LIPID PROFILE AND MEAN PLATELET VOLUME IN SUBJECTS RESIDING IN RAIPUR CITY

Akriti Jaiswal,[1] Dr. Prachi Shelke[2*]

PhD Scholar, Physiology, All India Institute of Medical Science's Raipur, Chhattisgarh
Assistant Professor, Department of Physiology, Shri Balaji Institute of Medical Sciences & Research Centre, Raipur, Chhattisgarh

Corresponding Author

Dr. Prachi Shelke[2]
Email id: prchshlk1@gmail.com

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ABSTRACT

Background: The average platelet size is evaluated by Mean Platelet Volume (MPV), which is a crucial component in the evaluation of atherosclerosis. Clot retraction, procoagulant activity, secretion, aggregation, shape change and spreading, and adhesion are among the activities of platelets. Electrical impedance can be used by the ABX Pentra automated analyzer to assess MPV. Atherosclerosis is predicted by cholesterol levels.

Aim: The goal of the current study was to determine how mean platelet volume and lipid profile markers, such as triglycerides, VLDL, HDL, LDL, and total cholesterol, correlated.

Methods: The link between lipid profile indicators, such as triglycerides, VLDL, HDL, LDL, and total cholesterol, and mean platelet volume was examined in 48 research participants who had no history of platelet dysfunction, alcohol use, or medication-induced platelet decline. The data collected were subjected to statistical evaluation and the results were formulated.

Results: The study's findings indicate that mean platelet volume and HDL had an unfavourable relationship. Therefore, the techniques used to raise HDL will result in a lower MPV and a lower risk of atherosclerosis. Additionally, there was a positive but statistically insignificant connection between VLDL and MPV and triglycerides. There was an observed negative and non-significant association between MPV and total cholesterol and LDL.

Conclusion: Mean Platelet Volume, or MPV, is a measure of platelet functions that positively correlates with β-thromboglobulin, platelet factor 4, thromboxane A2 release, platelet aggregation, and platelet activity. Where near-constant levels of platelet mass are observed, mean platelet volume in normal people is negatively correlated with platelet count.

Key Words: MPV, Lipid profile, HDL, triglycerides, VLDL.

INTRODUCTION

Thrombocytes, also known as platelets, are tiny, transparent cells with an irregular shape and width of 2-3 μm. They are produced by the fragmentation of precursor megakaryocytes, which are formed from pluripotent stem cells. Thrombopoietin is the major factor that regulates thrombopoiesis and aids in preserving a steady platelet mass. Thrombopoietin functions in tandem with interleukins, such as IL-6, IL-3, and IL-11. These cytokines are not necessary for megakaryocyte development, though.[1]

Sialic acid levels in platelets drop as people age, and a rise in IgG accumulation helps to flush out the older platelets. The spleen's macrophages are mainly responsible for eliminating ageing platelets. Because the liver has a greater blood flow than other organs, hepatic macrophages are also essential in the elimination of aged platelets. Protein synthesis cannot occur on its own in platelets.
However, when traumatised or injured in the vascular system, these platelets undergo a variety of processes, including adhesion, aggregation, shape change, and granule content release, which result in the production of fibrin plug.[2]

Megakaryocytes are formed from platelet fragments in the bone marrow. The ecosystem that produces platelets determines the size and volume of each one, or mean platelet volume. The mean platelet volume is unaffected by the ageing of platelets during circulation. In most patients, platelet-related parameters are quite constant. Nonetheless, MPV is elevated in patients with underlying diseases that cause increased platelet production, such as immunological thrombocytopenia, pre-eclampsia, myeloproliferative disorders, disseminated intravascular coagulation, and/or temporary hypoplasia recovery (cytotoxic treatment). Reduced MPV is observed in diseases such as bone marrow aplasia that lower platelet production.[3]

A significant risk factor for atherosclerosis is increased platelet function, which is well-established in acute ischemic stroke. High platelet reactivity and mean platelet volume are also associated with an increased risk of myocardial infarction. MPV is also suggested to be a biomarker and determinant of platelet function. In vitro studies have shown that small platelets are more reactive than large platelets.[4]
The current study was carried out to evaluate the correlation of lipid profile parameters, including total cholesterol, VLDL, HDL, LDL, and LDL, to mean platelet volume. Material and methods

