



Value of Platelet/Lymphocyte Ratio as a Predictor of Coronary Artery Disease Severity

Hamoda A^{1,*}, Ebaid H², Elrabat K² and Elemaary M²

¹Mahalla Cardiac Center, Egypt

²Cardiology department, Benha University, Egypt

*Corresponding author: Hamoda A, Mahalla Cardiac Center, Egypt; E-mail: ayman_hamoda1@hotmail.com

Abstract

Objective: The present study aim is to evaluate the value of platelet-to-lymphocyte ratio (PLR) as a predictor of the severity of atherosclerosis affecting coronary artery disease (CAD).

Methods: This is a prospective study where the included 120 patients who underwent coronary angiography who were referred from outpatient clinic in cardiology department at Benha University hospital with chest pain since January 2017 to December 2017. Gensini score which is a scoring system for evaluation of the severity of atherosclerosis, was calculated for all patients in the study. Patients with abnormal coronary angiography were divided according to their Gensini score into mild and severe atherosclerosis groups. Thirty patients with normal coronary angiography were considered as the control group. Mean PLR values of the three study groups were compared and PLR value was tested to find if it showed a positive correlation with Gensini score.

Results: The mean PLR of the severe atherosclerosis group was significantly higher than that of the mild atherosclerosis and controls groups ($p=0.001$). Also, PLR was positively correlated with Gensini score in CAD patients. A cut-off value of 117.39 for PLR predicted severe atherosclerosis with 72% sensitivity and 65.71% specificity. Pre-procedural PLR level was found to be independently associated with Gensini score, together with WBC, platelet count, age, serum creatinine level and low HDL level, in the stepwise linear regression analysis.

Conclusion: PLR is a simple, readily available marker with a potential for being an important predictor for severe atherosclerosis which would help to risk stratify patients before undergoing coronary angiography.

Keywords: Coronary artery disease; Gensini score; Platelet-lymphocyte ratio

Introduction

Cardiovascular diseases (CVDs) are still the leading cause of death all over the world, despite modern therapeutic advances. Inflammation role in causing CVD is well studied [1]. Because of long standing inflammation, lymphocytic count decrease due to increased lymphocytes apoptosis. Lymphocytes causes a more appropriate immune response, on the contrary, neutrophils has a damaging inflammatory response [2]. Additionally, inflammatory conditions cause relative increase in platelets count, which is associated with cardiovascular complications in patients with coronary artery disease. Platelet-to-lymphocyte ratio is a novel prognostic tool, which combine the risk estimation of both

parameter as It gives an idea about both the aggregation and inflammation pathways, and it may be more valuable than either platelet or lymphocyte count alone in the prediction of coronary atherosclerotic burden. Moreover, it could be useful as a prognostic tool than either platelet or lymphocyte count alone in predicting coronary atherosclerosis [3].

Methods

Study population

The current study was done prospectively in cardiology department in Benha University hospital, involved 120 patients who underwent elective coronary angiography between April

Received date: 12 September 2020; **Accepted date:** 22 September 2020; **Published date:** 29 September 2020

Citation: Hamoda A, Ebaid H, Elrabat K, Elemaary M (2020). Value of Platelet/Lymphocyte Ratio as a Predictor of Coronary Artery Disease Severity. SunText Rev Med Clin Res 1(2): 110.

DOI: <https://doi.org/10.51737/2766-4813.2020.010>

Copyright: © 2020 Hamoda A, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

2015 and March 2016 whom were referred from outpatient clinic. An informed consent was obtained from patients participating in this study. A physical examination was done for patients in this study, and they were asked about their history of previous attacks of myocardial infarction, diabetes mellitus, hypertension, family history of CAD and smoking. systemic hypertension was established if a patient had at least three repeated elevated measurements of blood pressure above 140 mm Hg regarding systolic blood pressure and 90 mm Hg regarding diastolic blood pressure or continuous use of medication which control blood pressure. Diabetes mellitus was diagnosed if fasting plasma glucose level above 126 mg/dl in at least two different occasion or continuous use of anti-diabetic drugs [4]. Smoking was defined as either current smoking or ex-smokers who quit smoking in the past 6 months. A positive family history for CAD was established if a history of CAD affected any of first degree relatives or sudden cardiac death before the age of 65 years for women and 55 years for men. Patients with at least moderate or advanced valvar affection, decompensated heart failure, any type of malignancy, blood diseases, severe renal impairment or hepatic affection, current infection or active systemic inflammatory conditions, or known autoimmune disorders and patients who are currently on steroid treatment were excluded.

