Original Research Article

Various Factors in Pediatric to Severe Dengue Infection-A Retrospective Study

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Abstract: ***Introduction***: Dengue epidemics are known to have occurred over the last three centuries in tropical, subtropical and temperate areas of the world. The World Health Organization (WHO) estimated that approximately 2.5 billion people living in dengue-endemic countries. ***Objective***: To assess the various factors in pediatric to severe dengue infection-A Retrospective study. ***Methods***: A hospital-based Retrospective study was conducted at Emergency, Observation and Referral Unit, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh from January to June 2021. Number of patients included in the study was 52. In children with high degree clinical suspicion of Dengue infection NS 1 antigen (who came within first 48 hours of fever) and/or Dengue Antibody IgM, IgG (who came after five days of fever) were performed. ***Results***: The study was enrolled 102 patients of suspected dengue fever of whom 52 (50.98%) were serologically confirmed to have dengue infection. 29 (55.8%) patients were males and 23 (44.2%) were females. 38 (37.25%) patients had classic dengue fever while 12 (11.76%) fulfilled the criteria of dengue hemorrhagic fever. Of those patients with dengue hemorrhagic fever, 6 patients had developed dengue shock syndrome. Most of dengue cases occurred during the month of June to September depicts the role of rainy season on clustering of cases. Maximum number of cases 52 cases (68.49%) was in the children age groups. All cases and is the most common symptom followed by headache, myalgia, vomiting etc. Hemorrhagic manifestations were seen that included petechiae, ecchymosis, gum bleeding, hematuria, malena, hematemesis and epistaxis. Most common complications were hepatic dysfunction, renal failure, multi organ failure, encephalopathy and ARDS. ***Conclusion***: Dengue is one amongst the key causes of dedifferentiated fever. It presents as an extremely broad wellness and is hardly recognized as a clinical entity by primary health care physicians. This study support additional studies on applying intervention measures to boost the diagnostic accuracy and exactness at the first tending level in dandy fever endemic regions*.
Keywords: Various Factors, Pediatric, Severe Dengue Infection.

INTRODUCTION

Dengue epidemics are known to have occurred over the last three centuries in tropical, subtropical and temperate areas of the world [1].

The first epidemic of dengue was recorded in 1635[2] in the French West Indies, although a disease compatible with dengue had been reported in China as early as 1992 AD [3]. During the 18th,

19th and early 20th centuries, epidemics of dengue-like diseases were described globally in the tropics as well as in some temperate regions. The World Health Organization (WHO) estimated that approximately 2.5 billion people living in dengue-endemic countries [4]. The virus serotypes are closely related but antigenically distinct [5]. In the last 50 years, incidence has increased 30-fold with increasing geographic expansion to new countries [6]. Annually a 100 million cases of Dengue fever and half a million cases of Dengue hemorrhagic fever (DHF) occur in the world with a case fatality in Asian countries of 0.5%–3.5% [7]. Dengue is a severe public health problem in tropical countries, with attack rates among susceptible populations frequently ranging from 40 to 50%, or as high as 80—90% in some cases. Of the 500000 cases of DHF that require hospitalization every year, death rates between 2.5 and 5% are recorded, but they can be as high as 20% in very young children if the appropriate treatment is not administered rapidly [8]. Dengue infections can result in a wide spectrum of disease severity ranging from an influenza-like illness (dengue fever; DF) to the life- threatening dengue hemorrhagic fever (DHF)/dengue shock syndrome (DSS), which, if left untreated, are associated with mortality as high as 20% [8-14]. Early diagnosis is essential and clinical suspicion is based on the frequency of symptoms in the population. The first confirmed report of dengue infection in Bangladesh dates back to 1960s, and since then more and more new states have been reporting the disease which mostly strikes in epidemic proportions often inflicting heavy morbidity and mortality [15]. Several fatal forms of the disease i.e., DHF, DSS have been reported in Bangladesh from time to time in different parts of Bangladesh. During all these epidemics infection occurred in active childrens in the age group of 16–60 years [16, 17]. The common signs and symptoms observed were fever, headache, myalgia, arthralgia and bleeding manifestations have also been observed.

