



## A STUDY ON HEMODYNAMIC CHANGES IN DENGUE FEVER PATIENTS WITH THROMBOCYTOPENIA

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### ABSTRACT

**AIMS AND OBJECTIVES:** 1. Correlation of days of thrombocytopenia with hemodynamic state of the patient.

**METHODS:** A total of 66 patients were included in the study. Convenient sampling was done. Eligible patients who satisfy the inclusion and exclusion criteria were taken for the study. Dengue spot test and daily complete blood counts were done from admission till discharge of the patients. Clinical parameters for hemodynamic stability were also noted.

**RESULTS :** 25% of patients presented with Dengue shock syndrome. Hemorrhagic manifestation was seen in 3% of the study population. Vomiting was seen in 21% and abdominal pain was observed in 10% of the study population. Mean platelet count was lowest on day 5. Mean Hb was highest on day 3. Mean PCV was highest on day 3. Mean systolic BP was lowest on day 6, day 7 and day 10. Mean diastolic BP was lowest on day 3 to day 5. Resolution of thrombocytopenia was found between day 9 and day 10. Median platelet count was lowest on day 6. Highest Hb was on day 3. Highest PCV was on day 3. Median systolic BP on all days was 120. Lowest median diastolic BP was seen on day 3 (70). Lowest Hb and PCV were seen on day 10.

**CONCLUSION:** We found that day 5 of dengue fever was associated with lowest platelet count

Our study found that there is significant correlation between Hb and PCV so that Hb can be used as a marker of PCV in dengue fever patients in resource limited settings. Thrombocytopenia could indicate severe dengue infection. There was significant correlation between platelet count and diastolic BP on day 6 and day 9 indicating probable reversible of plasma leakage syndrome. 31% of patients had leucopenia, 10% of patients had abdominal pain and 27% patients had vomiting indicating that thrombocytopenia could indicate severe dengue infection.

**KEYWORDS :** Dengue, Thrombocytopenia, Hypotension, plasma leakage

### INTRODUCTION

Dengue is the most prevalent mosquito-borne viral infection in the world. It is an acute viral infection which is hyper-endemic to the tropics where significant number of subjects are at risk<sup>2,3</sup>

Every year during July-November, an upsurge has been observed. It has a particular seasonal pattern i.e. peak after the monsoons. It is mostly prevalent in rural areas. The four main characteristic manifestations of dengue fever are continuous high grade fever of 2-7 days; hemorrhagic tendency as shown by positive tourniquet test, petichiae or epistaxis; thrombocytopenia and plasma leakage manifested by hemoconcentration.

The main symptom is bleeding and the most attributed causes include sequestration of platelets, platelet dysfunction and thrombocytopenia. Main causes for thrombocytopenia is destruction of platelet (ant platelet antibodies), DIC, bone marrow suppression in early stage and peripheral sequestration of platelets.

Thrombocytopenia in Dengue infections is most often transient and self limiting. However in clinical practice platelet transfusions are used although guidelines do not support this. However this is associated with adverse events which are not well studied. Hence this study is planned to study the temporal changes in platelet counts in patients with dengue fever with thrombocytopenia and correlate the same with hemodynamic parameters suggestive of capillary leak such as PCV, Hb, systolic and diastolic blood pressure

### AIMS AND OBJECTIVES

Correlation of days of thrombocytopenia with Hematocrit and hemodynamic state of the patient.

### METHODOLOGY

A Cross-sectional Study study was conducted on patients admitted in the medicine department of Yenepoya Medical College with a diagnosis of dengue fever. The study was conducted on 66 patients.

### Materials and methods

Eligible patients who satisfy inclusion, exclusion criteria will be contacted for the study. After a signed informed consent, patients will be recruited for the study. Daily complete blood counts, platelet count analysis will be done to check the rise in platelet count based on the mode of therapy. Patients will be examined until discharge for

gastrointestinal side effects such as vomiting, diarrhea, hematemesis, malena, abdominal pain and fluid overload states daily. Vital signs such as BP, Pulse, respiratory rate and temperature will be recorded daily. Their IV Fluid intake, oral fluid intake, platelet transfusion data, and any other therapies will be noted. Patients will be categorized into a single group and studied. Interventional data collected are taken from patients from various medical units as per the data in the records.

### Sample size and statistical analysis

Convenient sampling was done for a number of 66 cases of dengue fever with thrombocytopenia.

### Ethics

The study was conducted after ethical clearance from the ethics committee and university as per standard protocols and guidelines.

### RESULTS

**Table 1 Showing Demographic and clinical features of 66 patients with Dengue Fever with Thrombocytopenia**

Demographic and clinical features	Number and %
Mean Age in years ± SD	34±14
Gender Male gender N (%)	43( )
Fever N (%)	66(100)
Thrombocytopenia N (%)	66(100)
Headache N (%)	22(33)
Leucopenia N (%)	21(31)
Myalgia N (%)	21(31)
Vomiting N (%)	18(27)
Hypotension N (%)	17(25)
Abdominal Pain N (%)	7(10)
Rash N (%)	4(6)
Hemorrhagic manifestation N (%)	2(3)
Retro orbital pain N (%)	2(3)

This table shows, mean age of the patients were 34 with a standard deviation of 14 with male preponderance. 25% of patients presented with Dengue shock syndrome. Hemorrhagic manifestation was seen in 3% of the study population. Poor prognostic signs like Leucopenia and Myalgia were seen in 31% of the study population. Vomiting was seen in 21% and abdominal pain was observed in 10% of the study population.

