the average neutrophil-to-lymphocyte ratio was 2.25 (+0.99).

Table3:Whiteblood cellcountparametersin studypopulation

| Parameter | Mean | SD |
|---|---|---|
| **WBC count** | 9.5 | 1.67 |
| **Neutrophil** | 61.27 | 22.6 |
| **Lymphocyte** | 34.63 | 27.6 |
| **Neutrophil lymphocyte ratio** | 2.25 | 0.99 |

Graph3: Whitebloodcellcountparametersinstudypopulation




## Discussion

The population in this study was 56.72 years old on average (plus 5.5 years). The gender breakdown was 70.83% male and 29.17% female, with the majority (77.77%) falling into the 50 to 60 age range. There were 664 participants in the study, which was carried out by Pinheiro Machado G et al. The average age of the participants was 60.5 (12.1) years, and 66.3% of them were men. The average age of the participants, according to a study by Sari I and colleagues, was 60.6(+12.6) years, and 78% of them were men. White blood cell counts averaged 9.5 (+1.6). The neutrophil and lymphocyte count was 2.25 (+0.99) whereas the lymphocyte and neutrophil counts were 61.27 (+22.6) and 34.63 (+27.6) respectively. Park JS et al. used the data to conduct an analysis and discovered that the mean NLR was 4.7. (5.2). 5 Only 19.44% of patients had an NLR greater than 3, whereas the majority of patients (55.56%) had an NLR between 1 and 2. 244 participants (or 62%) had NLR levels under 2.80 out of 396 patients, according to the study by Misumida N and colleagues.

No matter whether a person has coronary artery disease (CAD) or not, a number of prior epidemiologic and clinical investigations have demonstrated a strong correlation between the quantity of leukocytes in the blood and the chance of having anything bad happen to the heart. The studies of left ventricular dysfunction (SOLVD) trials,

for instance, revealed that patients with left ventricular dysfunction who had a high leukocyte count were more likely to pass away from any reason than those with normal left ventricular function. A high leukocyte count was associated with impaired blood flow to the epicardium and myocardium, more severe coronary artery disease (CAD), and increased 6-month mortality in the TACTICS TIMI18 Sub group when conventional risk factors and biomarkers were taken into consideration. 8 In contrast to stable angina pectoris, a high leukocyte count may be a risk factor for acute coronary syndromes, according to a study of 6021 Japanese patients.

## Conclusion

The degree of coronary artery disease significantly correlated with the neutrophil-to-lymphocyte ratio, according to the study's findings. As a result, neutrophils and lymphocytes could act as proxies for indications of the severity of coronary artery disease.

## References


1. Elena V Kuklina, MD. PhD, Paula W. Yoon, Scd, MP HandNoraL.Keenan,PhD.Prevalence of Coronary Heart Disease Risk Factors and Screening for HighCholesterolLevelsAmongYoungAdults,UnitedStates,1999-2006;8(4):327-33.
2. Libby P, Ridker PM, Maseri A. Inflammation and atherosclerosis. Circulation.2002;105(9):1135-1143.
3. Pinheiro Machado G, Araujo GN, Carpes CK, Lech MC, Mariani S, Valle FH,BergoliLCC,WainsteinRV,WainsteinMV.Elevatedneutrophil-to-lymphocyteratiocanpredictproceduraladverseeventsinpatientswithST-elevationmyocardialinfarctionundergoingprimarypercutaneouscoronaryintervention.CoronArtery Dis. 2019 Jan;30(1):20-25.
4. SariI,SunbulM,MammadovCetal.Relationofneutrophil-to-lymphocyteandplatelet-to-lymphocyte ratio with coronary artery disease severity in patientsundergoingcoronary angiography. Kardiol Pol, 2015;73: 1310–1316.
5. ParkJS,SeoKW,ChoiBJ,ChoiSY,YoonMH,HwangGS,TahkSJ,ShinJH.Importance of prognostic value of neutrophil to lymphocyte ratio in patientswithST-elevationmyocardialinfarction.Medicine(Baltimore).2018Nov;97(48): e13471.
6. MisumidaN,KobayashiA,SaeedM,FoxJT,KaneiY.Neutrophil-to-lymphocyte ratio as an independent predictor of left main and/or three-vesseldiseaseinpatientswithnon-ST-segmentelevationmyocardialinfarction.CardiovascRevascMed.2015 Sep;16(6):331-5.
7. Selcuk H, Dinc L, Selcuk MT, Maden O, Temizhan A. The relation between differential leukocyte count, neutrophil to lymphocyte ratio and the presence and severity of coronary artery disease.
8. Sabatine MS, Morrow DA, Cannon CP, Murphy SA, Demopoulos LA, DiBattiste PM, McCabe CH, Braunwald E, Gibson CM. Relationship between baseline white blood cell count and degree of coronary artery disease and mortality in patients with acute coronary syndromes: a TACTICS-TIMI 18 sub study. Journal of the American College of Cardiology. 2002 Nov 20;40(10):1761-8.
9. Takeda Y, Suzuki S, Fukutomi T, Kondo H, Sugiura M, Suzumura H, Murasaki GI, Okutani H, Itoh M. Elevated White Blood Cell Count as a Risk Factor of Coronary Artery Disease Inconsistency Between Forms of the Disease. Japanese heart journal. 2003;44(2):201-11.