Biochemical and haematological parameters

After eight-hour-duration fasting, a venous blood samples from patients were obtained in tubes, which contain EDTA and analyzed within 20 minutes in the hospital laboratory. An automated haematology analyser (Abbott Cell- Dyn 3700; Abbott Laboratory, Abbott Park, Illinois, USA) was used to detect the total and differential leukocyte counts and the absolute counts were used in this study. PLR was calculated as platelet count divided by lymphocyte count. Total and high-density lipoprotein cholesterol (HDL), triglycerides, and fasting plasma glucose levels were measured using the Abbott Architect C16000 auto-analyser (Architect C16000 auto-analyser; Abbott Laboratory, Abbott Park, Illinois, USA). Plasma low-density lipoprotein cholesterol (LDL) concentrations were calculated using the Fried Ewald equation [5].

Elective coronary angiography was done for patients enrolled in this study by Judkins technique through the femoral approach. The coronary angiograms were assessed by two interventional cardiologists without knowing the patient data or the other interventional cardiologist's assessment when there is interobserver difference more than 20% a third interventional cardiologist was asked to decide the result of the coronary angiogram. A detailed review of each coronary angiogram established the lesion location, significance and percentage of vessel stenosis among all coronary artery lesions. CAD was defined in case there is stenosis of 50% or more of the vessel

lumen in any of the main coronary arteries, following the American College of Cardiology/American Heart Association (ACC/AHA) lesion classification [6]. The Gensini score was used to identify and quantify the severity of CAD. This is helpful in classification and scoring the degree and extent of the stenosis of the coronary arteries. This system scores one point if there is one % to 25% stenosis, two points if there is 26% to 50%, four points if there is 51% to 75%, eight points if there is 76% to 90%, 16 points if there is 91% to 99% stenosis, and 32 points if there is total occlusion. After that, the score is multiplied by a factor, which represent the significance of the lesion's location in the coronary arterial system. According to the location, scores are multiplied by five if the lesion is in the left main; two and half if the lesion is in the proximal left anterior descending (LAD) or left circumflex (LCX) artery; one and half if the lesion is in the mid-segment LAD and LCX; one for the distal segment of the LAD and LCX, first diagonal branch, first obtuse marginal branch, right coronary artery, posterior descending artery, and intermediate artery; and a half if the lesion is in the second diagonal and second obtuse marginal branches. According to their coronary angiograms, patients were categorized into three groups. The control group consisted of 30 patients with normal coronary arteries (first group). The rest of the patients who had coronary artery disease, were divided into two groups according to the calculated Gensini score: (21, 22) those with mild atherosclerosis (n=39; Gensini score <25 points) and severe atherosclerosis (n=51; Gensini score \geq 25 points) [7]. Correlation between platelet-lymphocyte ratio and severity of coronary artery disease was done. Also correlation between other data collected from patients and severity of coronary artery disease was done. The cut off value of platelet-lymphocyte ratio that was predictive to severe coronary artery disease was calculated.

Statistical Analysis

Data from enrolled patients were gathered, put into tables accordingly and analyzed statistically using STATA/SE version 11.2 for Windows (STATA Corporation, College Station, Texas). Moreover, continuous data were expressed as the mean \pm SD and range, and categorical data were expressed as a number and percentage. The Student t-test (t) was used to compare two groups of normally distributed data. The Kruskal Wallis test (χ^2) and the Analysis of Variance (ANOVA, F) test were used to do a comparison among more than two groups regarding parametric and non-parametric data respectively followed by post hoc test using the Bonferroni correction to test differences in pairs. Percent of categorical variables were compared using the Chi-square (χ^2) test and Fisher's Exact Test as appropriate. The Pearson correlation coefficient (r) and Spearman correlation coefficient (rho; ρ) were used to assess the correlation between estimated parameters as appropriate. The Receiver Operator

