



STUDY OF MEAN PLATELET VOLUME IN PATIENTS WITH ACUTE CORONARY SYNDROME

Dr. Saketh Reddy chinthakuntla¹, Dr. Nitin Jadhav^{2*}, Dr. Aparna Patange³, Dr. Jabbar Desai⁴, Dr. Rucha shetti⁵, Dr. Sushrut Patil⁶

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Abstract

Acute coronary syndrome (ACS) is one of the leading causes of mortality and morbidity worldwide. Atherosclerosis with plaque disruption and superimposed thrombosis is the common underlying cause. Coronary artery occlusion leads to clinical manifestations of unstable angina (UA) or acute myocardial infarction (AMI)^[1]. Platelet activation and aggregation have long been noted in the pathophysiology of coronary heart disease because platelets play an important role in contributing to thrombus formation after coronary plaque rupture. Mean Platelet Volume (MPV) is a simple and reliable thrombocyte size index, which correlates with platelet functional status, as a marker of the risk of atherothrombosis. In patients with non-ST elevation ACS, it has been shown that higher MPV indicates not only an increased risk of non-STEMI, but also ischemic complications.^[2] However, the association between MPV and the risk of acute coronary events, to the best of our knowledge, is under investigated. Hence present was carried out to find the mean platelet volume in patients with acute coronary syndrome. Aim: The aim of this study is to investigate whether there is an association between mean platelet volume (MPV) measurement and cardiac Troponin I (cardiac Troponin I) in patients admitted with a suspected diagnosis of ACS and to assess the potential diagnostic efficiency of MPV in the diagnostic workup for ACS

Material and methods: The study was conducted at KRISHNA INSTITUTE OF MEDICAL SCIENCES ON 96 patients who inclusive fulfill the criteria's were chosen as study subjects. Patients who are admitted in Medical Intensive Care Unit at Krishna hospital were included in the study. The main objective of this study was to study the association between mean platelet volume and acute coronary syndrome. At the time of registration, the baseline information was taken especially with respect to sociodemographic factors, clinical findings, and other investigations. Thus, each and every patient was followed up in till discharge. The data thus collected was analyzed to find role mean platelet volume in patients with acute coronary syndrome: a supportive diagnostic predictor. The collected data was compiled in Microsoft Excel 2010. Data describing quantitative measures was expressed as mean, median, mean + SD, standard deviation.

Qualitative type of data was expressed as percentage or proportion. Data was analyzed using SPSS (Statistical Package for Social Sciences) software 21 version, OpenEpi Software Version 2.3. For quantitative type of data test of significance applied was student t test and for Qualitative data Chi square test was applied.

Results: A total 96 patients were enrolled in this observational, comparative study, of them 48 patients were with Acute coronary syndrome (group I) and 48 were without Acute coronary syndrome (Group II).

Conclusion: This study concludes that there was significant association between mean platelet volume (MPV) and presence of Acute coronary syndrome. Mean platelet volume being simple, cost-effective tool that can be done along with biochemical cardiac markers to predict an impending adverse event in Atherosclerotic cardiovascular disease [ASCVD]. We suggest that along with ECG and other biochemical parameter of ACS [CPKMB, TROPI], mean platelet volume can be supportive diagnostic parameter in diagnosis of Acute coronary syndrome.

Keywords: Echocardiogram., Mean Platelet Volume , Acute coronary syndrome.

¹3rd year Resident, Department of medicine, Krishna vishwa vidyapeeth deemed to be university ,Karad , Satara, Maharashtra ,India

²Professor, Department of medicine, Krishna vishwa vidyapeeth deemed to be university ,Karad , Satara, Maharashtra ,India

³Associate Professor, Department of medicine, Krishna vishwavidyapeeth deemed to be university ,Karad , Satara, Maharashtra ,India

⁴Assistant Professor, Department of medicine, Krishna vishwavidyapeeth deemed to be university ,Karad , Satara, Maharashtra ,India

⁵3rd year Resident, Department of medicine, Krishna vishwavidyapeeth deemed to be university ,Karad , Satara, Maharashtra ,India

⁶3rd year Resident, Department of medicine, Krishna vishwavidyapeeth deemed to be university ,Karad , Satara, Maharashtra ,India

