Clinical Profile of Dengue Fever in Children: A Study from Tamilnadu, India

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Background: *In India, dengue epidemics are becoming more frequent. The majority of dengue viral infections are self-limiting, but complications may cause high morbidity and mortality.*
Objectives: *To assess the clinical profile of the dengue infection in children less than 14 years of age and to evaluate the outcomes of dengue fever from January 2018 to June 2018 at Pediatric Department,Coimbatore Medical College Hospital,Coimbatore.*
Results: *A total of 75 cases were classified into 63(84%) non severe and 12(16%) severe dengue cases. The most common age of presentation was above 5 yrs. The mean age of admission was 8.7 yrs. The most common presenting symptom was fever seen in 100% and hepatomegaly (64%) the most common physical finding. Gastrointestinal bleeding was markedly seen in severe dengue (76.9%). Elevation in aspartate transaminase (SGOT) was found in 47.42% and thrombocytopenia in 27.5%.The correlation between hepatomegaly and elevated SGOT was significant (P value 0.0346). Case fatality rate (CFR) was 1.03%.The mean duration of hospitalization was 4days.*
Conclusion: *In children, if symptoms like fever, pain, rashes, and vomiting are associated with hepatomegaly and elevated SGOT in context of low TPC, a strong possibility of dengue fever is present, especially in an epidemic setting. Early suspicion and effective management can reduce the severity.*
Keywords- *Dengue, Children, Clinical Profile*

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I. Introduction

Globally 50 million dengue infections are reported annually   .

The first dengue fever in India was reported during 1956 from Vellore and the first dengue haemorrhagic fever occurred in Calcutta in 1963. In India the annual incidence is estimated to be 7.5 to 32.5 million. Dengue fever presents as common viral fever which causes dangerous complications. Dengue re infection is observed to be more severe in children due to immunological phenomenon. Rapid increase in the dengue cases in 2017 became a public health concern in southern India. objective of this study was to assess the clinical profile of the dengue infection in children less than 14 years of age and to evaluate the outcome of dengue fever in the southern part of India where dengue outbreaks are rampant.

II. Material and Methods

It was a prospective observational study. All probable cases that had high grade fever, lymphadenopathy, hepatomegaly, features of shock or haemorrhage, and so forth and were admitted with provisional diagnosis of dengue fever to the PaediatricWard of Coimbatore Medical College Hospital, Coimbatore, were taken into account.
All children aged up to 14 years with positive dengue tests,

Table-1

Parameter	Variables	Numbers	%	Non severe dengue	Severe dengue
Age	<3Y 4-7Y 8-11Y >11Y	11 26 33 5	14.6% 30% 44% 6.6%	10 20 29 4	1 6 4 1
Sex	Male Female	45 30	60% 40%	37 26	8 4
Duration of hospitalization	0-3 D	16	21.3%	38	

	3-6D	48	64%	22	
	>6D	11	14.6%	3	12
Day of admission	0-3 D	13	17.3%	7	7
	3-6D	47	62.6%	10	4
	>6D	15	20%	46	1
Classification	Undifferentiated fever	22	29.3%		
	Dengue fever (with or without warning signs)	38	50.6%		
	Severe dengue (DHF)	15	20%		

either NS1 antigen, IgM, IgG antibody rapid serologicaltest kit, or ELISA, were taken into the study group. Children who were positive for malaria,meningitis, and enteric fever were excluded from the study.The whole number of patients included in our study was 75 ($n = 75$). Cases were followed up daily for the clinical and laboratory parameters. Blood parameters were monitored every day till remarkable improvement seen clinically and haematologically. Averages of TLC, TPC, Hb, haematocrit, and so forth were calculated for each patient and recorded.Daily vitals were monitored with tourniquet test. Chest X-ray, ultrasonography, and liver function tests were done on day3 of admission on all the patients. The patients were treated with oral paracetamol, intravenous fluids, blood products and inotropes as per the recent WHO dengue guidelines.

The outcomes were recorded. The clinical manifestations and laboratory findings like haemoglobin estimation, total platelet count, haematocritestimation, NS1 antigen, and IgM antibody of each groupof illness were compared using *Fisher's exact test* for proportions.

GraphPad version 6.0. software and SPSS version 22.0.0.0 software were used for data entry and analysis. *P* value below 0.05 was considered significant. Written consent was taken from the parents before enrolling in the study.

III. Observations and Results

The total number of cases was 75,out of which 63were cases of Non severe dengue (undifferentiated fever, dengue fever with warning signs, and dengue fever without warning signs) and12 were cases of severe dengue (DHF and DSS) according to WHO guidelines. There were 45 (60%) males and 30(40%) females in our study. Both the groups of severe and non severe dengue males had high incidence. The male-to female ratio was 3.4:1.