Characteristic [ROC] curve analysis of platelet/lymphocyte ratio for the prediction of severe atherosclerosis was done and the best cutoff point and the corresponding sensitivity, specificity and the area under the curve (AUC) were detected. A stepwise linear regression analysis for the severity of atherosclerosis as indicated by the Gensini score conditioned on potential risk factors and laboratory data of the studied groups was carried out to detect important predictors. After the calculation of each of the test statistics, the corresponding distribution tables were used to calculate the “P” (probability value). Statistical significance was defined at P value of less than 0.05 (S) and a P value less than 0.001 was defined to be highly significant (HS). While, a P value >0.05 was considered non-significant (NS) [8].

Results

A total of 90 patients with coronary artery disease (men 64.4%, mean age: 62±9years) and 30 control subjects (73.33% male,

mean age: 58±9 years) with normal coronary arteries were enrolled in the study. Baseline demographic, biochemical, and haematological characteristics of the groups are outlined in Table 1. The study groups were comparable in terms of gender and traditional coronary risk factors, while patients in the severe atherosclerosis group were older compared to the mild atherosclerosis group and control group (p=0.03).

Regarding lipid profile, Total cholesterol, LDL, TG levels did not differ between study groups (p=0.81, p=0.69, p=0.10 respectively) unlike HDL which differ significantly between study groups (p=<0.001). The severe atherosclerosis group and mild atherosclerosis group had significantly lower HDL levels compared to controls (p<0.001 for both). The HDL level in the severe and mild atherosclerosis groups did not reach statistically significant difference (p=0.08) (Table 1).

Table 1: Comparison of baseline risk factors between the study groups.

Variable		Controls (No.=30)		Mild atherosclerosis (No.=39)		Severe atherosclerosis (No.=51)		Test	P
		No.	%	No.	%	No.	%		
Gender	Female	8	26.67	16	41.03	16	31.37	$\chi^2=1.44$	0.49
	Male	22	73.33	23	58.97	35	68.63		
Age (years)	Mean ± SD; (range)	57.83±8.45; (42-71)		59.7±8.66; (48-75)		63.02±9.33; (49-83)†		F=3.50	0.03
Family history	No	27	90.0	35	89.74	44	86.27	FET	0.82
	Yes	3	10.0	4	10.25	7	13.72		
Smoking	No	20	66.67	29	74.35	35	68.62	$\chi^2=0.73$	0.69
	Yes	10	33.33	10	25.64	16	31.37		
Hypertension	No	20	66.67	24	61.53	27	52.94	$\chi^2=1.94$	0.38
	Yes	10	33.33	15	38.46	24	47.05		
Diabetes	No	22	73.33	29	74.35	35	68.62	$\chi^2=0.59$	0.74
	Yes	8	26.67	10	25.64	16	31.37		

Table 2: Comparing laboratory data between the study groups.

Variable	Control (No.=30)			Mild atherosclerosis (No.=39)			Severe atherosclerosis (No.=51)			Test	P
	Mean	± SD	Range	Mean	± SD	Range	Mean	± SD	Range		
Total cholesterol	180.67	37.42	104-262	178.32	37.38	104-262	175.94	22.41	123-206	F= 0.21	0.81(NS)
LDL	110.37	17.94	67-139	113.05	18.6	67-140	109.78	18.78	67-137	F= 0.37	0.69 (NS)

