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A Study of Platelet Indices in Patients of Acute Coronary syndrome

Jainendra Sharma[1], Gurdeep Kaur[2], Ranjna Veerwal[3], Gaurav Sharma[4], Ravi Kumar[5], Bhavesh Joshi[6], Sathish S[7]

[1]Senior resident MD General medicine RNT Medical College,[2]Professor MD Medicine RNT Medical college, [3]Senior resident MD General Medicine RNT Medical College, [4]Senior resident DNB General Medicine RNT Medical College, [5]3rd year junior resident RNT Medical College, [6]3rd year junior resident RNT Medical College,[7]3rd year junior resident RNT Medical College

Corresponding author:- Gaurav Sharma Senior resident DNB General medicine RNT Medical College Udaipur

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ABSTRACT:Background: In the development of Acute Coronary Syndrome(ACS), platelets play a critical role in the formation of thrombus on the ruptured plaque and consequent progression to myocardial infarction. Mean platelet volume (MPV) is a measurement that describes the average size of platelet in the blood. Increase of MPV may contribute to increased prothrombotic tendency of atherosclerotic plaque and increased risk of intracoronary thrombus formation in ACS cases. In this study we want to show the association of platelet indices with acute coronary syndrome.

Methods: Case control study done among 200 cases and 200 controls in Department of Medicine & Cardiology, RNT Medical College and MB Hospital Udaipur, using Prestructured questionnaire pertaining to basic details,clinical findings and laboratory findings.Platelet indices were estimated, Data analyzed using SPSS V 20 and results interpreted in form of tables and graphs and significance attributed to P<0.05

Results: out of 200 cases and 200 controls, 61(30.5%) cases and 52(26%) controls belonged to age group of 71-80 years;131(65.5%) cases and 128(64%) controls were males. 137(68.5%) of the cases had radiating chest pain. 99(49.5%) cases were ST elevated Myocardial infarction (STEMI). Mean Platelet volume (MPV) was 9.03±1.78 in cases and 7.5±0.58 among controls and this difference is statistically significant(P<0.05). MPV among cases with Normal Ejection fraction(EF) is 9.15±1.6 fl and with those with impaired EF is 9.03±1.7 fl. This difference among MPV and EF was statistically significant.(<0.05)

Conclusion: Mean Platelet Volume (MPV), Platelet large cell ratio(PLCR) and Platelet distribution width(PDW) may be used as prognostic indicator for ACS.

Key words: Platelet indices, Acute coronary syndrome,Ejection Fraction, fl (femtoliter)

I. INTRODUCTION

Acute coronary syndrome (ACS) is a spectrum of conditions due to decreased blood flow in the coronary arteries such that part of the cardiac muscle is not able to function properly or dies and that is a result of platelet rich coronary thrombus formation. Acute coronary syndromes are a continuum of ischemic myocardial events that range from unstable angina to non- ST elevation Myocardial Infarction and ST-elevation MI[1]

In the development of ACS, platelets play a critical role in the formation of thrombus on the ruptured plaque and consequent progression to myocardial infarction. Platelet activation is the key step of pathogenesis of acute coronary syndrome.Alterations in these parameters may result as pulling the trigger of acute coronary syndrome and its spread[1] Increase of platelet volume may contribute to increased prothrombotic tendency of atherosclerotic plaque in acute coronary syndrome and increased risk of intracoronary thrombus formation in ACS cases.[2]

Platelet parameters especially MPV could be an important and reliable marker in early detection of ACS when other markers are not available.

This study was aimed for patients who had increased MPV and were more likely to have atherosclerotic coronary artery disease. Therefore, it was advised to treat other treatable risk factor (Ex: smoking, hypertension, diabetes, dyslipidaemia, etc) to prevent CVD.

II. AIMS AND OBJECTIVES

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To investigate and compare the association of platelet indices with the acute coronary syndrome in case and control group.

III. MATERIAL AND METHODS

It was a case-control study conducted in the Department of Medicine and Cardiology, RNT Medical College & associated MB hospital, Udaipur for a period of 6 months among 200 Patient with acute MI and unstable angina admitted in the cardiac intensive care unit and 200 control patient admitted in hospital for non-cardiac chest pain with no evidence of IHD in history. A Pre-structured Proforma was used to record the relevant information from individual case selected for the study. After clinical examination,relevant blood investigations required for study and ECG were done. Platelet indices (PI) — plateletcrit (PCT), mean platelet volume (MPV) and platelet distribution width (PDW) are taken into account.

