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A Study on Different Aspects of Severe Dengue Fever in Pediatric Age Group in A Tertiary Care Setting of Eastern India

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ABSTRACT

Objectives: *To assess the severity of dengue fever in the study population and determine different features of severity of pediatric dengue.* Design: *Hospital based, descriptive, observational study.* Setting: *Pediatric intensive care unit (PICU) of Burdwan Medical College.* Subjects: *All children in the age group of less than or equal to 12 years who visited the pediatric emergency with clinical features of 'Probable case' of Dengue (WHO Case definition of dengue), who were subsequently diagnosed as Dengue fever by serology (by NS-1 Ag and/or dengue specific IgM MAC ELISA).* Results: *During the study period, 71 patients with dengue fever were admitted. Nine patients (12.7%) among them had features of severe dengue. Haemorrhagic manifestation was the most common clinical feature of severity (15.5%).* Conclusion: *Such studies on the profile of severe dengue in pediatric patients are very rare from Eastern part of India*

KEYWORDS : Dengue fever, Severity, Children

Introduction

The word 'dengue' may have its origin in the Swahili phrase 'ka-dinga pepo', which means cramp like seizure caused by an evil spirit.[1] The first epidemic of an illness that has similarities with dengue fever, was reported from Philadelphia in the year 1780.[2] Benjamin Rush referred that disease as 'break-bone fever'.[2]

Dengue fever is a viral infection caused by Dengue virus of Faviviridae family[3] and transmitted by Aedes mosquitoes.[4] Dengue has recently emerged as the most important arboviral disease worldwide.[5] Dengue virus has four distinct serotypes and immunity following infection is type specific.[6] Around 50 million dengue infections occur annually.[7] Majority of dengue patients are from WHO South-east regions (1.3 billion).[8]

Manifestations of Dengue infection can range from mild febrile illness to fatal haemorrhagic disease.[9] However, studies on the profile of dengue severity in pediatric patients are few in number. So, the present study was conducted to explore the range of manifestations of severe dengue in children with dengue fever.

Material and Methods

This was a hospital based, descriptive, observational, cross sectional study. The study was conducted in the department of Pediatric Medicine of a tertiary care hospital in eastern India over a period of one year. (1st June, 2015—31st May, 2016) Written informed consent was taken from parents of the children included in the study.

All febrile children (1year to 12 years of age) of either sex, admitted in Pediatric ward during the specified time period with clinical features of 'Probable case' of Dengue (WHO Case definition of dengue) [8], who were subsequently diagnosed as Dengue fever by serology (by NS-1 Ag and/or dengue specific IgM MAC ELISA) and whose parents allowed their children to be a part of the study, were included in this study.

Purposive sampling was done for inclusion of subjects in the study. Seventy one (71) consecutive children with dengue infection were recruited in the study out of all fever cases admitted in the Pediatric Medicine ward. Patients with pre-existing neurological disease, associated established co-infection and co-infestation and any patient with pre-existing chronic illnesses that may lead to neurological involvement were excluded from the present study.

After initial thorough history taking and clinical examination, dengue patients underwent investigations depending on the type of involvement. Then, data were computed in the Microsoft excel sheet and subsequently statistical analysis was done.

Results

Seventy one children aged between 1 and 12 years were included in the study. Forty seven (47/71, 66.2%) of them were males. The median age of the study population was 8 (5-9) years. Majority of the study population (49/71, 69.01%) were from urban areas.

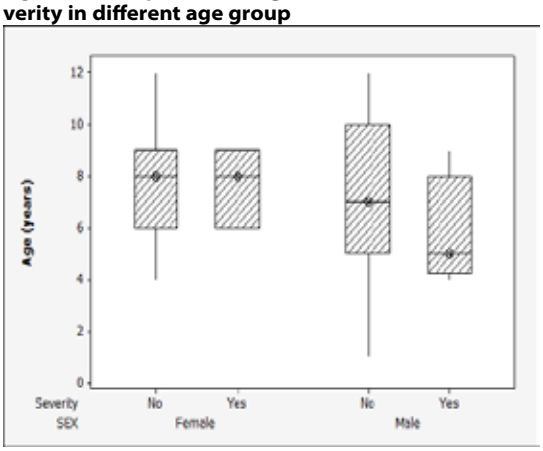
Table 1: Distribution of Patients According to Age Group (N=71)

AGE GROUP IN YEARS	NO. OF PATIENTS	PERCENTAGE
1-4	12	16.90
5-8	32	45.10
9-12	27	38.0
Total	71	100.0

Out of seventy one, sixty two patients (87.30%) had no feature of severity and nine patients (12.7%) had severe dengue.

In the age group of 1-4 years out of total 12 cases, one was severe; percentage of severity in this age group was 8.3. In the age group of 5-8 years out of total 32 cases, 5 cases were severe; percentage of severity in this age group was 15.6. In the age group of 9-12 years out of total 27 cases, 3 cases were severe; percentage of severe cases in this age group was 11.1. So, percentage of severity was most in 5-8 years age group. Out of total 46 male patients, 5 cases were severe; percentage of severity in the male was 10.6. Out of total 24 female patients, 4 cases were severe; percentage of severity in the female was 16.7. So, percentage of severe cases was more common in the female patients.

