



# International Journal of Research In Paediatric Nursing

E-ISSN: 2664-1305  
P-ISSN: 2664-1291  
IJRPN 2020; 2(1): 78-80  
Received: 13-11-2019  
Accepted: 18-12-2019

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## Clinical study of dengue fever in children

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### Abstract

**Background:** There is a spectrum of severity associated with dengue infections, ranging from a self-limiting sickness comparable to influenza to life-threatening dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). The purpose of this study was to investigate dengue fever in children aged 1 to 12 years old who were treated at a tertiary hospital.

**Keywords:** Dengue, children, NS 1 Antigen, platelet count, had dengue hemorrhagic fever, dengue shock syndrome

### Introduction

Dengue viruses (DV) are found as four antigenically related but separate serotypes, and *Aedes aegypti* mosquitoes are the vectors that transmit the disease to people. These viruses typically produce one of two syndromes: a mild capillary leakage syndrome known as dengue fever (DF) or a severe capillary leakage syndrome known as dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS). Both of these syndromes are known as dengue<sup>[1]</sup>. There is a spectrum of severity associated with dengue infections, ranging from a self-limiting illness comparable to influenza to the potentially fatal dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), both of which, if untreated, are associated with a mortality rate of up to twenty percent<sup>[2]</sup>. Dengue diseases have a wide spectrum of clinical manifestations, ranging from relatively moderate fever that is not distinguished to severe shock. Both adults and children can present with a wide variety of clinical symptoms. Children may also present with epistaxis, melena, and hepatomegaly in addition to the typical signs and symptoms (high-grade fever, myalgia, headache, and vomiting; retrobulbar discomfort). Children are being diagnosed with dengue fever at a higher rate than adults. Dengue fever continues to be a mystery in many respects, including the interaction between the virus and the host and the variety of clinical manifestation<sup>[3]</sup>. Early case discovery, which can be done by clinical suspicion along with test evidence, and early treatment are both effective at preventing complications associated with dengue fever. These problems include plasma leakage, haemorrhage, and organ dysfunction. Morbidity and fatality rates associated with dengue can be decreased by recognising the disease quickly and beginning treatment as soon as possible<sup>[4]</sup>. The purpose of this study was to investigate dengue fever in children aged 1 to 12 years old.

### Material and Methods

Present study was single-center, observational, cross sectional study, conducted in Department of Pediatrics, SSPM Medical College, Padve.  
. Study duration was of 2 years (July 2017 to June 2019).

### Inclusion criteria

- Children (1-12 years age) with serologically confirmed (either with positive NS1 antigen or IgM/IgG antibodies by rapid serology test kit or ELISA) dengue admitted to the paediatric ward.

### Exclusion criteria

- Cases confirmed as malaria, typhoid, chikungunya and other causes.
- Patients without parental consent.

Informed and written consent was obtained from the parents/guardian of all patients included in the study after explanation.

All of the probable cases that had high-grade fever, rash, lymphadenopathy, hepatomegaly, features of shock, or bleeding were admitted to the paediatric ward with a provisional diagnosis of dengue. The patient's demographic information, clinical profile, clinical findings, signs of plasma leakage (pleural effusion, ascites, raised haematocrit, bleeding, hypovolemic shock, and thrombocytopenia), and laboratory tests (complete hemogram with haematocrit and platelets, total count, and serum glutamic-pyruvic transaminase) were recorded.

Blood parameters such as haemoglobin percentage, total platelet count (TPC), haematocrit, hemogram, prothrombin time (PT), activated partial thrombin time (aPTT), total lymphocyte count (TLC), and liver function test were monitored each and every day until a significant improvement was observed clinically and hematologically. In cases where it was necessary, an ultrasonography of the abdomen and a chest X-ray were performed. The cases that were enrolled were categorised according to the WHO recommendations as non-severe dengue (with or without warning signs), undifferentiated fever, and severe dengue, which comprised dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Patients were given paracetamol, inotropes, intravenous fluids and whole blood, and platelet transfusions as necessary, in accordance with the recommendations provided by the WHO. The results of patients' treatments were kept track of. Microsoft Excel was used to collect and compile the data, and the SPSS 23.0 version was utilised for the analysis. Utilizing descriptive statistics, the statistical analysis was carried out.