Data captured was entered intoExcel and analysed using SPSS V.20. The results were either tabulated or shown as figures wherever necessary. Continuous variables were presented as Mean with Standard deviation, median and Categorical variables as proportions.Tests like Fisher's exact test or chi-square test or ANOVA were used as required. A difference was considered statistically significant if the P value was < 0.05 at 95% confidence intervals and 5% alpha error.

Inclusion Criteria for Case

Patient of acute MI and unstable angina

Inclusion Criteria for Control

Non-cardiac chest pain with no evidence of IHD in history, physical examination, ECG change, Cardiac enzyme derangement, constitute normal group (controls).

Exclusion Criteria for Case

1. Patients with serious hepatic and renal disease, those previously detected to have malignancy, and subjects receiving an anticoagulant, anti-inflammatory or antiplatelet therapy,septicemia,haematological disorders.
2. Those who refused giving consent.

IV. RESULTS

In our study,Out of 200 cases and 200 controls,61(30.5%) cases and 52(26%) controls belonged to age group of 71-80 years;131(65.5%) cases and 128(64%) controls were males.

It was observed that 137(68.5%) of the cases had radiating chest pain while all (100%) in control group had non-radiating chest pain. 137(68.5%) cases had chest pain as main complaints followed by epigastric discomfort(64.5%) while all (100%) controls had non radiating chest pain as main complaint followed by syncope(30%).

140(70%) cases ,65(32.5%) controls and 131(65.5%) cases,58(29%) controls reported to have DM2 and HTN respectively. (Table 1)

Table 1: Distribution of Case and Control according to Symptoms and History

		Case	Control
Chest pain	Yes (%)	137 (68.5)	200 (100)
	No (%)	63 (31.5)	0 (00
Dyspnea	Yes (%)	123 (61.5)	58 (29)
	No (%)	77 (38.5)	142 ()71
Epigastric Pain	Yes (%)	129 (64.5)	53 (26.5)
	No (%)	71 (35.5)	147 (73.5)
Sweating	Yes (%)	142 (71)	47 (23.5)
	No (%)	58 (29)	153 (76.5)
Dizziness	Yes (%)	114 (57)	57 (28.5)
	No (%)	86 (43)	143 (71.5)
Syncope	Yes (%)	78 (39)	60 (30)
	No (%)	122 (61)	140 (70)
H/o DM2	Yes(%)	140(70)	65(32.5)
	No(%)	60(30)	135(67.5)
H/o HTN	Yes(%)	131(65.5)	58(29)

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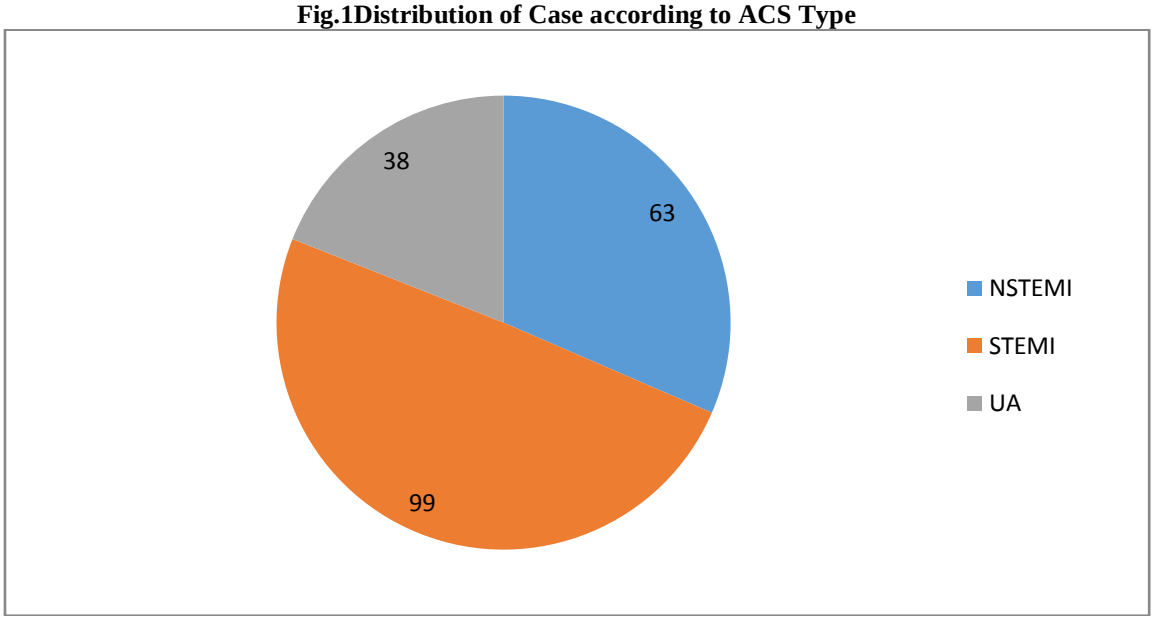
	No(%)	69(34.5)	142(72)
Alcohol	Yes (%)	83 (42.5)	48 (24)
	No (%)	117 (58.5)	152 (76)
Smoking	Yes (%)	80 (40)	47 (23.5)
	No (%)	120 (60)	153 (76.5)
Tobacco	Yes (%)	90 (45)	52 (26)
	No (%)	110 (55)	148 (74)