HDL	39.8	2.04	36-43	35.9	3.75	29-42	34.28	3.71	27-40	F= 25.09	<0.001* ^a (HS)
TG	125.97	30.75	92-201	140.35	24.72	105-190	136.0 2	28.68	90-199	F= 2.33	0.10
RBS	108.8	25.2	80-170	129.5	46.43	80-243	146	56.86	85-310	$\chi^2= 9.95$	0.007* ^b (S)
Creatinine	0.8	0.15	0.6-1.1	0.88	0.2	0.6-1.3	1.11	0.39	0.6-1.9	F= 12.93	<0.001* ^c (HS)
HB	13.55	1.41	11.1- 16.6	13.54	1.49	11.1- 16.6	13.71	1.63	9.1- 16.6	F= 0.16	0.85 (NS)
WBCs	8509.6 7	1912. 69	4500- 11000	8197.2 5	2126. 46	4200- 11600	9802. 6	2162.3 7	4200- 12800	F= 7.41	<0.001* ^d (HS)
PLT	24783 3.3	58359 .22	152000 - 356000	241582 .5	57942 .37	150000- 344000	27908 0	59096. 89	168000 - 375000	F= 5.26	0.006* ^e (S)
Lymphocyte	2518	729.5	1550- 3750	2295.3	670.9 7	1100- 3900	2179. 48	642.38	1200- 3900	F= 2.37	0.10 (NS)
PLR High (%) Middle (%) Low (%)	106.85	38.51	41.64- 186.45	113.22	40.03	51.31- 224	141.4	51.92	50.26- 223.72	F= 7.03	0.001* ^f (S)
MPV	8.41	1.01	6.8- 10.1	8.49	1.21	6.8-11.3	8.4	0.75	7.2-9.5	F= 0.11	0.90 (NS)
Gensini score	0	0	0	12.92	6.34	3-24	47.98	16.78	26-78	T= 12.51	<0.001 (HS)

Fasting blood sugar was significantly higher in severe atherosclerosis group than control group ($p=0.001$) and higher in mild atherosclerosis group than control group ($p=0.003$) but there were no statistically significant difference between mild and severe atherosclerosis group ($p=0.08$) (Table 2).

The mean serum creatinine level of the severe atherosclerosis group was found to be higher in control and mild atherosclerosis groups ($p=0.001$). The mean serum creatinine level of the severe atherosclerosis group was significantly higher than its level in the mild atherosclerosis ($p=0.001$) and it was significantly higher than its level in control group ($p<0.001$). The mean serum creatinine level was not statistically different between mild atherosclerosis group and control group ($p=0.75$). Among haematological parameters, haemoglobin levels were similar between all three groups ($p=0.85$). WBC counts was significantly higher in the severe atherosclerosis group than in the other two groups ($p<0.001$), whereas it was similar between the mild atherosclerosis and control groups ($p=1.00$). WBC counts were significantly higher in severe atherosclerosis group than WBC counts in control group ($p=0.03$). WBC counts were significantly higher in severe atherosclerosis group than mild atherosclerosis group ($p=0.001$). The severe atherosclerosis group had significantly higher platelet counts compared to both the mild atherosclerosis group and control group ($p=0.006$) and the severe

atherosclerosis group had significantly higher platelet counts than mild atherosclerosis group ($p=0.009$). There was no statistically significant difference regarding platelet counts between mild atherosclerosis and control groups ($p=1.00$). The difference regarding platelet counts between severe atherosclerosis and control group did not reach statistical difference ($p=0.07$). PLR was higher in severe atherosclerosis group than the other two groups ($p=0.001$). PLR was significantly higher in the severe atherosclerosis group compared to the mild atherosclerosis ($p=0.01$) and control groups ($p=0.004$) (141 ± 52 , 113 ± 40 , and 107 ± 39) (Figure 1).

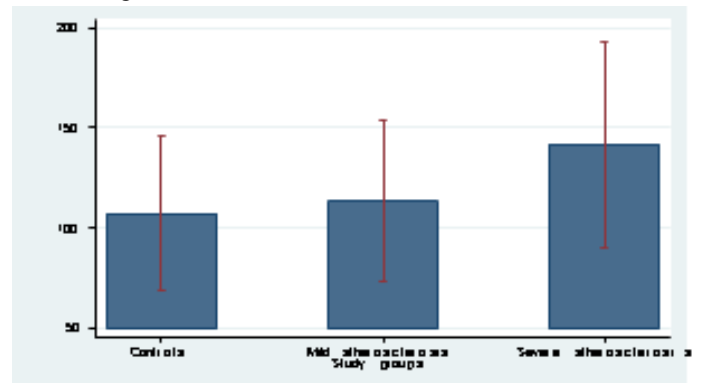


Figure 1: PLR were comparable between mild atherosclerosis and control groups ($p=1.00$).

