Pattern of Presentation and Outcome in Dengue Fever in Hospitalized Children in A Hospital in Dhaka

Rifat Taher Anne[1*] Shafatujjahan[2] Ferdousi Hasnat[3]
Mohammad Mahmudur Rahman Chowdhury[4]

ABSTRACT

Background : *A large number of people are becoming infected with dengue fever, which is a mosquito borne viral disease. It is mostly self-limiting, but complications can result with significant morbidity and mortality. In recent years, there has been a significant increase in the number of cases, with the majority of the population being children. There is scarcity of data regarding dengue in children in our country. Hence, to evaluate, the clinical and laboratory profile of Dengue Fever (DF) among the children and their outcome was aim of this research work.*

Materials and methods: *This is a retrospective observational study, performed among the serologically confirmed dengue virus infected 200 children, admitted in Department of Paediatrics, Kurmitola General Hospital (KGH) Dhaka from April 2019 to December 2021. Clinical and laboratory indicators were documented daily in the study cases, and the data were analyzed by SPSS version 25.*

Result: *Out of the 200 cases, 100 patients (50 percent) had classical DF, 61 patients (30.5 percent) had Dengue Hemorrhagic Fever (DHF) while 39 patients (19.5 percent) had Dengue Shock Syndrome(DSS). Mean age of patients were 5.8±3.6 years, male predominance. Most patients belong to urban area and middle socioeconomic background. Gastrointestinal symptoms were more prevalent in DHF patients. Most of the patients had thrombocytopenia and raised hematocrit. Thrombocytopenia, an elevated Hematocrit (hct) an elevated hypertransaminesemia were all found to be statistically significant in DHF. 85% patients were treated with crystalloid and 14% with colloid, found excellent outcome with no death.*

Conclusion: *Dengue fever is a major health problem, with a wide range of symptoms, from mild and self-limiting to severe and fatal. Unrecognized manifestations include a wide range of symptoms spanning multiple organ systems. Doctors should be on the lookout for atypical signs and symptoms.*

Key words: Clinical profile; Dengue fever; Dengue hemorrhagic fever; Dengue shock syndrome; Laboratory profile; Warning sign.

Introduction

Dengue fever is the most prevalent virus transmitted by arthropods and is a significant public health hazard in subtropical and tropical climates. Humans get infected by the virus by the bite of infected female mosquitoes of the species Aedes. Dengue fever is believed to be re-emerging globally as a result of a failure to control

Aides species, uncontrolled urbanization, growing populations, global warming, and increased airplane travel.[1] Dengue fever is a deadly mosquito-borne viral disease that has become a major global health problem in recent years. About 400 million dengue infections occur each year in tropical and subtropical nations, an increase of 30 times in just 50 years.[2,3] About 52.0 percent of the world's population is at danger of contracting dengue fever in 10 nations of the South-East Asia region.[4] Dengue fever initially appeared in Bangladesh in Dhaka city in the year 2000, killing 93 people and infecting 5551 others with the Case-Fatality Rate (CFR) of 1.7%. Since then, the country's major cities have seen an annual influx of cases of dengue fever.[5] The total number of recorded dengue cases in 2019 was 101,354 and the death rate was 0.16 per cent.[6] According to New Age, Bangladesh, DGHS reported, 28,429 were hospitalized throughout the country and 105 people died of dengue this year upto 31st December, 2021.[7] Children and adults in South-East Asia are increasingly being hospitalized or even killed by Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF) over the past 15 years.

1. Junior Consultant of Paediatrics
    Kurmitola General Hospital, Dhaka.

2. Associate Professor of Medical Onchology and Radiotherapy
    Chattogram Maa-O-Shishu Hospital Medical College, Chattagram.

3. Assistant Professor of Paediatrics
    Kurmitola General Hospital, Dhaka.

4. Assistant Professor of Medicine
    Chittagong Medical College, Chattagram.

*Correspondence : **Dr. Rifat Taher Anne**
                Cell : +88 01715 63 92 64
                Email : rifat.taher@gmail.com