The maximum number of cases, 33(34.02%), was seen in the group above 11 years of age, out of whom male children were 25 (33.33%) and female children 8(36.36%). The mean age of hospitalized patients was 8.7 yrs.63.9% of patients were admitted in the hospital for 3–6 days. Three children out of 12 severe dengue patients were admitted for more than 6 days. The mean stay of hospitalization was 4 days. In severe dengue cohort the mean stay was 5.8 days. The mean delay in admission after appearance of fever was 3.5 days (Table 1).

Fever was present in 100% of the cases; myalgia (74.8%) and abdominal pain (59.5%) were common. Hepatomegaly(43.8%) was the most common physical finding. The most common bleeding manifestations in both severe and non severe dengue were petechiae (22.1%). Gastrointestinal bleeding was significantly seen in severe dengue cases. 58.76% of the cases had normal leukocyte count, while leucopoenia was seen in 25.77% and leukocytosis in 8% of the cases.

Among the liver enzymes, SGOT was elevated in a larger proportion (86%) of patients when compared to alanine transaminase (SGPT) which was 30.92%.

Elevation in SGOT was significantly seen in those with severe dengue(76.92%, *P* value: 0.0346) rather than non severe dengue (42.85%). SGPT was very high (>1000 IU/L) in 3 patients whereas SGOT was very high (>1000 IU/L) in 5 patients. All these patients with high liver enzymes had other severities also. Out of them one child that had very high titre of both liver enzymes succumbed despite admission to the intensive care unit. 27.83% presented with thrombocytopenia (platelet < 100000). 69.23% of severe dengue cases had thrombocytopenia whereas only 21.42% of non severe dengue cases had thrombocytopenia. Thrombocytopenia was seen to be more relevant in those with severe dengue.

One of the important findings of dengue is raised haematocrit which was seen in 37.02% of the cases and it was statistically not significant.25.3% of the cases were detected to have pleural effusion by chest X-ray (PA view and oblique view in right lateral decubitus). Right sided effusion (17.3%) was most commonly seen followed by bilateral effusion (5.3%). Among the severe dengue cases, the majority, 33%, presented with bilateral effusion. Ultrasound of the abdomen detected hepatomegaly in 76% of the cases, which is the most common finding followed by ascites (22%) and gall bladder wall

edema (5.3%).In our study, the majority of the patients were positive for NS1 followed by IgM (Table 2) as a large number of patients presented within 4 days of fever. Serum IgG was estimated in those children who presented with history of 7 days. Tourniquet test was found to be negative in the majority of the patients. In this study it was found that the bleeding manifestation had no correlation with thrombocytopenia,

hepatomegaly, and raised SGOT (Table 3). All 75 patients had fever and they were treated with antipyretics (paracetamol) in appropriate doses. Patients who presented with warning signs and stable vital signs were initially encouraged to take oral fluids; if they were not tolerated intravenous fluids were started according to the WHO guidelines.

Dopamine was required in 4% of the cases and all of them were severe dengue cases 1.3%). Adrenaline was used only in one patient who belonged to the severe dengue category.. In our study all 75 (86.59%) of non severe dengue cases recovered. Among the severe dengue cases, 13 (13.40%), 12 cases (12.37%) recovered and 1 case (1.03%) expired due to intractable shock.

IV. Discussion

The most common Bleeding manifestations in both severe and non severe dengue were petechiae, purpura, and ecchymosis. Gastrointestinal bleeding was significantly seen in severe dengue cases. Haematemesis was the most common bleeding manifestation reported in other Indian studies. Convulsion due to infection is very rare. Two patients in the severe dengue group had convulsion after having DSS. There was no correlation between platelet counts and bleeding manifestations in our study. A similar finding was also noted in other studies [11]. Various factors apart from thrombocytopenia lead to bleeding in dengue. They are decreased platelet function, fibrinogen consumption, prolongation of PT/PTT, and vasculopathy[12].

In our study, in the majority of the patients tourniquet test was found to be negative, whereas studies in other countries, especially Southeast Asian countries, report tourniquet test positivity as the commonest bleeding manifestation [13]. Low proportion of positive tourniquet test in Indian studies may be due to the darker skin colour in Indian children [14].The most consistent finding was hepatomegaly, which was similar to many other studies [10, 11]. Among the various clinical findings hypotension, pleural effusion, and respiratory distress were notable and were analogous to other studies. Leukopenia was seen, which was similar to two other studies [10, 14]. The earliest haematological abnormality is a progressive decline in total WBC count in patients of dengue [2].