**Table 2 Showing Day wise Temporal changes in Mean Platelet count, Hemoglobin, PCV, Systolic BP and Diastolic BP in Dengue Fever with Thrombocytopenia.**

Parameter	D3	D4	D5	D6	D7	D8	D9	D10
Mean Platelet count $\pm$ SD	72733 $\pm$ 70895	72558 $\pm$ 65124	63173 $\pm$ 50055	71472 $\pm$ 54973	70046 $\pm$ 43511	84533 $\pm$ 37387	104476 $\pm$ 36292	127000 $\pm$ 31829
Mean Hb $\pm$ SD	14.5 $\pm$ 1.96	13.4 $\pm$ 2.31	13.7 $\pm$ 2.50	13.67 $\pm$ 2.40	13.4 $\pm$ 2.41	13.5 $\pm$ 2.95	13.6 $\pm$ 2.56	12.6 $\pm$ 2.21
Mean PCV $\pm$ SD	43.53 $\pm$ 4.97	40.08 $\pm$ 6.46	41.10 $\pm$ 7.08	40.22 $\pm$ 7.06	40.06 $\pm$ 7.15	40.25 $\pm$ 7.72	41.08 $\pm$ 6.54	38.2 $\pm$ 4.77
Mean Systolic BP $\pm$ SD	119 $\pm$ 10	118 $\pm$ 10	118 $\pm$ 12	116 $\pm$ 19	116 $\pm$ 20	119 $\pm$ 14	118 $\pm$ 13	114 $\pm$ 27
Mean Diastolic BP $\pm$ SD	75 $\pm$ 6	75 $\pm$ 8	75 $\pm$ 7	76 $\pm$ 7	75 $\pm$ 7	76 $\pm$ 9	76 $\pm$ 9	78 $\pm$ 8

This is a table showing day wise temporal changes in mean Platelet count, Hemoglobin, PCV, Systolic BP and Diastolic BP in dengue fever patients.

Mean platelet count was lowest on day 5. Mean Hb was highest on day 3. Mean PCV was highest on day 3.

**Table 3 Showing Day wise Temporal changes in Median Platelet count, Hemoglobin, PCV, Systolic BP and Diastolic BP in Dengue Fever with Thrombocytopenia.**

Parameter	D3	D4	D5	D6	D7	D8	D9	D10
Median Platelet count (inter quartile range)	48000 (21500-95000)	61000 (17250-107750)	48000 (33000-83750)	60000 (31500 - 94000)	66000 (36500 - 90000)	84000 (59500 - 114750)	89000 (83000 - 121000)	129000 (113500-140250)
Median Hb	14.5	13.7	14	13.9	13.6	13.4	13.6	12.4
Median PCV	42.7	40.3	42.2	41.9	40.8	40.0	41.6	37.9
Median Systolic BP	120	120	120	120	120	120	120	120
Median Diastolic BP	70	80	80	75	80	80	80	80

This is a table showing day wise temporal changes in Median Platelet count, Hemoglobin, PCV, Systolic BP and Diastolic BP in dengue fever patients.

Median platelet count was lowest on day 6.  
Highest Hb was on day 3. Highest PCV was on day 3.  
Median systolic BP on all days was 120  
Lowest median diastolic BP was seen on day 3 (70)

## DISCUSSION

Results of the study shows that day 5 of dengue fever was associated with lowest mean and median platelet count and recovery starting from day 6 onwards. This has implications for clinical practice so that clinicians do not discharge patients with thrombocytopenia before day 6.

Study by Tsai et al also show that lowest median platelet count occurs on day 5.

There are very few studies quoting day wise temporal changes in platelet count.

Our study shows that thrombocytopenia is transient and lasts for up to day 9.

WHO does not recommend unless there is bleeding.

Recent studies also report associated coagulation abnormalities which are responsible for bleeding.

There was no correlation between platelet count and PCV/ Platelet count and Hb/ and platelet count and systolic BP, indicating that thrombocytopenia is unrelated to capillary leak syndrome which is yet another complication of dengue fever.

We found positive correlation between platelet count and diastolic BP on day 6 and day 9; this may be related to reversal of capillary leak syndrome increasing the left ventricular volume.

This observation was not seen in any previous studies.

In our study of dengue fever with thrombocytopenia, we found that 25% of patients with hypotension qualifying to be called as Dengue shock Syndrome (DSS). 31% of patients with leucopenia, 10% of patients with abdominal pain and 27 % patients with vomiting indicating severe dengue infection. This indicates that nearly 1/3<sup>rd</sup> of dengue fever with thrombocytopenia may be severe dengue infection and thrombocytopenia could be a good marker for severity of dengue infection and also for deciding hospital admission.

Mean systolic BP was lowest on day 6, day 7 and day 10. Mean diastolic BP was lowest on day 3 to day 5.

Resolution of thrombocytopenia was found between day 9 and day 10  
Lowest Hb and PCV were seen on day 10.

WHO guidelines also endorse the same criteria of thrombocytopenia to be admitted for management.

This study helps in preventing mortality in dengue fever.

## SUMMARY AND CONCLUSION

We studied 66 patients of dengue with thrombocytopenia who were hospitalized with the objective of observing the temporal changes in platelet count and its relationship with other clinical and lab parameters of severe dengue infection. We found that day 5 of dengue fever was associated with lowest platelet count. Our study found that there is significant correlation between Hb and PCV so that Hb can be used as a marker of PCV in dengue fever patients in resource limited settings. There was significant correlation between platelet count and diastolic BP on day 6 and day 9 indicating probable reversible of plasma leakage syndrome. 22% of patients with thrombocytopenia had DSS indicating that patients with thrombocytopenia had to be monitored closely for Dengue shock syndrome. 31% of patients had leucopenia, 10% of patients had abdominal pain and 27 % patients had vomiting indicating that thrombocytopenia could indicate severe dengue infection.

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