**Journal Of Medical Science And Clinical Research**
IGM Publication       An Official Publication Of IGM Publication

# Study of Mean Platelet Volume in Acute Coronary Syndrome

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## Abstract
**Background:** *As the initial step in pathogenesis of Acute coronary syndrome is plaque erosion, rupture and thrombus formation. Mean platelet volume (MPV) correlates with platelet function and activation. Mean platelet volume can be used as a diagnostic parameter in patients with Acute Coronary syndrome. The primary objective of this study is to find out the association between mean platelet volume and Acute Coronary syndrome.*
**Methods:** *Our study included 50 cases with acute coronary syndrome and 50 controls who were selected based on inclusion and exclusion criteria. Mean platelet volume estimated by auto-analyser is compared between ST-elevation Myocardial infarction, Non- ST-elevation Myocardial infarction and control group.*
**Results:** *The mean value of mean platelet volume among those with diagnosis STEMI, NSTEMI and CONTROL was 11.09 ± 1.046 fl, 10.5 ± 0.54fl, and 7.84 ± 0.375 fl respectively. The mean was found to be statistically significant for each diagnosis.*
**Conclusion:** *Our study concluded that mean platelet volume is higher in patients with STEMI than NSTEMI but in control group mean platelet volume found to be normal .Hence mean platelet volume can be used as a diagnostic marker in Acute coronary syndrome.*
**Keywords:** *Acute coronary syndrome, STEMI, NSTEMI, Mean platelet volume.*

## Introduction
Acute coronary syndrome consists of unstable angina, STEMI and NSTEMI. Almost all cases of coronary artery disease is caused by atherosclerosis. After rupture of atherosclerotic plaque in the coronary artery, there is platelet adhesion, activation and aggregation of platelets which leads to formation of thrombus and ultimately resulting in acute myocardial infarction[1]. Large platelets are more active and more adhesive and tend to aggregate more than smaller ones[2]. Procoagulant properties of large platelets are due to abundance dense granules which contains ADP, P-selectin, Gp IIIa and

serotonin[3]. Coarsh et al[4] suggested that large platelets are metabolically and enzymatically more active than small platelets as assessed by invitro aggregometry. Mean platelet volume measures average size of platelets in circulating blood. Normal range of mean platelet volume is 7-9 fL[5]. The aim of our study is to determine the association between mean platelet volume and acute coronary syndrome

## Methods

The first 50 patients who were admitted with Acute coronary syndrome based on selection criteria in the department of general medicine in Rajah Muthiah medical college and hospital were taken for this study. We also took 50 healthy attenders of inpatients with corresponding age and sex who met the exclusion was taken into the study as a control group.

**Inclusion Criteria:** Patients who presented with chest pain lasting 20 minutes or more with CK-MB ≥40 IU/L or Trop-I positive and ECG showing ST-elevation or ST-depression.

**Exclusion Criteria:** Our study excludes patients with history of Cerebrovascular accidents, Coronary artery disease, Type 2 diabetes mellitus, Systemic hypertension, chronic kidney disease and history of platelet disorders.
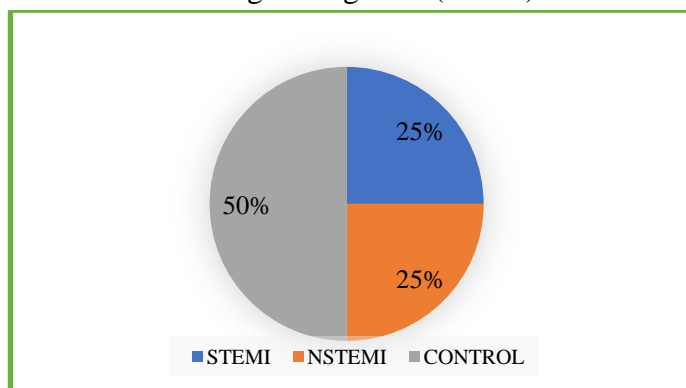
## Results

Total number of study participants enrolled into the study was 100.

