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# A STUDY ON PLATELET COUNT AS A PREDICTIVE PARAMETER FOR SEVERITY OF DENGUE FEVER IN PAEDIATRIC PATIENTS IN A TERTIARY CARE CENTER IN KOPPAL

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**ABSTRACT** **Introduction:** Dengue haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) are two most important manifestations of severe dengue. They present with bleeding manifestations, hypotension and thrombocytopenia. **Aim:** To determine the relationship between the platelet count and the severity of the dengue fever among the paediatric age group. **Material and Methods:** This descriptive study was conducted for one year among dengue IgM and NS1 positive cases in tertiary care centre in Koppal. Platelet counts of patients having dengue fever and DHF/DSS were entered in excel sheet and results were analysed by SPSS 21 version software. **Result:** Total 100 confirmed cases of dengue with thrombocytopenia were studied. Forty per cent of the cases were from age group of 5 to 10 years. Thirty-five per cent of cases had PC of 1 to 1.5 lakhs and 34 per cent had PC of 50,000 to 1,00,000. Nineteen per cent of cases had PC of 20,000 to 50,000 and 12 per cent cases had PC less than 20,000. The relationship between DHF/DSS cases with severe thrombocytopenia (PC < 20,000) was statistically not significant. **Conclusion:** Majority of patients with thrombocytopenia were 5-10 years of age. The occurrence of DHF/DSS did not increase with the severity of thrombocytopenia.

**KEYWORDS :** Dengue haemorrhagic Fever, Dengue Shock Syndrome, Thrombocytopenia, Paediatric age.

## INTRODUCTION

Dengue is a tropical viral disease and one of the most significant mosquito-borne arboviral infections. It is caused by the Dengue Virus, a single-stranded positive-sense RNA virus from the Flavivirus genus within the Flaviviridae family[1].

## COURSE OF THE DISEASE

### 1. Febrile phase-

Patients experience a sudden high-grade fever that typically lasts between 2 to 7 days. This phase is often accompanied by facial flushing, skin redness, muscle pain, joint pain, and headaches[2]. Tender hepatomegaly often develops a few days after the onset of fever[3]. The earliest abnormality in a complete blood count is typically a reduction in total white blood cells.

### 2. Critical phase-

This phase begins around the time of defervescence, typically between days 3 to 7 of illness, when the fever subsides. An increase in capillary permeability and sometimes elevated haematocrit levels are observed, marking the start of the critical phase, which lasts 24 to 48 hours[4].

### 3. Recovery phase-

Following the critical phase, patients enter the recovery phase, characterized by the gradual reabsorption of fluid from the extravascular compartment over the next 48 to 72 hours. During this phase, patients experience improved overall well-being, subsiding gastrointestinal symptoms, stabilized hemodynamic status, increased appetite, and enhanced diuresis. Vital signs generally show improvement[5].

## CLINICAL SPECTRUM

According to the World Health Organization and the National Vector Borne Disease Control Program, dengue is classified into the following categories:

### 1. Mild Dengue (Dengue without Warning Signs)-

Characterized by fever accompanied by symptoms such as headache, arthralgia, retro-orbital pain, rash, and myalgia.

### 2. Moderate Dengue (Dengue with Warning Signs)-

Warning signs and symptoms include:

- Persistent vomiting
- Abdominal pain and tenderness
- Syncope or dizziness
- Lethargy, restlessness, or sudden behavioural changes
- Bleeding manifestations such as hematemesis, excessive menstrual bleeding, epistaxis, melena, and haematuria
- Clinical fluid accumulation (ascites and pleural effusion)
- Enlarged liver (>2 cm)
- Laboratory findings: Progressive increase in haematocrit with a rapid decrease in platelet count[2].

### 3. Severe Dengue-

Defined by one or more of the following:

- Plasma leakage leading to shock and/or fluid accumulation, potentially with respiratory distress (DSS)
- Severe bleeding (DHF)
- Severe organ impairment

Shock typically occurs around the time of defervescence, usually on the fourth or fifth day of illness, often preceded by warning signs[12].

DHF/ DSS occurs most frequently in children with a history of dengue infection and in infants with waning levels of dengue antibodies derived from the mother. In most of the cases, thrombocytopenia occurs transiently and most of them are asymptomatic[6]. Spontaneous bleeding can be seen with PC <20,000. Therefore, platelet count should be monitored regularly among the patients suffering from dengue fever. Hence the present study was conducted to determine the relationship between the platelet counts and the severity of the disease in paediatric patients of dengue fever.

## AIM

To determine the relationship between the platelet count and the severity of the dengue fever among the paediatric age group

## MATERIAL AND METHODS

The present study was conducted prospectively for a period of 1year. Children below 15years experiencing a febrile illness clinically consistent with dengue infection fulfilling the criteria for diagnosis of DF/DHF/DSS admitted at a tertiary care centre in Koppal between January 2023 – April2024 were taken for the study. All the patients who were serologically positive for Dengue were included as study subjects. After obtaining the informed consent of the parents, blood samples were collected from all 100 paediatric patients. The patient was monitored for platelet counts and progression of dengue fever to DHF/DSS. Data was entered in Microsoft excel and analysed using SPSS 21 version software. The results are presented by frequencies, percentage and chi square test. Appropriate titres significances are used wherever necessary.

