Original Article

The Role Of Platelet Indices In Ischemic Heart Disease

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Abstract

Introduction: Ischemic heart disease is one of the leading cause for death worldwide.platelet plays an important role in the pathogenesis of acute coronary syndrome.platelet indices can be detected earlier,inexpensive,widely available and easily recordable inmost clinical laboratories,so it is one of the potential marker inischemic heart disease patients.the main objective of this study is to determine the correlation between platelet indices with the spectrum of Ischemic Heart Disease.

Materials and methods**:** This is a prospective hospital-based study was carried on 50 patients over one year. The patients were divided into two groups GROUP A (Case Group): diagnosed and admitted with ischemic heart disease GROUP B (Control Group): patients with non-cardiac chest pain.platelet indices which include platelet count, Mean platelet volume and platelet distribution width were determined in all groups compared and statistically analysed.

Results**:** Platelet count is significantly low in case group (101.52± 79.90) compare with control group (222.44±82.67). PDW are significantly high in case group (15.80± 5.17) compare with control group (12.04± 2.12). MPV are also significantly high in case group (11.69±2.52) compare with control group (10.23±1.01).

Conclusion**:** The platelet volume indices are an important, simple, effortless and a cost-effective tool, generated as a by-product of automated blood counts, useful in predicting the development of an acute coronary event sometimes in the near future and therapeutic modification for improved patient's cardiovascular care.

KEY WORDS: Ischemic heart disease,platelet indices,acute coronary syndrome

INTRODUCTION

In India ischemic heart disease (IHD) is one of the leading causes of death world wide.[1] The underlying pathology of ischemic heart disease is atherosclerosis.[1]The major risk factors for coronary artery disease (CAD) or ischemic heart disease are age, family history, obesity, mental stress, diabetes mellitus (DM), hypertension (HTN), elevated low-density lipoproteins (LDL) and smoking.[1,2]

Platelets plays a crucial role in the formation of prothrombotic events and progression of atherosclerosis . When atherosclerotic plaque ruptures and forms a thrombus on this plaque results in ischemia of coronary artery disease and infarction.[1, 2]About 70% of myocardial infarctions are caused by rupture of atherosclerotic plaque.[2]

Platelets plays a important role in coagulation, inflammation thrombosis and atherosclerosis[3]. Larger platelets have greater thrombotic potential. It is the most commonly used measurement of platelet size is a potential marker

of platelets reactivity including increased platelet aggregation, thromboxane synthesis and increased expression of adhesion molecule.[3]

Platelet contains chemokines, cytokines and growth factors[3] .Release of these factors interact with endothelial cells and leukocytes, which promotes inflammation and leads to the progression of atherosclerosis.[3,4]Trop I, Trop T and Creatine kinase enzymes are more sensitive and specific biomarkers of myocardial infarction which causes damage, they are still not enough sensitive at an early stage of Acute Coronary Syndrome and remains undetectable for about 40 - 60% of patients.[4]

Platelet indices can be detected earlier, relatively in expensive, widely available and also easily recordable in most of the clinical laboratories.[5] Hence platelet parameters can be used as potential marker for intervention in the emergency department by improving the risk stratification.Thus, our aim was to study platelet parameter in the spectrum of ischemic heart disease and to correlate clinicopathologically.

OBJECTIVE

To evaluate the platelet count in the spectrum of ischemic heart disease.

To evaluate the platelet volume indices (MPV and PDW) in the spectrum of Ischemic Heart Disease

MATERIAL AND METHODS:

This is a prospective hospital-based study was carried on 50 patients over one year in Sri Siddhartha Medical College, Tumkur. Study was carried out in coordination between Department of Pathology and Medicine. The patients were divided into two groups.

GROUP A (Case Group): The first group comprised of 50 patients admitted to intensive care unit of tertiary care center with an ischemic heart disease diagnosed on the basis of symptoms of Ischemia, characteristic electrocardiographic changes indicative of ischemia.

GROUP B (Control Group): The second group comprised of 50 patients attending medicine out patient department for a fitness check-up or patients with non-cardiac chest pain.

EXCLUSION CRITERIA:

1) Patients with a history of blood and platelets products received during the past three months.

2) Patients with a history of cancer and chemotherapy.

3) Patients on an oral anticoagulation therapy.

4) History of platelets diseases, including Idiopathic thrombocytopenia and Thrombotic Thrombocytopenic Purpura.

COLLECTION OF SAMPLES:

3ml of blood was collected in a EDTA tubes from all patients with acute coronary events within 4-6 hours of admission. Blood from controls were taken from the outpatient's departments when they come for routine health check up or patients with non-cardiac chest pain.Sample were analyzed within 2 hours after collection. Analysis of the blood sample was done by Automated Sysmex Hematology 6 part Analyser. Platelet parameters like total platelet count, mean platelet volume, platelet distribution width were noted and other regular blood investigations were performed.

STATISTICAL ANALYSIS:

Data entry was done in excel spreadsheet. Data cleaning, validation and analysis was done using SPSS (Version-20). The qualitative variables such as age groups and sex were expressed as frequencies and percentages. The difference between Platelets, PDW and MPV were tested using two sample t-test. Correlation between Platelets,

PDW and MPV were calculated using Spearman's rank correlation coefficient. P-value < 0.05 was set statistically significant.

RESULTS:

A total 50 patients were enrolled for present study. They were divided into two groups.

