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Original Research Article

Immature platelet fraction (IPF) as an indicator of platelet recovery in dengue fever

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Abstract

Introduction: Dengue fever is a major public health problem in India. Thrombocytopenia is a well-known complication. As there are inappropriate platelet transfusions, effective tools need to be established to predict platelet recovery. IPF measures immature platelets in blood. It holds great promise of becoming a reliable future guide for decisions concerning platelet transfusions.

Materials and methods: A retrospective cohort study conducted in a tertiary care hospital. Case records of patients with Dengue fever with platelet count <1lakh/cumm and at least one IPF value measurement were studied. Correlation was assessed between various parameters.

Results: Of 104 patients, 66.3% were male. Correlation between IPF value at the time of admission and platelet count at 24 and 48 hours showed significant positive correlation (Pearson's correlation 0.28 (p=0.003); 0.32 (p=0.00097) for platelet count at 24 and 48 hours respectively).81.7% patients had high IPF (>4.3%) and the rest had low IPF (<4.3%). High IPF group had significantly higher rise in platelet count at 24 to 48 hours as compared to normal IPF group (Independent T test values -2.808 (p=0.006); -3.57 (p=0.000552) for platelet count at 24 and 48 hours respectively).Among patients with high IPF at admission 83.5% showed improvement in platelet count at 24 hours and the rest in 48 hours.

Conclusion: IPF is an emerging tool in predicting the recovery of platelet count in dengue with thrombocytopenia. At present very few studies are there and ours is one such study where we have established a positive correlation of IPF with platelet recovery.

Keywords: Dengue fever; immature platelet fraction; IPF; thrombocytopenia.

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1. Introduction

Dengue fever is one of the most rapidly spreading mosquito-borne diseases that have become a major public health problem in India. Morbidity and mortality with Dengue fever are mainly due to its complications such as thrombocytopenia, bleeding manifestations, Dengue shock syndrome, ARDS, encephalitis etc. Thrombocytopenia is one of the defining findings in Dengue fever and it is often mistreated. In India, during Dengue outbreaks we observe an acute shortage of blood products mainly the platelets and the main reason for it is inappropriate use. There is a controversy regarding platelet transfusion in dengue fever with severe thrombocytopenia and an effective guideline need to be established for the same. Although there are various theories as to pathogenesis of thrombocytopenia in Dengue fever, the exact mechanism still needs to be unravelled. The complex pathogenesis shows that thrombocytopenia is not only due to decreased platelet production due to bone marrow suppression and attenuation of megakaryocyte maturation, but also due to increased peripheral platelet destruction. [1]

The immature platelet fraction (IPF) is one of the latest tests which measures immature or reticulated platelets in the peripheral blood. Immature platelets are morphologically bigger and more active than normal platelets. IPF is the equivalent of reticulocyte count for red blood cells and hence it reflects the activity of thrombopoiesis. [2,3] IPF levels rise as bone marrow production of platelets increases.[2,4]

Currently there are only few studies which show positive correlation of IPF with recovery of platelet count in Dengue patients.[5,6] As of now IPF holds a great promise

of becoming a reliable future guide for decisions concerning platelet transfusions.[5]

The objective of the study was to establish the relationship between IPF and increase in platelet count in patients with dengue fever with thrombocytopenia.

2. Materials and methods

The study was a retrospective cohort study, in which case records of patients admitted during one year period in a tertiary care hospital with serology proven Dengue fever with platelet count less than 1 lakh/cumm, who had got IPF measurement done at least once during the hospital stay were studied.

