

Evaluation of Thrombocytopenia with Special References to Platelet Indices in Five Part Cell Counter

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Abstract

Introduction: Thrombocytopenia is defined as platelet count less than 150,000/ μ l. There are various causes of thrombocytopenia's include increased peripheral destruction of platelets, decreased production of platelet, increased splenic sequestration abnormal platelet production. Platelet indices including platelet count, mean platelet volume (MPV), platelet distribution width (PDW), plateletcrit (PCT) & large platelet cell ratio (P-LCR) are helpful in evaluation of thrombocytopenias. Present study is evaluating this platelet indices by using five part cell counter.

Method: It was an observational cross-sectional study conducted in Department of Pathology. All detected thrombocytopenia cases (platelet count less than 1.5 lakh/mm³) from CBC done by Five Part Cell Counter.

Results: 150 cases of thrombocytopenia were included in our study. Majority of patients i.e 66.7% were in the age group of 15-49 yrs including males (52.7%) & females (47.3%). Infective conditions were found to be commonest cause of thrombocytopenia with 108 cases (72%), followed by 13(8.7%) anaemia cases, 8 (5.3%) ITP cases. The commonest cause of thrombocytopenia in was dengue with maximum cases of 74 (49.33%) out of 150 cases of thrombocytopenia. The mean MPV differed significantly (mean 9.5685 vs 8.5381) between two categories i.e in factious conditions vs all other conditions (except infectious), as indicated by a p-value of 0.02. The mean platelet distribution width (PDW) was significantly different [Mean \pm SD (63.06 \pm 23.63 vs 44.00 \pm 23.79)] between two categories i.e in factious conditions and all other conditions (except in fectionous) as indicated by ap-value<0.0001. The mean for parameter MPC showed significant difference [Mean \pm SD (67.56 \pm 20.25 vs 53.30 \pm 27.57)] between two categories of dengue and other infectious disease with a p-value of 0.033 by using t-test for in dependent variable. The mean P-LCR was significantly higher (0.01 \pm 0.01) in infectious condition as compared to non infectious category (0.004 \pm 0.008), as indicated by p-value of 0.007. The mean MP Md if fered significantly between two categories of infectious vs non infectious conditions as indicated by a p-value of 0.03.

Conclusion: Newer platelet parameters are being studied so as to ease the prognosis and diagnosis of patients. These parameters are easily available in five part hematological analyser. Parameters like MPV, PDW, MPC, P-LCR & MPM show significant statistical value, thus aiding in diagnosing various causes of thrombocytopenia. PDW & MPM can determine the hypoproductive causes of thrombocytopenia, thus can be utilized for deciding the need of platelet transfusion.

Keyword: Platelet parameters; Thrombocytopenia.

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Introduction

Thrombocytopenia is defined as platelet count less than 150,000 μ l. It is a common hematological disorder resulting in bleeding into mucus membranes which presents as petechiae, ecchymoses, epistaxis & gingival bleeding. However, bruising, hematuria, gastrointestinal bleeding and rarely intracranial haemorrhage can also occur.^{2,3}

There are various causes of thrombocytopenias include increased peripheral destruction of platelets, decreased production of platelet, increased splenic sequestration abnormal platelet production. Increased peripheral destruction of platelet occurs in ITP, due to drugs and infections. Decreased platelet/defective platelet production occur in bone marrow aplasias, leukemias, myelodysplastic syndrome and inherited disorders.⁵

While evaluating thrombocytopenia in a patient, bone marrow examination has been one of the procedures that have employed since long but procedure is invasive and may not be relevant in immune related thrombocytopenias. Hence, platelet indices which are possible to measure automatically by automated blood cell analysers may be of value in such cases. Platelet indices include platelet count, mean platelet volume (MPV), platelet distribution width (PDW), plateletcrit (PCT), large platelet cell ratio (P-LCR).¹² These indices may be helpful in evaluation of thrombocytopenias. MPV has been proposed to be a potentially useful screening test for platelet activation.¹⁷ Furthermore PDW may reflect change in morphology of platelet due to platelet activation. PCT is crucial measurement of platelet biomass which combines MPV with absolute platelet count. These indices are altered in different clinical conditions like cardiovascular (CV) disease, infectious diseases including tuberculosis, malarial infection, dengue fever and immune related conditions.¹³ P LCR were more reliable markers for distinguishing hyper destructive thrombocytopenia from hypo productive thrombocytopenia.¹⁸

Even though there are many studies on thrombocytopenia, very few studies are done on five-part cell^{14,15} counter by studying newer platelet parameters.¹⁶ These newer parameters changes can help in determining prognosis, determining causes of thrombocytopenia and storage of platelets in the body. Hence the need to study these parameters further in detail.

