

# Clinico-investigative Profile of Dengue Fever in a Rural Tertiary Care Hospital

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## ABSTRACT

**Objectives:** To study the clinico-investigative profile and outcome of dengue fever (DF) in pediatric age group using latest WHO dengue classification and management guidelines (2012) in a rural tertiary care hospital.

**Materials and methods:** A prospective observational hospital-based study was carried out from September 01, 2014 to September 30, 2016. This study included lab-confirmed cases of 182 pediatric patients of dengue admitted at Rural Medical College, Pravara Institute of Medical Sciences, Loni, Maharashtra. After clinical assessment, they were investigated and classified according to the latest WHO guidelines (2012) as dengue without warning signs, dengue with warning signs, and severe dengue; and were managed subsequently as per the same. Statistical evaluation of the clinical parameters was done using p value estimation.

**Results:** Out of 182 patients enrolled in the study, 42.85% of the children were admitted as dengue without warning signs followed by 41.75% of the cases were dengue with warning signs and 15.38% were severe dengue. Fever is the most common presenting symptom of DF and was present in 100% of the children, followed by headache, body ache, nausea, malaise/decreased appetite, vomiting, arthralgia, myalgia, abdominal pain, lethargy/restlessness, and bleeding. Clinical signs: Most patients had rash followed by hepatomegaly, splenomegaly, hypotension, ascites, pleural effusion, generalised edema, pulmonary edema, acute respiratory distress syndrome, pulmonary hemorrhage, and convulsions; all in decreasing order of their occurrence. In laboratory investigations, most patients had a deranged liver function test (most cases with raised aspartate transaminase) followed by thrombocytopenia, hemoconcentration, leukopenia, and neutropenia. Radiological and ultrasonographic findings demonstrated that most of the children had pericholecystic edema (74.17%), detectable as early as 3rd day of illness. Around 11.83% of the patients required blood product transfusion. The mortality rate in our study was found to be 2.74%.

**Conclusion:** Early diagnosis of dengue is essential with high index of suspicion; detection of NS1 antigen positivity and ultrasonographic evidence of pericholecystic edema can also

be useful. Strict adherence to the WHO protocols of severe dengue management aided by their algorithm (flowcharts) results in favorable outcome in the majority of the cases. For judicious fluid management, a good pediatric intensive care unit monitoring is essential. In severe dengue with major hemorrhagic manifestations, fresh whole blood should be used, and platelets are seldom used nowadays.

**Keywords:** Dengue, Pediatric dengue, Severe dengue, Warning signs.

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## INTRODUCTION

Dengue fever (DF) is the most rapidly spreading mosquito-borne viral disease in the world. An estimated 50 million infections every year occur in approximately 100 countries. Incidence has increased 30-fold with increasing geographic expansion with potential for further spread.<sup>1</sup> South-East Asia Region together with Western Pacific Region bears nearly 75% of the current global disease burden.<sup>2</sup> *Aedes (Stegomyia) aegypti* and *Aedes albopictus* are the primary epidemic vectors.

Around 2.5 billion people, two-fifth of the world's population in tropical and subtropical countries are at risk, and an estimated 50 million dengue infections occur worldwide annually in approximately 5,00,000 people with dengue hemorrhagic fever require hospitalization each year. A very large proportion, approximately 90% of them are children aged less than 5 years and about 2.5% of those affected die.

Cocirculation of multiple serotypes/genotypes are now emerging across various parts of the country.

Dengue is widely prevalent in the state of Maharashtra, more so in the rural population. Owing to its tropical climate and ample rainfall, stagnation of water during post-monsoon season is seen frequently and hence, these serve as subsequent breeding sites for vectors.<sup>3</sup> In view of this, the study has been conducted to understand and analyze the clinico-investigative profile of pediatric patients with DF in Rural Medical College, Pravara Institute of Medical Sciences, Loni, Maharashtra, India.

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## OBJECTIVES

- To study the clinical profile of patients admitted with DF in the Department of Paediatric, Rural Medical College, Pravara Institute of Medical Sciences, Loni, Maharashtra, India.
- Study the correlation between severity of dengue and clinical profile in cases of DF.
- To study the laboratory and radiological investigations of patients with DF.
- To assess the outcome of the cases of DF.

## MATERIALS AND METHODS

This study was a prospective observational study conducted in the Department of Paediatric, Pravara Rural Hospital, Pravara Institute of Medical Sciences, Loni, Maharashtra, India over a period of 24 months (1st September 2014 to 30th September 2016) with case proforma and written consent. The clinical profile, laboratory data, and outcome of all patients eligible were recorded and the statistics were analyzed. A total of 182 pediatric patients admitted as cases of dengue were studied during the period of the research. Inclusion criteria included all pediatric patients (aged between 1 month to 12 years) diagnosed as having DF which was laboratory confirmed based on either testing positive for dengue NS1 antigen in serum or presence of antibodies [Immunoglobulin M (IgM)/Immunoglobulin G (IgG)] against DF virus or both. All patients were with mixed infection and other viral exanthematous fevers/dengue-like illnesses with a negative lab test.