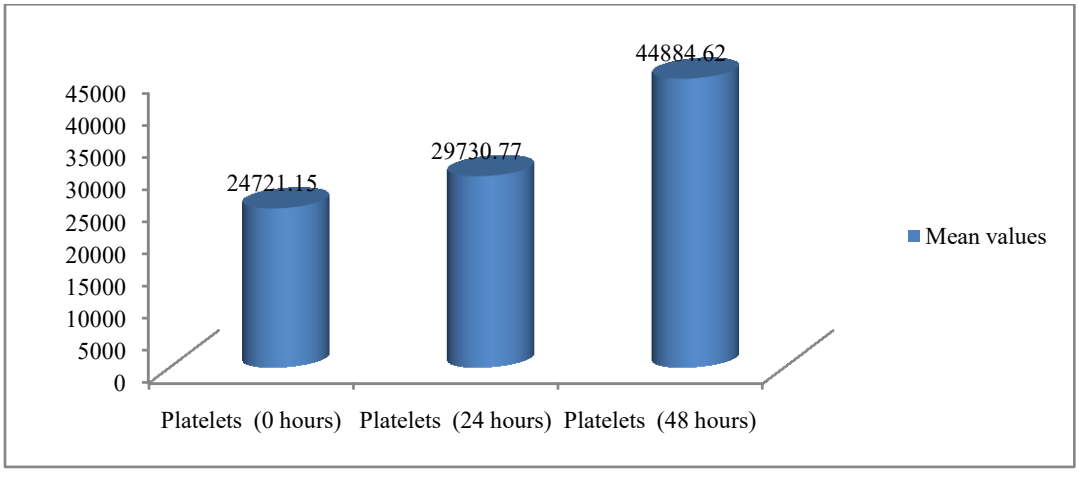
Patients with thrombocytopenia due to conditions other than dengue fever, patients who were on drugs causing thrombocytopenia or bone marrow suppression or who had received whole blood or platelet transfusions and patients who didn't have follow up platelet count reports at 24 and 48 hours were excluded from the study.

Descriptive statistical analysis is done in our present study. Results of continuous measurements are presented as Mean±SD and results of categorical measurements are presented as percentage. Pearson's correlation coefficient is used to assess correlation between various parameters and to find out the difference in mean values of two groups, independent T test was applied. IBM SPSS software is used and results are published as bar and scatter diagrams.

3. Results

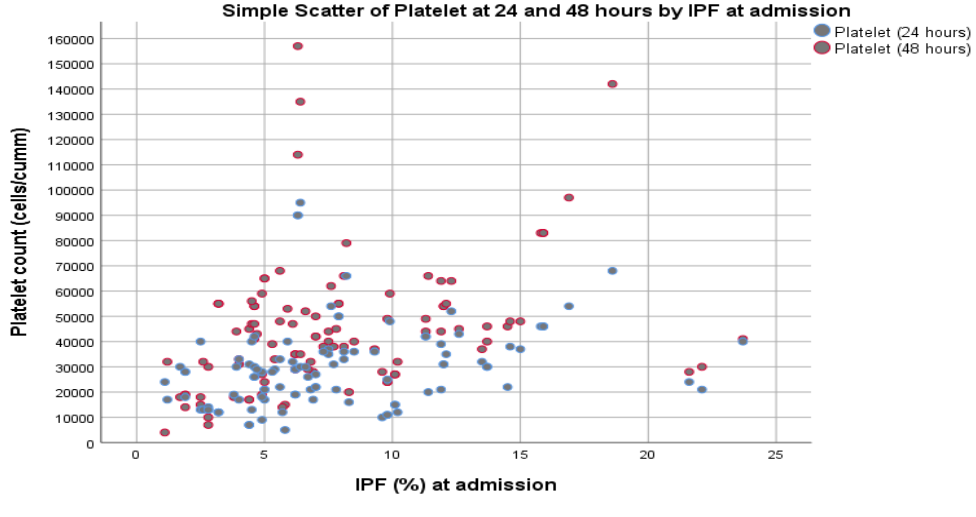
Total 104 patients satisfied the inclusion criteria, of which 69 (66.3%) were male. The mean IPF value (%) at admission was 7.84±4.65. Mean platelet values (cells/cumm) at admission, 24 hours and 48 hours were 24.7±23.4 x 10^3, 29.7±16.7 x 10^3 and 44.9±25.8 x 10^3 respectively (Figure 1).

Figure 1: Mean platelet values (cells/cumm) at admission, 24 hours and 48 hours



Correlation was assessed between IPF value at the time of admission and platelet count at 24 and 48 hours which showed a statistically significant positive correlation between IPF value and platelet count. As the IPF value increases platelet count also increases over 24 to 48 hours (Figure 2). Pearson's correlation coefficient were 0.28 (p=0.003) and 0.32 (0.00097) for platelet count at 24 hours and 48 hours respectively.

