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Platelet Count and Mean Platelet Volume in Hypertensive Patients: A Cross Sectional Study

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Abstract

Background: Platelets are the important constituents of blood which are the main players during the process of thrombus formation. Endothelium produces a large number of substances that affect blood flow and can lead to a hypertensive state. Large observational studies indicate that in hypertension, cardiovascular morbidity and mortality are related to the severity of hypertensive state and to the development of cardiac and vascular changes. Platelet count (PLC) and elevated mean platelet volume (MPV) levels are thought to be closely associated with cardiovascular diseases such as acute ischemic stroke, left ventricular hypertrophy, carotid atherosclerosis as well as hypertension. This study was done to evaluate PLC and MPV in hypertensive patients compared to control normotensive subjects. *Methods*: This was a cross sectional case control study in tertiary care hospital in Mangalore. During this study period 50 control and 50 cases were analyzed. *Results*: Among the controls majority are males (68%) with mean age of 44 years. Among the cases, majority are males (62%), with mean age of 60 years. In control, mean PLC were 2, 53,380 cells and average MPV was 8.46 fL. Among the case group, the mean PLC was 2, 36, 417 cells and average MPV was 8.40 fL. Since the p values are more than 0.05, there is no difference in PLC and MPV in cases and controls at the 5% level of significance. There was no increase in the platelet indices in hypertensive patients compared to normotensive patients. *Conclusion*: Though we started our study anticipating an increase in PLC and MPV in hypertensive patients, the results we obtained could not prove such a correlation. A further study and research involving a great number of patients is needed in this field to support the hypothesis.

Keywords: Platelet Count; Mean Platelet Volume; Hypertension; Correlation.

Introduction

Platelets are one of the components of blood which has an important role in the process of thrombus formation. Endothelium produces a large number of substances that has a significant effect on blood flow [1].

In hypertension, there is an imbalance between the vasodilator and vasoconstrictor substances that leads to a state of high blood pressure. There are many evidences that platelets and the endothelium which gets activated in hypertension have a crucial role in the increased thrombotic tendency seen in hypertension [1]. Increased platelet activity leads to shortening of bleeding time and increased platelet volume [2]. Large platelets are more active metabolically and enzymatically and they have an increased thrombotic potential [3].

Many observational studies have shown that in hypertension, cardiovascular morbidity and mortality are related to the severity of hypertension [4]. Some studies have shown that PLC and elevated MPV levels are closely associated with cardiovascular diseases as well as hypertension. Target organ damage caused by hypertension is a well known major risk factor for cardiovascular disease [5,6]. One of the study has shown MPV to be significantly raised in hypertension [7]. MPV is an indicator of activated platelet and a risk factor for myocardial infarction [8]. MPV is also implicated in acute ischemic stroke, carotid

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atherosclerosis, left ventricular hypertrophy in hypertensive patients [9,10].

This study was done to evaluate and correlate PLC and MPV in hypertensive patients compared to control normotensive subjects.

Objectives

To study the PLC and MPV in hypertensive patients in comparison with normotensive subjects and their implication in predicting cardiovascular abnormalities.

Study Design

Cross sectional case control study

Inclusion criteria: All the stages of hypertensive patients with or without medications.

Methodology

50 patients who were admitted in a tertiary care hospital in Mangalore and diagnosed with hypertension were taken as cases and 50 normotensive subjects were taken as controls.

Sample Collection

After institutional ethical clearance and written consent, two ml of blood is collected in an EDTA anticoagulated vacutainer from the vein in the antecubital fossa from control and case groups. Blood sample is fed into 5 part Mindray BC analyzer. PLC and MPV of hypertensive patients and normotensive subjects is recorded and data is statistically analyzed.

Results

This was a cross sectional case sontrol study in tertiary care hospital in Mangalore. During this study period 50 control and 50 cases were analyzed.

Controls: Among the controls, the lowest age was 18 and highest age was 88 with an average mean age of 44.12. Among these 34 are males and 16 females. The mean PLC was 2, 53,380 cells and average MPV was 8.46fL.

Cases: The cases were 50 in number with 31 males and 19 females. The lowest age was 38 and highest age was 79 with an average mean age of 60.14 years. The mean PLC was 2, 36, 417 cells and average MPV was 8.40fL(As shown in Table 1-3).

Table 1:

	Group	Mean	Std. deviation	Std. error mean	t value	p value
Age	Case	60.14	10.03	1.41	5.446	<0.001
	Control	44.12	18.21	2.57		

Table 2:

		Case	Control	Total
Gender	Male	31	34	65
	Female	19	16	35
Total		50	50	100

Table 3:

	Group	Mean	Std. deviation	Std. error mean	t value	p value
PLC	Case	300393	47884.7	67719.23	0.777	0.44
	Control	205082	66828.9	9451.02		
MPV	Case	8.57	0.76774	0.10858	0.599	0.55
	Control	8.46	0.94605	0.13379		

Since the p values are more than 0.05, there is no difference in PLC and MPV in cases and controls at the 5% level of significance. There was no increase in the platelet indices in hypertensive patients compared to normotensive patients.

Discussion

A lot of studies have shown a positive correlation between activation of platelet indices in hypertensive patients and subsequent development of

cardiovascular abnormalities, particularly ischemic heart disease. The exact mechanisms in support of increasing MPV as a surrogate for increasing platelet activation are not fully known. The increases MPV may relate to increased platelet activation, and the increased production of larger and more active platelet precursors from the bone marrow [3,6,7].

It is still not known whether an increasing MPV represents the collective platelet response to prothrombotic stimuli or whether it represents a greater pathophysiological role in thrombogenesis. This question may have important clinical implications. Indeed, the early detection of platelet activation can help in identifying patients at increased thrombotic risk prior to the onset of overt cardiovascular disease, such that early preventive strategies can be implemented [7-9].

The use of routine hematologyanalyzers to measure platelet activation status circumvents many of the frequently encountered technical problems associated with traditional methods, such fluorescence microscopy (to detect activation specific markers); platelet aggregometry and b-thromboglobulin/platelet factor 4 immunoassays. Data of platelet activation indices and complete blood count can be gained within a minute of sample aspiration of whole blood [6]. Some studies in the past have also not able to show an increase in platelet indices in hypertensive patients [5].

Though we started our study anticipating an increase in platelet indices in hypertensive patients, the results we obtained could not prove such a correlation.

Our study showed that PLC and MPV were not significantly raised in hypertensive patients, compared to controls. A further study and research involving a great number of patients is needed in this field to support the hypothesis.

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