**Table 1:** Distribution of study participants according to diagnosis (n=100)

| Diagnosis | Frequency | Percentage |
|-----------|-----------|------------|
| STEMI | 25 | 25.0 |
| NSTEMI | 25 | 25.0 |
| CONTROL | 50 | 50.0 |
| Total | 100 | 100 |

**Fig 1:** Pie chart showing distribution according to diagnosis (n=100)
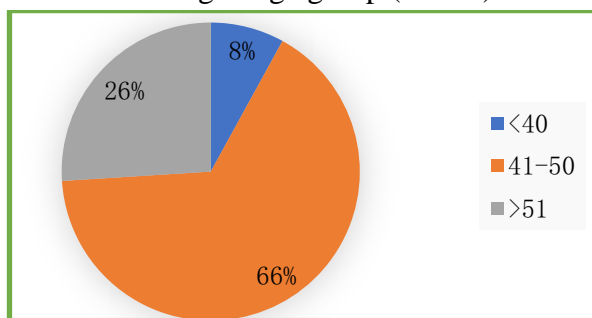


Out of 100 study participants 50% belonged to control group, 25% with STEMI, and 25% with NSTEMI.

**Table 2:** Distribution of study participants according to age group (n=100)

| Age (years) | Frequency | Percentage (%) |
|-------------|-----------|----------------|
| <40 | 8 | 8.0 |
| 41-50 | 66 | 66.0 |
| >51 | 26 | 26.0 |
| Total | 100 | 100 |

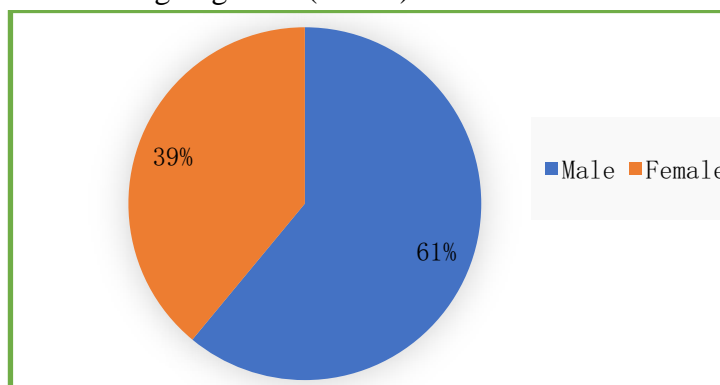**Fig 2:** Pie chart showing distribution according to age group (n=100)



Among the 100 study participants 8% were less than 40 years old group, 66% were 41 to 50 years old group, 26% were more than 51 years group.

**Table 3:** Distribution of study participants according to gender (n=100)

| Diagnosis | Frequency |
|---|---|
| Male | 61 |
| Female | 39 |

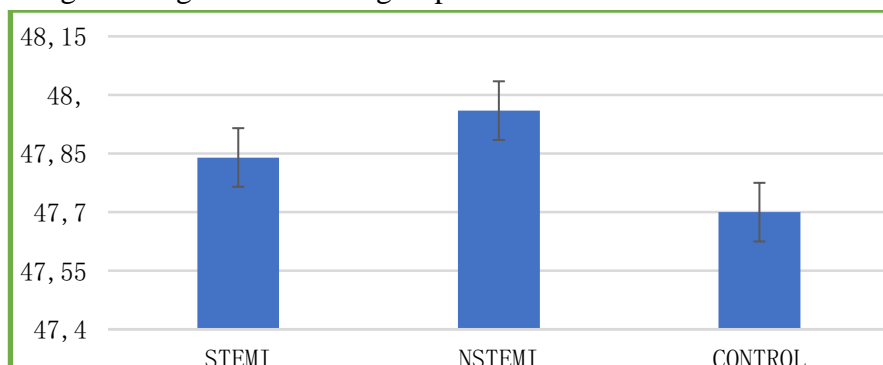**Fig 3:** Pie chart showing the according to gender (n=100)



Among 100 study participants 61 were males and 39 were females

**Table 4:** Comparison of mean age between STEMI, NSTEMI and CONTROL (n=100)

| Diagnosis | Age in years | | F value | P value |
|---|---|---|---|---|
| | Mean | SD | | |
| STEMI | 47.84 | 4.048 | .026 | .974 |
| NSTEMI | 47.96 | 5.358 | | |
| CONTROL | 47.70 | 4.709 | | |

**Fig 4:** Bar chart showing mean age between the groups.



The mean age among those with diagnosis STEMI, NSTEMI and control was 47.84 ± 4.048 years, 47.96 ± 5.358 years and 47.70 ± 4.709 years, respectively. All the three were similar with respect to age.