MATERIALS & METHODS

A hospital-based Retrospective study was conducted at Emergency, Observation and Referral Unit, Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh from January to June 2021. Number of patients included in the study was 52. In children with high degree clinical suspicion of Dengue infection NS 1 antigen (who came within first 48 hours of fever) and/or Dengue Antibody IgM, IgG (who came after five days of fever) were performed. Positive Dengue cases were taken written informed consent & interviewed on the risk factors of Dengue infection. Data related to patient's demography, risk factors, clinical presentation, pattern of Dengue infection and outcome were documented on the pre- structured questionnaire. Co-relation between the risk factors and mortality was also observed. All enrolled patients were treated according to the standard management protocol of national Dengue guideline (published in collaboration with WHO and Ministry of Health and Family welfare (MOHFW), Bangladesh).

Inclusion Criteria:
a) Dengue patients admitted in medical and adolescent wards of Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh.
b) Patients of all age groups, showing a temperature of >38.5oC for >24 hours, and clinically diagnosed as having dengue fever.

Exclusion Criteria:
a) Dengue cases with definite source of infection (e.g. respiratory or urinary tract infection, meningitis).
b) History of bleeding tendency since birth.
c) Immuno compromised patients.

The diagnosis of dengue fever, dengue hemorrhagic fever and dengue shock syndrome was based on the WHO (World Health Organization) criteria. Only those patients were included in the study with classical features of dengue – fever with chills, body ache, headache, rash, bleeding manifestations and thrombocytopenia and had a positive ELISA test. Patients who had malaria and enteric fever were excluded from the study. Detailed history and clinical examinations were done. Hematological profiles and biochemical investigations were done at the time of admission and were followed by daily (or bi-daily) investigations as required until discharge. Signs of plasma leakage were assessed by chest radiograph and abdominal ultrasonography. Specific investigations were performed in patients who presented with neurological involvement (cerebrospinal fluid analysis, neuroimaging, electro diagnostic studies or muscle biopsy) or hepatic failure (viral markers, peripheral smear and serology for plasmodium falciparum, typhoid fever and leptospirosis). Statistical analysis was performed by Chi -Square test done by using the Statistical Package "SPPS" for Social Sciences, with $p < 0.05$ taken as statistically significant.

RESULTS

The study was enrolled 102 patients of suspected dengue fever of whom 52 (50.98%) were serologically confirmed to have dengue infection. The age of the children range from 1 year to 18 years with a mean age of 6.66±3.69 years. The age distributions of the patients are shown in [Table-1].

29 (55.8%) patients were males and 23 (44.2%) were females. 38 (37.25%) patients had classic dengue fever while 12 (11.76%) fulfilled the criteria of dengue hemorrhagic fever. Of those patients with dengue hemorrhagic fever, 6 patients had developed dengue shock syndrome. Most of dengue cases occurred during the month of June to September depicts the role of rainy season on clustering of cases. Maximum number of cases 52 cases (68.49%) was in the children age groups as seen in Table 1. As seen in Table 2 fever was present in all cases and is the most common symptom followed by headache, myalgia, vomiting etc. Hemorrhagic manifestations were seen that included petechiae, ecchymosis, gum bleeding, hematuria, malena, hematemesis and epistaxis. Most common complicationswere hepatic dysfunction, renal failure, multi organ failure, encephalopathy and ARDS.

Table 1: Age distribution of patients with Dengue fever (n=52)