Out of 200 cases of ACS, 99(49.5%)cases were ST elevated Myocardial infarction(STEMI) followed by 63(31.5%) NSTEMI.(Figure 1)

Fig.1Distribution of Case according to ACS Type



Mean Platelet volume (MPV) was 9.03±1.78 in cases and 7.5±0.58 among controls and this difference is statistically significant(P<0.05). Similarly, The mean difference of PDW and PCT among STEMI, NSTEMI and UA was not statistically significant.(Table 2)

Table 2. Comparison of Different Platelet Indices with various ACS and Control group

ACS TYPE		Mean	Std. Deviation	P-value
Mean Platelet Volume(MPV) (6.5-12 fl)	STEMI	8.9	1.78	<0.05
	NSTEMI	8.7	1.56	
	Unstable Angina (UA)	8.2	1.75	
	Total	9.03	1.71	<0.05
	Control	7.5	0.58	
Platelet Distribution width(PDW) (9-17 fl)	STEMI	13.9	1.27	>0.05
	NSTEMI	13.9	1.18	
	UA	14.1	1.09	
	Total	13.9	1.20	<0.05
	Control	12.93	0.58	
Plateletcrit(PCT)	STEMI	2.7	0.8	>0.05

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(15-35%)	NSTEMI	2.8	0.70	
	UA	2.5	0.70	
	Total	2.7	0.74	<0.05
	Control	0.15	0.03	
Platelet large cell ratio(P_LCR) (0.1-0.2)	STEMI	29.5	1.50	<0.05
	NSTEMI	29.5	1.50	
	UA	29.58	1.6	
	Total	29.49	1.50	<0.05
	Control	23.6	1.41	

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MPV among cases with Normal Ejection fraction(EF) is 9.15±1.6 fl and with those with impaired EF is 9.03±1.7 fl. This difference among MPV and EF was statistically significant(<0.05) and same with Platelet large cell ratio(P_LCR)The difference among PDW and PCT in different EF were not statistically significant.

Table 3.Comparison of Ejection Fraction with Platelet Indices

Ejection Fraction		Mean	Std. Deviation	P-value
MPV	Normal(>55%)	9.1562	1.60928	>0.05
	Mildly Reduced(40-54%)	9.0948	1.65853	
	Moderately Reduced(<40%)	8.8976	1.83667	
	Total	9.0363	1.71150	
PDW	Normal	13.9923	1.19957	>0.05
	Mildly Reduced	14.0789	1.23442	
	Moderately Reduced	13.9197	1.19898	
	Total	13.9909	1.20597	
PCT	Normal	2.6848	.70158	>0.05
	Mildly Reduced	2.5808	.74120	
	Moderately Reduced	2.7506	.77200	
	Total	2.6782	.74160	
P_LCR	Normal	29.3717	1.51785	>0.05
	Mildly Reduced	29.6897	1.39194	
	Moderately Reduced	29.4145	1.59437	
	Total	29.4869	1.50977	

V. DISCUSSION

Our study had 259(64.7%) males included and similarly Zorlu et al[3] had 69.7% males in their study. In the current study, the majority of the patients had chest pain as the most common presenting symptom. Similarly, according to the study of Sah et al(2017)[4] chest pain was the most common presenting symptom

As per the present study MPV for case is significantly higher as compared to controls. Similar results were obtained by earlier studies by Pizzuli et al (1998)[5], Mirzaie et al. (2012)[6] Ulusoy et al. (2011)[7], and Ridvan et al. (2010)[8]. This shows that increased MPV was an indicator for larger and more active platelets and an independent risk factor for MI in coronary artery disease.

The current study showed that the difference among STEMI, NSTEMI and UA was not statistically significant in PDW and PCT while it was statistically significant among in MPV and P_LCR. However, according to the study of Patil and Karchi et al (2017)[9] there was statistically significant difference between among all the ACS type. Similar results were also found in the study of Venkatesan et al(2012)[10], Majumder et al(2018)[11]

In this study it was found that the difference among Ejection fractions was not statistically significant in PDW and PCT while it was statistically significant among in MPV and P_LCR. However, in the study of Walke and Nelson(2018)[12] it was found that all the factors of

ejection fraction showed statistically significant difference.

