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Original Research Article

Clinical-epidemiological profile of dengue fever in children admitted in a tertiary care hospital in Kolkata, West Bengal, India

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ABSTRACT

Background: Dengue infection has been known to be endemic in India for centuries. In recent years, the disease has changed its course manifesting in its severe form as Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS), with increasing frequency of outbreaks. The objective of the present study was to study the clinical and epidemiological profile of dengue fever in children admitted in a tertiary care hospital.
Methods: Clinical records of children aged 0-15 years with serologically confirmed dengue infection admitted at the Institute of Child Health, Kolkata during the Dengue outbreak (June 2016 to November 2016) were reviewed.
Results: Out of 958 cases of Dengue fever majority were boys 565 (59%), with M: F ratio of 1.4:1, and among them majority (40%) were in the age group of 5-10 years. Maximum number of cases were seen in the month of September 282 (29.4%). 65.6% cases had dengue fever without warning sign, while 28.6% had dengue fever with warning sign and 5.7% had severe dengue. Among the severe dengue cases 72% were less than 5 years of age while only 28% were more than 5 years of age. Out of 958 cases we had 63 (6.6%) cases of dengue with atypical manifestations. Seizure was the most common atypical manifestation. Six children expired with a Case Fatality Rate of 0.6%. Dengue shock syndrome was the leading cause of death.
Conclusions: Dengue affects all age groups, but children less than 5 years are more prone for developing severe dengue. Atypical manifestations are becoming more common in dengue fever, which can delay the diagnosis so careful observation from the clinician side is required to prevent any serious morbidity or mortality.

Keywords: Dengue, Dengue hemorrhagic fever, Dengue shock syndrome, Refractory shock

INTRODUCTION

Dengue fever is caused by flavivirus and is characterized by biphasic fever, myalgia or arthralgia, rash, leukopenia, thrombocytopenia and lymphadenopathy.[1] There are four serotypes of the virus Dengue virus (DENV) -1, DENV-2, DENV-3 and DENV-4 and each can cause epidemic. WHO in 2009 classified dengue fever into three groups: dengue fever without warning signs, dengue fever with warning signs and severe dengue.[2] The major warning signs associated with dengue infection are pain abdomen, persistent vomiting, clinical fluid accumulation, mucosal bleed, lethargy, restlessness, hepatomegaly and increase in hematocrit with concurrent fall in platelet counts. Criteria for severe dengue are severe plasma leakage, severe bleeding or severe organ involvement.

The 1st clinically recognized dengue epidemics occurred almost simultaneously in Asia, Africa, and North America in the 1780s.[3] There is 30- fold increase in global incidence of dengue fever over last five decades. Globally 50–100 million new dengue infections are

occurring annually.[4] Dengue infection is endemic in India for over two centuries. There is increasing frequency of outbreaks with significant morbidity and mortality since last few years.[5] Dengue fever was 1st documented in Kolkata (Calcutta) in 1824, and since then several epidemics took place in the city.[6] In recent years, the disease has changed its course manifesting in its most severe form such as Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS).

As of now there are no specific treatment or vaccines available for dengue viral infection, so the most efficient way to control the infection is by preventing its transmission through vector control.[7] The purpose of this study is to present a comprehensive study on the clinical-epidemiological profile of dengue fever in children, which will help the clinicians to understand the magnitude and consequence of the disease in a better way so that proper management steps could be taken to reduce the morbidity and mortality.

METHODS

The study type was retrospective, hospital record-based study. The study population was of children aged between 0-15 years age admitted with dengue fever diagnosed and classified as per revised WHO 2009 guidelines, in the pediatric medicine department of Institute of child health, Kolkata. The study period was from 1st June 2016 to 30th November 2016

Study technique

Patients were diagnosed by doing NS-1 ELISA test and /or IgM/IgG Mac ELISA test and were classified as per revised WHO 2009 criteria.