## Results

**Table 1:** General parameters

Parameter	Number of cases (n=135)
Age (years)	
1-3	21
4-7	28
8-11	31
11-12	55
Mean age (years)	8.7
Gender	
Male	89
Female	46
Duration of hospitalization (days)	
0-3	45
4-6	77
>6	13
Mean duration of hospitalization (days)	3.8

**Table 2:** Dengue according to severity

Dengue according to severity	Number of cases (n=135)
Dengue Fever	82
Severe dengue (DHF +DSS)	53
DHF	42
DSS	11

**Table 3:** Clinical profile of dengue

Symptoms	Number of cases (n=135)
Fever	135
Headache	102
Vomiting	95
Abdominal pain	91
Retro-orbital pain	68
Nausea	59
Joint pain	25
Difficulty in respiration	13
Signs	
Pallor (%)	53
Rash	39
Hepatomegaly	35
Icterus (%)	21
Petechiae/purpura/ecchymosis	21
Abdominal distension	17
Splenomegaly	6
Lymphadenopathy	2
Impaired consciousness	2

**Table 4:** Serological profile of children with dengue.

Parameter	
<b>Dengue Serology</b>	
IGM +ve	16.30%
NS I Ag +ve	48.15%
Both IGG & IGM +ve	31.85%
IGG +ve	8.15%
Platelet count	
≤20,000/mm <sup>3</sup>	0.74%
20,000–50,000/mm <sup>3</sup>	6.67%
50,000–100,000/mm <sup>3</sup>	27.41%
100,000–150,000/mm <sup>3</sup>	33.33%
>150,000/mm <sup>3</sup>	31.85%
Other	
Deranged LFT's	15.56%
Deranged RFT's	9.63%
Deranged Coagulation profile	3.70%

**Table 5:** Management of patients.

Management	Number of cases (n=135)
Antipyretics	135
I. V. fluids	105
Platelet transfusion	8
Whole blood transfusion	5
Dopamine	5
Other	
Children required who Mechanical ventilation	7
Children who needed blood products	13
Developed AKI	3
Case Fatality	2

## Discussion

The severity of the disease may be determined by a number of factors, including those pertaining to the host, the viral serotype or genotype, the order in which the virus infection occurred, variations in dengue cross-reactive antibodies, and T-cell responses. The symptoms of <sup>[5]</sup> DF typically resolve on their own, and fatalities are unusual. On the other hand, age-related changes in the severity of dengue are poorly known, and there is a paucity of data regarding clinical aspects in adult patients <sup>[6]</sup>. Although it appears that younger people are more likely to have shock and plasma leakage, the incidence of internal haemorrhage seems to rise in

tandem with the patient's age <sup>[7]</sup>. Additionally, the consequences of a dengue infection seen in adults, such as dengue fever with abnormal bleeding and dengue hemorrhagic fever, have been on the rise <sup>[8]</sup>. The presence of enhanced vascular permeability (plasma leakage syndrome) and notable thrombocytopenia (100,000/ml) in conjunction with bleeding, hepatomegaly, and/or impaired liver function can be used to differentiate DHF from DF. 2 Although children are more prone to experience hypovolemic shock, which is characterised by increased microvascular permeability in DHF, a significant death rate has been found in adult patients. This is despite the fact that children are more likely to acquire DHF <sup>[9]</sup>. It was underlined in the WHO guideline that, if untreated, the death rate for patients with DSS was between 30 and 40 percent <sup>[10]</sup>. It is important to keep in mind that early and vigorous therapy of dengue fever in children is closely related to the child's chance of surviving the disease. Patients with dengue fever who are exhibiting warning signs or have severe dengue need to be hospitalised. 17 Critical care units are often reserved for patients who have unstable hemodynamics, significant bleeding, respiratory distress, and organ failure <sup>[11]</sup>. Patients suffering from a severe dengue infection are more likely to experience malfunction in their organs. There could be a single dysfunction in one organ or a combination of two or more dysfunctions in different organs. Even in the absence of plasma leakage and shock, severe organ impairment such as hepatic failure, encephalitis or encephalopathy, acute renal failure, and myocardial dysfunction is associated with a significant death rate <sup>[12]</sup>. Predictors of mortality in severe dengue infection in children who have been admitted include the severity of the disease, hyperlactatemia at admission, the requirement for several vasoactive medications, and a positive fluid balance.

### Conclusion

Majority children had NS 1 Ag +ve, platelet count was 100,000–150,000/mm<sup>3</sup> & managed with antipyretics, IV fluids only.

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