The distribution of PDW in ACS patients ranges from 11 to 15. The mean PDW of study participants were 13.99 with a SD of 1.20.The distribution of PDW in non ACS patients ranges from 8 to 13. The mean PDW of study participants were 12.93 with a SD of 0.58.The present study showed that there was significant association between Platelet Distribution Width and ACS. A cross sectional study done by Mappangara I et al(2016)[13] in Indonesia showed There was a significant positive correlation between PDW and ACS patients

The distribution of PCT in ACS patients ranges from 1.7 to 3.95. The distribution of PCT in non-ACS patients ranges from 1.1 to 3.6. The mean PCT of study participants were 2.19 with a SD of 0.539.Whereas in a cross-sectional study conducted by Çetin M et al (2014)[14]consisted 565 subjects which classifiedinto three groups and In Group containing STEMI cases, PDW and PCT weresignificantly higher than the other groups.

VI. CONCLUSION

Mean PlateletVolume(MPV),Platelet large cell ratio(PLCR) and Platelet distribution width(PDW) may be used as prognostic indicator for ACS. It was also found that Mean platelet volume may be of some help in eliciting the pro-thrombotic events, and hence can act as one of the biomarker in detecting and differentiating the occurrence of cardiac or non-cardiac chest pain.

REFERENCE

[1]. Amsterdam, E. A.; Wenger, N. K.; Brindis, R. G.; Casey, D. E.; Ganiats, T. G.; Holmes, D. R.; Jaffe, A. S.; Jneid, H.; Kelly, R. F.; Kontos, M. C.; Levine, G. N.; Liebson, P. R.; Mukherjee, D.; Peterson, E. D.; Sabatine, M. S.; Smalling, R. W.; Zieman, S. J. (23 September 2014). "2014 AHA/ACC Guideline for the Management of Patients With Non-ST-Elevation Acute Coronary Syndromes: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines". Circulation 130 (25): e344–e426.

[2]. Meier P, Lansky AJ, Baumbach A. Almanac 2013: acute coronary syndromes. Heart. 2013;99:1488-93

[3]. Zorlu A. et al. Red cell distribution width (RDW) and increased risk of recurrent acute coronary syndrome. Acta Medica Anatolia. 2015;3(2):39-46.

[4]. Sah VK. Prakash S. Kohli SC. Thyroid Hormone Profile in Patients with AcuteCoronary Syndrome. Journal ofEndocrinology and Thyroid Research. 2017;2(4)

[5]. Pizzulli L, Yang A, Martin JF, Luderitz B. Changes in platelet size and count in unstable angina compared to stable angina or non-cardiac chest pain.Eur Heart J 1998; 19:80-84

[6]. Ali Zare Mirzaie, Maryam Abolhasani, Bina Ahmadinejad, Mahshid Panahi Medical Journal of Islamic Republic of Iran, Vol. 26, No. 1, Feb. 2012, pp. 17-21

[7]. Ulusoy et al. June 2011 • Gulhane Med J 2011; 53: 114-118

[8]. Rıdvan Mercan , Cengiz Demir, İmdat Dilek, Müntecep Asker, Murat Atmaca ; Van Tıp Dergisi: 17 (3): 89-95, 2010

[9]. Patil K. Karchi SD. A Comparative Study of Platelet Indices in Acute Coronary Syndrome. International Journal of Contemporary Medical Research. 2015;4(3):657-60.

[10]. Dr. Venkatesan S. A study on mean platelet volume in acute coronary syndrome [dissertation]. Institute of internal medicine madras medical college Rajiv Gandhi government general hospital. Chennai. 2012.

[11]. Majumder B. et al. Study of platelet count and platelet volume indices in the spectrum of coronary artery diseases and its clinicopathological correlation. 2018;15(1):63-66

[12]. Walke A. Nelson SS. To Study Red Cell Indices and Platelet Indices in Acute Coronary Syndrome. International Journal of Contemporary Medical Research. 2018;5(2):77-83

[13]. Mappangara I, Mappahya A, Witjaksono S. The Comparative and Usefulness of Platelet Distribution Width in Acute Coronary Syndrome. The Indonesian Biomedical Journal. 2016;8(3).

[14]. Çetin M, Özcan Çetin E, Akdi A, Aras D, Topaloğlu S, Temizhan A et al. Platelet distribution width and plateletcrit: novel biomarkers of ST elevation myocardial infarction in young patients. Kardiologia Polska. 2014