Age	Male	Female	Total
(Years)	n=32 (61.5)	n=20(38.5)	52(100.0)
1-5 Yrs.	12(23.1)	07(13.5)	19(36.5)
5-10 Yrs.	12(23.1)	08(15.4)	20(38.5)
10-15 Yrs.	08(15.4)	05(9.6)	13(25.0)
Total	**32(61.5)**	**20(38.5)**	**52(100.0)**
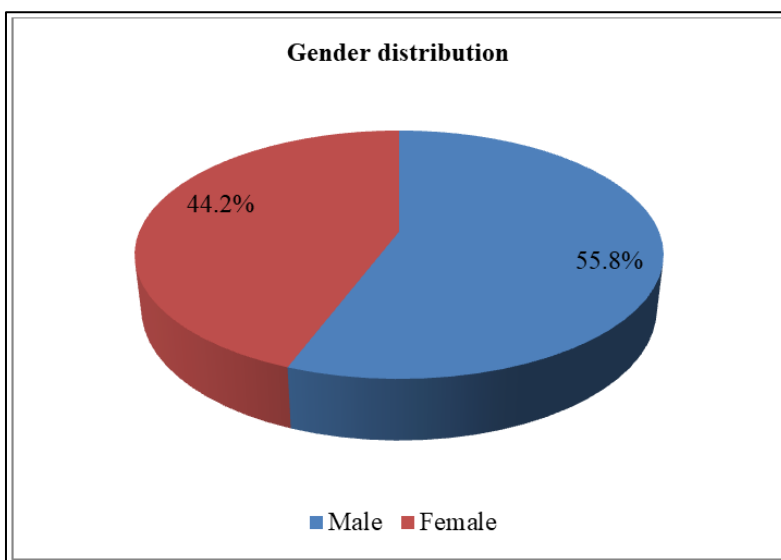
Figure 1: Sex distribution of Patients.
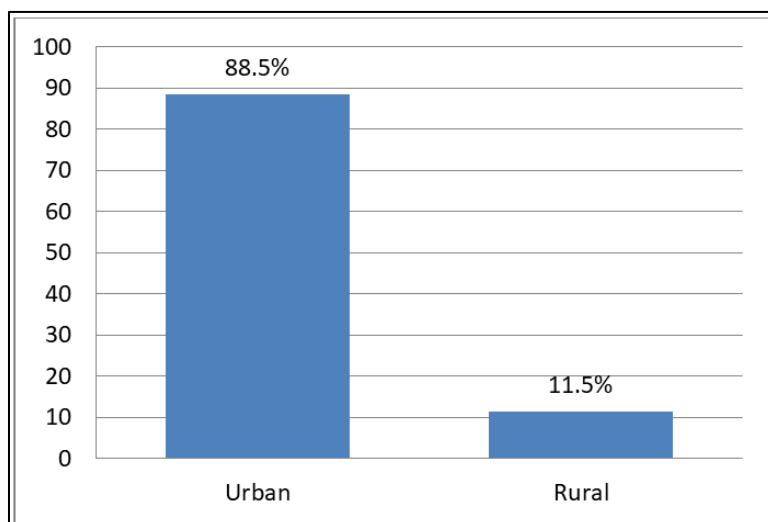
Figure 2: Geographical distribution of the urban and rural patient.

Among the study patients 46 (88.5%) from urban and 6 (11.5%) rural area [Figure-2].

Table 2: Symptoms and complications of dengue fever (n=52)

Symptoms	Patients (N=52)
Fever	38(73.1)
Headache	27(51.9)
Myalgia	19(36.5)
Vomiting	21(40.4)
Breathlessness	15(28.8)
Abdomen pain	13(25.0)
Bleeding tendency	11(21.2)
Skin rash	7(13.5)
Complications	
Hepatic dysfunction	24(46.2)
Renal failure	19(36.5)
Encephalopathy	8(15.4)
Multi organ failure	5(9.6)
ARDS	2(3.8)

Table 3: Distribution of the serologically dengue positive patients (n=52)

	Number	Percentage
Total serology positive	40	76.9
Total serology negative	12	23.1
Serological test	Positive	Percentage
NS1 Ag	19	47.5
IgM	13	32.5
Both IgM and IgG	8	20.0

Among 52 suspected dengue cases 40 (76.9%) cases were serologically dengue positive. Therefore, 12 (23.1%) serologically dengue negative cases were excluded from the study. Among the 39 serologically dengue positive patients 19 (47.5 %) were NS1 antigen positive, 13 (32.5%) IgM antibodies and 8(20.0%) both IgM and IgG antibodies positive. The distribution of the serologically dengue positive patients out of 52 clinically suspected cases were shown in [Table- 3]. Deranged liver operate in dandy fever infection is a results of the direct impact of the virus on liver cells or the unregulated host response against the virus. Headache was conjointly seen less often compared to different studies. This has conjointly been documented in our study.

