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A Study of Clinical Spectrum, Laboratory Profile and Outcome of Dengue Fever in Children

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Abstract **Original Research Article**

***Background*:** Dengue is one of the dreaded fevers of paediatric age group with variable presentations and complications. Understanding the knowledge of presentations and associated features would help to predict the severity of the disease. Dengue fever presents as a common fever with dangerous complications. Infection with dengue virus (DENV) provides lifelong immunity to the serotype affected providing partial and transient protection against re infection with the other three serotypes. ***Objective*:** To evaluate the clinical and laboratory features, as well as the consequences of dengue fever in children. ***Materials and Methods*:** This was an observational, cross-sectional study done by the Department of Paediatrics at Narsingdi's 100-bed district hospital from July 2021 to June 2022. A total of 100 dengue fever cases were enrolled and categorised according to WHO guidelines. All children under the age of 18 were screened and validated using the NS1 antigen and the Ig M and Ig G fast antibody detection serological tests. The study included all of the positive dengue patients. Malaria, typhoid, chikungunya, and other causes were excluded from the study. A systematic questionnaire was used to collect the clinical and demographic profiles. Haematological values were recorded and monitored till the patient was discharged. ***Results*:** The differences in fever, myalgia, vomiting, stomach discomfort, petechiae, bleeding symptoms, retro orbital pain, and hepatomegaly between the two groups were not statistically significant ($p>0.05$). Total leukocyte count (cells/mm3), SGPT (IU/L), SGOT (IU/L), Platelet count (/mm3), Haematocrit (%), Dengue serology, Hepatomegaly, Splenomegaly, Gall bladder wall thickening, and ascites were all important screening techniques for severe dengue fever diagnosis. This was statistically significant (p 0.05) when comparing severe dengue fever groups to non-severe dengue fever groups. ***Conclusion*:** Among the more common clinical characteristics were fever, myalgia, vomiting, stomach discomfort, petechiae, bleeding signs, retro orbital pain, and hepatomegaly. Total leukocyte count (cells/mm^3), SGPT (IU/L), SGOT (IU/L), Platelet count (/mm^3), Haematocrit (percent), and Dengue serology findings are more effective screening techniques for dengue fever diagnosis.

Keywords: Clinical Spectrum, Laboratory Profile, Outcome, Dengue Fever.

INTRODUCTION

Dengue fever is a mosquito borne arboviral disease which is of global concern. It commonly affects the young adults and paediatric cases of Dengue haemorrhagic fever has high mortality. [1].

Over 2.5 billion people – over 40% of the world's population – are now at risk from dengue.[2] The WHO currently estimates there may be 50–100 million dengue infections worldwide every year. [2]. WHO classified dengue into three categories: undifferentiated fever, dengue fever (DF) and dengue haemorrhagic fever (DHF). Severe dengue is also regularly observed during primary infection of infants born to dengue-immune mothers. [3]. Dengue virus belongs to the family Flaviviridae (single stranded non segmental RNA

viruses) and has four distinct serotypes: DEN-1, DEN-2, DEN-3 and DEN-4. Humans are the main reservoir for the dengue virus. Urbanization, substandard living conditions, lack of vector control and climatic changes are some of the important causes for dengue infection. Once considered an urban problem, it has now penetrated into rural areas also due to high population density and other factors**. [**4].

Clinical features of Dengue often depend on the age of the patient. Thus infants and children can suffer an undifferentiated febrile stage, with different kind of rash, e.g. exanthema and morbiliform rash, but for teenagers the recovering time, the fever and the set of symptoms are more intense. [5].

Severe dengue is also regularly observed during primary infection of infants born to dengue-immune mothers. The present study was conducted to assess the clinical profile, laboratory profile and associated risk factors related to outcome of children less than 15 years of age.

