SHORT REPORT

Relationship between platelet-to-lymphocyte ratio and Coronary Artery Lesion in non-diabetic patients with coronary heart disease.

Maohua Han[1], Yaning Sun[2], Na Li[3]

Abstract

This study was conducted to investigate the relationship between platelet-to-lymphocyte ratio and coronary artery lesion in non-diabetic patients with coronary heart disease. This observational research was done at Changyi people's Hospital, China, from January 2017 to August 2020. A total of 237 non-diabetic cases with suspected coronary heart disease were selected as subjects. Patients with negative coronary angiography were labelled as non-coronary heart disease patients (control group), patients with coronary heart disease confirmed on angiography comprised the coronary heart disease group. The results showed that smoking and hypertension history in the two groups were different (p=0.031 and 0.001). Platelet-to-lymphocyte ratio value and Gensini score in coronary heart disease group were higher as against the control group (both p<0.001). Platelet-to-lymphocyte ratio was an independent risk factor for coronary heart disease (p<0.001) using logistic regression analysis. A significant positive correlation between platelet-to-lymphocyte ratio and Gensini score in coronary heart disease patients (r=0.510, p<0.001) was determined by Spearman analysis. In conclusion, platelet-to-lymphocyte ratio can be acquired simply and quickly from blood routine examination, and its level is related to coronary artery lesion. Platelet-to-lymphocyte ratio may provide certain reference value in judging coronary artery lesion in non-diabetic patients with coronary heart disease.

Keywords: Non-diabetic; platelet-to-lymphocyte ratio; lymphocyte; coronary artery lesion

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Introduction

Coronary heart disease (CHD) leads to stenosis of vascular cavity, decreased blood flow, and myocardial blood supply disorder.[1,2] Inflammatory response can induce coronary atherosclerosis.[3] Blood routine examination is an inexpensive, simple and routine test which can be carried out in primary medical institutions. Platelet-to-lymphocyte ratio (PLR) can be calculated according to the platelet count and lymphocytes count. PLR is an inflammatory marker to determine cardiovascular disease. Platelets have the functions of thrombosis and haemostasis. Heredity or acquired defects in quantity and/or function of platelets may be associated with haemorrhagic diseases, and increased platelet count is a key factor in thrombus disease. As natural and adaptive immune cells, lymphocytes are considered to be the main participant in atherosclerosis. Increased platelets level and decreased lymphocytes level are related to adverse cardiovascular events. Some studies have shown that elevated platelet count is an independent factor affecting the poor prognosis of myocardial infarction.[4] Decrease of lymphocytes is related to the mortality of patients with coronary artery lesion (CAL).[5] Previous studies mainly focused on the relationship between PLR and the type and prognosis of CHD.[6] Gensini score was based on coronary angiography (CA) images and was scored according to the number, location, and degree of stenosis of the coronary artery lesions. Higher Gensini score indicates more serious CAL.Gensini score can be used to objectively evaluate CAL.[7] It is worth mentioning that the Gensini score can only be achieved with invasive CA. So, finding a rapid, simple, efficient and non-invasive method to judge CAL in non-DM subjects with CHD is vital.

One study reported positive correlation between PLR and Gensini score in CHD cases.[8]

A few studies have observed the relationship between PLR and severity of CAL in CHD in non-diabetic (non-DM) subjects. Whether PLR can be used for non-invasive assessment of CHD and CAL in non-DM subjects is still unclear.

The aim of this study was to investigate the relationship between PLR and CAL in non-DM subjects with CHD.

Methods and Results

This observational research was conducted at the Changyi people's Hospital, China, from January 2017 to August 2020. After approval of the Ethics Committee, a total of 237 non-DM patients with suspected CHD were selected as research subjects. The inclusion criteria were patients≥18 years old, those who were willing to undergo CA, those who gave informed consent to join the research, those with complete clinical data, and those who did not have

[1,3]Department of Internal Medicine-Cardiovascular, Changyi People's Hospital, Shandong, China; [2]Radiotherapy Center, Changyi People's Hospital, Shandong, China.

Correspondence: Maohua Han. e-mail: ixv716@163.com

diabetes. The exclusion criteria were patients with diabetes, primary renal disease, acute and chronic infection, tumour, hepatorenal insufficiency, acute myocardial infarction, cerebrovascular accident, severe valvular heart disease, haematological diseases, previous coronary intervention or coronary bypass grafting history, alcohol abuse, and those without CA.

The result of CA was checked in all the subjects. CHD was diagnosed based on CA results and WHO diagnostic criteria. CA was performed by Judkins selective CA.[9]

Patients with negative CA were non-CHD patients, and served as control group. Patients with CA showed that the degree of coronary artery stenosis ≥50% could be diagnosed with CHD, and they were included in the CHD group.