There was significantly higher percentage of patients with high PLR in the severe atherosclerosis group than in the other groups ($p=0.001$) (Figure 2).

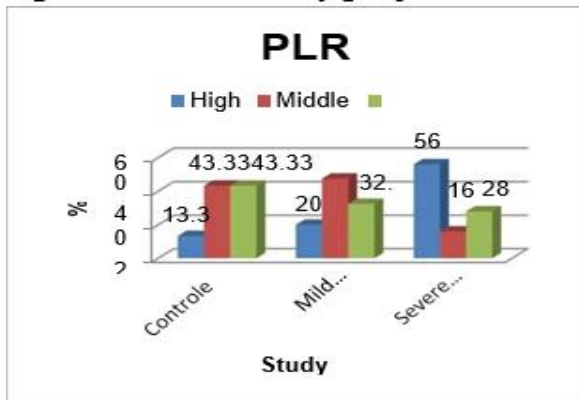


Figure 2: PLR in the study groups.

PLR was found to be inversely correlated with HDL level ($r=-0.35$; $p<0.001$). PLR was found to be correlated with Gensini scores ($r=0.64$, $p<0.001$), HDL levels ($r=-.35$, $p=<0.001$), TG levels ($r=0.33$, $p=<0.001$) and serum creatinine level ($r=-0.19$; $p=0.04$) (Table 3).

Table 3: Correlation coefficient and P value for different variables with PLR.

Variable	PLR (No.=120)	
	Correlation coefficient	P
Gensini score	0.64	<0.001 (HS)
Age (years)	0.001	0.99
Total cholesterol	0.07	0.46
LDL	-0.007	0.94
HDL	-0.35	<0.001 (HS)
TG	0.33	<0.001 (HS)
RBS	0.17	0.06
Creatinine	0.19	0.04 (S)
HB	-0.10	0.29

Using a cut-off level of 117.3, PLR predicted severe atherosclerosis with a sensitivity of 72% and specificity of 65% (area under ROC curve=0.672, 95% CI: 0.44-0.83; $p<0.001$) (Figure 3) (Table 4).

Table 4: Best cutoff point and its sensitivity and specificity and area under the curve.

Best cutoff point	117.39
Sensitivity (%)	72.0
Specificity (%)	65.71

Area Under the Curve (AUC)	0.6723
----------------------------	--------

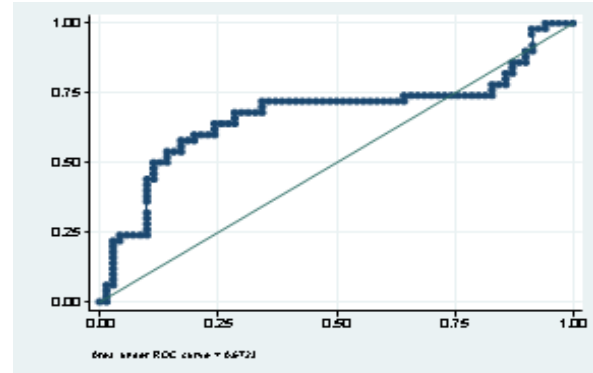


Figure 3: ROC analysis of PLR for prediction of severe atherosclerosis

Independent associations between Gensini score and independent variables were assessed by stepwise linear regression analysis by including Age (years), HDL, Serum Creatinine level, WBCs count, platelets count, Total cholesterol and PLR. Preprocedural PLR was independently associated with Gensini score ($\beta=0.63$, $p<0.001$), together with WBC ($\beta=0.008$, $p=0.001$), HDL ($\beta=-1.56$, $p<0.001$), platelets count ($\beta=-0.0002$, $p=<0.001$), total cholesterol level ($\beta=-0.08$, $p=0.046$), age in years ($\beta=0.34$, $p=0.01$) and serum creatinine ($\beta=19.26$, $p<0.001$) (Table 5).

Table 5: Stepwise linear regression of Gensini scores.