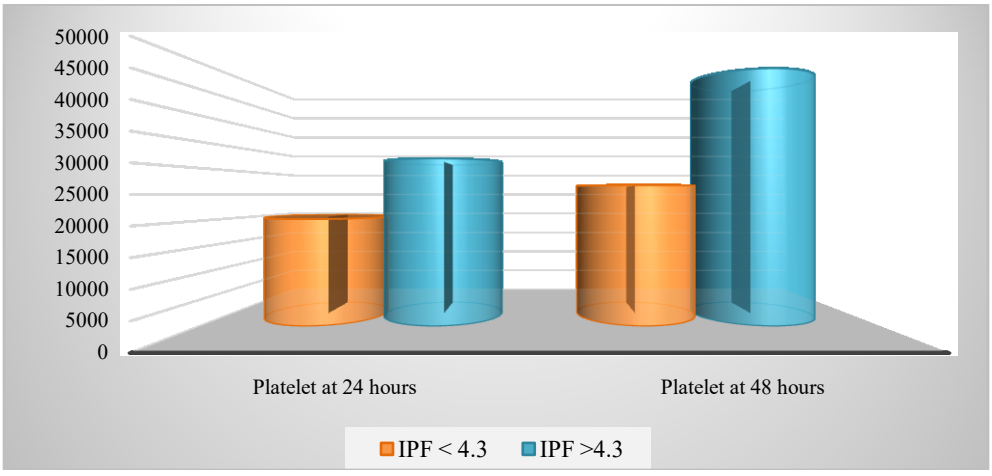
Figure 2: Correlation between IPF at the time of admission to platelet count at 24 hours and 48 hours



As the normal IPF value in a healthy adult is <4.3%, we divided our patients into two groups based on IPF values at admission as having normal IPF (<4.3%) and high IPF (>4.3%). 85 (81.7%) patients had high IPF at admission. We have found a statistically significant difference in rise in platelet count at 24 and 48 hours in two groups. Those who had a high IPF value at admission had a significantly higher rise in platelet count at 24 to 48 hours as compared to normal IPF group. Independent T test values were -2.808 (p=0.006) and -3.57 (p=0.000552) for platelet count at 24 and 48 hours respectively (Figure 3).

Among patients who had high IPF at admission 83.5% showed improvement in platelet count at 24 hours and the remaining 16.5% had platelet recovery in 48 hours.

Figure 3: Mean platelet count (cells/cumm) at 24 and 48 hours among normal and high IPF groups



4. Discussion

Immature platelet fraction (IPF) is an emerging laboratory parameter in thrombocytopenia of various causes. The reference range is 0.7-4.3%. There are very few studies till date regarding application of IPF in dengue fever with thrombocytopenia.[5,6]

Dadu *et al* [5] found out that IPF had a strong correlation with the recovery of platelet counts in patients with dengue. 84.3% patients showed recovery within 24hours after attaining the peak IPF, 93.75% of the patients showed recovery within 24–48 hours of the rise of the IPF compared with the previous day's value. In our study we have found similar results; among those who had high IPF value at admission, 83.5% showed recovery within 24 hours and remaining 16.5% in 48 hours. We can compare our results with another study conducted by Kumar *et al* [6] in which 86.4% patients showed recovery of platelet count within 24hours and the rest with 48 hours after attaining peak IPF value. They had observed a positive correlation between IPF level and the recovery of platelets in patients with dengue. We have also found a strong positive correlation between IPF level and platelet recovery.

In our study we divided our patients into two groups based on IPF values at admission as having normal IPF (<4.3%) and high IPF (>4.3%). Those who had a high IPF value at admission had a significantly higher rise in platelet count at 24 to 48 hours as compared to normal IPF group.

5. Conclusion

In India during dengue fever outbreaks, we see an acute shortage of blood product-platelets mainly due to inappropriate use. Immature platelet fraction has been proven quite effective in predicting the recovery of platelet count in dengue fever with thrombocytopenia. At present very few studies are there and ours is one such study where we have established a positive correlation of IPF with platelet recovery.

Limitation

It was a single centre retrospective study. A multicentre randomized study would give a better result.

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