## RESULTS

During the study period 100 paediatric cases who came with complaints consistent with dengue fever and tested positive for IgM antibodies and NS1antigens were included in the study. Majority of

cases were noted in the age group of 5-10 years, followed by 10-15 years, 1-5 years and less than 1 year. (Table 1)

**Table 1: Age And Sex Wise Distribution Of Dengue Seropositive Cases**

| Gender | Age in years | | | | |
|---|---|---|---|---|---|
| | <1 | 1-5 yrs | 5-10 yrs | 10-15yrs | total |
| Female | 4 | 6 | 26 | 20 | 56 |
| % | 7.14% | 10.71% | 46% | 35.71% | 100% |
| Male | 3 | 13 | 14 | 14 | 44 |
| % | 6.81% | 29.54% | 31.81% | 31.81% | 100% |
| Total | 7 | 19 | 40 | 34 | 100 |
| % | 7% | 19% | 40% | 34% | 100% |

Of these seropositive cases, 35% had thrombocytopenia (1-1.5 lakh), 34% had mild thrombocytopenia (50,000-1,00,000), 19% had moderate thrombocytopenia (20,000-50,000) and 12% had severe thrombocytopenia (<20,000). There was significant association between age and platelet count. (Table 2)

**Table 2: Age Wise Distribution Of Platelet Counts In Dengue Cases**

| Platelet Count | Age 0-1 | 1-5yrs | 5-10yrs | 10-15yrs | Total | p-value |
|---|---|---|---|---|---|---|
| <20,000 | 1 | 0 | 6 | 5 | 12(12%) | <0.05 |
| 21-50,000 | 1 | 3 | 8 | 7 | 19(19%) | |
| 51-1lakh | 4 | 10 | 11 | 9 | 34(34%) | |
| >1lakh | 1 | 6 | 15 | 13 | 35(35%) | |
| Total | 7 | 19 | 40 | 34 | 100 | |

The seropositive patients were evaluated clinically for the presence of symptoms suggestive of DHF/DSS and further were correlated with the platelet counts. Of all the cases 46 of them had features of DHF/DSS on admission. In the present study 66.67% cases of severe thrombocytopenia, 42.10% with moderate thrombocytopenia and 50% cases with mild thrombocytopenia presented with DHF/DSS (Table 3). The study was found to be not significant which suggests that there is no association between severity of thrombocytopenia and severity of presentation of dengue fever.

**Table 3: Platelet Counts Compared With Severity Of Disease At Admission**

| Platelet Count | DF | DHF/DSS | TOTAL | P value |
|---|---|---|---|---|
| <20,000 | 4 | 8 | 12 | >0.05 |
| % | 33.33% | 66.67% | 100% | |
| 21-50,000 | 11 | 8 | 19 | |
| % | 57.89% | 42.10% | 100% | |
| 51-1 lakh | 17 | 17 | 34 | |
| % | 50% | 50% | 100% | |
| >1lakh | 22 | 13 | 35 | |
| % | 62.85% | 37.14% | 100% | |
| Total | 54 | 46 | 100 | |
| % | 54% | 46% | 100% | |

## DISCUSSION

There are four antigenically distinct serotypes of dengue, namely DEN1, DEN2, DEN3 and DEN4 which are responsible for DF and DHF. There is no cross immunity by infection with these viruses, and hence people from the dengue endemic area are susceptible for infection with four different dengue virus serotypes[7].

In the present study majority of patients were female children (46%) belonging to 5-10 years age group. A study done by Khateri *et al.* and Mohan *et al.* had male preponderance. Other studies have noted that 5-9years is the most prevalent age group in paediatric dengue patients[8,9].

DHF and DSS are mainly clinical diagnosis based on bleeding manifestations and hypotension respectively, which is supported by haematocrit. Haematocrit depicts the volume status of the patient and is the key to management of these cases. The diagnosis of DF/DHF/DSS was mainly based on the clinical criteria[10]. whereas in the study done by de Castro et al[11], the confirmation of DHF was made by the presence of haemorrhagic manifestations like petechiae with purpura, epistaxis, menorrhagia or a positive tourniquet test. The confirmation of DSS was made when the pulse pressure was 20 mmHg or below. None of the literatures have given a clear-cut description of the clinical presentation of dengue fever and the prevalence of thrombocytopenia in these patients. Platelet count can point towards dengue fever but has very minimum role in management of cases.

There are mainly two causes for mechanism of thrombocytopenia in dengue cases. One is virus induced bone marrow suppression which leads to reduced production and the other cause is immune mediated destruction of platelets. Both mechanisms can co-exist.

In our present study 100% of the cases of DHF/DSS had thrombocytopenia. However, Variable prevalence of thrombocytopenia has been revealed in various studies which ranges from 58-83%[8].

## CONCLUSION

Majority of the patients were male and belonged to 5-10year age with thrombocytopenia. There was no positive correlation between severity of thrombocytopenia and development of DHF/DSS. Hence, we should depend on clinical features mainly of bleeding manifestations and hypotension for management of sever dengue.

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