Based on these findings, the patients were classified according to the WHO 2012 classification as dengue, DF with warning signs, and severe dengue. Detailed clinical examination was done and laboratory parameters were recorded at regular intervals. Along with supportive care, fluid management was done according to WHO guidelines, "handbook of clinical management of dengue 2012,"<sup>4</sup> and blood components were used wherever indicated. Patients were discharged once they were alleviated of their symptoms, had good oral intake, and their platelet count was in rising trend and above 1,00,000/ $\mu$ L.

The entire data collected from complete clinical profile of all the patients qualifying for the study was compiled and conclusions were drawn. Both qualitative and quantitative data was represented as frequency and percentage. Association between age, sex, symptoms, and signs of the patients with severity of dengue (dengue without warning signs, dengue with warning signs, and severe dengue) were assessed by chi-square test for trend as well independence using the software GraphPad InStat version 3.10 for Windows.

## RESULTS AND DISCUSSION

- Out of 182 patients enrolled in the study, 42.85% of the children were admitted as dengue without warning signs followed by 41.75% of the cases were dengue with warning signs and 15.38% were severe dengue. Most children were in the age group of 6 to 12 years (46.70% of the patients) and age was found to have a significant association with the severity of DF.
- A 1.16:1 male:female ratio was observed in our patients with DF but gender had no significant association with severity of DF.
- Fever is the most common presenting symptom of DF and was present in 100% of the children, followed by headache, body ache, nausea, malaise/decreased appetite, vomiting, arthralgia, myalgia, abdominal pain, lethargy/restlessness, and bleeding. Retro-orbital pain, a prominent symptom described in most studies and textbook was seen infrequently and so was itching (Table 1).
- Presence of nausea, malaise, decreased appetite, vomiting, arthralgia, abdominal pain, lethargy, restlessness, giddiness, and bleeding were found to have significant association with severity of dengue by using chi-square test for trend ( $p < 0.05$ ) while headache, body ache, myalgia, retro-orbital pain, and itching were found to have no significant association.
- Among the clinical signs, most patients had rash followed by hepatomegaly, splenomegaly, hypotension, ascites, pleural effusion, generalized edema, pulmonary edema, acute respiratory distress syndrome (ARDS), pulmonary hemorrhage, and convulsions—all in decreasing order of their occurrence. All clinical signs were found to have a significant association with the severity of dengue as calculated using chi-square test for trend ( $p < 0.05$ ) except convulsion. Thus,

**Table 1:** Distribution as per symptomatology

Symptoms	No. of cases (n = 182)	Percentage
Fever	182	100.00
Headache	141	77.47
Bodyache	121	66.48
Nausea	118	64.83
Malaise/Decreased appetite	101	55.49
Vomiting	100	54.94
Arthralgia	90	49.45
Myalgia	87	47.80
Abdominal pain	76	41.75
Lethargy/Restlessness	56	30.76
Bleeding	44	24.17
Giddiness	48	26.52
Retro-orbital pain	31	17.03
Itching	23	12.63

**Table 2:** Distribution as per clinical signs

Signs	No. of cases (n = 182)	Percentage
Rash	79	43.40
Hepatomegaly	67	36.81
Splenomegaly	44	24.17
Hypotension	64	35.16
Ascites	50	27.47
Pleural effusion	27	14.83
Generalized edema	13	7.14
Pulmonary edema	9	5.04
Acute respiratory distress syndrome	2	1.09
Pulmonary haemorrhage	2	1.09
Convulsions	1	0.54

hepatosplenomegaly and plasma leak syndromes were significant (Table 2).

- The overall occurrence of rashes in the study group was 43.40%, out of which maximum number of cases had a typical dengue flush followed by confluent rash (White island in red sea). Petechiae were particularly seen in severe dengue cases and only three of the cases had ecchymoses (Table 3).
- Among the laboratory investigations, most patients had a deranged liver function test (LFT) (most cases with raised aspartate transaminase) followed by thrombocytopenia, hemoconcentration, leucopenia, and neutropenia. Neutropenia was a prominent feature in our study, whereas most studies have observed neutrophilia or normal polymorph counts.<sup>5</sup> Only 5 of our cases had leukocytosis. Significant hemodilution was particularly seen in cases of severe dengue where active bleeding manifestations occurred. The NS1 antigen estimation showed a high positivity (96.70%) early in the disease, whereas IgG and IgM detection was low (Table 4).
- Radiological and ultrasonographic findings demonstrated that maximum children had pericholecystic edema (74.17%), detectable as early as 3rd day of illness. Other common findings included hepatomegaly, ascites, and splenomegaly. Ultrasonography thorax and chest X-ray also revealed pleural effusion predominantly bilateral during critical phase in cases of severe dengue; only one case was found to have unilateral right-sided involvement (Table 5).