Variable (No.=120)	B	95% CI	P
Age (years)	0.34	0.08 to 0.61	0.01
HDL	-1.56	-2.20 to -0.92	<0.001
Creatinine	19.26	11.55 to 26.97	<0.001
WBCs	0.008	0.005 to 0.01	0.001
PLT	-0.0002	-0.0003 to -0.0001	<0.001
Total cholesterol	-0.08	-0.15 to -0.001	0.046
PLR	0.63	0.44 to 0.83	<0.001

In addition, the patients ($n=120$) were divided into three textiles based upon their PLR values (lower than 96.8, higher than 146.9 and those in between). The mean Gensini score of patients in the high PLR textile was significantly higher than that of the middle and lower textiles ($p<0.001$ for both) (Figure 4) (Table 6).

Table 6: Variations in Gensini scores in different PLR tertiles.

PLR	Gensini scores		
	Mean	± SD	Range
High (>146.99) (No.=40)	46.27	23.85	0-78
Middle (96.82- 146.99) (No.=40)	13.95†	14.57	0-58
Low (<96.82) (No.=40)	12.67	13.23	0-36
F	45.51		
P	<0.001* (HS)		

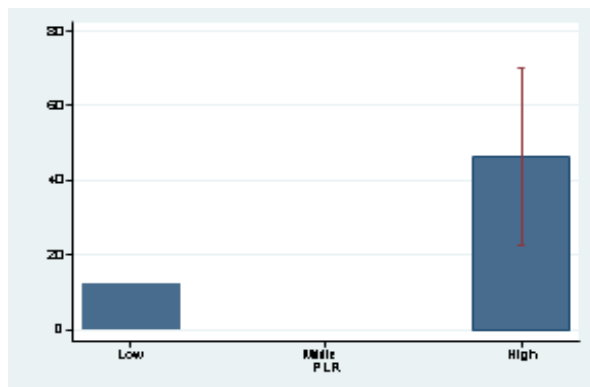


Figure 4: Showing mean Gensini score and standard deviation for the high, mid and low PLR groups.

Discussion

Although there is a significant number of new inflammatory biomarkers are being studied in the context atherosclerosis and coronary artery disease, many offer little improvement in the current risk-prediction models. Most of the other newly introduced inflammatory risk markers are expensive to test, are not readily available, lack standardization, and have not been confirmed by multiple prospective studies [9]. This study was conducted to explore the value of platelet/lymphocyte ratio as a predictor of coronary artery disease severity. The current study involved 120 patients with chest pain who were eligible and planned for elective coronary angiography. Their gender, risk factors, laboratory data and their angiographic results were collected and statistically analyzed. In the present study, the three group were comparable regarding gender and basal risk factors like presence of systemic hypertension, family history of coronary artery disease, diabetes mellitus, and smoking except age which was higher in the severe atherosclerosis group. This is consistent with risk factor distribution in the groups of Yüksel et al. On the contrary, there were some differences between these results and Sari et al where there were two groups one with normal coronary angiography and another group for patients with abnormal coronary angiography in which female gender was significantly

higher in the normal coronary angiography group. Also Smoking status was significantly higher in the abnormal coronary angiography group [10]. This disparity between the results of these studies may be due to small sample size in the present study which didn't reveal difference of risk factor distribution in different groups. In the current study, total cholesterol, LDL- c, TG levels did not differ between study groups unlike HDL which was significantly lower in the severe atherosclerosis group than other two groups and these results were partially there was a highly significant difference in the level of triglycerides between coronary artery disease and non- coronary artery disease patients. However, the HDL was significantly lower in coronary artery disease patients as compared to non- coronary artery disease patients. The LDL was significantly higher in coronary artery disease patients as compared to non- coronary artery disease patients. The total cholesterol level was significantly higher in coronary artery disease patients as compared to non-coronary artery disease patients [11].

This difference may be due to different grading system used in the current study and the Ashfaq study. Also, lipid profile may have been changed by the lipid lowering drugs like statins. In the present study, the mean serum creatinine level of the severe atherosclerosis group was found to be higher than its level in control and mild atherosclerosis group [12]. In the present study the severe atherosclerosis group had significantly higher platelet counts compared to both the mild atherosclerosis group and control group (p=0.006). Underwent coronary angiography. There was no relationship between Gensini score and platelets counts [13]. According to the present study WBC counts was significantly higher in the severe atherosclerosis group than in the other two groups and Lymphocyte count was comparable between all three groups. Patients with coronary artery disease had a higher WBC counts than those with normal coronary arteriograms. A positive correlation between WBC and the severity of CORONARY ARTERY DISEASE was noted [14].