**Table 5:** Distribution of sex and diagnosis (n=100)

| Diagnosis | Male | | Female | |
|---|---|---|---|---|
| | N | % | N | % |
| STEMI | 17 | 27.9 | 8 | 20.5 |
| NSTEMI | 15 | 24.6 | 10 | 25.6 |
| CONTROL | 29 | 47.5 | 21 | 53.8 |
| Total | 61 | 100 | 39 | 100 |

X2 – 0.715  df – 2   P value – 0.700

**Fig 5:** Compound bar chart showing distribution of sex and diagnosis
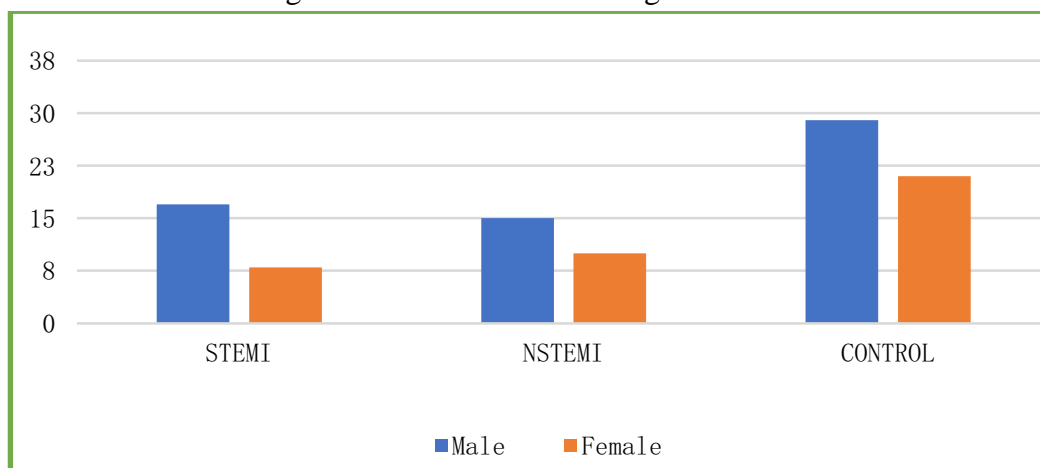


61% of the study participants were males and 39% were females. Among the males, 27.9% had STEMI, 24.6% had NSTEMI. Among the females, 20.5% had NSTEMI, 25.6% HAD NSTEMI. This association was not statistically significant.

**Table 6:** Comparison of mean platelet count volume between STEMI, NSTEMI, CONTROL (n=100)

| Diagnosis | Mean Platelet Volume | | F value | P value |
|---|---|---|---|---|
| | Mean | SD | | |
| STEMI | 11.09 | 1.046 | 115.539 | < 0.001 |
| NSTEMI | 10.5 | 0.54 | | |
| CONTROL | 7.84 | 0.375 | | |

