

Significance of Particular Platelets Indices: Review Article¹

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ABSTRACT

A complete blood count is a usual test for establishing a baseline and essential tool for the diagnosis of many diseases, a complete blood count contains many parameters including platelets indices and these are available at a relatively low cost, in this review, I am going to focus on particular platelets indices that are platelets distribution width and mean platelets volume and its significance in important clinical conditions. Conclusion: platelets distribution width and mean platelets volume have potential diagnostic values which may help in disease management.

Keywords: *platelet indices, CBC, platelet count, PDW, MPV.*

INTRODUCTION

A complete blood count (CBC) or complete blood picture is a routine investigation inexpensive tool giving a general assessment of a patient's condition in various diseases, generally speaking, CBC has three main components one concerned with white blood cells, the other with red blood cells, and the last is concerned with platelets. The aspect of platelets is composed of platelet count and platelet indices. Platelet distribution width (PDW) and mean platelet volume (MPV) are the parameters I am going to explore. PDW and MPV are easy to measure[1].

Platelets indices are now under considerable attention for their significance in diagnosis and prognosis for different diseases, as the platelets indices have a major limitation which is the lacking of consistency in measuring platelets indices by different methods this provokes a demand for a universal measuring method in order to get benefit from different experiences around the world[2]. During platelets activation, there will be a spherical shape changing with pseudopodia formation, these changes are reflected as an alteration in PDW and MPV[3]. The purpose of this review to have an idea about the changes in PDW and MPV in several important medical situations which may help in these diseases management.

THROMBOSIS

Thrombosis and embolism cause death frequently, so we need simple and accessible, routine monitoring parameters for platelet activation. It's preferable to avoid expensive, time-consuming test which is difficult to

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perform routinely[1]. In platelet activation which precedes thrombosis their morphological changes in form of acquiring spherical morphology and possessing pseudopodia by platelets lead to changes in PDW and MPV[1].

Cancer has thrombotic complications about 78% which can lead to Vaso occlusive diseases MPV and PDW are increased in those patients [4]. PDW and MPV may be used to identify a complete resolution of thrombus in Deep vein thrombosis, these indices are higher in patients with complete healing than others without complete healing[5]. Pregnancy has a thrombosis risk[6]. Interestingly the PDW and MPV increased progressively as pregnancy precedes[1].

MPV and PDW may help in determining the severity of pulmonary embolism whether it is sub-invasive or non-invasive, as MPV and PDW are higher in sub-invasive than non-invasive which will aid in the management decision[7]. The above facts may further potentiate the significance of MPV and PDW in thrombosis.

RELATION TO INFLAMMATION

In relation to MPV and PDW to inflammation, researchers found a valuable association with patients with rheumatoid arthritis as MPV is a good inflammatory marker and PDW is considered an indicator for acute phase reactant[8].

CHANGES IN PREGNANCY

Pregnancy is a hypercoagulable state and platelet changes may play a role in various pathogenesis processes. In pregnant women with pre-eclampsia and gestational diabetes, there is a significant increase in MPV, larger platelets are more beneficial for the coagulation process but it can be a disease manifestation as in patients with gestational diabetes have significantly higher MPV than in healthy pregnant women, in viral infection and autoimmune diseases during pregnancy there is a difference in PDW and MPV but the difference is insignificant[9,10].

In preeclampsia there is a significant increase in PDW and MPV in preeclamptic patients compared to the control group and related to the disease severity, MPV is increased 4 to 6 weeks before the disease onset giving prediction importance to this parameter[11].

PLATELETS HYPOPRODUCTION & PLATELETS PERIPHERAL DESTRUCTION

PDW, MPV is higher in destructive thrombocytopenia (Dengue fever, immune thrombocytopenic purpura, malaria, kala-azar) than in non-megaloblastic hyperproliferative thrombocytopenia, in megaloblastic thrombocytopenia PDW, MPV is higher than non-megaloblastic and destructive thrombocytopenia[12]. Concerning MPV its normal range is between 7.2 – 11.7 fL, and more than 13 fL occurs in platelets peripheral destruction where there is compensation by the new metabolically active larger platelets, while platelets hypoproduction variety the MPV is less than 10 fL also an inflammation of low intensity can produce a lower MPV as in rheumatoid arthritis[2].

IN CEREBROVASCULAR ACCIDENTS AND MYOCARDIAL INFARCTIONS

Increased MPV is associated with an increased probability of having cardiovascular or cerebrovascular events and also with increased arterial and venous thrombosis[13]. In patients with acute myocardial infarction and unstable angina, there is a significant increase in MPV and PDW in comparison with a patient with stable coronary heart diseases, larger platelets are more active and hence there is more chance for thrombosis, this fact can be used as a predictive measure for preventing coronary heart diseases complications[14-17].

IN COVID-19 INFECTION

Thrombosis and coagulopathy are important complications of coronavirus infection, platelets affection by coronavirus play a role in the processes of coagulopathy as a result of this affection the inflammatory and procoagulant features of the platelets will be enhanced[18]. Thrombopoiesis is controlled by inflammation like IL-1 and IL -2 and thrombopoietin and platelets size represented by MPV is a reflection of their activities, larger platelets are metabolically more active and have more ability to produce thrombosis[18]. PDW reflects the differences in platelet sizes, in covid infection, there is an increase in platelet distraction, and the newly produced immature platelets have variable sizes and hence lead to an increase in PDW[18].

IN DIABETIC PATIENT

PDW and MPV are significantly higher in a patient with diabetes than in healthy non-diabetic patients and significantly higher in complicated diabetics than non-complicated diabetics[19], this will improve our management for diabetics patients.

Another study concerned with Diabetes mellitus II shows that PDW is significantly increased in diabetic patients with or without complications than in nondiabetic patients, and MPV is significantly increased in diabetic patients with complications than diabetic patients without complications or non-diabetic patients [20].

IN TINNITUS

It was found that only increasing MPV may be used as an indicator for thrombotic and vascular causes of tinnitus[21].

RESEARCH HIGHLIGHTS

- 1- Platelet indices have potential diagnostic value.
- 2-Platelet indices of relatively low cost.
- 3-In platelet indices measurements the major limitation is the lacking of consistency in measuring platelets indices by different methods
- 4- Thrombosis and coagulopathy are important complications of coronavirus infection, platelets affected by coronavirus play a role in the processes of coagulopathy

CONCLUSION

Platelets distribution width and mean platelets volume have potential diagnostic values which may help in diseases management

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