Date of Submission   :   23rd May 2021
Date of Acceptance   :   25th June 2021

According to the World Health Organization (WHO) there are three distinct types of dengue infections: classical Dengue Fever (DF) Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). DHF and DSS, the two most dangerous forms of dengue fever, are often referred to as "severe dengue."[3] Dengue infections can be caused by any of the four DENV serotypes (DEN1-DEN4). Adolescents and older children are more likely to develop classic dengue fever. Typical symptoms are high grade fever, severe headache, myalgia and arthralgia, nausea, vomiting and a rash. More than half infected patients have a typically macular or maculopapular rash, but that can be confluent and leave small patches of normal skin. Sore throat and cough are just few of the other symptoms that may be present normally. Symptoms can range from slight fever to a life-threatening hemorrhagic fever, shock, and other unusual presentations. More severe symptoms appear after reinfection with a separate DENV serotype.[8,9] Children's hemodynamic systems have a limited ability to correct for capillary leakage, which puts them at greater risk of developing a severe illness like dengue shock syndrome.[3,10] Despite of children are the most susceptible group for dengue, there is a lack of evidence on the prevalence of dengue fever among children in South Asia. There is scarcity of data of dengue infection in children in our country. Aim of study was the clinical and biochemical profiles and hospital outcomes of paediatric patients, hospitalized in Kurmitola general hospital. All the patients had fever with vomiting (65.5%), abdominal pain (55%) and skin rash (40.5%), pleural effusion (24.5%) and ascites (20%). And 14.5% presented with shock.

Materials and methods

This retrospective observational study was performed among the serologically confirmed dengue virus infected children admitted in Department of Paediatrics, Kurmitola General Hospital (KGH) Dhaka from April, 2019 to December 2021. Two hundred children hospitalized in the pediatric unit during this time period with either Dengue NS1 or anti-dengue IgM confirmed cases of dengue were included in this study. Clinical and laboratory indicators were monitored daily in the study cases and the data were entered onto a pre-created data sheet developed by the researchers. Dengue Fever (DF) Dengue Haemorrhagic fever (DHF I, II) and Dengue Shock Syndrome (DSS/DHF III, IV) were diagnosed in accordance with WHO guidelines in the patients. Dengue syndrome patients in Bangladesh were given oral paracetamol, oral or intravenous fluids and blood transfusions in accordance with the Government of People's Republic of Bangladesh's National Guideline for Clinical

Management of Dengue Syndrome, 4th edition.[11] Intravenous fluids were reduced and oral fluids were promoted when the patients' condition improved. Once a patient's condition had stabilized, they were released.The data were analyzed using descriptive statistics. Quantitative data was presented as a mean + SD. Chi-square or Fisher's exact tests were used to compare the frequency of various signs, symptoms, and laboratory parameters with disease severity. A p-value of less than 0.05 was considered significant in this study, which made use of SPSS version 25.0.0 for data entry and analysis.

Results

There were 200 people in our study (n=200), with the youngest being 2 months old and the oldest being 15 years old and a mean age was of 5.8±3.6 years. In this study, 122 (61%) of the participants were males, and 78 (39%) were females with a male-to-female ratio of 1.5 to 1. Most of the patients 151 (75.5%) came from urban and 49 (24.5%) from rural areas. Table I shows that the majority of the 148 respondents (74%) belonged to middle-class family. Of the 200 cases, 100 patients (50 percent) had classical DF, 61 patients (30.5 percent) had DHF, while 39 patients (19.5 percent) had DSS. Dengue fever severity was not correlated with socioeconomic status or the location of the study participant's residence.

Table I Demography features of patients (n=200)

Parameter	Total No(%)
Age (Mean±SD) Years	5.8±3.6
Sex	
Male, n (%)	122(61.0%)
Female, n (%)	78(39.0%)
Residency	
Urban	151(75.5%)
Rural	49(24.5%)
Socioeconomic condition	
Low	20(10%)
Middle	148(74%)
High	32(16%)

Fever was the most frequently reported symptom, with a prevalence of 100%, followed by vomiting (65.5%), abdominal pain (55%) and skin rash (40.5%) as well as pleural effusion (24.5%) and ascites (20%). 14.5 percent of patients were in shock when they arrived. 13.5% of people reported body pains, and 10% reported headaches. In 9.5 percent of the cases, there was bleeding. The second table is shown here (Table II).

Table II Clinical profile of dengue patients (n=200)

Clinical Features	Number
Fever or H/O fever	200(100%)
Vomiting	131(65.5%)
Abdominal pain	110(55%)
Rash	81(40.5%))
Pleural effusion	49(24.5%)
Ascites	40(20%)
Cough	32(16%)
Shock	29(14.5%)
Body ache	27(13.5%)
Headache	20(10%)
Bleeding	19(9.5%)

Table III shows the comparison of clinical and lab parameters of DF, DHF and DSS. Gastrointestinal symptoms such as vomiting, abdominal pain and gastrointestinal bleeding were found to be more prevalent in patients with DHF, with a statistically significant p value. Thrombocytopenia, an elevated Hct, an elevated hypertransaminesemia were all found to be statistically significant in DHF.