DISCUSSION

Dengue is a very important emerging disease of the tropical and sub-tropical regions. The identification is by clinical features but they can present with varied manifestation [13, 14]. This study describes the clinical profile, laboratory features and outcome of DF/DHF/DSS in children patients. The male to female ratio in this study was 1.6:1 respectively. The study revealed that majority of the cases was in the younger age group 52 cases (50.98%). The clinical profile of dengue revealed that fever was the most common presenting symptom (100%). Similar studies in past have also substantiated fever as being the most common presenting symptom [5,8,13]. Abdominal pain and vomiting were due to the liver injury caused by the dengue virus. Other infections that cause fever and gastrointestinal symptoms such as typhoid, leptospirosis, and enteroviral infections are common in Bangladesh and may often lead to a delay in the diagnosis of dengue. Complications observed in present study were hepatic dysfunction, renal failure, encephalopathy, multi organ failure, and ARDS. Deranged liver operate in dandy fever infection is a results of the direct impact of the virus on liver cells or the unregulated host response against the virus. Fulminant hepatic failure occurs because of acute severe hepatitis and massive necrosis of the liver, causing hepatic encephalopathy and even death [15]. An exclusive study on dengue shock syndrome conducted in Mumbai in 2003 reported hepatomegaly (97.4%), altered sensorium (58%), diarrhoea (50%), rash (42%), and cough (38%) in a significant number of cases Headache was conjointly seen less often compared to different studies [16]. This has conjointly been documented in our study. Most of the patients presented with dengue fever while dengue hemorrhagic fever and dengue shock syndrome were a minority group. Similar findings have also been reported from othes study. Hemorrhagic manifestations included petechiae, ecchymosis, gum bleeding, hematuria, malena, hematemesis and epistaxis. Early clinical features of dengue infection are variable among patients, and initial symptoms are often non-specific; therefore, specific laboratory tests are necessary for an accurate diagnosis [2, 16]. According to the US Centers for Disease Control and Prevention (CDC) and the WHO (World Health Organization) dengue guidelines [2], the clinical features of DF and DHF are sudden onset of fever, severe headache, myalgias and arthralgias, leucopoenia, thrombocytopenia, and hemorrhagic manifestations. It occasionally produces shock and haemorrhage, leading to death. Classic DF symptoms include fever, headache, retro-orbital pain, myalgias and arthralgias nausea, vomiting, and often a rash. Some DF patients develop the more serious form of the disease DHF with symptoms that include a decline in fever and presentation of hemorrhagic manifestations, such as microscopic hematuria, bleeding gums, epistaxis, hematemesis, melina, and ecchymosis. DHF patients develop thrombocytopenia and hemoconcentration; the latter is due to an increase in the concentration of blood cells resulting from the leakage of plasma from the bloodstream. These patients may progress

into DSS, which can lead to profound shock and death if not treated. Due to an increase in the alertness among medical fraternity following the initial epidemic and the availability of diagnostic tools in the hospital have contributed to the increased detection of cases [17]. A gradual increase in cases was noticed during rainy season. Pre-monsoon increase in the number of cases was noted in the months of March and April due to the stagnation of water, after a few bouts of pre-monsoon rainfall which facilitate vector breeding. These findings highlight that preventive measures against dengue infection should be taken during water stagnation periods after the initial bouts of rainfall and at the end of monsoon. In this study, DENV1 and DENV3 infections were observed but not DENV4 in 2016 and 2017 [6]. In addition, DENV1 and DENV3 coinfections were detected in 18.5% cases in the year 2012, with higher tendency for hemorrhagic manifestations [13,17]. Previous studies have shown that DENV2 and DENV3 serotypes were associated with haemorrhagic manifestations whereas Chandrakantaet. Concurrent infections may present the possibility of recombination between viruses leading to the emergence of more virulent strains, underscoring the need for continued surveillance and serotyping.

