



## UTILITY OF IMMATURE PLATELET FRACTION (IPF) TO PREDICT PLATELET RECOVERY IN DENGUE PATIENTS AT A TERTIARY CARE CENTRE

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### ABSTRACT

**Introduction:** Dengue fever is a major public health problem in India. Thrombocytopenia is a common haematologic abnormality in dengue which demands platelet transfusion. Platelet transfusion though life saving has its own hazards so that unnecessary usage is to be avoided. Immature Platelet Fraction (IPF) is an index of thrombopoiesis which quantitates reticulated platelets, IPF is already being used in many institutions over the world to monitor cases of ITP, TTP and Marrow transplant to accurately predict recovery from thrombocytopenia.

**Aim & Objectives:** To evaluate and utilise the quantification of reticulated platelets and IPF to predict recovery in cases of thrombocytopenia arising due to platelet destruction seen in cases of Dengue

**Methods:** This is an observational descriptive study done in 2019 on 36 dengue patients who were positive for NS1 antigen or IgM antibody or both and were treated conservatively at Shri Sathya Sai Medical College and Research Institute. The platelet count and IPF value of all these patients were evaluated on a daily basis. The work was carried out after an approval from Institutional ethics committee. Data was analysed statistically.

**Results:** There is statistically significant ( $P < 0.01$ ) improvement in platelet values within 48 hours when the IPF is more than 6.1%. If the IPF value is more than 6.25% and 10.6% there is 67% and 100% chance of platelet recovery within 48 hours respectively.

**Conclusion:** IPF is an important parameter which can be confidently utilized in predicting platelet recovery so that prophylactic platelet transfusions can be deferred and also the hazards associated with it. Hence, Practitioners handling Dengue cases may be oriented to look for IPF and consider it before referral or active intervention.

### KEYWORDS :

#### INTRODUCTION

Dengue is a mosquito borne viral infection with potential fatal complications. According to the ministry of health, In India there were 157315 dengue cases including 166 deaths in the year 2019. Among them 8526 cases were reported from Tamilnadu as per the national vector borne diseases control program of which Chennai reported about more than 1000 cases. Dengue fever is one of the rapidly spreading 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.

The immature platelet fraction (IPF) is one of the 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.

#### Aim & Objectives

With the burden of dengue fever in India demanding platelet transfusion, we aim to study the immature platelet dynamics and the immature platelet fraction cutoff and utilize it to predict platelet recovery so that platelet transfusion can be deferred.

#### MATERIALS & METHODS

This is an observational descriptive study done at the department of General Medicine, Shri Sathya Sai Medical College & Research Institute, South India where information was collected from records for the period from July to December 2019. This study was approved by the Institutional Ethics Committee.

The study population includes 36 dengue patients who were positive

for NS1 antigen or IgM antibody or both and treated at our hospital conservatively.

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.

The platelet count and IPF were retrieved from System XE2100 hematology analyzer. The patients were grouped into 5 categories according to their platelet count on the day of the admission

High risk < 20,000/c.mm  
Moderate > 20,000 – 40,000 /c.mm  
Low risk > 40,000 – 1,00,000 /c.mm  
No risk > 1,00,000 – 1,50,000 /c.mm  
Normal > 1.5 lakhs /c.mm

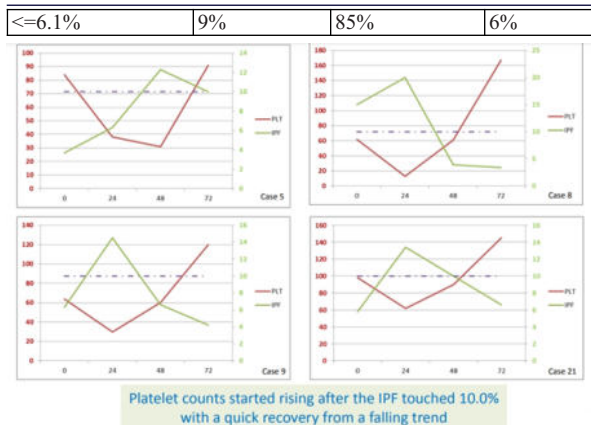
A platelet value of < 1,50,000 was considered as thrombocytopenia. For this study a change in platelet value of more than 20,000 count in 48 hrs was considered as a clinically significant change. For the IPF a value > 6.1% was considered as a high IPF value. Data were entered in Microsoft Excel 2010 and analysed. Descriptive analysis was initially performed. This was followed by associating between high values of IPF and significant clinical change in platelet values during the subsequent 48 hrs.

#### RESULTS

Table shows 56% of patients with high IPF showed a change in risk category from high to low, but only 9% of patients with < 6.1% showed this change. 41% of patients with high IPF & 85% of patients with low IPF showed no change and only a mere 3% with high IPF showed change to high risk with fall in platelets. There is statistically significant ( $P < 0.01$ ) improvement in platelet values within 48 hours when the IPF is more than 6.1%. It was observed that in thrombocytopenia a cut off value of IPF more than 6.1% yield maximum positive likelihood ratio. The sensitivity, specificity and positive predictive value (PPV) for the cut off was 77%, 63% and 67%. A PPV of 67% indicates that if the IPF value is more than 6.1%, there is 67% chance of platelet recovery within 48 hours. If the IPF is more than 10.6% there is 100% chance of platelet recovery within 48 hours.

#### Association Between Change In Platelet Category From Day 1 To 3 And Day 1 IPF Value > 6.1%

Day 1 To 3 Change In Platelet Category			
Day 1 IPF >= 6.1%	>=20000	20000-<20000	<=20000
>=6.1%	56%	41%	3%



## DISCUSSION

IPF levels rise as bone marrow production of platelets increases. The IPF values were on the rising trend from day 1 to day 5. From day 5 to day 7 it is on the decreasing trend. This is because the IPF increases 1-2 days to 3-7 days before platelet recovery. In this study we found 56% of patients with high IPF showed change in risk category within 2 days and 24% within 4 days and 15% within 6 days. Only 9% of patients with IPF less than 6.1% showed platelet recovery. A cut off value of 10.6 or more indicated that there is 100% chance of platelet recovery by 20000 within 48 hours.

## CONCLUSION

Dengue epidemic calls for platelet transfusion, sometimes inappropriate also. Careful clinical watch and monitoring platelet count may help to group the patients under risk category. Immature platelet fraction is an additional parameter that can be utilized and monitored to predict platelet recovery, so that prophylactic platelet transfusion can be deferred and also the hazards associated with it. Hence, Practitioners handling Dengue cases may be oriented to look for IPF and consider it before referral or active intervention.

## Limitations

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

## REFERENCES

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