

Mean Platelet Volume as A Diagnostic Predictor in Myocardial Infarction

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Abstract

Background: Platelets play a pivotal role in both hemostasis and thrombosis. Mean platelet volume (MPV) is a measure of the average size of your platelets. Mean platelet volume (MPV) has been found to be an independent risk factor in western populations and also from Indian Data. **Aims:** To investigate whether there is association between Mean Platelet Volume (MPV) and Cardiac Troponins (C Tn I) in patients admitted with suspected case of Myocardial infarction. To Assess the potential efficiency of MPV in the diagnostic workup of Myocardial infarction. **Methodology:** 100 patients admitted in SDM Medical College and Hospital casualty and CCU of Narayana Hrudayala were included in this study after taking informed consent. **Results:** In our study, we found that only 5 % of patients has MPV Value more than 11.5 out of 100 patients, 20 % of patients has MPV value more than 10. It is observed that it MPV is higher in males with mean value of 9.27 compared to females which is 8.946. where as Troponin-I is higher in females with mean value 5.089 in comparison with females which is 5.303. **Conclusion:** Mean platelet volume (MPV) has been found to be an independent risk factor in western populations and also from Indian Data. Hence we thought it appropriate to look at this parameter in Indian patients with history of MI or CAD.

Keywords: Myocardial Infarction; Mean Platelet Volume; Troponin.

Introduction

Mean Platelet Volume: Mean platelet volume (MPV) is a measure of the average size of your platelets, a type of blood cell that helps prevent bleeding. MPV is particularly important in determining the cause of thrombocytopenia or thrombocytosis and it can be a useful diagnostic tool even if your platelet count is normal.

When an injury occurs, platelets aggregate to plug the wound and send hormone signals through the blood to attract protein clotting factors, which assist in repairing the injury.¹

Platelet count is measured as a part of the complete blood cell count (CBC) with automated blood cell counters along with in most analysers the mean platelet volume (MPV).

MPV is an analyzer-calculated measure of thrombocyte (platelet) size, determined directly from analysis of the platelet size-distribution curve.

The MPV normal range (expressed in femtoliters (fl)).

Myocardial infarction (MI) and coronary artery disease (CAD) is a significant cause for morbidity and mortality even in developing countries like India. Significant risk factors such as diabetes, hypertension, smoking, hypercholesterolemia and lifestyle have been already studied. (Fig. 1)

The term myocardial injury should be used when there is evidence of elevated cardiac troponin values (cTn) with at least one value above the 99th percentile upper reference limit (URL). The myocardial injury is considered acute if there is a rise and /or fall of cTn values. (Fig. 2)

The aim of the study is to investigate whether there is association between Mean Platelet Volume (MPV) and Cardiac Troponins (C Tn I) in patients admitted with suspected case of Myocardial infarction and To Assess the potential efficiency of MPV in the diagnostic workup of Myocardial infarction. (Fig. 4)

Materials and Methods

The present study will be carried out in the patients admitted to Emergency Department and Cardiac Care Unit attached to Department of General Medicine, Sdm College Of Medical Sciences And Hospital, Sattur, Dharwad.

Sample size : 100 patients admitted to Emergency Department and Cardiac Care Unit in SDM Hospital from November 2017 to November 2018 will be subjected for the study.

Study Design: An observational, descriptive, comparative study.

Inclusion criteria

ACS was diagnosed based on the presence of either of the criteria:

1. Detection of rise in cardiac biomarker Trop I > 0.01 for acute myocardial infarction.
2. For Unstable Angina where Trop I is < 0.01 , with atleast one of the following four:
 - a. Typical symptom of ischemia.
 - b. ECG changes indicative of new ischemia.
 - c. Development of pathological Q wave in the ECG.
 - D. Echocardiographic evidence of new regional wall motion abnormality.