Group A (case group) comprised of 50 patients with ischemic heart disease. Group B (control group) comprised of 50 patients with non – cardiac chest pain or normal healthy subjects.

Group A comprised of 50 patients of ischemic heart disease. Mean age of this group is 56-66 years.The male to female ratio is more common in male 79.6%and females 20.4%. (See table 1&2) Mean platelet count is 1 lakh. Mean platelet distribution width is 15.80. Mean platelet volume is 11.69.Group B comprised of 50 patients of healthy control group. Mean age of this group is 56-65 years. The male to female ratio is more common in males71.4%and females with 28.6%. See table 1&2) Mean platelet is 2.2 Lakh. Mean platelet distribution width is 12.04. Mean platelet volume is 10.23.

Mean age is taken between 56-65 years both in case and control group in age wise distribution of patients with ischemic heart disease which is statistically significant.

Tables1:Age group wise distribution of a patients with ischemic heart disease:

Age	Group A (Cases)	Group B (Control)
<=45	16.3%	14.3%
46-55	24.5%	26.5%
56-65	34.7%	30.6%
>65	24.5%	28.6%

Table 2 : Sex wise distribution of a patients with ischemic heart disease:

Sex	Group A (Cases)	Group B (Control)
Male	79.6%	71.4%
Female	20.4%	28.6%

The males are more commonly occurs ischemic heart disease both in case and control group with compared to females. Platelet count is significantly low in case group (101.52± 79.90) compare with control group (222.44±82.67). PDW are significantly high in case group (15.80± 5.17) compare with control group (12.04± 2.12). MPV are also significantly high in case group (11.69±2.52) compare with control group (10.23±1.01).(see table 3)

Table 3: Comparison of platelet parameters between the group

Parameter	Group	N	Mean std deviation	T- value	p-value
Platelet count	Group A (cases)	50	169.92±81.90	-3.145	0.002(S)
	Group B (control)	50	222.44±82.67		
PDW	Group A (cases)	50	15.80 ±5.17	4.709	<0.001(S)
	Group B (control)	50	12.04 ±2.12		

MPV	Group A (cases)	50	11.69±2.52	3.743	<0.001(S)
	Group B (control)	50	10.23±1.01		

DISCUSSION

In the present study, we demonstrated that platelet count is low in ischemic heart disease (101.52± 79.6 x 10^3ul) as compared to patients with non-cardiac chest pain (222.44 ± 826.77 x10^3ul) and the difference was statistically significant ($p<0.05$). A study done by Martin et al [6]and Pizzuli et at [7], demonstrated similar that platelet count is significantly low in ischemic heart disease (274 ± 65 x10^3ul) and (245± 56x 10^3ul) respectively as compared to patients with non-cardiac chest pain or healthy subjects (276±65x10^3ul) and (261± 58x10^3ul) respectively and the difference was statistically significant. Decreased platelet count is characteristic of pre thrombotic state this can be resulted from platelet consumption in acute phase of clot formation and thrombosis in the course of acute coronary syndrome.[6,7]

In the present study, we demonstrated that MPV is significantly high in Ischemic heart Disease (11.69± 2.52 fl) as compared to patients with non cardiac chest pain or healthy subjects(10.23±1.01 fl) and the difference is statistically significant. Similarly, Khanderkar et al [8] and VitthalKhode [9] et al also showed similar findings showing increased MPV in IHD patients compared to control groups and found to have 10.43± 1.03fl and 9.65 ± 0.96fl respectively.

Increased MPV suggest pre thrombotic state in Acute Coronary Syndromes.[8] Due to this there will be destruction of platelets in an attempt to maintain hemostasis and which increases the platelet mass, body tries to synthesize large platelets until the destructed one become substituted .[9] These large platelets are enzymatically, metabolically more active and have higher potential for thrombosis compared to smaller one .Theses large platelets are risk factor for myocardial infarction and which leads to death .[10]

In the present study, we demonstrated that PDW is significantly high in Ischemic heart disease (15.80 ± 5.17fl) as compared to patients with non-cardiac chest pain or healthy subjects (12.04 ± 2.12fl) as compared to the healthy control. Similar results were found by Bhatt Payal et al [11] and Subbarayan Det al[12] that IHD patients had significantly higher PDW 14.53 ± 1.78 fl and 14.98± .41fl respectively than healthy control. Larger platelets are associated with a reduced count and have been observed in the early stage of Acute Coronary Syndrome.[11,12]Increased PDW indicates atherosclerosis, Acute coronary syndrome associated with systemic increase in platelet destruction rate.[13]

We conclude that platelet count was significantly lower in study group as compared to control group (normal healthy controls or non-cardiac chest pain patients) and it is found that it is statistically significant with inverse relation between MPV and PDW. It was in concordance with study done by Priyanka G et al[14] which showed statistically significant with inverse relation between MPV and PC . This is due to large platelet associated with reduced count, have been observed in early stage of Acute Coronary Syndrome.[14,15]

CONCLUSION: In the present study platelet count was significantly lower in group A(study group) as compared to group B(control group). MPV and PDW were significantly higher in group A (study group) compared to group B (control group). As the is small and cardiac enzyme, coronary angiography findings were not available, larger comprehensive studies are required for the confirmation. If patient's previous platelet parameters are available, then comparison of it may be beneficial. The platelet volume indices are an important, simple, effortless and a cost-effective tool, generated as a by-product of automated blood counts, useful in predicting the development of an acute coronary event and therapeutic modification for improved patient's cardiovascular care.

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