MATERIALS AND METHODS

The study was carried out after approval from the relevant ethical committee. The individuals who visited the institute's outpatient department of medicine made up the study population. 148 participants of both genders were chosen at random for the study using a straightforward random selection technique. participants who were willing to engage in the study, those who were older than eighteen, participants of both genders, and those from various socioeconomic backgrounds met the study's inclusion requirements. Alcoholics, patients on antiplatelet medicines, and those with genetic diseases impacting platelets were excluded from the study. All subjects gave their written and verbal informed permission after being fully briefed about the study.

After final inclusion in the study, Every subject had a thorough medical examination and had their history collected. Demographic factors such as diet, lifestyle, employment, religion, rural/urban status, gender, and age were evaluated in this study. Hematologic measures such as Mean Platelet Volume (MPV), Platelet Count, Differential leukocyte count (DLC), Total leukocyte count (TLC), and mean haemoglobin were evaluated, along with waist:hip ratio, BMI, and blood pressure. Complete lipid profile, serum electrolytes, glucose (postprandial and fasting), SGOT, SGPT, albumin, total protein, bilirubin, creatinine, and mean serum urea were the biochemical markers evaluated.
In order to determine the average platelet volume, 5 millilitres of intravenous blood were drawn from the antecubital vein in a sterile and aseptic manner. The blood was then placed in a test tube containing an anticoagulant and examined using an electrical impedance-based ABX Pentra automated analyzer.

The samples were removed if platelet aggregates were seen. When the platelet volume was between 7.8 and 11 fl, it was taken into consideration. Values over 11.1fl were deemed abnormally high.

Using SPSS software version 21 (Chicago, IL, USA) for statistical assessment and one-way ANOVA and t-test for result formulation, the gathered data were examined. The data were presented as a mean, standard deviation, percentage, and number. At $p<0.05$, the significance threshold was maintained.

RESULTS

In order to determine the relationship between mean platelet volume and lipid profile measures such as triglycerides, total cholesterol, HDL, LDL, and VLDL, a descriptive cross-sectional clinical investigation was carried out. The age range of the 148 research participants was 45–66 years old.

The correlation between the mean platelet volume and haemoglobin was evaluated, and the results showed that the person correlation value was -0,52 and the 2-tailed value was -0.512. The correlation value between haemoglobin and MPV was -0.52, with a 2-tailed significance value of -0.512 (Table 1). There was a non-significant negative connection found between MPV and haemoglobin. The correlation between MPV and total leucocyte counts was evaluated, and the results indicate a negative and non-significant relationship. The on-person correlation was 0.751, while the sig. 2-tailed was -0.24. (Table 1)

Between mean platelet volume and HDL, a statistically significant negative correlation was observed, with person coefficient and sig. 2-tailed values of -.179 and 0.24, respectively.

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Between mean platelet volume and HDL, a statistically significant negative correlation was observed, with person coefficient and sig. 2-tailed values of -.179 and 0.24, respectively. The link between the study individuals' mean platelet volume and platelet count was also evaluated in this investigation; the findings are shown in Table 3. The correlation's sig. 2-tailed values and Pearson correlation were found to be -.034 and -.173, respectively. These findings demonstrate that there was a negative connection between platelet count and mean platelet volume. Table 3 shows that there was a statistically significant link.

DISCUSSION

In order to determine the relationship between mean platelet volume and lipid profile measures such as triglycerides, total cholesterol, HDL, LDL, and VLDL, a descriptive cross-sectional clinical investigation was carried out. The age range of the 148 research participants was 45–66 years old. After evaluating the average amount of platelets and comparing it to haemoglobin, it was seen that the person correlation value seen was -0,52 and sig. A 2-tailed value of -0.512 was seen. With the hemoglobin, the correlation value with MPV was -0.52 and sig. 2-tailed value of -0.512. There was a non-significant negative connection found between MPV and haemoglobin. The association between MPV and total leucocyte counts was found to be negative and non-significant, with an on-person correlation of 0.751 and a sig. 2-tailed correlation of -0.24. These findings aligned with the findings of Greisenegger S et al. (2004) and Toryila JE et al. (2009), who also showed a comparable association between leucocyte numbers and haemoglobin. According to the study's findings, there was a statistically significant and negative correlation between mean platelet volume and HDL, with corresponding person coefficient and sig. 2-tailed values of -.179 and 0.24.