**Fig 6:** Bar chart showing mean platelet count volume between the groups
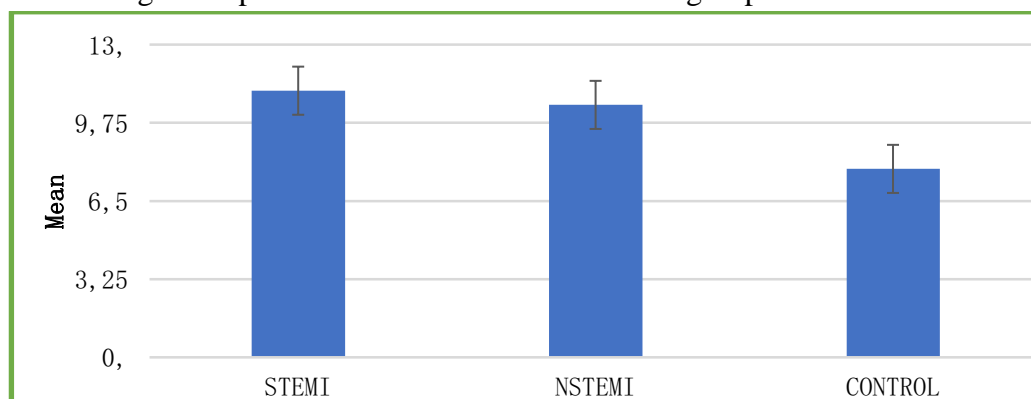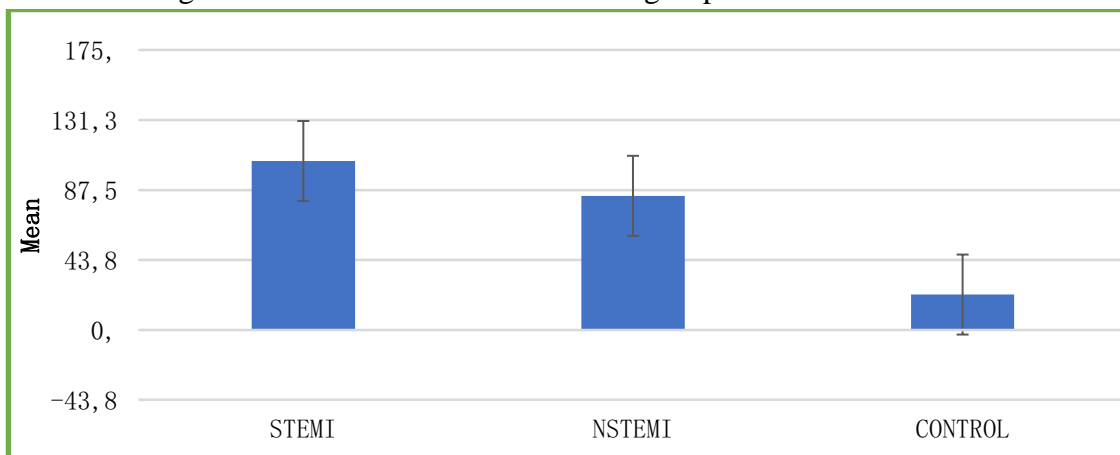


The mean value of mean platelet volume among those with diagnosis STEMI, NSTEMI and CONTROL was 11.09 ± 1.046 fl, 10.5± 0.54fl, and 7.84 ± 0.375fl respectively. The mean was found to be statistically significant for each diagnosis.

**Table 7:** Comparison of mean values CK-MB between STEMI, NSTEMI, CONTROL (n=100)

| Diagnosis | Mean platelet volume | | F value | P value |
|---|---|---|---|---|
| | Mean | SD | | |
| STEMI | 105.60 | 10.45 | 224.706 | <.001 |
| NSTEMI | 83.84 | 10.119 | | |
| CONTROL | 22.10 | 6.482 | | |

**Fig 7:** Bar chart showing mean values CK-MB between the groups



The mean value of mean CK-MB among those with diagnosis STEMI, NSTEMI and CONTROL was 105.60 ± 10.45 IU/L, 83.84 ± 10.119 IU/L and 22.10 ± 6.42 IU/L, respectively. The mean was found to be statistically significant for each diagnosis

**Discussion**

The study done by Randheer et al evaluated 215 patients and results showed that mean platelet volume (MPV) was found to be higher among ACS patients as compared to non-ACS, 11.44±1.23 vs 9.91±1.27 fl (p-value<0.001)[6]. In another study done by pervin et al, showed results similar to our study (MPV higher in ACS than Non-ACS)[7].The study done by A Mathur et al and AS Assiri et al are also in concordance with this study[8,9]. This study also compares mean platelet volume among STEMI and NSTEMI case groups. The result showed that mean value of MPV in STEMI is 10.32±0.77932 which was greater than the mean value of MPV in NSTEMI which was 9.22±0.52743 and It was statistically significant (P<0.05).Other studies comparing the MPV in STEMI and NSTEMI was conducted by Rifat et al and the study showed that the difference in mean platelet volume in STEMI and

NSTEMI was 8.7±1 and 7.9±0.7 fl (p<0.01) respectively and it is statistically significant and concordance with this study[10].

**Conclusion**

In this study mean platelet volume was higher in ACS than in control group and in particular mean platelet volume was higher among patients with STEMI than NSTEMI (case groups).Large platelets are more active haeomostatically and leads to development of coronary thrombosis. Hence this study showed that mean platelet volume might be useful as an additional diagnostic tool in addition to other diagnostic marker on early detection of myocardial infarction.

**Conflict of interest:** None to declare

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