A STUDY ON PLATELET COUNT AND INDICES IN ACUTE CORONARY SYNDROME

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ABSTRACT

BACKGROUND

Acute coronary syndrome is a set of signs and symptoms due to rupture of a plaque and is a consequence of platelet rich coronary thrombus formation. Platelet parameters, especially MPV could be an important and reliable marker in early detection of acute coronary syndrome when other markers are not available.

Aim- To study the effect of platelet count and their indices, platelet volume and platelet distribution width and their prognostic significance in acute coronary syndrome.

MATERIALS AND METHODS

This was a case control study, and sample size was taken for convenience. Patients admitted to Rajiv Gandhi Government General Hospital, Madras Medical College, Chennai during the period extending from April 2016 to September 2016, were included in the study for convenience sake. A total of 100 patients were included in the study, in which 50 patients were cases admitted with chest pain and diagnosed as ACS. The control group considered of 50 age matched subjects who were admitted for chest pain evaluation and subsequently found to be non-cardiac chest pain after performing relevant investigations. Blood samples were taken at the time of admission for platelet parameters.

RESULTS

A total of 50 patients with acute myocardial infarction and 50 age matched controls were studied. The mean platelet count of the cases was 4.98 ± 0.23 lakhs/mm³ and that of controls was 1.29 ± 0.42 lakhs/mm³. Mean Platelet Volume (MPV) was significantly elevated in acute myocardial infarction (10.2 ± 1.1 femtolitres) when compared with controls (8.29 ± 0.9 femtolitres).

CONCLUSION

Platelet parameters mainly MPV and PDW are readily available and relatively simple and inexpensive laboratory tests, which were detected to be significantly raised in patients who have suffered an acute coronary syndrome.

KEYWORDS

Platelet Count, Mean Platelet Volume, Platelet Distribution Width in Acute Coronary Syndrome.

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BACKGROUND

Myocardial infarction is a major cause of morbidity and mortality in the world. Despite the impressive strides in diagnosis and management over the past four decades, acute myocardial infarction continues to be a major public health problem in industrialised world and is becoming an increasingly important problem in developing countries.¹ In United States² 13 million individuals have ischaemic heart disease, > 6 million have angina pectoris and > 7 million have persistent myocardial infarction. Because acute myocardial infarction may strike an individual during productive years, it can have profoundly deleterious psychosocial and economic ramifications.

After rupture of an atherosclerotic plaque in a coronary artery there is platelet adhesion, activation and aggregation

leading to the formation of a thrombus and ultimately culminating in acute myocardial infarction. So the more reactive the platelets are, higher the chances for myocardial infarction.

Assiri et al¹ stated that platelet parameters, mainly MPV and PDW are inexpensive lab tests which we detected to be significantly raised in patients suffering from acute coronary syndrome compared with controls.

Jasmine Jasani et al² stated that acute coronary syndrome had higher platelet volume indices and lower platelet counts compared with those with stable angina and normal population. Measurements of platelet volume indices and platelet count benefit in detecting patients at higher risk for coronary events

SC Costa et al³ states that platelet indices as additional and complementary marker as thrombotic risk in acute coronary syndrome. So, in this observational study associations between platelet counts, mean platelet volume and platelet distribution width as thrombotic risk in acute coronary syndrome were investigated in tertiary care hospital.

MATERIALS AND METHODS

This was a case control study, and the sample size was taken for convenience. Patients admitted to Rajiv Gandhi

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Government General Hospital, Madras Medical College, Chennai during the period extending from April 2016 to September 2016, were included in the study for convenience sake. Total of 100 patients were included in the study, in which 50 patients were cases admitted with chest pain and diagnosed as ACS study site. This was conducted among patients admitted in Internal Medicine and Cardiology wards of Rajiv Gandhi Government General Hospital, Chennai during the period extending from April 2016 to September 2016.

Sampling Method

Convenient sampling technique was used.

Cases

Cases were defined as those patients admitted in RGGGH Internal Medicine and Cardiology wards with chest pain and diagnosed as ACS.

Controls

Controls were age and sex matched patients admitted in RGGGH Internal Medicine and Cardiology wards with chest pain and diagnosed as non-cardiac chest pain after further workup.

Inclusion Criteria for Cases

- Age ranged from 18 - 80 years.
- Patient diagnosed as-
 - Unstable angina.
 - STEMI- ST Elevation Myocardial Infarction.
 - Non-STEMI- Non-ST Elevation Myocardial Infarction.

Exclusion Criteria

- Patients with active haemorrhage.
- Haematological disorders like leukaemia, lymphoma and bone marrow disorders.
- Patients who have been transfused blood or platelet prior to admission- 8 days back.
- Patients who received chemotherapy/ radiotherapy.
- Previous stroke.
- Blood pressure > 180/110 mmHg and other risk factors for cardiovascular disease were excluded.