Data Analysis

Statistical analysis was done using SPSS version 20 software. Appropriate statistical test like chi square test for categorical data, ANOVA for continuous variables were performed whenever necessary. P value less than 0.05 was considered as statistically significant.

RESULTS

A total of 958 children were admitted with dengue fever between the month of June 2016 and November 2016 in our hospital. Maximum admissions occurred in the month of September 282 cases (29.4%) followed by august 270 cases (28.1%). Monthly distributions of dengue cases are given in Figure 1.

Out of 958 cases, 565 (59%) were boys and 393 (41%) were girls with M: F ratio of 1.4:1. Among the total admitted patient's majority i.e. 385 cases (40%) were in the age group of 5–10 years, while 35.8% were in 1-5 years age group, 149 cases (15.6%) in >10-15 years, and 81 cases (8.5%) were infants.

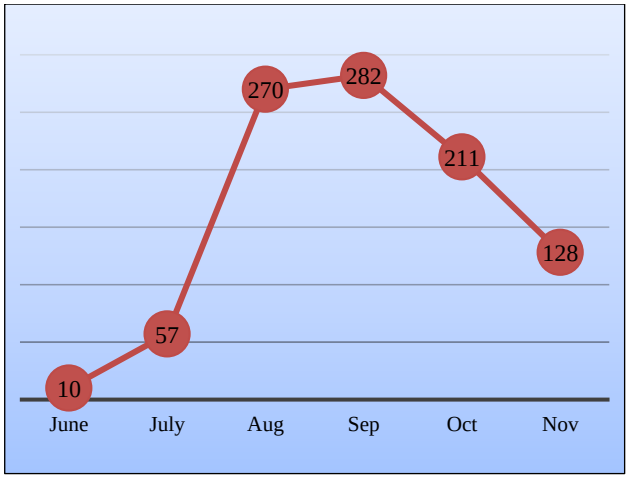

Figure 1: Number of admitted dengue cases from June 2016 to November 2016.

Distribution of dengue fever with respect to age and sex of children is shown in Table 1.

Table 1: Age and sex distribution of the dengue cases (n=958).

Age Group	Sex		Total (%)
	Male (%)	Female (%)	
Upto 1 year	53 (5.53)	28 (2.92)	81 (8.46)
>1-5 Year	186 (19.41)	157 (16.39)	343 (35.80)
>5-10 Year	223 (23.28)	162 (16.91)	385 (40.19)
>10-15 Year	103 (10.75)	46 (4.80)	149 (15.55)
Total	565 (58.97)	393 (41.02)	958 (100)

Clinical profile of the admitted patients showed that Dengue fever without warning sign was seen in 629 (65.6%) cases, while dengue with warning sign in 274 (28.6%) and severe dengue in 55 (5.7%) cases (Figure 2).

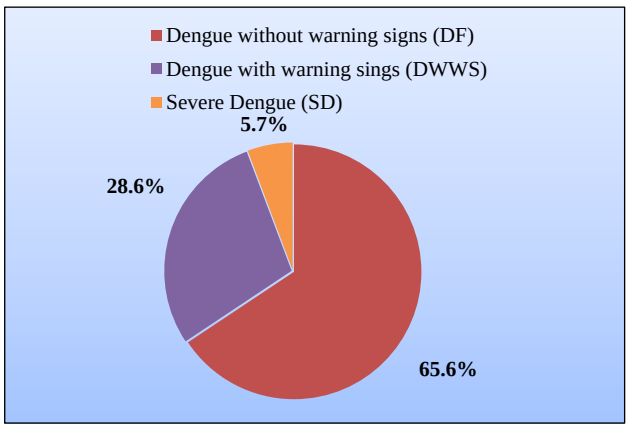

Figure 2: Distribution of the dengue cases according to severity.

The mean age of patient suffering from dengue fever without warning sign was 77.5±43.3 (mean±SD) months while for dengue fever with warning sign it was 67.9±42.9 months, and for severe dengue it was

45.3±39.4 months (Table 2). This showed occurrence of severe dengue more in lower age groups. As per our data out of 55 severe dengue cases 40 (72%) were less than 5 years age while only 28% were more than 5 years of age that was a significant association (p=0.000, df=2, chi square 23.03, α- 0.05) found between severity of dengue fever and the lower age group.