In this study platelet/lymphocyte ratio was higher in severe atherosclerosis group than the other two groups (p=0.001) platelet/lymphocyte ratio was significantly higher in the severe atherosclerosis group compared to the mild atherosclerosis

($p=0.01$) and control groups ($p=0.004$) (141 ± 52 , 113 ± 40 , and 107 ± 39 respectively, $p=0.001$). Platelet/lymphocyte ratio were comparable between mild atherosclerosis and control groups ($p=1.00$). The results of the present study are concordant with results where 388 patients who underwent coronary angiography were evaluated retrospectively. Gensini score was calculated for all of the patients. Patients with coronary artery disease were categorized as mild and severe atherosclerosis, according to their Gensini score. Eighty patients with normal coronary arteries formed the control group. The mean platelet/lymphocyte ratio of the severe atherosclerosis group was significantly higher than that of the mild atherosclerosis and controls groups. Also, platelet/lymphocyte ratio was positively correlated with Gensini score in Coronary Artery Disease patients. In the multivariate, Pre-procedural platelet/lymphocyte ratio level was found to be independently associated with Gensini score analysis.

180 consecutive patients underwent elective coronary angiography. While 100 patients had abnormal coronary angiography (CAG), 80 patients had normal CAG. Platelet/lymphocyte ratio were calculated as the ratio of platelet count to lymphocyte count respectively. Patient with abnormal CAG had significantly higher platelet/lymphocyte ratio when compared to patients with normal CAG. PLR was significantly correlated with Syntax score and Gensini score. Patients with CORONARY ARTERY DISEASE had significantly higher platelet/lymphocyte ratio when compared to patients with normal coronary artery angiography, which is concordant with the present study [15,16]. Study questioned the association of PLR with the severity and complexity of coronary atherosclerosis as assessed by the Syntax score in patients with ACS who underwent urgent CA. Platelet/Lymphocyte Ratios were significantly higher in patients with intermediate to high Syntax scores compared with those with low Syntax scores. In multivariate analysis, the independent predictors of intermediate to high Syntax score were PLR, the left ventricular ejection fraction and age. $PLR \geq 116$ had 71% sensitivity and 66% specificity in predicting intermediate to high Syntax score. Increased Platelet/Lymphocyte Ratio is an independent predictor of higher Syntax score [17]. According to our knowledge, there is limited data and studies that investigated the relation of Platelet/Lymphocyte Ratio and severity of coronary artery disease in chronic stable coronary artery disease and its value in prediction of coronary artery disease severity. Therefore, this study examined the unexplored relation between PLR and stable coronary artery disease which included 120 patients.

Study Limitations

Study limitations include the relatively small number of patients in this study, the study was done in a single centre and it was not a cross-sectional design. One of the limitation of the Current

study is that the burden of atherosclerosis affecting coronary arteries and its severity was only assessed by diagnostic coronary angiography; since it displays the lumen of coronary arteries without evaluation of the arterial wall itself, it does not deliver precise data about the plaque burden affecting the coronary arteries. Thus, studies which use intravascular ultrasound or multiline computed tomography coronary angiography may offer more accurate evidence about the quantity of coronary atherosclerosis. Lack of other established inflammatory markers, such as interleukin-6, tumour necrosis factor- α , and C-reactive protein, is another limitation of the present study. Additional limitation of the current study is that it does not reflect the mechanism of the relationship between Platelet/Lymphocyte Ratio and atherosclerosis affecting the coronary arteries. Although it was found that there were significant associations but this is a relatively small study and additional prospective studies which include large sample of patients are required to endorse the correlation between PLR and coronary artery disease severity and if it is a cause or result of atherosclerosis process. In spite of those limitations, the current study is one of the leading studies regarding assessing the association between PLR and the coronary atherosclerosis severity valued by Gensini score.