AIMS AND OBJECTIVE

1. To study clinicopathological information to know the common causes of thrombocytopenia in patients visiting tertiary care hospital in Five Part Cell Counter.
2. To study changes in platelet parameters platelet distribution width (PDW), mean platelet volume (MPV), platelet large cell ratio (P-LCR), plateletcrit (PCT) and mean platelet component (MPC) in various conditions of thrombocytopenia.

MATERIAL AND METHODS

This was a cross sectional observational study done in Department of Pathology for duration of 2 years. 150 patients of both sexes and all ages who are diagnosed with thrombocytopenia on five part cell counter, attending tertiary care hospital were taken.

Blood samples was collected using ethylenediamine tetra acetic acid bulb (EDTA bulb). Thrombocytopenia cases detected from CBC analysed by Five Part Cell Counter was noted. Informed written consent was taken of the patient for research purpose. Complete history, important clinical details was be analysed. Various platelet parameters like MPV, PDW, P-LCR, PCT & MPC were studied in thrombocytopenia cases.

These platelet counts and platelet parameters along with details and history of patients was collected.

Peripheral blood smears and bone marrow aspirations stained with Leishman's stain or Hematoxylin and Eosin stain.

Study instrument

Seimens Advia 2120 Hematology System-Five part hematology analyser.¹⁹ Olympus Cx21i binocular microscope.

Inclusion criteria

All detected thrombocytopenia cases (platelet count less than 1.5 lakh/mm³) from CBC done by 5-part cell counter in department of pathology.

Exclusion criteria

All patients not giving consent.

RESULTS

Table 1 shows the distribution of patients as per age and sex. As regards age, majority, i.e. 100 (66.7%) patients were in the age range of 15-49 years, followed by 24 (16%) in the range 50-64 years, 17 (11.3%) in the 5-14 years. There were 6 (4%) patients above 65 years and 3 (2%) below 5 years. Further, there were 71 (47.3%) females, while 79 (52.7%) males in the study.

Table 2 provides the distribution of patients as per their clinical conditions. There were 108 (72%) cases of infective condition, followed by 13 (8.7%) anaemia cases, 8 (5.3%) peripheral disease cases. Other conditions, as shown in table, were observed in less than 5% of the cases.

Table 1: Distribution of patients according to age and sex

| Age Category (years) | Sex | | Total |
|----------------------|------------|-----------|------------|
| | Number (%) | | |
| | Female | Male | |
| <5 | 3 (4.2) | - | 3 (2.0) |
| May-14 | 8(11.3) | 9(11.4) | 17(11.3) |
| 15-49 | 54 (76.1) | 46 (58.2) | 100 (66.7) |
| 50 - 64 | 3 (4.2) | 21 (26.6) | 24 (16.0) |
| >=65 | 3 (4.2) | 3 (3.8) | 6 (4.0) |
| Total | 71 (100) | 79(100) | 150(100) |

Table 2: Distribution of patients as per clinical condition

| Clinical Condition | Number (%) |
|---------------------------|------------------|
| Infective condition | 108 (72.0) |
| Anaemia | 13 (8.7) |
| IITP | 8 (5.3) |
| Epithelial malignancy | 3 (2.0) |
| Haematological malignancy | 2 (1.3) |
| Autoimmune disease | 1 (0.7) |
| Drug toxicity | 1 (0.7) |
| Genetic disorder | 1 (0.7) |
| Pregnancy | 1 (0.7) |
| Others | 12 (8.0) |
| Total | 150 (100) |

Table 3 gives the mean and standard deviation for various platelet parameters according to clinical condition. For statistical comparison of parameters, the conditions like anaemia, peripheral destruction, epithelial malignancy, haematological malignancy, auto immune disease, drug toxicity, genetic disorder, pregnancy and other conditions were merged together due to sample inadequacy. The parameters for this combined group were compared

with that of infective condition for significance of difference of means using two sample independent t-test. Table 12A gives the mean and standard deviation for pooled clinical conditions. Table 4 gives the comparison of platelet parameters between two diagnostic categories using t-test for independent samples. It is evident that the mean platelet distribution width (PDW) was significantly different between two categories as indicated by a