Figure 1: Box plot showing sex-wise distribution of severity in different age group



Haemorrhagic manifeatations were seen in 15.5% of children and happened to be the most common clinical feature of severity. Thrombocytopenia was the most common laboratory finding of severity and seen in 22.5% of total patients.

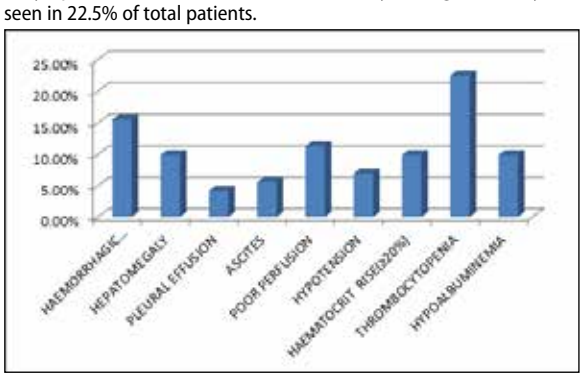


Figure 2: Bar diagram showing distribution of clinical & laboratory features responsible for severity of dengue

In the present study, four patients died and sixty seven patients recovered and ultimately discharged. So, percentage of mortality was 5.6% and percentage of recovery was 94.4%.

DISCUSSION

Dengue is endemic in more than 100 countries. WHO South-East Asia and Western Pacific regions are the most seriously affected. 2.5 billion people (two fifths of the world's population) are at risk.[8] Major disease outbreaks have occurred in India over last few years. In 1996, the first major outbreak of dengue fever was reported from Delhi where more than 10,000 cases and 400 deaths were reported.[10]

The dengue viruses are members of the genus Flavivirus and family Flaviviridae. There are four virus serotypes, which are designated as DENV-1, DENV-2, DENV-3 and DENV-4.[11] Aedes (Stegomyia) aegypti (Ae. aegypti) and Aedes (Stegomyia) albopictus (Ae. albopictus) are the two most important vectors of dengue.[12]

Both the innate immunity such as the complement system and NK cells as well as the adaptive immunity including humoral and cell mediated immunity are involved in the pathogenesis of severe dengue.[13,14] Enhancement of immune activation, particularly during a secondary infection, leads to exaggerated cytokine response resulting in changes in vascular permeability. In addition, viral products such as NS1 may play a role in regulating complement activation and vascular permeability.[15]

Dengue virus infection may be asymptomatic or may cause undifferentiated febrile illness (viral syndrome), dengue fever (DF), or dengue haemorrhagic fever (DHF) including dengue shock syndrome (DSS). Infection with one dengue serotype gives lifelong immunity to that particular serotype, but there is only short-term cross-protection for the other serotypes. The clinical manifestation depends on the virus strain and host factors such as age, immune status, etc.

Dengue haemorrhagic fever and dengue shock syndrome

Typical cases of DHF are characterized by high fever, haemorrhagic phenomena, hepatomegaly, and often circulatory disturbance and shock.[16] Moderate to marked thrombocytopenia with concurrent haemoconcentration (rising haematocrit) are constant and distinctive laboratory findings.

Expanded dengue syndrome (unusual or atypical manifestations)

Unusual manifestations are uncommon. In recent years with the geographical spread of dengue illness, there have been increasing reports of DF and DHF with unusual manifestations. These include: neurological, hepatic, renal and other isolated organ involvement.

The present study was done with seventy one children in the age group of one to twelve years who presented with fever and clinical features, suggestive of 'probable case' of dengue[8] (as mentioned in WHO guideline-2011) and were subsequently confirmed as dengue. Severity of dengue was assessed by clinical features and laboratory findings as per WHO guideline of dengue.[8]

In the present study male to female ratio was 1.96:1 and compared to Pancharoen, et al[17](1.11:1) the males affected were more in our study. But, in the study by Misra, et al[18] (3:1) males affected were even more.

Rural-Urban distribution:

In the present study most of the dengue cases (69%) were from the urban background.

In the present study percentage of severe dengue (DHF & DSS) was 12.67%. Among them DHF was 7.04% and DSS (DHFIII+DHFIV) was 5.63%.In the study by Kabra, et al[19], percentage of DHF was 33% and percentage of DSS was 47%. In the study by Verma R, et el[20], two patients were suffering from dengue shock syndrome, two patients had dengue haemorrhagic fever and the remaining patients had dengue fever.

In the present study haemorrhagic manifestations was the most common clinical severity feature and thrombocytopenia was the most common laboratory feature of severity.

Conclusion

The present study is about the profile of severe dengue in pediatric patients. To the best of our knowledge, such studies are very few in number from Eastern India. Limitation of the present study is its small sample size. Only hospitalised patients were included, which limits the extrapolation of the results to the general population. Therefore, further population based researches involving larger sample sizes are required to understand the natural picture.

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Conflict of Interest- Nil

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