Conclusion

According to this present study, high Platelet/Lymphocyte Ratio appears to be a predictor for severity of coronary Artery disease and PLR value positively correlates with Gensini score. When we realize that PLR is a simple parameter that can be calculated from routine complete blood count report, which is an easily available marker, it can be beneficial in identifying individuals at high risk for advanced coronary artery disease who might benefit from closer follow-up and a more intensive therapeutic approach [18].

References

1. Turgay C. Predictive value of admission platelet volume indices for in-hospital major adverse cardiovascular events in acute ST-segment elevation myocardial infarction. *Angiol.* 2015; 66: 155-162.
2. Maxwell E, Bhat T. Neutrophil to lymphocyte ratio (NLR) and cardiovascular diseases: an update. *Expert review cardiovascular Therapy.* 2016; 14: 573-577.
3. Murat Y, Yildiz A, Oylumlu M, Akyuz A, Aydin M, Kaya H, et al. The association between platelet/lymphocyte ratio and coronary artery disease severity. *Anatolian J Cardiol.* 2016; 15: 640.
4. Standards of medical care in diabetes-2016 abridged for primary care providers. *Clinical diabetes: a publication of the American Diabetes Association.* 2016; 34: 3.

5. William TF, Levy RI, Donald S. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clin Chem.* 1972; 18: 499-502.
6. Thomas JR. Guidelines for percutaneous transluminal coronary angioplasty: a report of the American College of Cardiology/American Heart Association Task Force on assessment of diagnostic and therapeutic cardiovascular procedures. *J Am Coll Cardiol.* 1988; 12: 529-545.
7. Goffredo G. A more meaningful scoring system for determining the severity of coronary heart disease. *Am J Cardiol.* 1983; 51: 606.
8. Douglas GA, Bland JM. Measurement in medicine: the analysis of method comparison studies. *J Royal Statistical Society.* 1983; 32: 307-317.
9. Mohammad M, Fatemi O. Components of the complete blood count as risk predictors for coronary heart disease: in-depth review and update. *Texas Heart Institute J.* 2013; 40: 17.
10. Ibrahim S. Relation of neutrophil-to-lymphocyte and platelet-to-lymphocyte ratio with coronary artery disease severity in patients undergoing coronary angiography. *Polish Heart J.* 2015; 73: 1310-1316.
11. Fauzia A, Goel PK, Sethi R, Khan MI, Ali W, Idris MZ, et al. Lipoprotein levels in relation to severity of coronary artery disease in North Indian patients. *Heart views: the official J Gulf Heart Association.* 2013; 14: 12.
12. Şule K. Serum creatinine is independently associated with angiographic extent of coronary artery disease in patients with stable angina pectoris. *Anatolian J Cardiol.* 2011; 11.
13. Rasit SM. The relationship between the Gensini score and complete blood count parameters in coronary artery disease. *Koşuyolu Kalp Dergisi.* 2012; 15: 51-54.
14. John BK, Turkevich D, Sharp J. Association between leukocyte count and the presence and extent of coronary atherosclerosis as determined by coronary arteriography. *Am J Cardiol.* 1984; 53: 997-999.
15. Hatice S, Dinc L, Selcuk MT. The relation between differential leukocyte count, neutrophil to lymphocyte ratio and the presence and severity of coronary artery disease. *Open J Internal Med.* 2012; 2: 163-9.
16. Amaro A. Leukocyte count as a predictor of the severity ischemic heart disease as evaluated by coronary angiography. *Revista portuguesa de cardiologia: orgao oficial da Sociedade Portuguesa de Cardiologia Portuguese journal of cardiology: an official journal of the Portuguese Society of Cardiol.* 1993; 12: 913-7.
17. Alparslan K. Association of platelet-to-lymphocyte ratio with severity and complexity of coronary artery disease in patients with acute coronary syndromes. *Am J Cardiol.* 2014; 114: 972-978.
18. Sevket B, Ozturk C. The platelet-lymphocyte ratio: a simple, inexpensive and rapid prognostic marker for cardiovascular events. *Platelets.* 2015; 26: 680-681.