**Table 4:** Distribution as per investigations

Hematological findings	No. (n = 182)	Percentage
Deranged LFT	128	70.32
Thrombocytopenia	114	62.63
Hemoconcentration	100	54.94
Leukopenia	94	51.64
Neutropenia	66	36.66
Hemodilution	25	13.73
Leukocytosis	5	2.74

**Table 3:** Distribution of patients according to type of rashes

Type of rash	No. of cases (n = 182)	Percentage of occurrence in total patients
Dengue blush	48	26.37%
Dengue confluent rash (White island in red sea appearance)	20	10.98%
Petechiae	8	4.39%
Purpura/Ecchymoses	3	1.66%
Maculopapular rash	0	0.00%
Total rashes	79	43.40%

- The mortality rate in our study was found to be 2.74%. Two of the cases of mortality presented to us with dengue shock syndrome (DSS) at the time of admission with severe bleeding manifestations and death occurred within 6 hours of admission in pediatric intensive care unit (PICU). Other deaths in our study included one due to dengue encephalitis with multiple organ dysfunction syndrome and two others due to ARDS and respiratory failure. Reported case fatality rates for the world are approximately 1%, but in India, the focal outbreaks have reported case fatality rates of 3 to 5%.<sup>2</sup> The overall mortality rates for patients of dengue encephalitis can be as high as 5-8%.<sup>6</sup>
- Progression to severity: Out of 28 patients of severe dengue in our study, 17 patients had severe dengue at the time of admission, seven cases (3.84%) admitted as dengue with warning signs progressed to severe dengue and four cases (2.19%) admitted as dengue without warning signs progressed to severe dengue. Thus, one must watch out for progression of severity even in cases, which appear to be mild to start with.
- Duration of hospitalization was longest in patients with severe dengue followed by dengue with warning signs and probable dengue.
- The results of this study were found to be consistent with other studies conducted in similar areas.<sup>7-9</sup>

**Table 5:** Distribution of patients according to radiological findings

USG findings		Positive
Pleural effusion	Left side	0 (0.00%)
	Right side	1 (0.54%)
	Bilateral	26 (14.28%)
Organomegaly	Hepatomegaly	67 (36.81%)
	Splenomegaly	44 (24.17%)
	Ascites on USG	50 (27.47%)
	Pericholecystic edema	135 (74.17%)
<b>CXR findings</b>		<b>Positive</b>
Pleural effusion	Left side	0 (0.00%)
	Right side	1 (0.54%)
	Bilateral	15 (8.24%)
	Pulmonary edema	09 (4.94%)
	Acute respiratory distress syndrome	02 (1.09%)

USG: Ultrasonography; CXR: Chest X-ray

**CONCLUSION**

The recent advances in our understanding of this disease, its pathogenesis, and clinical presentation with standardization of management protocols are resulting in improved outcome. In our study, appropriate fluid management was the mainstay of treatment. Crystalloids (normal saline) were the most used fluid, colloid use (fresh frozen plasma) was less commonly used and inotropes were used in some selected cases only. Fresh whole blood was used in eight patients who had severe dengue with major bleeding manifestations. Platelet transfusion was used in only two cases of severe dengue. The very frequent use of platelet transfusions, which used to be the highlight of dengue management in the past, is no longer in practice. In our study, five mortalities also occurred (2.74%), of which two patients presented with DSS and died within 6 hours of admission. All other cases responded well to the management.

Conclusions drawn from our study could thus be:

- Diagnosis of dengue requires high index of suspicion and it is essential to diagnose it early to prevent complications. Detection of NS1 antigen, ultrasonographic evidence of pericholecystic oedema and fluid collection in 3rd space (Ascites, Pl. effusion, etc.) are all pointers towards the diagnosis.
- Close monitoring of severe dengue cases and also a watch for cases of dengue with warning signs tend to progress to severe dengue. On rare occasions, simple dengue without warning signs may also progress to severe dengue.
- Strict adherence to the WHO protocols of severe dengue management aided by their algorithm (flow charts) results in favorable outcome in majority of the cases. For judicious fluid management (crystalloids in majority and colloids like plasma occasionally), a good PICU monitoring is essential.

- In severe dengue with major hemorrhagic manifestations whole blood should be used. Platelet use has become infrequent and has very limited use.

Thus, DF, one of the scourges of this millennium can be managed with a favorable outcome by early diagnosis, diligent monitoring, and appropriate management with fluids, hematological and other supportive management.

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