Exclusion criteria

1. Patients with chest pain of > 6 hrs .
2. Critically ill patients (ACS associated with Renal Failure, Hepatic Failure, Myeloproliferative disorder or Malignancy).
3. Patients having any platelet disorder as Thrombocytopenia or Thrombocytosis.
4. Patients with any Clotting or Bleeding Disorder.
5. Patients with Antiplatelet Therapy.

Statistical analysis:

- Student t- test.
- Chi square test.

Collection of data (including sampling procedure, if any):

A pretested proforma meeting the objectives of the study is prepared. The cases for the study are

selected in accordance with the above mentioned inclusion and exclusion criteria.

The data is collected according to the proforma in terms of detailed history, clinical examination and the necessary investigations. The following investigations will be carried out.

Investigations Required:

Blood sample for :

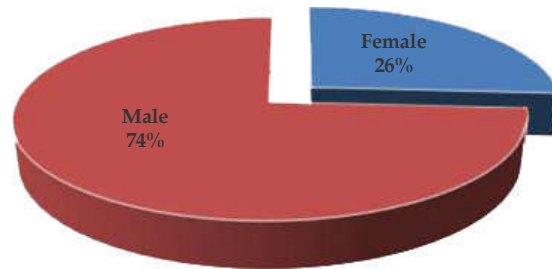
1. Trop I sample.
2. CKMB
3. BNP
4. 2 D ECHO
5. 12 Lead ECG.

Ethical clearance was obtained by the ethical committee of Shri Dharmasthala Manjunatheshwara College Of Medical Sciences and Hospital ,Dharwad ref :SDMIEC:0349:2017

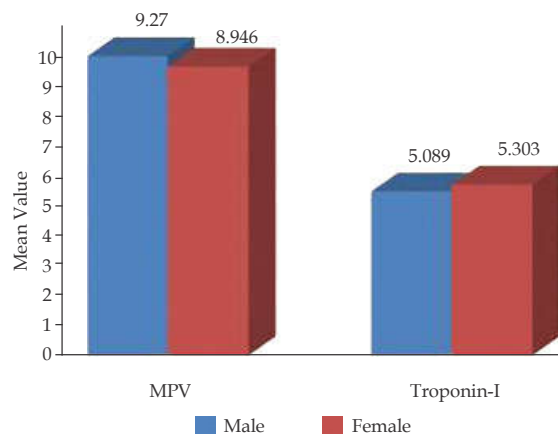
Results

100 patients admitted in SDM Medical College and Hospital casualty and CCU of Narayana Hrudayala were included in this study after taking informed consent.

In the study group of 100 patients, 74 patients were male and 26 were female. (Graph 1)



Graph 1: Gender Distribution.



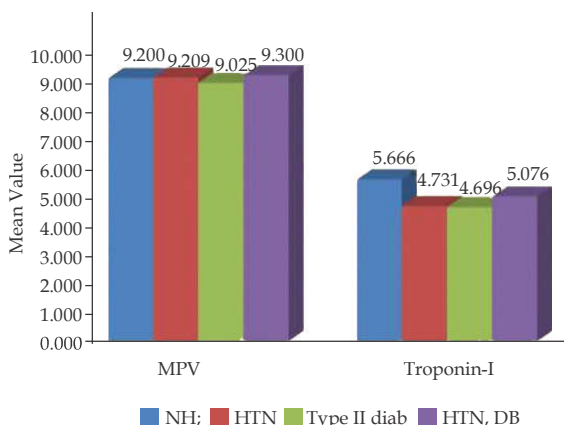
Graph 2: Comparison of MPV With Troponin-I Genderwise.

Table 1: Statistics.