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1. Introduction

Acute coronary syndrome (ACS) is one of the leading causes of mortality and morbidity worldwide. Atherosclerosis with plaque disruption and superimposed thrombosis is the common underlying cause. The clinical use of mean platelet volume (MPV) is unknown. Although it is routinely measured in hematological auto-analyzers for more than a decade, many laboratories do not usually include this in the final report of complete blood count. The primary reason is the lack of standardization of this value.^[1] Another reason is the limited evidence that this measurement adds any valuable information in the clinical situation. Mean Platelet Volume (MPV) is a simple and reliable thrombocyte size index, which correlates with platelet functional status, as a marker of the risk of atherothrombosis. Previous evidence suggests MPV may be an independent risk factor for recurrent myocardial infarction of existing risk factors such as hypertension, dyslipidemia, increased fibrinogen, white blood cell count, or plasma viscosity.^[3] As MPV is an index of platelet size that correlates with platelet activation. In patients with non-ST elevation ACS, it has been shown that higher MPV indicates not only an increased risk of non-STEMI, but also ischemic complications.^[2] Particularly, the risk prediction for patients with non-ST-elevation ACS (NSTEMI-ACS), including unstable angina and non-ST-elevation myocardial infarction, can be challenging.

Aim: The aim of this study is to investigate whether there is an association between mean platelet volume (MPV) measurement and cardiac Troponin I (cardiac Troponin I) in patients admitted with a suspected diagnosis of ACS and to assess the potential diagnostic efficiency of MPV in the diagnostic workup for ACS

Material and methods: The study was conducted at KRISHNA INSTITUTE OF MEDICAL SCIENCES ON 96 patients who inclusive fulfill the criteria's were chosen as study subjects. Patients who are admitted in Medical Intensive Care Unit at

Krishna hospital were included in the study. The main objective of this study was to study the association between mean platelet volume and acute coronary syndrome. At the time of registration, the baseline information was taken especially with respect to sociodemographic factors, clinical findings, and other investigations. Thus, each and every patient was followed up in till discharge. The data thus collected was analyzed to find role mean platelet volume in patients with acute coronary syndrome: a supportive diagnostic predictor

Inclusion criteria:

The patients who presented in the hospital with chest pain consistent with ACS with any of following features were added in the case group:

- a. Electrocardiogram (ECG) changes:
 - i. ST elevation
 - ii. ST depression
 - iii. T wave inversion.

b. Troponin I elevation.

The collected data was compiled in Microsoft Excel 2010. Data describing quantitative measures was expressed as mean, median, mean + SD, standard deviation.

Qualitative type of data was expressed as percentage or proportion. Data was analyzed using SPSS (Statistical Package for Social Sciences) software 21 version, OpenEpi Software Version 2.3. For quantitative type of data test of significance applied was student t test and for Qualitative data Chi square test was applied.

2. Results

A total 96 patients were enrolled in this observational, comparative study, of them 48 patients were with Acute coronary syndrome (group I) and 48 were without Acute coronary syndrome (Group II).

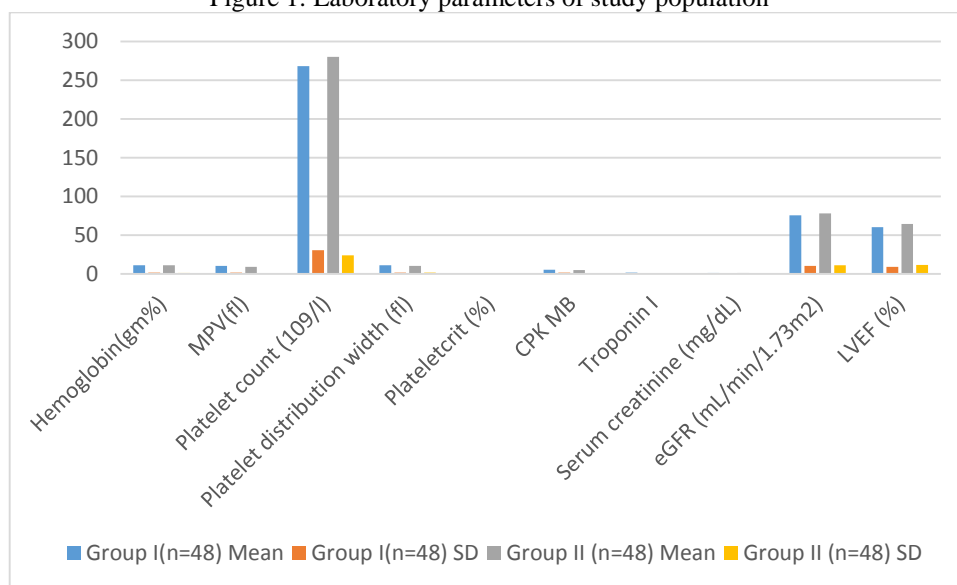
Group I- patients with Acute coronary syndrome
Group II- patients without Acute coronary syndrome

Table 1: Laboratory parameters of study population

Variables	Group I(n=48) (WITH ACS)		Group II (n=48) (WITHOUT ACS)		P value
	Mean	SD (±)	Mean	SD (±)	
Hemoglobin(gm%)	10.9	1.3	10.8	1.1	In significant

