

EVALUATING THE ROLE OF EOSINOPHIL PERCENTAGE AND ABSOLUTE EOSINOPHIL COUNT AS HEMATOLOGICAL MARKERS OF RECOVERY IN CHILDREN WITH DENGUE FEVER AGED 1 TO 12 YEARS

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Abstract

Background: The objective of the study was to evaluate the role of eosinophil percentage and absolute eosinophil count as hematological markers of recovery in children with dengue. **Methodology:** This study was a retrospective record based observational study done at the department of paediatrics, Kanyakumari Government Medical College and Hospital between January 2022 to December 2022 on 39 children admitted with dengue fulfilling the inclusion and exclusion criteria. Children with Dengue NS1 Antigen or Dengue IgM positive admitted in the department of paediatrics, Kanyakumari government medical college and hospital were included in the study. Children less than one year and more than 12 years of age, children with clinical and laboratory features of dengue who are not Dengue NS1 Antigen or Dengue IgM positive, children with co infections, worm infestation, allergy, asthma, hematological disorders, malignancy, chronic illness and peripheral eosinophilia on admission were excluded from the study. Complete blood count was done at admission which included total leukocyte count, differential count, hematocrit and platelet count. Absolute Eosinophil count was calculated from total leukocyte count and eosinophil percentage. The eosinophil percentage and absolute eosinophil count at onset of recovery phase was recorded. Statistical significance was assessed at P value less than 0.05. **Results:** Of the 39 children with dengue included in the study, 19 (48.7%) were male and 20 (51.3%) were female. The mean age of the study participants was 8.13 ± 2.76 years. The mean eosinophil percentage on admission and at recovery for the study participants were 3.67 ± 1.578 % and 12.2 ± 6.174 % . The mean absolute eosinophil count on admission and at recovery for the study participants were 229.74 ± 122.552 cells/cu.mm and 963.00 ± 585.221 cells/cu.mm. A statistically significant rise was observed in eosinophil percentage and absolute eosinophil count at the onset of recovery phase in our study. (PValue <0.05). **Conclusion:** Eosinophilia can be used as a hematological marker of recovery in dengue fever.

INTRODUCTION

Dengue was identified as one of the four main infectious diseases threatening global health in the new five year strategic plan announced by World Health Organization (WHO) in January 2019.^[1] As per global modelled data, India contributes to around a third of the global dengue burden.^[2] As per the data published by the National Center for Vector Borne Diseases Control (NCVBDC), Ministry of Health & Family Welfare, Government of India, the total number of dengue cases in India in 2021 was 1,93,245 of which 6039 dengue cases were notified

from Tamil Nadu. In the same year, deaths due to dengue fever in India was 346 of which 8 were from Tamil Nadu.^[3]

Dengue is a mosquito borne viral disease with seasonal pattern. Dengue virus belong to the genus flavivirus. There are four dengue serotypes which may be in circulation singly or more than one serotype might be in circulation at a time in an area. Dengue virus are transmitted by the bite of female Aedes mosquito, Ae. aegypti being the most common vector in urban areas. Severe dengue is a leading cause of serious illness and death in several countries. Patients with severe dengue may present with

manifestations like shock, plasma leakage, bleeding and organ involvement. There is no specific treatment for dengue. Early detection and proper management lowers fatality rates of severe dengue to below 1%.^[4]

This study was done with the objective of evaluating the role of eosinophil percentage and absolute eosinophil count as hematological markers of recovery in children with dengue.

MATERIALS AND METHODS

This study was a retrospective record based observational study done at the department of paediatrics, Kanyakumari Government Medical College and Hospital between January 2022 to December 2022 on 39 children admitted with dengue fulfilling the inclusion and exclusion criteria. Details were collected retrospectively using case records. Children with Dengue NS1 Antigen or Dengue IgM positive admitted in the department of paediatrics, Kanyakumari government medical college and hospital were included in the study. Children less than one year of age and more than 12 years of age, children with clinical and laboratory features of dengue who are not Dengue NS1 Antigen or Dengue IgM positive, children with co infections, worm infestation, allergy, asthma, hematological disorders, malignancy, chronic illness and peripheral eosinophilia on admission were excluded from the study.