CONCLUSION

Dengue is one amongst the key causes of dedifferentiated fever. It presents as an extremely broad wellness and is hardly recognized as a clinical entity by primary health care physicians. This study support additional studies on applying intervention measures to boost the diagnostic accuracy and exactness at the first tending level in dandy fever endemic regions. Dengue fever infection will have probably fatal consequences, and up to now, vector management strategies to forestall unfold of the virus are unsuccessful. Though there are promising immunizing agent candidates in development, additional studies are needed for a larger understanding of the body substance immune responses to dengue fever break bone fever infectious wellness infection and disease pathological process.

REFERENCES

1. TuiskunenBäck, A., & Lundkvist, Å. (2013). Dengue viruses–an overview. *Infection ecology & epidemiology*, 3(1), 19839.
2. TuiskunenBäck, A., & Lundkvist, Å. (2013). Dengue viruses–an overview. *Infection ecology & epidemiology*, 3(1), 19839.
3. Welsch, S., Miller, S., Romero-Brey, I., Merz, A., Bleck, C. K., Walther, P., & Bartenschlager, R. (2009). Composition and three-dimensional architecture of the dengue virus replication and assembly sites. *Cell host & microbe*, 5(4), 365-375.
4. WHO. Dengue and severe dengue. 2019. Available: https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue/
5. Gothwal, S. K., & Saini, A. (2016). Clinical profile of dengue fever infection in patients admitted in tertiary care centre Agroha, Hisar, Haryana, India. *International Journal of Research in Medical Sciences*, 4(6), 2146-2149.
6. Srinivasa, K., Ajay, J., & Manjunath, G. A. (2017). Clinical profile and outcome of dengue among hospitalized children-a single centre prospective study. *J Pediatr Res*, 4(02), 145-150.
7. Rao, M., Aparna, A., & Jyothi, R. C. (2016). Clinical profile and outcome of dengue infections in children. *IOSR*, 15(2), 07-13.
8. Halstead, S. B. (2000). Global Perspectives on Dengue Research.
9. Alam, A. S., Sadat, S. A., Swapan, Z., Ahmed, A. U., Karim, M. N., Paul, H. K., & Zaman, S. (2009). Clinical profile of dengue fever in children. *Bangladesh Journal of Child Health*, 33(2), 55-58.
10. WHO (2009) Dengue Guidelines for Diagnosis, Treatment, Prevention and Control WHO (2009)http://whqlibdoc.who.int/publications/2009/9789241547871 _eng.pdf.
11. Tyagi, B. K., Hiriyan, J., Samuel, P., Tewari, S. C., & Paramasivan, R. (2006). Dengue in Kerala: A critical review. *ICMR Bull*, 36(4-5), 13-22.
12. Konar, N. R., Mandal, A. K., & Saha, A. K. (1966). Hemorrhagic fever in Kolkata. *J Assoc Physicians India*, 14, 331–40.
13. Abdul Kader, M. S., Kandaswamy, P., & Appavoo, N. C. (1997). Anuradha Outbreak and control of dengue in a village of Dharmapuri, Tamil Nadu. *J Commun Dis*, 29, 69–72.
14. Narayanan, M., Aravind, M. A., Thilothammal, N., Prema, R., Sargunam, C. R., & Ramamurty, N. (2002). Dengue fever epidemic in Chennai-a study of clinical profile and outcome. *Indian pediatrics*, 39(11), 1027-1033.
15. Aggarwal, A., Chandra, J., Aneja, S., Patwari, A. K., & Dutta, A. K. (1998). An epidemic of dengue hemorrhagic fever and dengu shock syndrome in children in Delhi. *Indian pediatrics*, 35, 727-732.
16. Balaya, S., Paul, S. D., D'lima, L. V., & Pavri, K. M. (1969). Investigations on an outbreak of dengue in Delhi in 1967. *Indian journal of medical research*, 57(4), 767-74.
17. Yacoub, S., & Wills, B. (2014). Predicting outcome from dengue. *BMC Medicine,* 12, 147-57.