Table III Comparison of clinical and lab parameters of DF, DHF and DSS

	Total (n=200)	DF (n=100)	DHF (n=61)	DSS (n=39)	p value
Vomiting	131(65.5%)	60(60%)	55(90.16%)	16(41.03%)	0.008
Abdominal pain	110(55%)	55(55%)	35(57.38%)	20(51.28%)	0.0403
Rash	81(40.5%)	37(37%)	29(47.54%)	15(38.46%)	0.344
Bodyache	27(13.5%)	16(16%)	10(16.39%)	1(2.56%)	0.0214
Headache	20(10%)	10(10%)	8(13.11%)	2(5.13%)	0.3151
Bleeding	19(9.5%)	0(0%)	16(26.23%)	3(7.7%)	0.000088
Shock	29(14.5%)	0(0%)	0(0%)	29(74.36%)	0.00
Leukopenia	90(45%)	5(5%)	50(81.97%)	35(89.74%)	0.000000001
Thrombocytopenia	160(80%)	75(75%)	55(90.16%)	30(76.92%)	0.074
Raised Hct	159(79.50%)	75(75%)	55(90.16%)	29(74.36%)	0.058
Hypertransaminasemia	80(40%)	10(10%)	40(65.57%)	30(76.92%)	0.0000061

Severe abdominal pain (40%), Persistent vomiting (35.5%), fluid accumulation (Pleural effusion 24.5% and ascites 20%) were the three most prevalent warning signs, followed by bleeding, lethargy, and a hematocrit rise of more than 20% in Table IV.

Table IV Warning signs of patients (n=200)

	Number	%
Severe Abdominal pain or tenderness	80	40
Persistent vomiting	71	35.5
Pleural effusion	49	24.5
Ascites	40	20
Bleeding	19	9.5
Lethargy, restlessness	28	14
Increases in hematocrit >20%	26	13
Less urine output for 4-6 hrs	10	5
Rapid decrease in platelet count	5	2.5
Liver enlargement >2 cm	3	1.5

Leucopenia and thrombocytopenia were found in 45% and 80% of cases, respectively, in the lab parameters (Table V). The majority of patients (79.5 percent) had an elevated haematocrit. Hypertransaminesemia was found in 40% of the patients, and an altered coagulation profile was found in 31%.

Table V Lab parameters of Dengue patients (n=200)

	Number	%
Leukopenia (<4,000/cmm)	90	45
Thrombocytopenia (<1,50,000/cmm)	160	80
Raised Hct	159	79.5
Hypertransaminesemia	80	40
Abnormal PT/APTT	62	31

In majority of patients Dengue NS1 172 (86%) followed by IgM antibody 14 (7%), were found to be positive. An intravenous fluid infusion was required for all patients except two with dengue fever. In 170 cases, crystalloid was administered (85 percent), while colloid was administered in 28 cases (14 percent). All of the cases were recovered and discharged successfully.

Table VI Diagnosis, treatment modality and outcome of the study participants

Parameter	Number (%)
Diagnostic test	
NS1	172 (86%)
IgM	14 (7%)
IgG	10 (5%)
Fluid management	
Crystalloid	170 (85%)
Colloid	28 (14%)
Inotropes	6(3%)
Outcome	
Recovery	200 (100%)
Death	00 (0%)

Discussion
Dengue fever is the mostcommon tropical arboviral infection, transmitted by mosquitoes .It is one of the major health crises in South Asian countries with high mortality and morbidity rate due to large number of outbreaks[11,12]. In this investigation, clinical and biochemical profiles, hospital outcomes were studied.

In this study, out of the 200 participants, 50 percent had DF, 30.5 percent had DHF and 19.5 percent had DSS. In a recently published article conducted on children in Bangladesh, by Shultana et al showed that 74.15% had DF, 6.74% DHF and 19.10% had DSS.[13] In another recent study by Khan et al found that 63.9% had DF, 18.7 % DHF and 17.4% had DSS which was similar to our findings.[14] Patients in this study ranged in age from

2 months to 15 years, with a mean age of 5.8±3.6 years. Khan et al. and Islam et al found the same findings.[15] Islam et al reported the mean age to be 6.5±3.5 years with age range of 6 months to 15 years.[15] Boys outnumber girls by a ratio of 1.5:1, which is comparable with other studies and may be due to the fact that boys spend more time outside playing than girls do, as well as the fact that boys traditionally wear full slipcloths and spend more time outside than girls do.[16,17] Urban children are still more likely to contract dengue than rural children, which is identical with the research by Mazumder et al.[16]

According to the findings of this study, all of the children examined had fever or a history of fever. Additionally, patients were more likely to exhibit symptoms such as vomiting (65.5 %) and abdominal pain (55%). It matches with the studies of Islam et al in our country and Mishra et al and Agarwal et al in India, who found that abdominal pain and vomiting were the most common symptoms apart from fever.[15,18,19] In this study the most common finding of plasma leakage were pleural effusion (24.5%) and ascites (20%).

