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Platelet indices in differentiating hypoproductive and hyperdestructive thrombocytopenia

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Abstract
The volume indices of the platelets are very easily available and this is considered very useful in diagnosing thrombocytopenia. There are only a handful studies which have reported platelet indices which would be very useful in differentiating different types of thrombocytopenia. This study is one such noble attempt to find whether this is actually useful in the initial evaluation of patients with thrombocytopenia using the platelet indices.

Keywords: platelet, indices, thrombocytopenia, hypoproductive, destructive

Introduction
Thrombocytopenia is defined as the presence of reduced number of platelets in circulating blood. It may be the result of inadequate production of platelets or their peripheral destruction. The volume indices of the platelets are very easily available and this is considered very useful in diagnosing thrombocytopenia. There are two types of thrombocytopenia they are the hypoproductive and the other one the hyperdestructive. The former is also known as the hypoproliferative thrombocytopenias, while the latter are categorized as destructive thrombocytopenias [1]. The primary function of the platelets is to maintain the hemostasis and since this is very important for the sustainment of life, any deviation is observed and taken care very seriously. Majority of the times we need bone marrow aspiration studies to find out the cause [2]. Apart from some obvious cause the gold standard is the bone marrow aspiration studies [3]. There are only a handful studies which have reported indicating that platelet indices which would be very useful in differentiating different types of thrombocytopenia [4, 5]. Moreover very few studies indicate that the platelet volume indices are differentially altered in various causes of thrombocytopenia [5, 6]. This study is one such noble attempt to find whether this is actually useful in the initial evaluation of patients with thrombocytopenia using the platelet indices.

Aims and Objectives
To evaluate the variation in platelet indices in establishing clinical correlation in patients presenting with thrombocytopenia.

Materials and Methods
The study was done from June 2018 to May 2020. This study was done in Adichunchanagiri Institute of Medical Sciences. This study is a cross sectional study
Thirty cases were chosen, out of which six were proven hypoproductive variety and the rest were proven hyperdestructive type.
Platelet count, Plateletcrit (PCT), Platelet Distribution Width (PDW) and Mean Platelet Volume (MPV) were collected and tested for statistical significance by unpaired-t test.

Exclusion criteria
1. Paediatric cases
2. Patient on antiplatelet drugs.

Inclusion criteria

Proven cases of thrombocytopenia

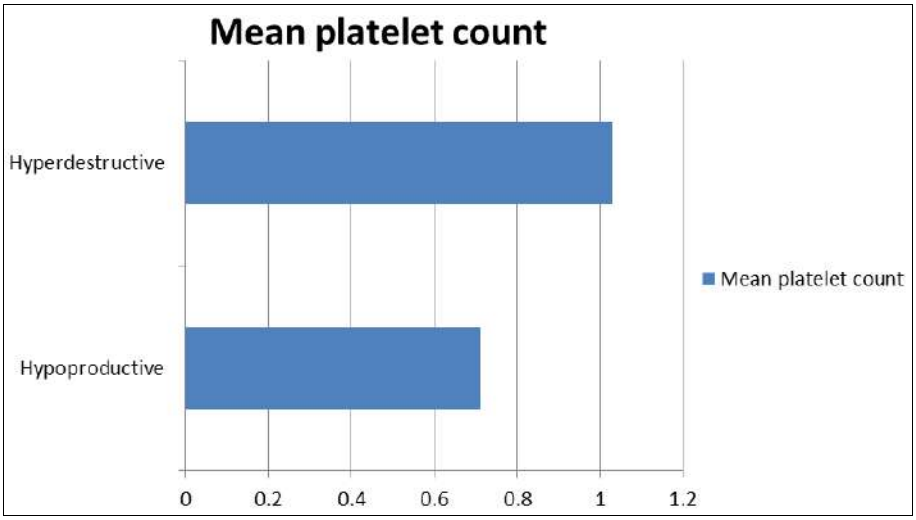
Detailed history was taken. Obvious hyperdestructive causes were determined by clinical history and relevant tests. Proven cases of hypoproduction were taken for the study.

The blood was drawn taking all aseptic precautions and then sent for the clinical laboratory.

Automated Hematology Analyser was used to assess platelet indices. Correlation with routine peripheral smear findings of the respective cases was done.

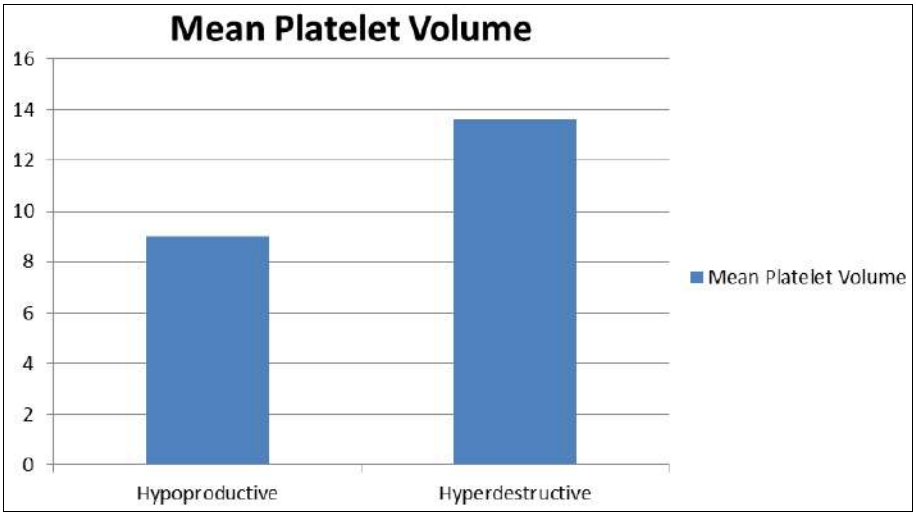
Statistical analysis: The results are presented in Mean±SD. The Unpaired t-test was used for comparisons.