Table-2: Mean (SD) age of the patients according to severity of dengue.

Severity	N	Mean age in months	Std. deviation
DF	629	77.5	43.3
DWWS	274	67.9	42.9
SD	55	45.3	39.4

But no such statistically significant (p=0.287, df=2, chi square 2.496, α- 0.05) association was found between sex and the severity of dengue fever (Table 3).

Association between Clinico- epidemiological profiles of the patients with severity of dengue fever is shown in Table 3.

Out of 958 cases, 63 (6.6%) cases of dengue fever presented with atypical manifestations like febrile diarrhoea, respiratory tract infections (RTI), urinary tract infection (UTI), seizures, Haemophagocytic lymphohistiocytosis (HLH), hepatitis, and skin manifestations like impetigo, exfoliative dermatitis. Among them, seizure was the leading presentation, seen in 22 cases (2.29%), followed by febrile diarrhoea 11 cases (1.14%), urinary tract infection 8 (0.83%), respiratory tract infections 7 (0.73%), skin manifestations 6 (0.63%), HLH in 5 cases (0.52%) and hepatitis in 4 cases (0.42%) (Figure 3).

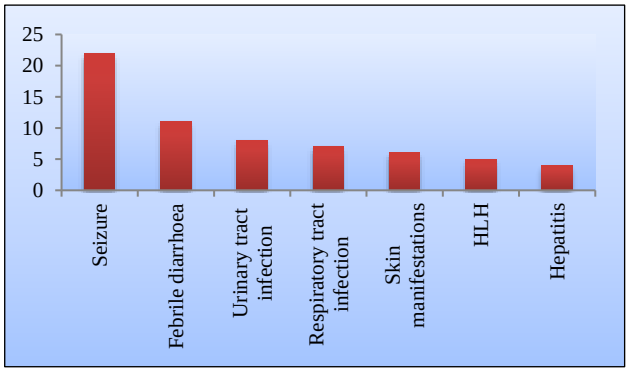

Figure 3: Distribution of a typical manifestation in dengue fever (n=63).

It was found that out of these 63 cases of atypical presentation, 28 (44.44%) cases had severe dengue, 30 (47.6%) cases had dengue with warning sign, while only 5 (8%) cases had dengue without warning sign. (Table 3)

The chi square test performed showed a significant association (p=0.000) between severity of dengue fever with the presence of atypical manifestations. (Table 3)

In present study six out of 958 children expired with a case fatality rate (CFR) of 0.6%. Among them 4 expired due to dengue shock syndrome (DSS), while one each died of severe dengue with HLH, and severe hemorrhage with refractory shock.

Table-3: Association between clinico-epidemiological profiles with severity among the dengue patients (n=958).

Variables	Severity of the dengue cases			Total (%)	p value
	DF	DWWS	SD		
Age group					
Upto 1 year	31	34	16	81 (8.46%)	0.000
>1-5 year	223	96	24	343 (35.80%)	
>5-10 year	262	111	12	385 (40.19%)	
>10-15 year	113	33	3	149 (15.55%)	
Sex					
Boys	374	154	37	565 (58.98%)	0.287
Girls	255	120	18	393 (41.02%)	
Atypical manifestations					
Present	5	30	28	63 (6.58%)	0.000
Absent	624	244	27	895 (93.42%)	

