Research Article

Use of mean platelet volume and platelet distribution width in predicting trend in platelet count and bleeding risks in patients of dengue fever

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ABSTRACT

Background: Dengue fever is a global re-emerging disease. Various parameters have been used to predict the complications of the Dengue fever. MPV and PDW is used to predict the trend in the platelet count and risk of bleeding manifestations.
Methods: It is a prospective observational study at MIMS, Mandya. The patient's data, platelet count, MPV, PDW and clinical characteristics were selected using standard proforma.
Results: Out of 15 patients with Dengue fever, only 2 patients had petechial rashes, There were no cases of DSS or DHF. There was no correlation between the platelet count, MPV, PDW, serology, gender and severity of the cases. There was no significant correlation between the Platelet count, MPV and PDW.
Conclusions: There was no correlation between the platelet count, MPV and PDW in patients with dengue fever.

Keywords: Dengue fever, Platelet count, MPV, PDW

INTRODUCTION

Dengue is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold with increasing geographic expansion to new countries. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries. In India dengue has seen resurgence in recent times. Reported case fatality rates in India are 3-5 %.[1]

Clinical features in dengue can range from a nonspecific febrile illness to severe disease i.e. dengue hemorrhagic fever and dengue shock syndrome in which patients develop hematological complications.[2]

One of the most common laboratory findings in dengue is thrombocytopenia. Thrombocytopenia leads to bleeding although the platelet count may not directly correlate with the bleeding manifestation. Recently platelet indices have been investigated as prospective platelet activation markers 3. Platelet volume, a marker of platelet function and activity is measured as mean platelet volume (MPV) by hematology analyzers. It's been observed in few studies that MPV can be used as independent predictor of bleeding.[3,4]

The study of platelets would have a substantial impact on reducing the mortality and morbidity associated with dengue. Hence the present study is planned to analyze the platelet parameters in dengue illness and to correlate the same with clinical course.

Aims and objectives

- To measure the trend in platelet count in patients with dengue and its correlation with MPV and PDW
- Assessing the significance of MPV and PDW in predicting bleeding risk in patients with similar platelet count
- The study is conducted with the hypothesis, that higher MPV and PDW indicate a trend in increase in the subsequent platelet count.

METHODS

It is a prospective observational study for a period of one year done in MIMS, Mandya. Dengue cases with serological confirmation by either dengue specific NS1 antigen assay and/or IgM antibodies detection were selected. Patient's clinical data collected from examination and medical records. The platelet parameters measured by the Abacus 5 automated hematology analyzer (Diatron group, SSM module; USA) on venous samples collected in K3EDTA tubes every day morning during the duration of illness. The data is collected in a specially designed proforma for the study. It is transformed to a master chart which will then be subjected to analysis.

Inclusion criteria

All patients with clinical features and serologically positive dengue infection above age of >18 years were included.

Exclusion criteria

Other causes of thrombocytopenia like due to infections other than dengue, megaloblastic anaemia, cirrhosis etc.

Statistical analysis

Statistical analysis was done by measuring the correlation coefficient between the MPV, PDW and platelet count.

RESULTS

This is an ongoing study at the Mandya Institute of Medical Sciences, Mandya. This is an interim report of the first four months of the study period. A total number of 15 cases with dengue fever were studied. Out of the 15 patients, 11 were male and 4 were female. The age group ranged from 18 to 45 years. Only 2 of the 15 patients with Dengue fever had bleeding manifestations in the form of petechial rashes. There were no cases of dengue shock syndrome or dengue haemorrhagic fever.

Table 1: The relationship between the platelet count, MPV and PDW of the dengue cases for three days.

Sl No	Platelet parameters								
	Day 1			Day 2			Day 3		
	Platelet count	MPV	PDW	Platelet count	MPV	PDW	Platelet count	MPV	PDW
1	80,000	7.1	9%	43,000	10.3	14%	85,000	11.2	18%
2	20,000	9	11%	15,000	11.5	16%	34,000	12.3	18%
3	15,000	10.4	13%	23,000	12.3	18%	46,000	13.4	19%
4	45,000	8.3	9%	24,000	10.2	11%	32,000	11.6	14%
5	30,000	12.1	12%	45,000	11.5	11%	68,000	12.3	15%
6	94,000	7.8	10%	47,000	12.5	18%	1,05,000	13.2	18%
7	36,000	9.4	14%	49,000	11.8	17%	84,000	12.6	17%
8	78,000	13.4	18%	95,000	12.7	16%	1,10,000	12.9	17%
9	27,000	12.9	16%	42,000	13.6	15%	87,000	13.1	16%
10	35,000	10.3	15%	28,000	13.2	17%	47,000	13.6	17%
11	18,000	12.7	16%	31,000	13.8	18%	65,000	13.2	16%
12	23,000	7.5	11%	15,000	11.3	14%	29,000	12.5	15%
13	1,08,000	11.3	9%	62,000	10.6	8%	45,000	10.2	9%
14	32,000	13.1	17%	58,000	13.5	18%	1,20,000	13.1	18%
15	58,000	10.6	15%	29,000	9.1	13%	23,000	9.3	13%

Out of 15 cases 7 were positive for NS1 antigen, 8 for IgM antibodies and 4 were IgG positive. There was no relationship between the gender, age and serology with severity of illness or extent of thrombocytopenia. The

three day readings of the platelet count, MPV and PDW of the fifteen cases were presented in the Table 1. The absolute value of MPV and PDW showed no relationship with respect to platelet count. The correlation coefficient

between platelet count and MPV on day 1, 2 and 3 are 0.159, 0.214 and 0.451 respectively and is not statistically significant.

DISCUSSION

MPV has been evaluated as a diagnostic tool in different conditions with thrombocytopenia with contradictory results. It has been demonstrated that MPV has sufficient sensitivity and specificity to discriminate aplastic anemia, bone marrow disease, hypoproductive thrombocytopenia, and bone marrow metastasis of solid tumor. However, it has limited sensitivity and specificity. The association of thrombocytopenia with dengue infection has been proved to be significant (p<0.001).

No significant difference was observed in MPV with severity of diseases. In the study done by Dewi et al there was no significant difference in MPV between DF, DHF and DSS (9.18±1.5 fL vs. 8.94±1.94 fL vs. 8.57±1.03 fL, p=0.761).[5] Wiwanitkit et al found that MPV for patients with DHF is not decreased & appears to be similar to that for the general healthy population.[6]

No significant relation was observed between IgM, IgG antibodies and serology (seropositive or seronegative) with MPV (fL) (corresponding to minimal platelet counts attained during the course of illness). No significant relation was observed between them even at the time of discharge.

CONCLUSION

No significant difference was observed in Mean between MPV at the time of minimal platelet counts and at discharge in dengue cases except in dengue fever cases. This is correlated with study done by Dewi et al and Wiwanitkit et al.

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