Leukopenia was not significantly related with severe dengue cases which were against some results [15]. In our study thrombocytopenia was seen to be more in those with severe dengue [15]. There were a low proportion of children with evidence of haemo concentration in our study group. The percentage increase in haematocrit is an accurate indicator of vascular permeability and plasma leakage. But it was also reported in previous studies that in some cases the fluid leakage does not achieve a high degree haemoconcentration even if the patient is in shock; this explains our findings. I0n some DF patients the rise

Table-2

INVESTIGATIONS	VARIATIONS	NON SEVERE DENGUE	SEVERE DENGUE	TOTAL	P VALUE
TLC	Leukopenia(<4000/cu.mm) Leukocytosis(>11000/cu.mm) Normal TLC(4000-11000/cu.mm)	23 5 35	9 1 2	32 6 37	
Liver enzymes	Rise in SGPT(IU/liter) total 50-200units 200-1000u >1000u Rise in SGOT(IU/l) total 50-200units 200-1000u >1000u	36 7 - 47 16 -	9 2 1 9 3 -	55 9 1 56 19 -	0.5421 0.0321
TPC	>100000 100000-50001 <50000	42 15 6	5 4 3	47 19 9	
Hematocrit	>36.3% <36.3%	45 18	10 2	55 20	
Chest xray	Pleural effusion Right side Left side Right + left	10 8 1 1	9 5 1 3	19 13 2 4	0.0034 0.3912 0.0001

USG abdomen	Hepatomegaly	48	9	57	
	Ascitis	12	5	17	
	GB wall edema	1	3	4	
Dengue serology	NS1	15	1	16	
	IGM	31	8	39	
	IGG	2	-	2	
	IGM & IGG	3	1	4	
	NSI & IGM	12	2	14	

PCV could have been due to dehydration as a result of poor intake and vomiting [16]. There are no clear-cut guidelines for haemoconcentration in the Indian population. Elevation of SGOT was significantly more compared to SGPT in the present study and is more associated with severity of infection which coincides with others also [14]. SGOT raise more than SGPT in dengue may be due to involvement of myocytes.

Value more than 1000 IU/L is seen in severe dengue. Very high levels of SGOT and SGPT indicate severity of the disease along with morbidity and mortality. This differs from the pattern seen in viral hepatitis [17]. In this study one child who had liver enzymes >1000 IU/L succumbed on the second day of hospitalization in spite of all measures.

Table-3

BLEEDING MANIFESTATION				
	Present	Absent	Total	P value
Thrombocytopenia Present Absent Total	9 12	19 35	28 47	0.4128
HEPATIC MANIFESTATIONS				
Hepatomegaly Present Absent Total	12 2	45 16	57 18	0.3087
Raised SGOT Present Absent Total	20 -	55 -	75 -	0.2791

Table-4

MANAGEMENT

Management	Nonsevere dengue(n=63)	Severe dengue(n=12)	Total(n=75)
Antipyretics	63	12	75
Intravenous flyuids	23	12	35
Platelet transfusion	-	-	-
Whole fresh blood transfusion	-	--	-
Dopamine	-	3	3
Adrenaline	-	1	1

Rise in PT/aPTT also depicts severity of disease. Ascitis and pleural effusion were common presentations, whereas chest X-ray revealed pleural effusion in 25.3%. In USG of the abdomen right sided effusion (17.3%) was most commonly seen which was similar to the previous study [11]. Pleural effusion is more significant in severe dengue. Among types of effusions bilateral pleural effusion is more indicative of severity of the disease. In our study all non severe dengue cases recovered. Among the severe dengue cases 12 cases recovered and 1 child expired due to intractable shock.There was less mortality in the present study group, whereas mortality rate was high in earlier previous studies. This could be due to delay in recognition of epidemic in previous years or delay in seeking medical attention. Case fatality rate (CFR) of the SEAR countries in 2006 was less than 1%. India, Indonesia, Bhutan, and Nepal still have case fatality rates above 1% [18]. Early diagnosis and improved case management of dengue fever are required to bring down CFR to below 1%.

V. Conclusion
Dengue is a common disease in this part of the world. It is one of the dreaded fevers for the paediatric age group.The disease has various presentations and features, but early diagnosis and management can decrease case fertility rate significantly. In our study we have enlisted all the typical and atypical presentations, epidemiological data, investigations, and management according to recent WHO guidelines.

Severe dengue is very dangerous for children. Lab parameter like raised SGOT is very significant for distinguishing severe disease from non severe variety. Pleural effusion is a dominant feature of severe disease.This study will elaborate knowledge about the disease and will improve the outcome.

Abbreviations
SGOT: Aspartate transaminase
CFR: Case fatality rate
WHO: World Health Organization
DHF: Dengue haemorrhagic fever
DSS: Dengue shock syndrome
IgM antibody: Immunoglobulin M antibody
IgG antibody: Immunoglobulin G antibody
TLC: Total leukocyte count
TPC: Total platelet count
Hb: Haemoglobin
SGPT: Alanine aminotransferase
aPTT: Activated partial thromboplastin time
PT: Prothrombin time
DF: Dengue fever
PCV: Packed cell volume
USG: Ultrasonography
SEAR: Southeast Asian region.

Competing Interests
The authors declare that they have no competing interests.

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