



## A PROSPECTIVE STUDY OF PREDICTORS AND OUTCOME OF SEVERE DENGUE ILLNESS IN CHILDREN

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**ABSTRACT** **Introduction:** Dengue is an acute febrile arboviral illness. It is mainly endemic in tropical and subtropical areas as its transmitting mosquito - Aedes genus - is primarily seen in both these areas. The average incubation period is seven days (three to 14 days). The spectrum of dengue ranges from a non-severe febrile disease to a severe systemic life-threatening illness. **Materials and Methods:** This is a prospective study conducted in the Department of Pediatrics, Indira Gandhi Institute of Child Health, Bangalore a tertiary care centre in Bangalore from March 2021 to September 2021 (monsoon season in Karnataka). Results of laboratory parameters like complete blood count, including packed cell volume, platelet count, LFT, RFT, RBS, Serum calcium and Electrolytes, were collected. Coagulation profile, serum IgG, ultrasound abdomen, MRI, and chest radiography were performed only if clinically indicated. Children were classified according to WHO guidelines 2015. **Results:** A total of 120 children were included of which 67(56.2%) were boys and 53 (43.8%) were females. (M: F=1.28:1). 0-1 age group included 10 infants. (8.1%) and 21 (16.5%) were more than 10 years of age. Mean age of the series was 6.61 (SD 3.49) years and 19 (8.2%) were infants. Mild Protein energy malnutrition in 41 children, grade 2 PEM in 5 cases and grade 4 PEM in two children. **Conclusion:** Dengue fever can affect children irrespective of their age or nutritional status. Older children and male sex were found to be more affected. There are definite clinical and lab parameters which are predictors of the severity of Dengue fever. Though severe illness is associated with high morbidity early diagnosis and timely appropriate clinical management, correction of dehydration along with proper referral system can save the children. The mortality can be reduced to zero even in patients having expanded dengue syndrome and Dengue shock syndrome. None of the comorbidities had affected the outcome.

**KEYWORDS :** Dengue, packed cell volume, platelet count, LFT, RFT

### INTRODUCTION

Dengue is an acute febrile arboviral illness. It is mainly endemic in tropical and subtropical areas as its transmitting mosquito - Aedes genus - is primarily seen in both these areas. The average incubation period is seven days (three to 14 days). The spectrum of dengue ranges from a non-severe febrile disease to a severe systemic life-threatening illness.

Since 2000, epidemic dengue has spread to new areas and has increased in already affected regions. In 2003 eight countries-India, Bangladesh, Maldives, Indonesia, Myanmar, Sri Lanka, Timor-Leste and Thailand reported Dengue cases. Reported case fatality rate in these regions is approximately is 1%. But due to focal outbreaks away from urban areas, India,

Indonesia, and Myanmar have reported case fatality rates of 3-5%. Mortality from dengue can be reduced by timely implementation of appropriate clinical management which includes early clinical and laboratory diagnosis, judicious intravenous rehydration, training health care personnel, timely and prompt referral from primary health-care centers. Integrated vector management- effective urban and household water management, implementing better outbreak prediction through coordinated epidemiological surveillance are also equally important in reducing morbidity.

### MATERIALS AND METHODS

This is a prospective study conducted in the Department of Pediatrics, Indira Gandhi Institute of Child Health, Bangalore a tertiary care centre in Bangalore from March 2021 to September 2021 (monsoon season in Karnataka).

### Inclusion Criteria:

Children admitted to Paediatric ward or ICU diagnosed as Dengue fever with clinical features and laboratory parameters were selected. Those confirmed on consecutive sampling by NS1Ag test or IgM Elisa were included.

### Exclusion Criteria:

Those children with other chronic illnesses diagnosed to have Dengue

fever. Results of laboratory parameters like complete blood count, including packed cell volume, platelet count, LFT, RFT, RBS, Serum calcium and Electrolytes, were collected. Coagulation profile, serum IgG, ultrasound abdomen, MRI, and chest radiography were performed only if clinically indicated. Children were classified according to WHO guidelines 2015.

Typical features and complications with immediate outcome measures were noted. (5) Patients were followed up daily to assess clinical and laboratory progression till discharge and subsequently in outpatient care if required. Children with chronic co morbidities were also observed and analysed separately to know the outcome.

### Statistical Analysis:

The statistical analysis was done using SPSS. Qualitative data was analysed and expressed in proportions and quantitative data in mean and standard deviation. The discrete variables were analysed using Chi-Square test, and continuous variables using ANOVA. The analysis was performed using SPSS 16.0 software. P value less than 0.05 was considered as significant.

### RESULTS

A total of 120 children were included of which 67(56.2%) were boys and 53 (43.8%) were females. (M: F=1.28:1). 0-1 age group included 10 infants. (8.1%) and 21 (16.5%) were more than 10 years of age. Mean age of the series was 6.61 (SD 3.49) years and 19 (8.2%) were infants. Mild Protein energy malnutrition in 41 children, grade 2 PEM in 5 cases and grade 4 PEM in two children.