Those who were diagnosed as acute coronary syndrome were admitted in General Medicine ward and Cardiology ward at Government Rajiv Gandhi Government Hospital, Chennai were selected. Selected socioeconomic, clinical and laboratory data were collected from patients recorded in proforma. 2 mL of blood was withdrawn by venepuncture from patients within 24 hours of admission to the hospital for assessing platelet count, Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW). The instrument used for analysis was Cobas Micros OT 18 automated haematological analyser. CBC, ECG, CK, CK-MB Troponin T and echocardiography was done for every patient for diagnosis of acute coronary syndrome. Evaluated clinically by detailed history taking and clinical examination with the help of structured questionnaire.

Statistical Analysis

The data collected during the study was formulated into a Master Chart in Microsoft Office Excel sheet and statistical analysis was done with the help of computer using Statistical

Package for Social Sciences (SPSS) software 16 version. The prevalence is expressed in percentage. Quantitative data were expressed in mean, minimum, maximum and standard deviation. The qualitative data was expressed by Chi-square test and student's t-test was used to examine the degree of significance. The difference was considered statistically significant, if p value was ≤ 0.05 .

RESULTS

In this study, the age of the cases ranged from 20 to 80 years. The mean was 52.98 ± 15 years. The maximum number of cases, i.e. 25 cases fell in the age group of 40 - 60 years. This comes to 38.5% of the total cases. With male predominance of 69.2% among total cases. This pattern corresponds to pattern reported in India which is as follows: Coronary artery disease appears a decade earlier compared with the age incidence in developed countries and the peak period is attained between 51 - 60 years (Park K). Coronary risk factors were more prevalent among acute coronary syndrome cases compared to controls.

	Case MI	Control	P value
Age	52.98 ± 15.00	49.03 ± 10.36	0.167
Male No.	45(69%)	25(71%)	0.819
Coronary Risk Factors			
Diabetes Mellitus	36 (55%)	27(77%)	0.032*
Systemic Hypertension	30(46%)	24 (69%)	0.032
Smoking	25(38%)	22(63%)	0.02*

Table 1. Distribution of Case and Control with respect to Risk Factors

Platelet Parameters

There was statistically significant difference in platelet count between cases and controls. The mean platelet count of the cases was 4.98 ± 0.23 lakhs/mm³ and that of the controls was 1.29 ± 0.42 lakhs/mm.³³

The MPV of the cases ranged from 8.4 to 12 femtolitres with a mean of 10.2 ± 1.1 femtolitres. The MPV of the controls ranged from 7 to 10.60 femtolitres with mean of 8.29 ± 0.9 femtolitres. The difference between the two was statistically significant.

The PDW also significantly higher in Acute Coronary Syndrome cases (13.0646) compared to controls (10.7629), p value < 0.001).

Platelet Parameter	Cases	Controls	P-value
Platelet count	4.98 ± 0.23	1.29 ± 0.42	0.050
Mean platelet volume (FL)	10.2 ± 1.1	8.29 ± 0.9	0.001
Platelet distribution width (FL)	13.0646	10.7629	0.001

Table 2. Distribution of Case and Control with respect to Platelet Count and Indices

DISCUSSION

Myocardial infarction is a major cause of morbidity and mortality in developed countries and is a major problem in developing countries.⁴ The projection of large increase in ischaemic heart disease worldwide, IHD is likely to become the most common cause of death worldwide by 2020.⁵ Endogenous and exogenous risk factors like smoking, dyslipidaemia, diabetes mellitus and systemic hypertension

significantly increase the individual's risk for myocardial infarction.^{6,7} However, they only explain a part of the cases and there may be other relevant risk factors which needs to be identified. Large platelets are more reactive, produce more thrombotic factors.

The MPV, PDW in patients with diabetes mellitus is significantly larger from those without diabetes. Sharpe et al⁸ stated that MPV and PDW was significantly increased in diabetic subjects compared with non-diabetics. They stated that since the platelet size is a determinant of platelet function with larger platelets being more reactive per unit volume, the platelets might play a part in the micro and macrovascular complications of diabetes mellitus. Osuna et al⁹ (1998) also observed a higher MPV with diabetes mellitus.

CONCLUSION

Our study thus concludes that platelet volume parameters, mainly MPV and PDW are available and inexpensive markers, and were found to be significantly raised in patients admitted with acute coronary syndrome. From this observation, it is suggested to use platelet parameters to screen patients presenting to emergency room with chest pain who are suspected to have acute coronary syndrome.

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