METHODOLOGY

This was an observational, cross sectional study conducted by Department of Paediatrics at 100 bedded district hospital, Narsingdi during the study period was from July 2021 to June 2022. Total 100 cases of dengue fever were enrolled and classified as per WHO guidelines. The clinical profile and demographic profile was recorded in a structured questionnaire form. Haematological parameters were recorded and followed till the day of discharge. The duration of stay was recorded and outcomes were noted. All the probable cases suspected with clinical signs and symptoms of dengue fever were admitted in the paediatric ward. All the children below 18 years of age were screened and confirmed with NS1 antigen and Ig M and Ig G rapid antibody detection serological test. All the positive cases of dengue were enrolled in the study. Informed consent was obtained from all the cases and written consent from the parents or guardians in the study after explanation. Cases confirmed as malaria, typhoid, chikungunya and other causes were excluded from the study. The demographic and clinical profile of the enrolled cases was collected in a predesigned structured questionnaire sheet. The clinical profile included duration of fever, bleeding manifestations, retro orbital pain, myalgia, vomiting and others. All the admitted cases were followed regularly and haematological parameters like Hb%, total platelet count (TPC), haematocrit, heamogram, Prothrombin time (PT), activated partial thrombin time (aPTT), Total lymphocyte count (TLC), liver function test were evaluated regularly during follow up. Ultra sonogram of abdomen, chest X-ray were done in cases where required. The enrolled cases were classified based on the WHO guidelines as severe dengue fever which included dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS), non-severe dengue (with or without warning signs) and undifferentiated fever. The total duration of stay was noted in each enrolled case. The frequency of signs and symptoms and laboratory parameters were compared between non severe and severe dengue cases. The patients were treated as per WHO guidelines by paracetamol, inotropes, I.V. fluids and whole blood, platelet transfusions where required.

RESULTS

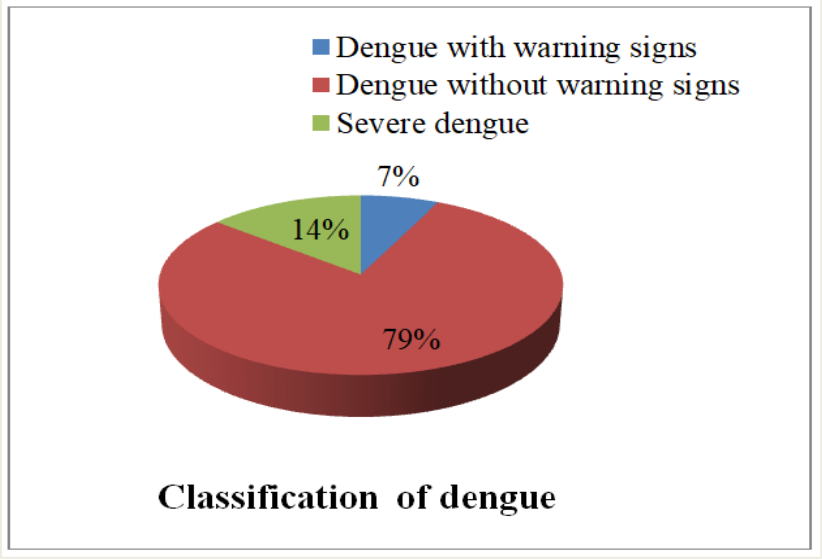

Figure 1: Classification of dengue fever

Majority (79.0%) patients were diagnosed dengue without warning signs, 7(7.0%) were dengue with warning signs and 14(14.0%) were severe dengue.

Table 1: Demographic parameters of the study population

	Severe dengue (n=14)	Non severe dengue (n=86)	P value
Age (years)			
≤5	3 (21.4%)	8 (9.3%)	
6-10	9 (64.3%)	63 (73.3%)	0.403^{ns}
11-15	2 (14.3%)	15 (17.4%)	
Sex			
Male	8 (57.1%)	54 (62.8%)	0.686^{ns}
Female	6 (42.9%)	32 (37.2%)	
Duration of hospital stay (days)			
≤3	12 (85.7%)	75 (87.2%)	
4-6	2 (14.3%)	7 (8.1%)	0.560^{ns}
>6	0 (0.0%)	4 (4.7%)	

ns= not significant; p value reached from chi square test

Almost two third (64.3%) patients belonged to age 6-10 years in severe dengue and 63(73.3%) in non-severe dengue. Majority (57.1%) patients were male in severe dengue and 54(62.8%) in non-severe dengue. Majority (85.7%) patients were hospital stay ≤3 days in severe dengue and 75(87.2%) in non-severe dengue. The difference were not statistically significant (p>0.05) between two groups.