**Table 1: Age distribution**

S.No	Age group	Number (Frequency)
1	0-1 year	10
2	1-5 years	40
3	5-10 years	49
4	>10 years	21

**Table 2: Multiple Comparison of Lab Parameters in DWS and Severe Dengue**

Parameter	Variable	DWS	DSS
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Platelet count	<50,000/Cumm	23	27
	50000-1 lakh	53	19
	1-1.5 lakh	19	5
	>1.5 lakh	11	1
Serum Sodium	<130 meq/L	15	20
	130-135	19	11
	>135	21	10
SGOT	<200 units	76	35
	>200	6	12
Serum albumin	<2.5 gm/dl	16	29
	2.5-3	59	19
RBS	40-70 mg/dl	64	104
	>70 mg/dl	41	25

**Table 3: The Mean Values of Lab Parameters in Mild, DWS (Dengue with Warning Signs) & Severe Dengue**

	Mild	DWS	Severe Dengue
HB	12.14±1.187	11.99±1.80	11.97±1.96
PCV	34.67±7.72	36.57±4.13	35.96±7.49
Platelet Count	52430±6055	90613.21±50028.67	58653.85±36686.2
SGOT	153.55±151.93	213±429.57	469.39±794.15
SGPT	77.84±69.49	99.32±162.87	165.49±281.28
Serum Sodium	134±3.4	133.95±8.157	129.88±5.853
Serum Albumin	2.283±0.147	3.055±0.458	2.194±0.55

**Table 4: Post HOC Analysis of Dengue Illness in 3 Groups as Type 1 Mild, Type 2 DWS, & Type 3 Severe**

Dependent Variable	Type	Significance
Platelet Count	12	0.001
	13	0.000
	23	0.000
Serum Sodium	12	0.167
	13	0.002
	23	0.067
Serum Albumin	12	0.94
	13	0.000
	23	0.000
SGOT	12	1.00
	13	0.003
	23	0.010

Clinical classification among the study group showed 39 (32.9%) had mild dengue fever, 55 (45.29%) had dengue with warning signs and 27 (22.22%) had severe dengue fever. Dengue shock syndrome was present in 17 children. Children were initially compared in 3 groups as mild dengue, Dengue with warning signs, and severe dengue. Comparison was also made in 2 groups as mild 85(71.4%) and severe dengue (67-28.6%) as per WHO 2015 clinical guidelines to know the predictors of progression to severe dengue. Multiple variables were also compared in dengue with warning signs and severe dengue.

## DISCUSSION

Mean age of the group was 6.61± 3.497 years. Infants constituted 8.2 % and 57.7% of children belonged to 5-15 age group in our study group similar to that seen in study conducted by Manjunadh et al. Study by Mittal et al showed 68% cases were in the age group of 6–12 years, only 2.9% were infants and the mean age group was 8.3±3.5 years. A study conducted by Misra S et al in 2016 also shows similar results. Among the group 4 infants belonged to less than 6 months of age but the age group showed no association with severity of illness when the different age groups were compared.

Only 22.4% children had protein energy malnutrition and most of the children had normal weight. It has been reported that children having better nutritional status can also have more complications due to better immunological response.(16) Among the study group, 77 had mild dengue fever, 106 had dengue with warning signs and 52 had severe dengue fever as per the latest WHO classification (5) There was an overlapping of clinical signs among Dengue with warning signs, severe Dengue, including expanded dengue syndrome and severe dengue shock syndrome(DSS) as described in WHO national guidelines.

Fever was present in almost all the cases (94.8%) and the mean duration was 4.8 days similar as described in most of the studies. (11).vomiting and abdominal pain, myalgia, lethargy, rash, Flushing, bleeding manifestations were the most common symptoms at presentation. Most of the studies have shown similar data of clinical manifestations as described in a study conducted in Karachi, Pakistan.(17)and from Kerala Generalized lymph node enlargement was seen in (23.8%) with features

of lymph node abscess in 3 children. A study from Trivandrum shows less incidence of lymphadenopathy. Hepatomegaly alone was seen in 73 children, 46 had hepatosplenomegaly with enlarged tender liver in 14 cases and 8 had splenomegaly alone. These findings were significantly associated with severe dengue with a p value of 0.002, similar to the results described by Mohan et al. Clinical jaundice was present only in 3 children similar to that reported in the study from Trivandrum.(16) Severe dehydration was present in 12 children and among them 9 had diarrhea. The presentation was with severe pneumonia in 8 children and 4 had features of ARDS.

## CONCLUSION

Dengue fever can affect children irrespective of their age or nutritional status. Older children and male sex were found to be more affected. There are definite clinical and lab parameters which are predictors of the severity of Dengue fever. Though severe illness is associated with high morbidity early diagnosis and timely appropriate clinical management, correction of dehydration along with proper referral system can save the children. The mortality can be reduced to zero even in patients having expanded dengue syndrome and Dengue shock syndrome. None of the comorbidities had affected the outcome.

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