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EARLY DENGUE FEVER AND HEMATOLOGICAL PARAMETERS- A CASE SERIES

Abena Hidangmayum*, Sorokhaibam Babina[1], Cindy Konsam[2], T Jeetenkumar Singh[3], Vishnu Theja Posa[4] and Rachel Shimray[5]

*Senior Resident, Department of Pathology, Regional Institute of Medical Sciences, Imphal.

[1]Professor, Department of Pathology, Regional Institute of Medical Sciences, Imphal.

[2]Post Graduate Trainee, Department of Pathology, Regional Institute of Medical Sciences, Imphal.

[3]Professor, Department of Medicine, Regional Institute of Medical Sciences, Imphal.

[4]Post Graduate Trainee, Department of Medicine, Regional Institute of Medical Sciences, Imphal.

[5]Assistant Professor, Department of Pathology, Regional Institute of Medical Sciences, Imphal.

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***Corresponding Author**
Abena Hidangmayum
Senior Resident, Department of Pathology, Regional Institute of Medical Sciences, Imphal.

ABSTRACT

Dengue is an acute febrile illness caused by the dengue virus of four different serotypes (DENV-1-4). In India, as per the National Centre of Vector Borne Disease Control, the incidence of dengue fever to date in India is 94,918 cases of which 1338 cases (1.4%) have been reported in Manipur. The study was conducted during the early outbreak of dengue in the state to study the various hematological parameters in dengue-positive cases.100 cases were studied of which the male-to-female ratio was 0.9:1, with ages ranging from 3m to 78 years. Leucopenia was seen in 36 cases, altered Neutrophil: Lymphocyte ratio was seen in 44 cases and thrombocytopenia in 75 cases.

KEYWORDS: Dengue fever, hematological parameters, leucopenia, Neutrophil to lymphocyte Ratio (NLR), thrombocytopenia, platelet indices.

INTRODUCTION

Dengue is one of the most prevalent mosquito-borne arboviral infections caused by the dengue virus and transmitted by the Aedes mosquito. According to the World Health Organisation (WHO), Five countries (India, Indonesia, Myanmar, Sri Lanka, and Thailand) are among the 30 most highly endemic countries of dengue in the world.[1] Despite the control efforts, India in recent years has been witnessing outbreaks of dengue fever, though such outbreaks are rare in Manipur, the northeastern part of India. Manipur has recorded a peak positivity of dengue fever from the last week of August 2023 with an active case of 1338 as of 13th October 2023.[2] Dengue virus belongs to the flavivirus of the family Falviviridae, four serotypes of the DENV virus (1-4) have been identified.[3,4] The milder form, Dengue fever presents with fever myalgia, and headache while dengue hemorrhagic fever or shock is fatal. This can be diagnosed with NS1 ag detection. Leucopenia and thrombocytopenia are usually seen in dengue fever.[5] The role of Neutrophil to lymphocyte Ratio (NLR) in dengue is under study concerning dengue fever.[6] Thrombocytopenia is also considered a common manifestation of dengue fever.[7] This study aims to study the various hematological parameters of dengue seropositive patients.

MATERIALS AND METHODS

This descriptive study was undertaken at the Regional Institute of Medical Sciences, Imphal during the early period of the dengue outbreak from 15 August 2023 to September 15, 2023. 100 cases admitted with fever with seropositive dengue were included in the study and their 1st-day hospital admission blood parameters were studied for various hematological parameters- total count, differential count, Neutrophil to Lymphocyte ratio, thrombocytopenia, and platelet indices. White blood cell(WBC) counts and platelet values were obtained using an automated hematology analyzer- Mindray BC- 5150. On the 1st day, blood parameters were manually evaluated on peripheral smear. Whole blood was collected in an EDTA vacutainer, smears were made using Leishman stain. The smears were examined and the platelet count was crosschecked manually under oil immersion in 10 fields on a monolayer zone where RBCs are just touching each other for platelet count. The average platelets per field were calculated and multiplied by 15000 which gave the platelet count. Normal platelet count for the study was taken as 1,50,000- 4,00,000 cells/cumm. Platelet counts less than 150000 cells/cumm was taken as thrombocytopenia and graded into 4 grades. Platelet indices were collected from the hematology analyzer. WBC counts of less than 4000 were taken as leucopenia irrespective of the age groups. Neutrophil: Lymphocyte ratio was

calculated by dividing neutrophils by lymphocytes. Patient details were collected from the requisition forms.