A total of 59 children were admitted with dengue fever in the study period, of which 20 were excluded from the study after applying the exclusion criteria. After obtaining informed consent from the parents, demographic details and clinical details of illness were recorded in a predesigned questionnaire. Complete blood count was done at admission which included total leukocyte count, differential count, hematocrit and platelet count. Absolute Eosinophil count was calculated from total leukocyte count and eosinophil percentage. Further investigations and repeat complete blood count were done as per patient's clinical indication. The eosinophil percentage and absolute eosinophil count at onset of recovery as indicated by rising platelet count and clinical features of recovery was recorded. Data collected was analyzed using suitable statistical methods using SPSS 25 software. Statistical significance was assessed at P value less than 0.05.

RESULTS

Of the 39 children with dengue included in the study, 19 (48.7%) were male and 20 (51.3%) were female. The mean age of the study participants was 8.13 ± 2.76 years. Of the 39 children, 4 (10.3%) were aged 1 to 4 years, 16 (41.0%) were between 5 to 8 years and 19 of the children (48.7%) were aged 9 to 12 years. Of the 39 children, 8 (20.5%) were with mild symptoms and 31 (79.5%) were with moderate to severe symptoms. 21 (53.8%) of the children were treated in the pediatric intensive care unit. The mean eosinophil percentage and absolute eosinophil count among the age groups and genders at admission and at onset of recovery is shown in [Table 1 and 2].

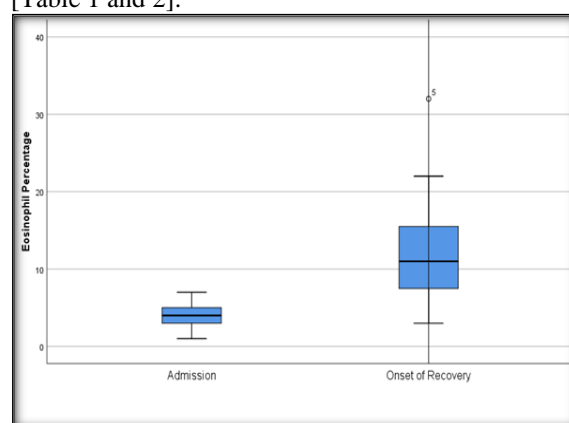


Figure 1: Eosinophil percentage distribution on admission and at onset of recovery.

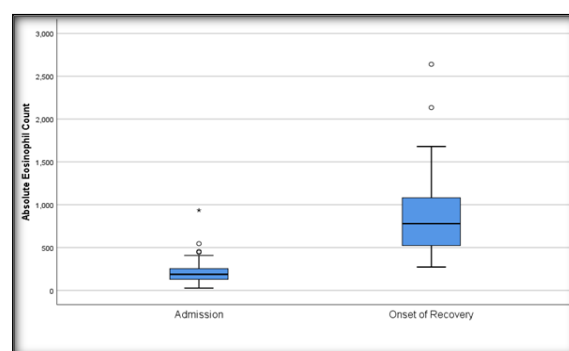


Figure 2: Absolute Eosinophil Count distribution on admission and at onset of recovery.

The distribution of eosinophil percentage and absolute eosinophil count on admission and at recovery for the study participants is shown in [Figure 1 and 2].

Table 1: Mean eosinophil percentage and absolute eosinophil count among the age groups at admission and at onset of recovery

Age	Laboratory parameter	At admission	At onset of recovery phase
1 to 4 years	Eosinophil Percentage (%)	3.50±1.732	8.25±4.992
	Absolute Eosinophil Count (cells/cu.mm)	236.00±206.819	733.25±640.321
5 to 8 years	Eosinophil Percentage (%)	3.81±1.424	12.69±5.016
	Absolute Eosinophil Count (cells/cu.mm)	206.56±109.042	845.25±336.963
9 to 12 years	Eosinophil Percentage (%)	3.58±1.742	12.63±7.174
	Absolute Eosinophil Count (cells/cu.mm)	232.41±204.470	961.74±599.959

Table 2: Mean eosinophil percentage and absolute eosinophil count in male and female children at admission and at onset of recovery

Gender	Laboratory parameter	At admission	At onset of recovery phase
Male	Eosinophil Percentage (%)	3.95±1.224	11.47±6.802
	Absolute Eosinophil Count (cells/cu.mm)	229.74±122.552	814.21±402.596
Female	Eosinophil Percentage (%)	3.40±1.847	12.90±5.600
	Absolute Eosinophil Count (cells/cu.mm)	214.99±204.348	963.00±585.221

The mean eosinophil percentage and mean absolute eosinophil count on admission and at recovery for the 39 children enrolled in the study is shown in table 3. A statistically significant rise was observed in eosinophil percentage and absolute eosinophil count at the onset of recovery phase in our study.

