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"STUDIES ON PLATELET COUNT AND IDENTIFICATION"

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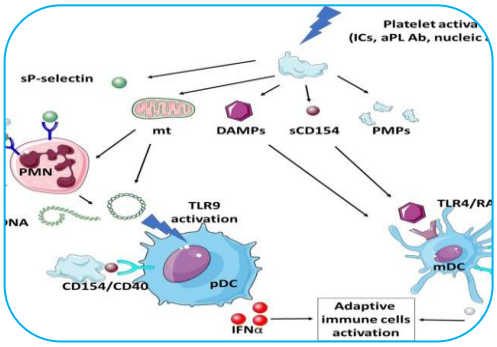
ABSTRACT:

Platelets are specialized blood cells responsible for maintaining the vascular integrity and haemostatic physiology in humans. Platelets also participate actively in numerous immune and inflammatory responses for atherosclerosis, cancer malignancies, and many hereditary disorders. The prime function of platelet is to arrest bleeding by facilitating thrombus formation at the site of injury. However, increased platelet activity renders unusual platelet aggregation leading to stroke and cardiovascular diseases.



KEY WORDS: *Platelets, bleeding, numerous immune and inflammatory.*

INTRODUCTION

The introduction of various indices into automated hematology analyzers has revolutionized the understanding of various hematological disorders including platelet disorders. Platelet parameters such a mean platelet volume (MPV), platelet distribution width (PDW), and platelet large cell ratio (P-LCR) appear to be new potential biomarkers in several diseases due to their easy availability and inexpensive measurement methods. However, the efficacy of these underutilized parameters in diagnosing the underlying platelet disorders needs to be established for clinical use.

Therefore, both quantitative and qualitative abnormalities related to platelet may cause several clinical manifestations, characteristically prolonged bleeding and/or atypical thrombus formation. In a healthy individual, platelet count ranging from 1,50,000 to 4,50,000/µl of blood is considered as normal. However, the reference interval for platelet count varies as per the geographical location and ethnic affiliation of the population. Earlier studies have evidenced that Harris platelet syndrome (HPS) is the commonest inherited giant platelet disorder reported among the blood donors of the north-eastern region of India, where significantly low platelet count with raised Mean platelet volume (MPV) is observed. Since information related to the prevalence of low platelet count among the ethno-culturally diverse population of Assam is scanty, the present study primarily focuses on the screening of low platelet count among healthy individuals of upper Assam. Subsequent studies have also confirmed that sex and age have a significant bearing on platelet count. Besides, an inverse correlation between platelet count and MPV has been reported earlier in healthy people. Accordingly, the values of MPV were moreover analyzed for the study population to decipher their compensatory effect for count deficit. Other than thrombopoietin, Interleukin-6 (IL-6) also exhibits hematopoietic activity in promoting thrombopoiesis. It was also reported that this cytokine has a remarkable property to act as a therapeutic agent in treating thrombocytopenia.

MATERIALS AND METHODS:

Blood samples were collected in ethylenediamine- tetra-acetic acid (EDTA) anticoagulant tube and analyzed using Sysmex XS-800i. Samples were analyzed within 3 h of venipuncture to eliminate the possibility of platelet swelling in EDTA. Thrombocytopenia cases were identified on a daily basis from the hemogram reports generated in the hospital laboratory. Platelet count and platelet indices (MPV, PDW, and PLC-R) were recorded.

Patients with platelet count < 1.5 lakhs/cumm and confirmed by peripheral smear examination were included in the study. Thrombocytopenia due to decreased bone marrow production, artifactual thrombocytopenia and those for which hematology analyzer did not provide results of platelet indices were excluded from the study. Results of special tests performed for determining the etiology of thrombocytopenia such as bone marrow examination, serology for dengue, sepsis profile, and quantitative buffy coat along with other relevant clinical details were collected from the case files.

DISCUSSION:

Unrelated healthy subjects were recruited who had volunteered specifically for this study. Individuals with history of malaria, jaundice, thyroid disorders, anemia or any other acute infections diagnosed in the previous 6 months were excluded. Besides, individuals on medication due to hypertension, diabetes mellitus, stroke, heart attack, asthma, epilepsy, kidney diseases, arthritis or any other chronic diseases were exempted from the study. The study also excluded participants with the history of bleeding manifestation.

CBC Analysis and Microscopic Examination:

Intravenous blood samples were drawn aseptically in K_3EDTA vacutainer tubes. CBC profile of each individual was determined by Automated Hematology Analyser (Celltac α, MEK-6420K, Nihon Kohden, Japan) within 4–6 h of sample collection. Considering the reference interval for platelet count among the Indian population, a count less than $130 \times 10^3/\mu l$ of blood was referred to as low platelet count for the present study. The values of platelet count and MPV were recorded for further analysis. The peripheral blood smears of a few samples were also examined for cellular morphology and in vitro platelet clumping.

There are numerous studies in the literature which have evaluated the use of platelet indices in differentiating the hyper destructive thrombocytopenia from hypoproduction of platelets. However, there are fewer studies done to evaluate the utility of platelet indices in differentiating immune and non-immune causes of hyper destructive thrombocytopenia. The automated hematology analyzers function based on the principles of electrical impedance, light scatter, and fluorescence. Although the generated platelet indices in the automated analyzers can be really informative regarding platelet kinetics and the probable mechanism of thrombocytopenia, they are not yet widely accepted for routine clinical use.

An explanation for the age-dependent decline in platelet count observed by Biino *et al.* and others is still awaited.[5] It has been suggested that it may be due to reduced hematopoietic stem cell reserve in aging individuals.[8] It is also possible that the age-dependent decline in platelet number reflects epigenetic changes in the megakaryocyte genome, such as hypomethylation of genes that determine platelet count or changes in histone acetylation, which lead to differences in gene expression as we get older. The seasonal factors that in one longitudinal study accounted for 2% of the overall variance in platelet count, and caused a peak in platelet count during autumn and winter months, also remain to be clarified, though it is possible that this reflects the increased prevalence of viral infections during the winter months, since infection has been established to increase platelet count.[9] Thus, while considerable progress has been made in identifying the genes that determine platelet count in humans, several challenges remain, not least of which will be to determine the impact of epigenetic programming on platelet count. The value of populations such as those of the province of Ogliastra in facilitating greater understanding of this area cannot be overestimated.

CONCLUSION :

Many studies in the past have analyzed the utility of these platelet indices in differentiating hyperdestructive from hypo proliferative conditions causing thrombocytopenia, but studies analyzing the utility of these indices within the hyperdestructive group are limited. The study highlights the variation of platelet indices in disease state compared to healthy controls where all the three parameters were significantly altered. Of the three indices, MPV shows promise as marker to differentiate immune causes from other cases of hyperdestructive thrombocytopenia. Studies including larger sample size along with a meta-analysis of various studies in the future are needed to prove the efficacy of these parameters for clinical significance.

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