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"FIGHT THE BITE"- ROLE OF PLATELET INDICES AND HAEMATOCRIT IN DENGUE FEVER PATIENTS: A PROSPECTIVE OBSERVATIONAL STUDY

Medicine

Dr. Rebekah. M Junior Resident, Department of Pathology, Sri Siddhartha Medical College and Hospital, Tumkur.

Dr. Chaithra H Associate Professor, Department of Pathology, Sri Siddhartha Medical College and Hospital, Tumkur.

Dr. Rajendra Prasad Professor, Department of Pathology, Sri Siddhartha Medical College and Hospital, Tumkur.

ABSTRACT

Introduction: Dengue fever is a major public health problem in tropical and subtropical countries0.[1] It is a mosquito-borne viral disease affecting 50 million humans every year across the globe.[1,2] Due to its diverse clinical manifestation and severe complications, early and accurate diagnosis is critical for apt treatment.[3]Hence haematological parameter like haematocrit and platelet indices aids in early diagnosis of patients who can go in for complications and candidates who need transfusion. **Objective:** To assess the haematological parameters like platelet indices and haematocrit and correlation between them in dengue fever patients. **Methodology:** This is a cross-sectional study conducted on patients who visited SSMCH, Tumkur from May 2023 to July 2024. Blood samples were collected from suspected cases in EDTA tube and haematological parameters were like haematocrit and platelet indices (platelet count, platelet volume[MPV], platelet distribution width[PDW] and plateletcrit[PCT]) were observed using HORIBA Yumizen 500. Data was analysed using SPSS version 22. 0 and 'p' value was calculated using chi square test. **Results:** A total of 150 seropositive cases were studied in which majority were Dengue NS1 positive (79%). Adults and slight male preponderance was noted. 125 cases (83.3%) showed low platelet count (< 1 lakh/mm3) with high MPV and PDW of the cases. Around 85(56.6%) patients had an increased haematocrit. **Discussion:** Dengue was first reported in 1940 in India, but first confirmed case was recorded in 1997 from Kerala.[3,4]Thrombocytopenia is a major concerning factor of dengue fever. To avoid many unnecessary platelet transfusions and prevent risk of transfusion reactions, simple haematological parameters like haematocrit and platelet indices can be used as a novel marker to predict patients who really require transfusions. In this present study, low platelet count was associated with high PDW and MPV. Most of the patients also had high haematocrit of >50% which was also an important indicator in the management of dengue fever. 'p' value is <0.05 was statistically significant and also was in concordance with other similar studies. **Conclusion:** This study showed most of the patients were Dengue NS1 positive with thrombocytopenia. Platelet indices and haematocrit are also useful for monitoring the prognosis of the patients with dengue fever.

KEYWORDS

Dengue Fever, Thrombocytopenia, Haematocrit, Platelet Indices.

INTRODUCTION

Dengue is the most common acute febrile disease characterized by sudden onset of fever.[1] It is mosquito-borne viral disease caused by 4 various serotypes of dengue virus (DEN1-4) of Flavivirus family.[2,3]

It is transmitted through Aedes Aegypti mosquito predominantly in tropical and subtropical countries of the world affecting about 2.5 billion people.[2]

Overall around 3.2-7.5 million people are affected in India every year.[4]

Though it is a self limiting disease, known as simple dengue. It may progress into complicated dengue such as Dengue Hemorrhagic Fever(DHF) and Dengue shock syndrome (DSS), as these require immediate treatment to prevent mortality.[5,6]

Simple hematological parameters like platelet indices(PI) and hematocrit (HCT) helps in early diagnosis and management of dengue cases by preventing unwanted transfusion.[6]

OBJECTIVES & AIM

To assess the haematological parameters like platelet indices and haematocrit and correlation between them in dengue fever patients.

MATERIALS AND METHODS

This is a cross-sectional study conducted on patients who visited SSMCH, Tumkur from May 2023 to July 2024.

Blood samples were collected from suspected cases in EDTA tube and haematological parameters were like haematocrit and platelet indices (platelet count, mean platelet volume[MPV], platelet distribution width[PDW] and plateletcrit[PCT]) were observed using HORIBA Yumizen 500.

Data was analysed using SPSS version 22. 0 and 'p' value was calculated using chi square test.