Statistics	Age	MPV	TROPONIN -I	CK-MB	BNP	Creatinine	HB	TLC	Platelet Count
N	100	100	100	100	100	100	100	100	100
Mean	59.020	9.186	5.145	20.224	406.261	1.056	13.443	10592.900	2.911
Median	60.000	8.800	2.075	10.850	177.000	.945	13.600	9600.000	2.895
Std. Deviation	12.149	1.573	7.134	22.599	565.000	.625	2.391	3483.838	.957
Range	54.000	7.200	29.950	79.000	3255.000	5.840	12.500	20330.000	4.460
Minimum	30.000	6.600	.050	1.000	5.000	.400	6.300	4470.000	.630
Maximum	84.000	13.800	30.000	80.000	3260.000	6.240	18.800	24800.000	5.090
Percentiles	25	49.000	8.100	.153	3.613	50.125	.800	8100.000	2.243
	75	67.000	10.300	7.368	28.300	551.250	1.200	12845.000	3.573

From the above graph it is observed that MPV is higher in males with mean value of 9.27 compared to females which is 8.946. (Graph 2)

Where as Troponin-I is higher in females with mean value 5.089 in comparison with females which is 5.303.



Graph 3: Comparison of Mean MPV and Troponin-I, Comorbidity wise.

It is observed that out of 100 patients, MPV is higher in patients with type 2DM and HT with mean value of 9.300 followed by patients with HTN alone with mean value of 9.029, followed by patients with no comorbidities with mean value of 9.200 followed by type 2 DM which is 9.025. where as troponin -I was higher in patients with no comorbidities with mean value of 5.666, followed by patients with type 2 DM and HTN with mean value of 5.076, followed by HTN with mean value of 4.731, followed by type 2 DM with mean value of 4.696. (Graph 3) (Table 1)

Table 2: Gender.

Gender	Frequency	Percent
Female	26	26.0
Male	74	74.0
Total	100	100.0

Table 3: Complaints

Complaints	Frequency	Percent
Chest Pain	20	20.0
Chest Pain Associated with Sweating	1	1.0

Chest Pain Radiating To Neck	1	1.0
Chest Pain, Sweating	1	1.0
Chest Pain and Discomfort, Vomiting	1	1.0
Chest Pain, Dyspnea	4	4.0
Chest Pain, Dyspnea On Exertion	1	1.0
Chest Pain, Giddiness	6	5.0
Dyspnoea On Exertion	2	2.0
Breathlessness On Exertion	1	1.0
Breathlessness, Dry Cough	1	1.0
Breathlessness, Sweating	1	1.0
Chest Pain Radiating To Back	1	1.0
Chest Pain, Epigastric Discomfort	1	1.0
Chest Pain, Fatigue	1	1.0
Epigastric Discomfort	2	2.0
Epigastric Discomfort, Vomiting	1	1.0
Breathlessness On Exertion	1	1.0
Chest Discomfort, Vomiting, Dyspnoea	1	1.0
Chest Pain , Sweating, Giddiness	1	1.0
Chest Pain Associated With Sweating	3	3.0
Chest Pain Radiating To Back	2	2.0
Chest Pain Radiating To Back, Sweating	1	1.0
Chest Pain, Vomiting	1	1.0
Dyspnoea On Exertion, Chest Pain	2	2.0
Dyspnoea On Exertion, Giddiness	1	1.0
Retrosternal Chest Pain	1	1.0
Retrosternal Chest Pain, Dyspnea	2	2.0
Breathlessness, Dry Cough	1	1.0
Breathlessness, Giddiness	1	1.0
Chest Pain Radiating To Left Arm	4	4.0
Dyspnoea On Exertion, Dry Cough	1	1.0
Retrosternal Chest Pain, Breathlessness	1	1.0
Sudden Onset Breathlessness	1	1.0
Breathlessness On Exertion, Vomiting	1	1.0
Chest Pain Radiating To Back	1	1.0
Chest Pain Radiating To Back, Sweating	1	1.0
Chest Pain Radiating To Both Upper Arms	5	5.0
Chest Pain Radiating To Left Arm	8	8.0
Chest Pain Radiating To Left Upper Arm	1	1.0
Chest Pain Radiating To Right Arm	1	1.0
Chest Pain, Breathlessness	9	9.0
Chest Pain, Giddiness	2	2.0
Total	100	100.0