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EVALUATING THE CORRELATION OF LIPID PROFILE PARAMETERS INCLUDING TRIGLYCERIDES, VLDL, HDL, LDL, AND TOTAL CHOLESTEROL TO MEAN PLATELET VOLUME

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ABSTRACT

Background: The measurement of average platelet volume, or MPV, is essential for determining the presence 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 purpose of the current study was to evaluate the relationship between mean platelet volume and lipid profile markers, such as triglycerides, VLDL, HDL, LDL, and total cholesterol. **Methods**: The link between lipid profile measures, 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 gathered data were statistically assessed, and conclusions were drawn.

Results: The study's findings indicate that there was an inverse relationship between mean platelet volume and HDL. 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: The current study, within its limits, finds that mean platelet volume and HDL showed a negative connection. 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.

Keywords: MPV, Lipid profile, HDL, triglycerides, VLDL.

INTRODUCTION

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. 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 platelets 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.

There is a correlation between MPV and platelet functioning, which is a significant atherosclerosis risk factor. It is widely known that acute ischemic stroke is associated with increased platelet function. High platelet reactivity and mean platelet volume are also linked to an increased risk of myocardial infarction. Additionally, it has been proposed that MPV is a biomarker and a factor in platelet function.

Studies conducted in vitro have revealed that tiny platelets are more reactive than big platelets.4 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.

MATERIALS AND METHODS

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 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.

The inclusion criteria for the study were subjected older than 18 years, subjects from both genders, all socioeconomic backgrounds and the research participants who volunteered to take part. 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. Following their final enrollment in the research, each participant had a thorough medical examination and a comprehensive 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 expressed in percentage and number, and mean and standard deviation. The level of significance was kept at $p<0.05$.

RESULTS

The present descriptive cross-sectional clinical study was conducted to assess the correlation of Lipid profile parameters including Triglycerides, VLDL, HDL, LDL, and total cholesterol to mean platelet volume. The 148 study

subjects were within the age range of 45-66 years. On assessing the mean platelet volume and its correlation with hemoglobin, 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 (Table 1). A non-significant negative correlation was seen between hemoglobin and MPV. On assessing this correlation to MPV to total leucocyte counts was on person correlation was .751 and for the sig. 2-tailed was -0.24 which shows the negative and non-significant correlation of MPV to total leucocyte count (Table 1).

A negative and statistically significant correlation was seen between mean platelet volume and HDL having the values of person coefficient and sig. 2-tailed values of -.179 and 0.24 respectively. For mean platelet volume and VLDL (very low-density lipoprotein), it was seen that the values of person coefficient and sig. 2-tailed values were .097 and .224 respectively showing a non-significant positive correlation. The negative and statistically non-significant correlation was seen between LDL and MPV with respective values of Pearson correlation and sig. 2-tailed as -.011 and .874 respectively. A positive correlation between MPV and triglycerides was seen which was statistically non-significant having values of Pearson correlation and sig. 2-tailed of .100 and .221 respectively. An insignificant negative correlation in the present study was seen between total cholesterol and Mean Platelet Volume with Pearson correlation and sig. 2-tailed values of -.001 and .971 respectively (Table 2).

The present study also assessed the correlation between mean platelet volume and platelet count in the study subjects, and the results are depicted in Table 3. It was seen that Pearson correlation and sig. 2-tailed values for this correlation were -.173 and -.034 respectively. These results show that a negative correlation was seen in Mean platelet volume and platelet count. This correlation was statistically significant (Table 3).

DISCUSSION

The present descriptive cross-sectional clinical A research was carried out to evaluate the relationship between mean platelet volume and lipid profile markers, such as triglycerides, total cholesterol, HDL, LDL, and VLDL. 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. Haemoglobin had a -0.52 correlation value with MPV and a -0.512 2-tailed significance value. 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.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.

CONCLUSION

The current study, within its limits, finds that mean platelet volume and HDL showed a negative connection. 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. A few drawbacks of the current study were, nonetheless, a limited sample size, a brief monitoring period, and biases related to geographic areas. Therefore, further long-term research with bigger sample sizes and longer observation periods will aid in coming to a conclusive result.

REFERENCES

1. Jam Coll Cardiol. 2013;62(18_S2):C116-C116. doi:10.1016/j. jacc.2013.08.354
2. Victor M, Ropper AH, Adams RD. Cerebrovascular diseases. Adam's and Victor's Principles of Neurology. Ed. Ropper A H, Samuels MA. 9th ed. United States of America, McGraw Hill 2009.
3. Patel SR, Hartwig JH, Italiano JE Jr. The biogenesis of platelets from Megakaryocyte proplatelets. The Journal of Clinical Investigation 2005;115:3348–54.
4. Buckley MF, James JW, Brown DE, Whyte GS, Dean MG, Chesterman CN, et al. A novel approach to the assessment of variations in the human platelet count. Thromb Haemost 2000;83:480-4.
5. Greisenegger S, Endler G, Hsieh K, Tentschert S, Mannhalter C, Lalous chek W, Is elevated mean platelet volume associated with a worse outcome in patients with acute ischemic cerebrovascular events? Stroke 2004;35:1688–91.
6. Toryila JE, Amadi K, Adelaiye AB. Platelet count and mean platelet volume amongst elderly Nigerians. Science World J 2009;4:15-8.
7. Li JY, Li Y, Jiang Z, et al. Elevated mean platelet volume is associated with presence of colon cancer. Asian Pac J Cancer Prev. 2014;15:10501-4.
8. Khemka R, Kulkarni K. Study of relationship between Platelet Volume Indices and Hyperlipidemia. Annals of Pathology and Laboratory Medicine.2014;1:8-14.
9. Tsiara S, Elisaf M, Jagroop IA, Mikhailidis DP. Platelets as predictors of vascular risk: is there a practical index of platelet activity? Clin Appl ThrombHemost. 2003;9:177-90.
10. Huo Y, Ley KF. Role of platelets in the development of atherosclerosis. Trends Cardiovasc Med. 2004;14:18-22.

TABLES

Parameter (n=148)	**Mean Platelet Volume**	**Values**
Mean Platelet Volume		**Hemoglobin**
Pearson correlation	1	-0.52
Sig. 2-tailed		-0512
Hemoglobin		
Pearson correlation	-0.52	1
Sig. 2-tailed	-0512	
Mean Platelet Volume		**Total Leucocyte Count**
Pearson correlation	1	-0.24
Sig. 2-tailed		.751
Total Leucocyte Count		
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)	**Mean Platelet Volume**	**Values**
Mean Platelet Volume		**HDL**
Pearson correlation	1	-.179
Sig. 2-tailed		0.24
HDL		
Pearson correlation	-.179	1

Sig. 2-tailed	0.24	
Mean Platelet Volume		**VLDL**
Pearson correlation	1	.097
Sig. 2-tailed		.224
VLDL		
Pearson correlation	.097	1
Sig. 2-tailed	.224	
Mean Platelet Volume		**LDL**
Pearson correlation	1	-.011
Sig. 2-tailed		.874
LDL		
Pearson correlation	-.011	1
Sig. 2-tailed	.874	
Mean Platelet Volume		**Triglycerides**
Pearson correlation	1	.100
Sig. 2-tailed		.221
Triglycerides		
Pearson correlation	.100	1
Sig. 2-tailed	.221	
Mean Platelet Volume		
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)	Mean Platelet Volume	Values
Mean Platelet Volume		**Hemoglobin**
Pearson correlation	1	-.173
Sig. 2-tailed		-.034
Platelet Count		
Pearson correlation	-.173	1
Sig. 2-tailed	-.034	

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