MPV (fl)	10.1	1.5	8.8	0.6	<0.0001
Platelet count (109/l)	268.2	30.5	280.3	23.9	In significant
Platelet distribution width (fl)	11	1.3	10.11	1.4	<0.001
Plateletcrit (%)	0.3	0.1	0.2	0.1	<0.0001
CPK MB	5.3	1.5	4.7	0.7	0.01
Troponin I	1.3	0.7	0.8	0.3	<0.0001
Serum creatinine (mg/dL)	0.9	0.3	0.9	0.2	In significant
eGFR (mL/min/1.73m2)	75.6	10.2	77.9	10.8	In significant
LVEF (%)	60.3	8.7	64.4	11.5	In significant

Figure 1: Laboratory parameters of study population



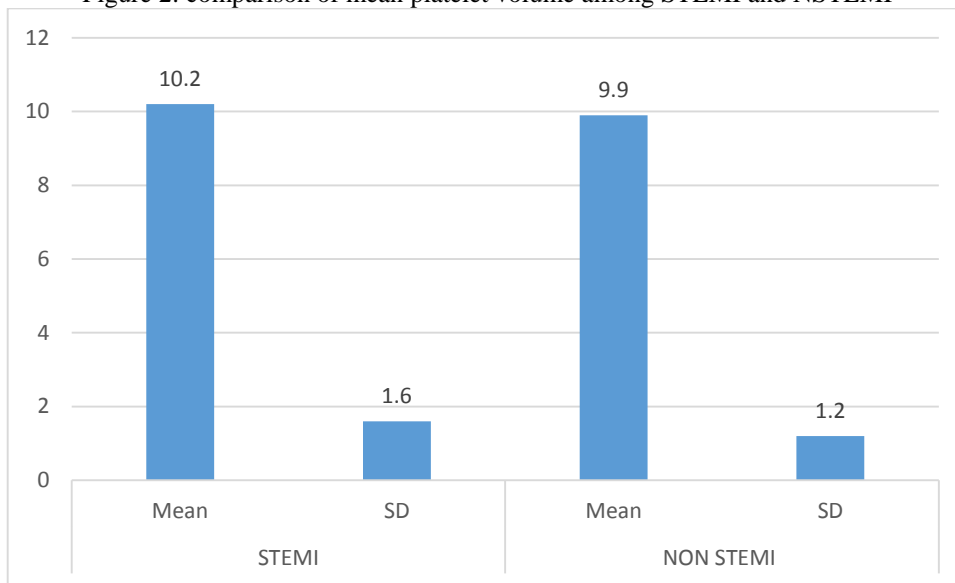
On laboratory investigations, all mean values of Group II were on a higher range as compared to Group I. statistical significance was seen for MPV, Platelet distribution width, Plateletcrit, CPK MB

and troponin I, Mean MPV of Group I was 10.1(±1.5) and of Group II was 8.8 (±0.6) and troponin I of Group I was 1.3(±0.7) and of Group II was 0.8 (±0.3)

Table 2: comparison of mean platelet volume among STEMI and NSTEMI

Parameter	STEMI		NON-STEMI		P value
	Mean	SD (±)	Mean	SD (±)	
MPV (fl)	10.2	1.6	9.9	1.2	0.3

Figure 2: comparison of mean platelet volume among STEMI and NSTEMI



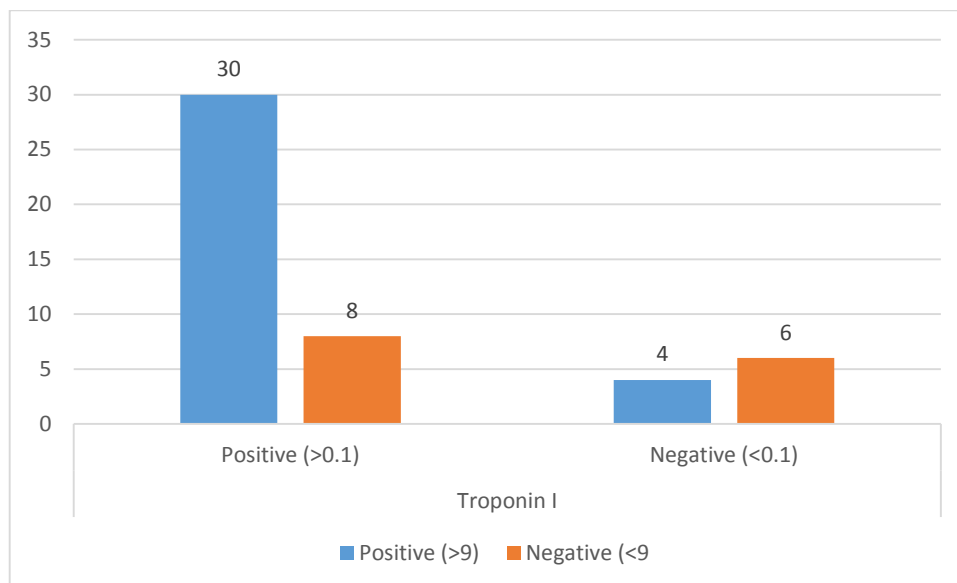
Mean platelet volume among ACS group was compared (between STEMI and NSTEMI). Mean MPV among STEMI was 10.2(±1.6) fl and among non-STEMI was 9.9(±1.2) fl .P value of 0.3 was