Table 2: Clinical profile of the study population

	Severe dengue (n=14)	Non severe dengue (n=86)	p value
Fever	14 (100.0%)	86 (100.0%)	-
Myalgia	12 (85.7%)	71 (82.6%)	0.770^{ns}
Vomiting	13 (92.9%)	69 (80.2%)	0.254^{ns}
Abdominal pain	10 (71.4%)	59 (68.6%)	0.832^{ns}
Petechiae	9 (64.3%)	62 (72.1%)	0.550^{ns}
Bleeding manifestations	9 (64.3%)	60 (69.8%)	0.680^{ns}
Retro orbital pain	8 (57.1%)	66 (76.7%)	0.121^{ns}
Hepatomegaly	10 (71.4%)	55 (64.0%)	0.586^{ns}

ns= not significant; p value reached from chi square test

Fever, myalgia, vomiting, abdominal pain, petechiae, bleeding manifestations, retro orbital pain and hepatomegaly were not statistically significant (p>0.05) between two groups.

Table 3: Laboratory profile of the study population

	Severe dengue (n=14)	Non severe dengue (n=86)	P value
Total leukocyte count (cells/mm^3)			
<4000	1 (7.1%)	39 (45.3%)	
4000-11000	8 (57.1%)	36 (41.9%)	0.011^{s}
>11000	5 (35.7%)	11 (12.8%)	
SGPT (IU/L)			
<50	0 (0.0%)	46 (53.5%)	
51-200	3 (21.4%)	32 (37.2%)	0.001^{s}
201-1000	8 (57.1%)	8 (9.3%)	
>1000	3 (21.4%)	0 (0.0%)	
SGOT (IU/L)			
<40	0 (0.0%)	39 (45.3%)	
41-200	4 (28.6%)	37 (43.0%)	0.001^{s}
201-1000	8 (57.1%)	10 (11.6%)	
>1000	2 (14.3%)	0 (0.0%)	
Platelet count (/mm^3)			
<50000	10 (71.4%)	11 (12.8%)	
50000-100000	4 (28.6%)	37 (43.0%)	0.001^{s}
>100000	0 (0.0%)	38 (44.2%)	
Haematocrit (%)			
≤40.0	8 (57.1%)	73 (84.9%)	0.014^{s}

	Severe dengue (n=14)	Non severe dengue (n=86)	P value
>40.0	6 (42.9%)	13 (15.1%)	
Dengue serology			
Ns1Ag	11 (78.6%)	37 (43.0%)	0.058[ns]
IgM	8 (57.1%)	18 (20.9%)	0.004[s]
IgG	7 (50.0%)	20 (23.3%)	0.036[s]
Both (IgG and IgM)	2 (14.3%)	0 (0.0%)	0.001[s]
Chest X-ray			
Normal	0 (0.0%)	56 (65.1%)	
Right pleural effusion	9 (64.3%)	18 (20.9%)	0.001[s]
Left pleural effusion	3 (21.4%)	12 (14.0%)	
Bilateral pleural effusion	2 (14.3%)	0 (0.0%)	
Hepatomegaly	11 (78.6%)	24 (27.9%)	0.001[s]
Spleenomegaly	10 (71.4%)	23 (26.7%)	0.001[s]
Gall bladder wall thickening and ascites	14 (100.0%)	29 (33.7%)	0.001[s]

s= significant, ns= not significant; p value reached from chi square test

Majority (57.1%) patients were found total leukocyte count 4000-11000 cells/mm^3 in severe dengue and 36(41.9%) in non-severe dengue. Majority (57.1%) patients were found SGPT 201-1000 IU/L in severe dengue and 8(9.3%) in non-severe dengue. Majority (57.1%) patients were found SGOT 201-1000 IU/L in severe dengue and 10(11.6%) in non-severe dengue. Almost two third (71.4%) patients were found Platelet count <50000 /mm^3 in severe dengue and 11(12.8%) in non-severe dengue. Majority (57.1%) patients were found Haematocrit ≤40.0 percent in severe dengue and 73(84.9%) in non-severe dengue. Eight (57.1%) patients were found IgM positive in severe dengue and 18(20.9%) in non-severe dengue. Seven (50.0%) patients were found IgG positive in severe dengue and 20(23.3%) in non-severe dengue. Two (14.3%) patients were found IgG and IgM positive in severe dengue and not found in non-severe dengue. Almost two third (64.3%) patients were found right pleural effusion in severe dengue and 18(20.9%) in non-severe dengue. Eleven (78.6%) patients were found hepatomegaly in severe dengue and 24(27.9%) in non-severe dengue. Ten (71.4%) patients were found spleenomegaly in severe dengue and 23(26.7%) in non-severe dengue. All (100.0%) patients were found gall bladder wall thickening and ascites in severe dengue and 29(33.7%) in non-severe dengue. Which were statistically significant (p<0.05) between two groups.