RESULTS

Of the 100 cases studied, females were found to be more affected than the male population. Male: Female ratio is 0.9:1. The study age group ranged from 3 months to 78 years. The paediatric age group accounted for 19% of the total cases, with ages ranging from 3 months to 15 years. 68.4%(13 cases) were girl children as compared to 31.6% (6 cases) of the boy population (Table 1).

Table 1: Age distribution of dengue fever.

Age groups	Male	Female	Total
Paediatric (3m to 15 years)	06	13	19
Adult(18years to 78years)	43	38	81
Total	49	51	100

The 1st-day blood parameters revealed leucopenia in 36% (36 cases) and 6% of leucocytosis while 58% of cases had normal total counts. Reactive lymphocytes on peripheral smear with features displaying skirting of cytoplasm, and plasmacytoid lymphocytes were noted in peripheral smear. Neutrophil: lymphocyte ratio was found to be normal in 56 cases (56%) and reduced NLR less than 1 was seen in 23 cases (23%) and NLR >3 was seen in 21 cases (21%) (Table 2).

Table 2: NLR ratio distribution.

Grading	NLR
Normal score(1-3)	56 cases (56%)
Decreased(<1)	23 cases(23%)
Increased(>3)	21 cases(21%)
Total	100 cases.

Thrombocytopenia were graded into 4 grades. Platelet counts in the study ranged from 1600 to 6,98,000 cells/cumm.75% had thrombocytopenia at the time of diagnosis, 3% had thrombocytosis and 22% had a normal platelet count. Grade 1 thrombocytopenia accounted for 38% of cases, Grade 2- 13%, grade 3-15%, and Grade 4-2%. (Table 3). The nadir platelet value was noted in a 54-year-old male with 1600 cells/cumm. Platelet indices for all 60 cases were studied, however, 2 cases with grade 4 thrombocytopenia had no machine values for PLCC and PLCR which was due to the severe thrombocytopenia (Table 4).

Table 3: Distribution of thrombocytopenia.

Thrombocytopenia Grades	Cases /percentage
GRADE 1(75000-150000)	44(38%)
GRADE 2(50000-< 75000)	11(13%)
GRADE 3(50-25000)	17(15%)
GRADE4(<25000)	3(4%)

Table 4: Platelet indices distribution.

Platelet Indices	Mpv	Pdw	Pct	Plcc	Plcr
Normal	36	89	50	62	45
Increased	64	11	03	03	12
Decreased	-	-	47	35	45

DISCUSSION

Dengue fever is a self-limiting acute febrile illness. The early period of DF can mimic any other acute febrile illnesses and hence a laboratory blood investigation is a reliable dependent factor in distinguishing it from other febrile illnesses. In the present study, dengue fever is observed preponderantly in the female population which may be considered as a new trend in the recent outbreak. The cogitation of acute or chronic infection and the gender population demographic factors may be considered for this altered trend.

A normal total count is observed during the early days of dengue fever.[8] Leucopenia is usually observed during dengue fever.[9,10] A previous study suggested the absence of leucopenia as a predictor of severe dengue.[11] Peripheral blood smear showed reactive lymphocytes, few showing dark basophilic cytoplasm and larger nucleus while few had plasmacytoid morphology. Similar observations were seen in studies done by Singh Yadav[12] and Choudhary et al.[13]

Post-COVID, the importance of Neutrophilic Lymphocyte Ratio (NLR) has been considered as a defined marker of inflammation and its application has been used to assess infectious and non-infectious disease.[14,15] Dengue in its early stages tends to have a normal NLR. An altered NLR ratio implies a poor clinical outcome. A decrease in NLR could indicate a poor clinical prognosis and could be an independent indicator of severity.[16]

A significant finding in our study was thrombocytopenia. Thrombocytopenia in dengue is due to suppression of bone marrow by the dengue viral infection.[17] Other schools of thought are the infection of megakaryocytes causing increased platelet destruction and the presence of antibodies directed against the platelets.[18,19] Also the peripheral destruction of peripheral

platelets or bone marrow megakaryocytes leads to reduced platelet production. As a result, the estimation of platelet count is an indispensable part of the workup of dengue fever.

CONCLUSION

In Early dengue fever, the total counts are usually normal. However, parameters like NLRs and other platelet indices could aid in the initial differential approach between dengue and other febrile illnesses. Thrombocytopenia tends to occur earlier in dengue patients. Any alteration in the total counts points towards disease progression. Hence in regions with inadequate resources, haematological parameters can be used as a useful tool to differentiate febrile illnesses.

Limitation

The clinical data of the patients were obtained directly from the clinical records and secondary databases. The evaluation of the laboratory tests was only conducted upon admission to the hospital, and these laboratory parameters were not followed up during hospitalization.

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