Inclusion Criteria

- All patients with clinical features and serologically positive dengue infection (dengue NS1/IgM positive).
- Platelet < 1.5 lakh/cumm.

Exclusion Criteria

All patients on antiplatelet drugs, already received platelet transfusion and hematological/systemic malignancies.

RESULTS

- A total of 150 seropositive cases were studied in which majority were Dengue NS1 positive (79%) and predominantly seen in adults with slight male preponderance noted.
- Most of the patients presented with fever, vomiting, myalgia and backache. In severe cases bleeding manifestations were seen.
- 125 cases (83.3%) showed low platelet count (< 1 lakh/mm^3) with high MPV and PDW of the cases. Around 85 (56.6%) patients had an increased haematocrit.

Table 1: Percentage Distribution of the Study Population According to Platelet Count

Platelet count (/mm3)	No. of patients	Percentage
<10,000	22	14.6%
10,000-20,000	29	19.3%
20,000-50,000	42	28.0%
50,000-1,00,000	32	21.3%
1,00,000-1,50,000	25	16.6%

Table 2: Age and Sex Distribution

SL NO	AGE (YEARS)	MALE (n)	FEMALE (n)
1	15-30	63	30
2	31-45	18	14
3	46-60	10	8
4	>60	3	4
TOTAL (n=150)		84	56

Table 3: Correlation Between Thrombocytopenia and Bleeding

Platelet count	Bleeding manifestations		Without bleeding manifestations		Total	
	Number	%	Number	%	Number	%
<10,000	14	25.9%	5	5.2 %	19	12.6%

10,000-20,000	14	25.9%	22	22.9 %	36	24.0%
20,000-50,000	18	33.3%	24	25.0 %	42	28.0%
50,000-1,00,000	6	11.1%	10	10.4 %	16	10.6%
>1,00,000	2	3.7 %	35	36.4 %	37	24.6%
Total	54	36.0 %	96	64.0 %	150	100%
P = 0.000						

Table 4 : Dengue Serology Status of the Patient

SL NO	DENGUE SEROLOGY	NO OF PATIENTS	PERCENTAGE %
1	NS 1 + VE	79	52.6 %
2	Only IgM + VE	35	23.3%
3	Both IgG & IgM +VE	26	17.3%
4	Triple positive (NS1 + IgG + IgM)	10	6.66%
5	TOTAL	150	100.0%

Table 5 : Comparison of Various Platelet Indices with Various Platelet Range.

PLATELET INDICES	PLATELET COUNT (LAKHS PER MM 3)					
	<0.25	0.25-0.50	0.5-1.0	1-1.5	>1.50	P value
Mean MPV (fl)	22.31	8.4	8.6	9.1	10.0	<0.003
Mean PDW (fl)	28 .19	18.5	15.3	13.4	12.7	<0.011
Mean PCT (%)	0.03	0.42	0.06	0.12	0.24	<0.001

Table 6: Correlations of Platelet Count and Hematocrit:

Platelet Count	No of Cases	Hematocrit		P value
		Low <36%	Raised >36-56%	
<50,000	93	29	37	0.032
50000-1lakh	32	21	34	0.011
1.0-1.5 lakhs	25	15	14	0.003
	N=150	N=65	N=85	

DISCUSSION

Dengue was first reported in 1940 in India, but first confirmed case was recorded in 1997 from Kerala.

Thrombocytopenia is a major concerning factor of dengue fever. It is due to direct suppression of bone marrow by the virus, due to viral replication within the platelets.

Dengue fever continues to be one of the most common mosquito-borne viral illnesses in tropical and subtropical regions, posing a significant burden on public health. Hematological alterations are among the earliest and most consistent findings in dengue infection and can provide important clues for diagnosis, prognosis, and management. The present study assessed the role of platelet indices and hematocrit in patients with dengue fever and compared the results with previously published literature.

Thrombocytopenia and Platelet Indices

In our study, 83.3% of cases presented with thrombocytopenia, a finding well-established in the pathogenesis of dengue. The reduction in platelet count can be explained by bone marrow suppression due to viral infection, increased peripheral destruction, and immune-mediated clearance. This finding is consistent with Kadadavar et al. (2023), who reported a similar prevalence of thrombocytopenia in dengue patients in a tertiary care setting.