Table 3: Mean eosinophil percentage and absolute eosinophil count in male and female at admission and recovery

Laboratory parameter	At admission	At onset of recovery phase	P value (paired t test)
Eosinophil Percentage (%)	3.67±1.578	12.2±6.174	<0.05 (Statistically significant)
Absolute Eosinophil Count (cells/cu.mm)	222.17±167.479	890.51±503.681	<0.05 (Statistically significant)

DISCUSSION

Hematological parameters have a major role in the diagnosis and management of dengue fever. An increase in hemoglobin, hematocrit and monocyte count and a decrease in total count and platelet count are major hematological parameters that help in the diagnosis of dengue. Serial monitoring of hematocrit and platelet count are done as a part of management of dengue as per standard guidelines. The hematological parameters of recovery in dengue are increase in platelet count and decrease in hematocrit and hemoglobin. The role of eosinophil percentage and absolute eosinophil count are less commonly studied. This study was undertaken to evaluate the feasibility of using eosinophil percentage and absolute eosinophil count as a marker recovery in dengue in children.

It has been observed that in acute phase of several viral illnesses, there was fall in eosinophil concentration due to inflammation and during convalescence, the eosinophil concentrations rose to normal or high.^[5] A study done among 96 dengue patients at Chettinad Hospital and Research Institute, Chennai, Tamil Nadu, India, in 2019 observed a significant increase in eosinophil percentage and absolute eosinophil count during recovery similar to our study.^[6] A study among 716 dengue patients done by Faheem Anwar et al (2018) observed a decrease in eosinophil count during acute phase of dengue.^[7] Eosinopenia in acute phase has also been observed in the study at China by F X Qui et al. (8) Eosinophilia has been demonstrated during recovery phase of dengue in several studies.^[9-11]

CONCLUSION

A statistically significant increase in eosinophil percentage and absolute eosinophil count in the

recovery phase of dengue fever was observed in our study. We conclude that in dengue fever, eosinophilia can be used as a hematological marker of recovery in clinical practice.

REFERENCES

1. Thirteenth General Programme of Work 2019–2023 [Internet]. [cited 2023 Nov 29]. Available from: <https://www.who.int/about/what-we-do/thirteenth-general-programme-of-work-2019---2023>
2. Shet A, Kang G. Dengue in India: Towards a better understanding of priorities and progress. *Int J Infect Dis.* 2019 Jul;84:S1–3.
3. DENGUE/DHF SITUATION IN INDIA :: National Center for Vector Borne Diseases Control (NCVBDC) [Internet]. [cited 2023 Nov 29]. Available from: <https://ncvbdc.mohfw.gov.in>
4. Dengue and severe dengue [Internet]. [cited 2023 Nov 29]. Available from: <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>
5. Beeson PB, Bass DA. The eosinophil. *Major Probl Intern Med.* 1977;14:1–269.
6. Nayar S, Sriranjani B, Shanmugam P. Haematological Predictors of Recovery in Dengue Cases. *Natl J Lab Med.* 2019; Vol-8(4): 22-24.
7. Anwar F, Ullah S, Aziz AUR, Rehman AU, Khan J, Tayyab M, et al. Epidemiological and hematological investigation of dengue virus infection. *Microbiol Immunol.* 2022 Sep;66(9):426–32.
8. Qiu FX, Gubler DJ, Liu JC, Chen QQ. Dengue in China: a clinical review. *Bull World Health Organ.* 1993;71(3–4):349–59.
9. Malathesha MK, H.n A. Hematological manifestations in dengue fever--an observational study. *J Evol Med Dent Sci.* 2014 Mar 3;3(9):2245–51.
10. Jameel T, Mehmood K, Mujtaba G, Choudhry N, Afzal N, Paul RF. Changing haematological parameters in dengue viral infections. *J Ayub Med Coll Abbottabad JAMC.* 2012;24(1):3–6.
11. Pancharoen C, Thisyakorn U. Dengue virus infection during infancy. *Trans R Soc Trop Med Hyg.* 2001;95(3):307–8.