DISCUSSION

Dengue infection has become major public health problem in recent years. Last few decades has seen an increasing number of dengue patients due to overgrowing population, rapid urbanization and poor sanitation.[1] In the present study dengue fever outbreak occurred during monsoon and post monsoon season that is between August 2016 and November 2016 due to abundance of mosquito breeding in these seasons. September was the

peak month when maximum cases were admitted. A similar finding was observed in many studies done previously.[8-10] There was significant male preponderance found in present study with a M: F ratio of 1.4:1 which is in accordance with the study by Manjunath J. Kulkarni et al, Alok Kumar et al and Adarsh Eregowda et al.[10-12] The reason for this could be explained by gender bias in our country and also may be due to limited outdoor activity of females. In present study out of 958 cases majority of them (40%) were in the age group of 5-10 years followed by 1-5 years (35.8%). A similar distribution was found in other studies also.[10,13]

Authors classified our cases as dengue without warning sign, dengue with warning sign, and severe dengue according to the revised WHO 2009 classification criteria and found that out of 958 cases 629 cases (65.6%) were of dengue without warning sign, while 274 cases (28.6%) were of dengue with warning sign and 55 cases (5.7%) were of severe dengue.[2] Alok Kumar et al and Adarsh Eregowda et al found a similar distribution. While study done by Alfredo et al showed a higher incidence of severe dengue almost 26% in their studies unlike ours.[11,12,14]

In the present study out of 55 severe dengue cases majority (72%) of them were below 5 years and only 28% were above 5 years and that was a statistically significant association found between severity of dengue fever and the lower age group. This showed occurrence of severe dengue more in less than 5 years age groups. This finding was supported by the studies done by Alfredo J. Mena Lora et al, and Hammond SN et al.[14,15] Regarding sex distribution of severe dengue out of 55 cases there were 67.3% boys, and 32.7% girls which was similar to the finding of Alok et al but this was not statistically significant. Unlike ours Kabra et al and Vinod H Ratageri et al reported more severe disease among girls.[11,16,17]

Atypical presentations of dengue fever are rare and include encephalopathy, seizures, febrile diarrhoea, acalculous cholecystitis, hepatitis, myocarditis, severe gastrointestinal hemorrhage, and rhabdo¬myolysis.[17-19]. These atypical manifestations sometimes lead to diagnostic dilemma. In the present study Dengue with atypical manifestations were present in 63 (6.6%) patients. Among them seizure (2.29%) was most common followed by febrile diarrhoea, RTI, UTI, HLH, hepatitis and skin manifestations like impetigo and exfoliative dermatitis. Satya Sudhish et al in their study found hepatitis in 40.6% patients, febrile diarrhea in 12% and acalculous cholecystitis in 6.66% cases of dengue fever.[20] While Kumar AS et al found 30.84% hepatitis, 12.14% acalculous cholecystitis, and 2.80% encephalopathy cases.[18] Dengue with HLH is very rare. The present study showed 5 patients of dengue fever with HLH during this outbreak. Several studies have shown association of dengue with HLH.[21-23] Present study showed a statistically significant association (p=0.000) between the atypical presentation of dengue fever and the severity of the disease. Atypical manifestations make dengue patients more prone for developing complications, a similar finding was shown by kamath et al.[24] In the present study six out of 958 children expired with a CFR of 0.6%. DSS was the leading cause of death (66.7%), followed by severe dengue with secondary HLH (16.7%), and severe hemorrhage with refractory shock (16.7%), this was in accordance with WHO 2012 data and several studies done previously.[4,9,13]

Limitation of the present study is its being a retrospective record based and single centre based study. Therefore, it is necessary to conduct these studies in large populations and multi centers to understand the Clinico-epidemiological profile of dengue fever to diagnose, treat and to develop preventive strategies in future.

CONCLUSION

Dengue fever is a common preventable vector borne disease with predilection for monsoon and post monsoon season; hence preventive measures should be taken in full swing at the very onset of the monsoons. It is common in both sexes and can affect any age group. But lower age group especially infants are more prone for developing severe dengue with significant mortality. Dengue can present atypically with encephalopathy, hepatitis, HLH, UTI, RTI, etc. These atypical manifestations can modify the disease course and may delay the diagnosis, so clinicians in endemic areas should be aware of the varied clinical profile of dengue infection for appropriate and prompt management of this morbid and potentially fatal disease.

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