UTILITY OF IMMATURE PLATELET FRACTION (IPF) TO PREDICT PLATELET RECOVERY IN DENGUE PATIENTS HAVING THROMBOCYTOPENIA

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Introduction

• Thrombocytopenia is a feature of a lot of diseases including viral infections like dengue
• Monitoring platelet count is critical in the management of dengue as fall in platelet count may necessitate transfusions
• Recovery is heralded by an increase in the number of platelets
• Both doctor and patient anxiously await an increase in platelet count.

• Is there a way to monitor when the platelets would increase?
• Is there a way of predicting recovery?
• Can unnecessary transfusions be avoided?
Immature Platelet Fraction (IPF)

- Recently introduced parameter in certain cell counters (Sysmex and CELL DYN Abbott)
- IPF is an index of thrombopoiesis which quantitates reticulated (young) platelets
- Analogous to reticulocytes
- The RNA of these platelets can be accurately quantitated by flow cytometry using a fluorescent dye like oxazine
- 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.
Aims and Objectives

Aim of the Current Study

• Evaluate and use the quantification of reticulated platelets and IPF to predict recovery in cases of thrombocytopenia arising due to platelet destruction seen in cases of Dengue

• Compare our finding with the only other study available (Dadu, et al)
Methodology

1. Established the range of IPF in individuals with normal platelet counts in our setup by studying 100 cases

   • Normal range: 1.0 to 9.0%
   • Mean: 4.0%
   • Standard deviation: 1.84

2. Selection of Cases for the Current Study

<table>
<thead>
<tr>
<th>Number of cases fulfilling inclusion criteria</th>
<th>Patients with a positive dengue test (IgM or NS1 with or without IgG positivity) ..AND.. Platelet count &lt; 1 lakh / cumm</th>
<th>56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases fulfilling exclusion criteria</td>
<td>Dengue serology (IgG positive)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Dengue cases Platelet count &gt;1 lakh/cumm</td>
<td>11</td>
</tr>
</tbody>
</table>
Methodology

- Dengue serology was recorded by doing ELISA test using Euroimmune system; with kits from PANBIO (NS1 Antigen) and Euroimmune (IgG and IgM)
- These patients had follow-up at intervals ranging from 24 to 72 hours with at least two platelet count readings
- The platelet count and immature platelet fraction was estimated using the fluorescent dye binding of platelet RNA on the SYSMEX XN 1000 by flow cytometry (Oxazine dye 0.003%) on the PLT channel. CBC was recorded simultaneously
- Peripheral smears were studied in all these cases with a note on the presence of large platelets on smear

<table>
<thead>
<tr>
<th>#readings</th>
<th>#cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>upto 72 hrs</td>
<td>4</td>
</tr>
<tr>
<td>upto 48 hrs</td>
<td>3</td>
</tr>
<tr>
<td>upto 24 hrs</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>56</td>
</tr>
</tbody>
</table>
Platelet counts started rising after the IPF touched 10.0% with a quick recovery from a falling trend.
Observations

Sample: cases with 3 readings

Platelet counts started rising after the IPF touched 10.0% with a quick recovery from a falling trend
Observations

Sample: cases with 2 readings

Case 50

Case 56

Case 33

Case 30
## Results and Discussion

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Current study</th>
<th>Dadu et al</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Similar</td>
<td>Similar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Current study</th>
<th>Dadu et al</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sysmex XN 1000</td>
<td>Sysmex XE-2100</td>
</tr>
</tbody>
</table>

| Number of Cases          | 56 cases      | 32 cases   |

<table>
<thead>
<tr>
<th>Recovery from falling trend</th>
<th>Current study</th>
<th>Dadu et al</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 24 hours</td>
<td>92.80%</td>
<td>100%</td>
</tr>
<tr>
<td>Within 24-48 hours</td>
<td>7.20%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recovery from peak</th>
<th>Current study</th>
<th>Dadu et al</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same day</td>
<td>46.40%</td>
<td>18.79%</td>
</tr>
<tr>
<td>Within 24 hours</td>
<td>94.60%</td>
<td>84.30%</td>
</tr>
<tr>
<td>Within 24-48 hours</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Conclusion

• IPF shows a strong co-relation with a recovery of platelet counts in patients with dengue infections

• IPF can be used confidently to predict recovery of platelets in patients of dengue

• An IPF value of more than 10.0% indicates recovery of platelet count within 48 hours
References


- **Sachdev R, Tiwari AK, Goel S, Raina V, Sethi M.** Establishing biological reference intervals for novel platelet parameters (immature platelet fraction, high immature platelet fraction, platelet distribution width, platelet large cell ratio, platelet-X, plateletcrit, and platelet distribution width) and their correlation among each other. Indian J of Pathol Microbiol 2014;57(2):231-235


THANK YOU

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