Table 4: Outcome of the study population

	Severe dengue (n=14)	Non severe dengue (n=86)	P value
Discharged	9 (64.3%)	81 (94.2%)	
Discharged against medical advise	3 (21.4%)	4 (4.7%)	0.002[s]
Death	2 (14.3%)	1 (1.2%)	

s= significant; p value reached from chi square test

Two (14.3%) patients were death in severe dengue and 1(1.2%) in non-severe dengue. The difference was statistically significant (p<0.05) between two groups.

DISCUSSION

In urbanization, poor living conditions and inadequate waste management, vector borne diseases like dengue fever are becoming more common. Although vector Control programmes are launched in endemic countries, yet dengue fever has become a serious problem worldwide. This study describes the clinical profile, laboratory features and outcome of DF/DHF/DSS in patients.

In this study showed that the majority (79.0%) patients were diagnosed dengue without warning signs, 7(7.0%) were dengue with warning signs and 14(14.0%) were severe dengues. Sharma *et al.*, [1] reported out of total 200 cases enrolled in the study, 8.5% were undifferentiated dengue fever, 80% were dengue fever with or without warning signs and 11.5% were of severe dengue. In study of Nagaram *et al.*, [3] reported total of 174 children with 149 non-severe dengue and 25 severe dengue cases. Our findings were on par with findings of Kabilan *et al.*, who reported 75.9% of children with warning signs and 6.6% of severe dengue cases in his study. [6].

In this study showed almost two third (64.3%) patients belonged to age 6-10 years in severe dengue and 63(73.3%) in non-severe dengue. Majority (57.1%) patients were male in severe dengue and 54(62.8%) in non-severe dengue. Majority (85.7%) patients were hospital stay ≤3 days in severe dengue and 75(87.2%) in non-severe dengue. The difference were not statistically significant (p>0.05) between two groups. Nagaram *et al.*, [3] reported among males, 87 were diagnosed with non-

severe dengue, 8 were severe dengue cases and 62 among female were non-severe cases and 17 were of severe cases. The most common age group affected in the study was 6-10 years (52.9%), 92 cases with 84 non-severe and 8 severe dengue cases. The mean duration of hospitalization was 5.21 days in severe dengue and 3.4 days in non-severe dengue cases. Dhooria *et al.,* [7] who reported 59% of cases in children between 10-15 years but on par with findings of Sharma *et al.,* [1]. The duration of stay of hospitalization was almost similar in both non-severe and severe cases in contrast to few studies which mentions duration of stay more in severe dengue cases. [8] Sharma *et al.,* [1] reported a total of 200 cases with 113 males and 87 females. The mean age of admission was 9 years and mean duration of stay in hospital was 4.61 days. The most common age group affected was 11-15 years (46.15%). This correlated with a study conducted by Eregowda and Valliappan [9] and Mishra *et al.,* [10].

In this study showed fever, myalgia, vomiting, abdominal pain, petechiae, bleeding manifestations, retro orbital pain and hepatomegaly were not statistically significant (p>0.05) between two groups. Sharma *et al.,* [1] reported Fever was the most common finding in all cases (100%) followed by vomiting (87%), myalgia and abdominal pain (84%) and retro orbital pain was seen in 77% of cases. Fever was the most common symptom followed in order by vomiting, myalgia, abdominal pain and retro orbital pain was found less commonly. These findings are on par with many studies, however some of the studies reported headache as the most common symptom.[11] However findings in studies of Kobilan *et al.,* and Mishra *et al.,* reported bleeding manifestations in non-severe cases of dengue also. [12, 13]. Nagaram *et al.,* [3] observed that among the clinical features, fever (100%) was the most common presenting feature, followed by vomiting in 115 (66%) and abdominal pain in 73 (41.9%). Rash was observed in 43 (24.7%), significant bleeding was seen in 9 (5.2%). Usual forms of bleeding were malena, hematuria, epistaxis, and excessive menstrual bleeding in adolescent girls. Other common symptoms were myalgia, loose stools. Vazhayil *et al.,* [14] showed that common clinical features included fever, vomiting, headache, myalgia, abdominal pain, petechiae, melena, maculopapular rash, and retro-orbital pain as shown in the previous studies. [15- 17].