Interestingly, we found that thrombocytopenia was accompanied by a significant rise in mean platelet volume (MPV) and platelet distribution width (PDW). These parameters reflect increased platelet turnover, suggesting active bone marrow response to thrombocytopenia. High MPV indicates the release of larger, younger platelets into circulation, which is supported by the observations of Thapa et al. (2019), who also demonstrated elevated MPV and PDW values in dengue patients compared to controls. Likewise, George et al. (2023) highlighted the prognostic role of platelet indices, demonstrating that alterations in MPV and PDW correlated with mortality and survival outcomes.

Plateletcrit (PCT), a measure of total platelet mass, was reduced in most of our patients. This aligns with the study by Kantharaj (2018), who emphasized the role of PCT as an adjunct marker for assessing transfusion needs in dengue. Incorporating PCT into clinical practice could therefore help clinicians avoid unnecessary platelet transfusions and reserve them for patients with clinically significant bleeding or profound thrombocytopenia.

Hematocrit and Hemoconcentration

Elevated hematocrit was observed in 56.6% of cases in our cohort. Hemoconcentration is a hallmark of dengue and reflects increased vascular permeability and plasma leakage. The WHO guidelines consider a hematocrit rise of ≥20% to be an important criterion for diagnosing severe dengue. Our findings are in agreement with Rai et al. (2019), who reported a strong association between raised hematocrit and progression to severe disease. Patel et al. (2016) also corroborated the prognostic utility of hematocrit, concluding that it is a simple, cost-effective, and reliable marker for early recognition of complications.

Concordance with Previous Literature

Taken together, the hematological parameters in our study — thrombocytopenia with raised MPV, PDW, and reduced PCT, along with elevated hematocrit — show a pattern consistent with previous Indian and international studies (Kadadavar et al., 2023; George et al., 2023; Thapa et al., 2019; Rai et al., 2019; Patel et al., 2016). These findings reaffirm that platelet indices and hematocrit are not only diagnostic markers but also important prognostic indicators.

Clinical Implications

Routine monitoring of platelet indices and hematocrit in dengue patients can significantly enhance patient management. By identifying patients at risk of bleeding (low platelet count, low PCT) or plasma leakage (raised hematocrit), clinicians can stratify cases into mild and severe dengue and initiate timely interventions. Importantly, these markers also serve to reduce the inappropriate use of platelet transfusions, which carry risks of transfusion reactions, alloimmunization, and transmission of infections. Our results, in line with those of Kantharaj (2018) and Patel et al. (2016), emphasize the need to incorporate these simple, cost-effective hematological parameters into standard care protocols in endemic regions.

Strengths and Limitations

The strengths of our study include its prospective design and reliance on objective hematological measurements. However, being a single-center study, the results may not be generalizable to larger populations. Moreover, clinical outcomes were not longitudinally tracked, limiting correlation with disease progression. Future multicentric studies with serial monitoring and clinical correlation will help validate and strengthen the predictive role of these parameters.

CONCLUSION

The present study highlights the diagnostic and prognostic value of simple hematological parameters in patients with dengue fever. Thrombocytopenia was the most consistent finding, and its association with raised MPV and PDW suggests active bone marrow response and increased platelet turnover. Reduced plateletcrit further underscores its potential utility in predicting transfusion requirements. Additionally, elevated hematocrit was observed in more than half of the cases, serving as a reliable marker of hemoconcentration and plasma leakage, both of which are critical in identifying patients at risk of severe dengue.

Our findings are in concordance with previous studies, including those by Kadadavar et al., George et al., Thapa et al., Rai et al., and Patel et al., reaffirming that platelet indices and hematocrit can serve as valuable, cost-effective, and easily accessible markers for monitoring disease severity. Importantly, their use may help reduce unnecessary platelet transfusions and enable timely clinical interventions, particularly in resource-limited settings where advanced diagnostic modalities may not be readily available.

Future multicentric studies with larger sample sizes and longitudinal follow-up are warranted to further validate these findings and integrate them into standardized management protocols. Until then, routine monitoring of platelet indices and hematocrit should be encouraged in endemic regions as part of the initial evaluation and ongoing management of dengue patients.

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