The person coefficient and sig. 2-tailed values for mean platelet volume and VLDL (very low-density lipoprotein) were found to be.097 and.224, respectively, indicating a non-significant positive connection. LDL and MPV showed a negative and statistically non-significant connection, with corresponding Pearson correlation and sig. 2-tailed values of -.011 and.874 respectively. There was a statistically non-significant positive association between MPV and triglycerides, with values of sig. 2-tailed and Pearson correlation of.100 and.221 respectively. In the current investigation, there was a weak negative connection (Pearson correlation, sig. 2-tailed values of -.001 and.971 respectively) between mean platelet volume and total cholesterol.

These findings concurred with those of Li Jy et al.7 and Khemka R et al.8 in 2014, whose authors observed a comparable association between cholesterol and MPV to that found in the current investigation.

The link between the study individuals' mean platelet volume and platelet count was also evaluated in this investigation; the findings are shown in Table 3. The correlation's sig. 2-tailed values and Pearson correlation were found to be -.034 and -.173, respectively. These findings demonstrate that there was a negative connection between platelet count and mean platelet volume. There was a statistically significant association. These findings were consistent with those of Tsiara S et al. (2009) and Huo Y et al. (2010), whose authors demonstrated a comparable association between mean platelet count and MPV to that found in the current investigation.

COCLUSION

The current study, within its limits, finds that mean platelet volume and HDL showed a negative connection. Therefore, techniques used to raise HDL will result in a lower MPV and a lower risk of atherosclerosis. Additionally, there was a positive but statistically insignificant connection between VLDL and MPV and triglycerides. There was an observed negative and non-significant association between MPV and total cholesterol and LDL. A few drawbacks of the current study were, nonetheless, a limited sample size, a brief monitoring period, and biases related to geographic areas.

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TABLES

Parameter (n=148)	Test	MPV	Values
MPV	Pearson correlation	1	-0.52
	Sig. 2-tailed		-0512
Hb	Pearson correlation	-0.52	1
	Sig. 2-tailed	-0512	
MPV	Pearson correlation	1	-0.24
	Sig. 2-tailed		.751
TLC	Pearson correlation	.751	1
	Sig. 2-tailed	-0.24	

Table 1: Correlation of MPV with hemoglobin and total leucocyte count in study subjects

Parameter (n=148)	Stats	MPV	Values
MPV	Pearson correlation	1	-.179
	Sig. 2-tailed		0.24
HDL	Pearson correlation	-.179	1
	Sig. 2-tailed	0.24	
MPV	Pearson correlation	1	.097
	Sig. 2-tailed		.224
VLDL	Pearson correlation	.097	1
	Sig. 2-tailed	.224	
MPV	Pearson correlation	1	-.011
	Sig. 2-tailed		.874
LDL	Pearson correlation	-.011	1
	Sig. 2-tailed	.874	
MPV	Pearson correlation	1	.100
	Sig. 2-tailed		.221
Triglycerides	Pearson correlation	.100	1
	Sig. 2-tailed	.221	
MPV	Pearson correlation	1	-.001
	Sig. 2-tailed		.971
Total Cholesterol	Pearson correlation	-.001	1
	Sig. 2-tailed	.971	

Table 2: Correlation of MPV with cholesterol and associated factors in study subjects

Parameter (n=148)		MPV	Values
MPV	P	1	-.173
	Sig. 2-tailed		-.034
Platelet Count	P	-.173	1
	Sig. 2-tailed	-.034	

Table 3: Correlation of MPV with Platelet count in the study subjects