In this study showed that the majority (57.1%) patients were found total leukocyte count 4000-11000 cells/mm^3 in severe dengue and 36(41.9%) in non-severe dengue. Majority (57.1%) patients were found SGPT 201-1000 IU/L in severe dengue and 8(9.3%) in non-severe dengue. Majority (57.1%) patients were found SGOT 201-1000 IU/L in severe dengue and 10(11.6%) in non-severe dengue. Almost two third (71.4%) patients were found Platelet count <50000 /mm^3 in severe dengue and 11(12.8%) in non-severe dengue. Majority (57.1%) patients were found Haematocrit ≤40.0 percent in severe dengue and 73(84.9%) in non-severe dengue. Eight (57.1%) patients were found IgM positive in severe dengue and 18(20.9%) in non-severe dengue. Seven (50.0%) patients were found IgG positive in severe dengue and 20(23.3%) in non-severe dengue. Two (14.3%) patients were found IgG and IgM positive in severe dengue and not found in non-severe dengue. Almost two third (64.3%) patients were found right pleural effusion in severe dengue and 18(20.9%) in non-severe dengue. Eleven (78.6%) patients were found hepatomegaly in severe dengue and 24(27.9%) in non-severe dengue. Ten (71.4%) patients were found spleenomegaly in severe dengue and 23(26.7%) in non-severe dengue. All (100.0%) patients were found gall bladder wall thickening and ascites in severe dengue and 29(33.7%) in non-severe dengue. Which were statistically significant (p<0.05) between two groups. Sharma *et al.,* [1] reported leukopenia was seen in 36% of cases and leukocytosis in 20% of cases. In liver enzymatic profile, SGOT was raised in 22.5% of cases with 78.26% rise seen among severe dengue cases and 15.25% in Non-severe cases. SGPT was raised in only 12.5% of cases with 13.04% in severe dengue cases and 12.43% in non-severe cases. Significant P value was observed in both SGOT (P value: 0.002) and SGPT (P value: <0.0001) in severe dengue cases than in Non-severe dengue cases. Raised haematocrit ≥36.3% was seen in 55% of total cases with 30.43% in severe and 58.2% in non-severe dengue cases. Statistical significance (P value: <0.001) for thrombocytopenia and haematocrit (P value: 0.012) was seen in severe dengue cases than in non-severe dengue cases. Raise in SGOT may be due to involvement of myocytes.[18] Nagaram *et al.,* [3]. Platelet count <10,000 was seen in 22 (7.3%) cases, 10,000-20,000 in 40 (13.2), 20,000-50,000 in 99 (32.7%), 50,000-1,00,000 in 66 (21.8%) and >1 lakh in 66 (21.8%). Statistical significance was associated with raised haematocrit (P value <0.001) and severe thrombocytopenia (<50,000cells/mm3) (P value <0.005) and more associated with severe dengue cases than non-severe dengue cases. Statistical association (p valve<0.05) was associated with both raised SGOT and SGPT values which was observed in severe cases of dengue than in non-severe dengue cases. Spleenomegaly was observed in 40 cases in total (23%) with 23 cases of non-severe dengue and 17 cases of severe dengue. Hepatomegaly was observed in 41 cases (23.56%) in total with 23 among non-severe and 18 among severe dengue cases. However considerable significance was not associated with these findings in our study. Aggarwal *et al.,* [19] who reported 79% of hepatomegaly and 19% of spleenomegaly in their study. Ratageri *et al.,* observed 70% cases to have pleural effusion and more so, on right side (52%). [20] Kale *et al.,* which showed higher Hb and HCT in the DF without warning signs. [21].

In this study observed 2(14.3%) patients were death in severe dengue and 1(1.2%) in non-severe dengue. The difference was statistically significant (p<0.05) between two groups. In study of Nagaram *et al.,* [3] 12.0% patients were death in severe dengue and

4.03% in non-severe dengue. Mehta *et al.*, [2] reported treatment outcome showed that 90% patients did not require platelet transfusion and 96.9% patients were cured.

CONCLUSION

Fever, myalgia, vomiting, stomach discomfort, petechiae, bleeding symptoms, retro orbital pain, and hepatomegaly were among the more prevalent clinical profiles. Dengue serology, chest X-ray, and USG findings are more effective screening tools of laboratory results for diagnosis of dengue fever than total leukocyte count (cells/mm3), SGPT (IU/L), SGOT (IU/L), Platelet count (/mm3), Haematocrit (percent), Dengue serology, chest X-ray, and USG findings.

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