Results

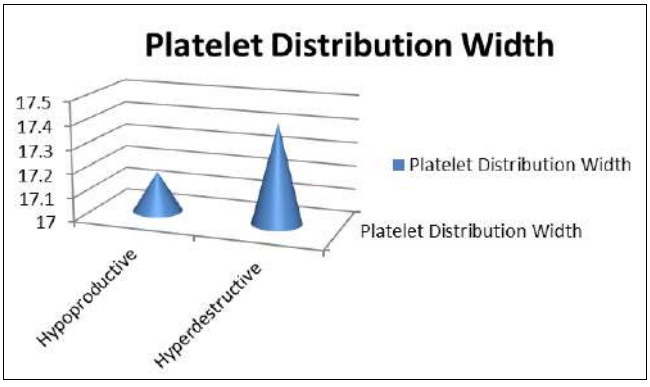


Graph 1: Mean platelet count

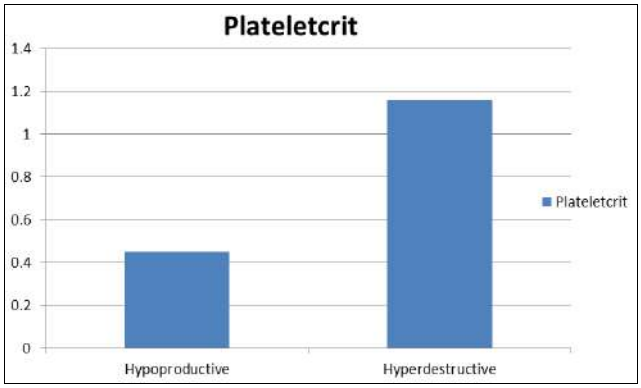
The mean platelet count was observed to be less in hypoproductive type.



Graph 2: Mean Platelet volume



Graph 3: Platelet distribution width



Graph 4: Plateletcrit

Table 1: Comparison of platelet indices between hypoproductive thrombocytopenia and hyperdestructive thrombocytopenia

Platelet indices	Hypoproductive (n=13)	Hyperdestructive (n=57)	p-value
Platelet count	0.69±0.52	1.01±0.33	Significant
MPV	9.04±1.06	13.58±1.76	Significant
PDW	17.09±2.84	17.26±1.47	Not Significant
PCT	0.43±0.41	1.12±0.37	Significant

Discussion

Platelets play a significant role in normal haemostasis, thrombosis and in various bleeding disorders [15]. Hence, quantitative alterations in platelets (thrombocytopenia) cause great morbidity. Thrombocytopenia can be due to either peripheral destruction (destructive thrombocytopenia) or inadequate production (hypoproliferative thrombocytopenia). Destructive thrombocytopenia category includes idiopathic thrombocytopenia, malaria, kala-azar, and dengue fever. 8 The disease categories, which are included in hypoproliferative group, include aplastic anemia, acute leukemias and chronic lymphocytic leukemias (with marrow infiltration) [8]. Platelet indices are the measurements made on peripheral blood platelets, including MPV, PDW and PLCR. Mean platelet volume is a measure of platelet volume, which reflects change in either platelet stimulation or rate of platelet production [9]. Dividing the plateletcrit by the number of platelets (plateletcrit 5 ratio of platelet volume to whole blood volume) yields the MPV. Platelet distribution width is a measure of platelet heterogeneity. The heterogeneity in platelet volume is considered to be due to aging of platelets or due to heterogeneous demarcation of megakaryocytes [10]. Platelet large cell ratio is the measure of larger platelet (.12 fl in size). It is an established fact that platelet volume indices vary with the platelet count.6 In order to avoid the confounding effect of platelet count, we have selected cases with similar platelet count (p50. 586) in all the three categories of thrombocytopenia. There is a paucity of literature on platelet indices in patients with thrombocytopenia due to infections, notably malaria, leishmaniasis and dengue fever. Although thrombocytopenia is an established finding in malaria, seen in 40. 5–85% of patients [11], no study on platelet indices in malaria patients was found in literature. Thrombocytopenia in malaria is usually due to peripheral destruction of platelets [12]. Dengue and dengue hemorrhagic fever are also associated with variable degree of thrombocytopenia [13]. Published studies conclude that the cause of thrombocytopenia in dengue fever may be immune mediated destruction of platelets [14].

Conclusion

Our study shows that alterations in platelet volume indices can give the haematologist an initial hint about the possible mechanism of thrombocytopenia.

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