The degree of stenosis of each vessel was quantitatively analysed according to the Gensini scoring system. No abnormality was zero point, stenosis ≤25% was one point, stenosis ranging from 26% to 50% was two points, stenosis ranging from 51% to75% was four points, stenosis ranging from 76% to 90% was eight points, stenosis ranging from 91% to 99% was 16 points and 100% stenosis was 32 points. According to the research method of Ding et al,[10] the multiple relationship was calculated according to the location of the lesion. The total Gensini score of CAL in each subject was the sum of Gensini scores for each branch of stenosis.

Clinical data, including gender, age, past history (smoking and hypertension), systolic blood pressure (SBP), and diastolic blood pressure (DBP) were kept as record. Morning fasting venous blood were obtained before CA. Total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), triglyceride (TG), fasting blood glucose (FPG), and PLR were detected.

The data was entered in SPSS 25 for analysis. The normality of measurement data was tested by Kolmogorov-Smirnov test. Measurement data of normal distribution were expressed by mean±SD, and comparison between the two groups was performed by independent sample t-test. Counting data were expressed as n (%). Gensini score of non-normal distribution was expressed by median and quartile, Mann-Whitney U Test was used for Gensini scores difference. Risk factors of CHD were analysed by logistic multivariate model. Spearman rank correlation analysis was used for correlation test. The $p<0.05$ was significant.

Among the total 237 subjects with suspected CHD, 123 (51.90%) were males and 114 (48.10%) were females; 68 (28.69%) were non-CHD (control group) and 169 (41.31%) were CHD (CHD group).

Table-1: Comparison of related parameters.

Parameters	Control group (n=68)	CHD group (n=169)	*p*-value
Gender			0.933
Male [(n(%)]	35 (51.47)	88 (52.07)	
Female [(n(%)]	33 (48.53)	81 (47.93)	
Age (years)	61.01±11.11	61.26±8.95	0.859
Smoking history n (%)	18 (26.47)	70 (41.42)	0.031
Hypertension history n (%)	22 (32.35)	95 (56.21)	0.001
SBP（mmHg）	130.83±19.02	131.26±15.66	0.858
DBP（mmHg）	80.40±10.16	81.13±8.13	0.561
TC（mmol/L）	4.85±0.61	4.92±0.49	0.357
LDL-C（mmol/L）	3.04±0.38	3.05±0.31	0.831
HDL-C（mmol/L）	1.32±0.17	1.30±0.13	0.314
TG（mmol/L）	1.37±0.16	1.40±0.14	0.204
FPG（mmol/L）	5.18±0.60	5.20±0.51	0.781
PLR	132.31±15.19	153.36±15.12	<0.001
Gensini score	0 (1,1)	60.34 (54.16, 66.00)	<0.001

SBP：systolic blood pressure, DBP：diastolic blood pressure，TC：total cholesterol; LDL-C: low density lipoprotein cholesterol, HDL-C:high density lipoprotein cholesterol , TG:triglyceride, FPG: fasting blood glucose , PLR:Platelet-to-lymphocyte ratio.

Table-2: Variables in the Equation of Logistic.

Variables	B	S.E.	Wald	df	p-value	Exp (B)
Smoking history	0.340	0.425	0.641	1	0.423	1.405
Hypertension history	0.837	0.448	3.487	1	0.062	2.309
PLR	0.108	0.017	39.549	1	<0.001	1.114
Constant	-15.227	2.670	32.528	1	<0.001	<0.001

PLR:Platelet-to-lymphocyte ratio.

No differences were noted in gender, age, SBP, DBP, TC, LDL-C, HDL-C, TG, and FPG between the control group and the CHD group (p=0.933, 0.859, 0.858, 0.561, 0.3571, 0.831, 0.314, 0.204 and 0.781), as shown in Table-1. However, there were significant differences in smoking history and hypertension history between the above two groups (p=0.031 and 0.001) (Table-1). The PLR value and Gensini score in CHD group were higher than those in control group (both $p<0.001$) (Table-1).

PLR was an independent risk factor for CHD ($p<0.001$) (Table-2) using logistic regression analysis.

A significant positive correlation between PLR and Gensini score in CHD sufferers (r=0.510, $p< 0.001$) was noted on Spearman analysis.

Conclusion

PLR can be acquired simply and quickly from blood routine examination, and its level is related to CAL. PLR may provide certain reference values in judging CAL in non-DM sufferers with CHD. However, since the sample size of this study was small, prospective and multi-centre studies with large sample sizes are needed to further verify the conclusions of this study.

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