obtained showing there was no significant statistical association of MPV among STEMI and NSTEMI

Table 3: Correlation between MPV and troponin I among ACS patients

MPV	Troponin I		Total
	Positive (>0.1)	Negative (<0.1)	
Positive (>9)	30	4	34
Negative (<9)	8	6	14
Total	38	10	48

Figure 3: Correlation between MPV and troponin I among ACS patients



This bar graph shows Sensitivity of 78.9%, specificity of 60% for correlation of MPV and troponin I among ACS patients

Positive correlation was seen between MPV and Troponin I. Significant cases having positive MPV were even positive for troponin I. Applying chi square test, chi value 5.8 and p value 0.0001, shows statistical significance.

3. Discussion

Laboratory investigation

On laboratory investigations, all mean values of Group II were on a higher range as compared to Group I. statistical significance was seen for MPV, Platelet distribution width, Plateletcrit, CPK MB and troponin I, Mean MPV of Group I was 10.1(\pm 1.5) and of Group II was 8.8 (\pm 0.6) and troponin I of Group I was 1.3(\pm 0.7) and of Group II was 0.8 (\pm 0.3)

Study by Abubakar et al [4] showed that the MPV of patients with ACS was increased at 8.3 fL compared to 7.3 fL in patients not diagnosed with ACS. Similar results were seen in present study. Study by Susmitha MS et al [5] showed that mean MPV of 10.03(\pm 1.04) fL, Platelet count of 250(\pm 89) \times 10⁹ /L, LCR of 26.4(\pm 8.9), PDW of 12.9(\pm 2.7) were observed in ACS Group and no significant difference of Platelet count, P-LCR and PDW among study and control Groups. Study by Pal R et al [6] showed that mean platelet volume (MPV) was, 11.44(\pm 1.23) vs 9.91(\pm 1.27) fl (p-value<0.001). Huang HL et al [7] showed that mean MPV was 10.7 (\pm 0.80) fL vs 10.0 (\pm 0.64) fL, p=0.03.

Mean MPV among STEMI and Non-STEMI

Mean platelet volume among ACS group was compared (between STEMI and NSTEMI). Mean

MPV among STEMI was 10.2(\pm 1.6) fl and among non-STEMI was 9.9(\pm 1.2) fl .P value of 0.3 was obtained showing there was no significant statistical association of MPV among STEMI and NSTEMI

Correlation between MPV and Troponin I

Positive correlation was seen between MPV and Troponin I. Significant cases having positive MPV were even positive for troponin I. Applying chi square test, p value 0.0001, shows statistical significance.correlation of MPV and troponin I among ACS patients showed sensitivity of 78.9%, specificity of 60%

Study by D Aryanto et al [8] showed no statistical significance with hypertension, and other laboratory parameters. Whereas strong association was seen in present study. 92% sensitivity and 71% specificity were noted by D Aryanto et al. [8] Study by Abubakar et al [4] showed that positive predictive value and specificity for ACS were 100%, sensitivity of 43.6 and a negative predictive value of 46.2. Study by Susmitha MS et al [5] showed significant difference was observed for MPV of ACS and control Groups with p value of 0.025. Study by Pal R et al [6] showed negative predictive value of 82.53%. study by Wang et al [9] showed that higher MPV is independently associated with higher risk of plaque rupture

4. Conclusion

This study concludes that there was significant association between mean platelet volume (MPV) and presence of Acute coronary syndrome. Mean platelet volume being simple, cost-effective tool that can be done along with biochemical cardiac markers to predict an impending adverse event in Atherosclerotic cardiovascular disease [ASCVD].

We suggest that along with ECG and other biochemical parameter of ACS [CPKMB,TROPI], mean platelet volume can be supportive diagnostic parameter in diagnosis of Acute coronary syndrome. Thus, MPV marker can be used as a screening test in diagnosing ACS

5. References

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