These two were the most common ultrasonographic fin dings of plasma leakage in DHF, according to Srikiatk-hachorn et al and Islam et al.[20,15] Twenty-one percent of the children had rashes. It was found that typical symptoms such as body aches (13.5 percent) and headaches (10 percent) were less common in our study, which was in line with findings made by Shultana et al in Dhaka city.[13] In the present study, 14.5% presented with shock and 9.5% patients had hemorrhagic manifestations (Hematemesis 5.5% and Malena 4%) in DHF. Khan et al found that haematemesis and melena were the most common haemorrhagic manifestations in children and they reported 12.2% had shock in their study.[14] Regarding the warning signs, severe abdominal pain, persistent vomiting, clinical accumulation of fluid were the most prevalent warning signs followed by bleeding, lethargy and raised hematocrit by >20%. A study by Adam et al,found the same result.[21]

Leukopenia and thrombocytopenia were found respectively 45% and 80% cases in this study and raised hematocrit in 159(79.5%) cases, which is parallel with the findings of Mazumder et al and Khan et al.[16,14] In DHF, thrombocytopenia and elevated Hct levels were much more common. This study found that DHF patients had significantly higher levels liver transaminases. This finding matches with Mazumder et al.[16] The present study also found a correlation between DHF and a prolonged PT and APTT. Similar findings are shown by Khan et al.[14]

Regarding management, we followed the National Guideline for Clinical Management of Dengue Syndrome 4th Edition 2018 Revised.[22] Most of the patients required intravenous fluid, 85% treated with Normal saline, when 14% got colloid and 3% required inotropes. Case fatality rate (CFR) of more than 1% was reported in India, Bhutan, and Nepal, where early diagnosis and upgraded management skills may have contributed to the absence of mortality in the current study group.[23]

Conclusion

In this region of the world, dengue fever is a common infectious disease, with a wide range of symptoms and complications, but raising awareness, timely diagnosis and prompt treatment can significantly reduce the risk of serious morbidity and mortality. The epidemiological data, investigations, and treatment outlined in the most recent WHO guidelines were all included in this study.This research will add to our understanding of the disease and help us get a better result.

Recommendation

There must be constant monitoring of the evolving disease pattern. Efforts should be made to prevent the disease at the policy and management levels.

Limitations

Few patients were enrolled in the study due to time and money constraints. For the same reasons, it was not possible to perform serotyping on the dengue virus.

Disclosure

All the authors declared no competing interest.

References

1. Identification of Dengue Virus in Respiratory Specimens from a Patient Who Had Recently Traveled from a Region Where Dengue Virus Infection Is Endemic. J ClinMicrobiol. 2007; 45(5): 1523-27.

2. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, Drake JM, Brownstein JS, Hoen AG, Sankoh O, Myers MF, George DB, Jaenisch T, Wint GR, Simmons CP, Scott TW, Farrar JJ, Hay SI. The global distribution and burden of dengue. Nature. 2013; 496: 504–507.

3. World Health Organization. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control - New Edition. Geneva: World Health Organization. 2009.

4. WHO. Comprehensive guidelines for prevention and control of dengue and dengue haemorrhagic fever. Geneva: World Health Organization. 2011.

5. Sharmin S, Viennet E, Glass K, Harley D, The emergence of dengue in Bangladesh: epidemiology, challenges and future disease risk. Trans R Soc Trop Med Hyg. 2015; 109: 619–627.

6. Annual report on confirmed and suspected cases in Bangladesh, 2019. DGHS. Ministry of Health and Family Welfare. Bangladesh.

7. TanzilRahaman.Second highest dengue deaths logged in 2021. New Age, Bangladesh. 31st December.2021.

8. Morales I, Salje H, Saha S, Gurley ES. Seasonal distribution and climatic correlates of dengue disease in Dhaka, Bangladesh. The American journal of tropical medicine and hygiene. 2016; 94(6): 1359-1361.

9. Burke DS, Nisalak A, Johnson DE, Scott RM. A prospective study of dengue infections in Bangkok. Am J Trop Med Hyg. 1988; 38: 172-180.
https://www.newagebd.net/article/158732/second-highest-dengue-deaths-logged-in-2021.

10. Elling R, Henneke P, Hatz C, Hufnagel M. Dengue fever in children: where are we now ? The Pediatric infectious disease journal. 2013; 32(9): 1020-102.

11. National Guideline for Clinical Management of Dengue Syndrome. 4th Edition 2018. DGHS, Mohakhali, Dhaka.

https://dghs.gov.bd/index.php/en/publications/guideline.

12. Sharma NL, Balasubramanyam V, Kandati J, Ponugoti M. Clinical and laboratory profile of dengue fever in children during an outbreak-one year study at tertiary care hospital, Chennai, Tamilnadu, India. Int J ContempPediatr. 2016; 4(1): 110-115.

13. Shultana K, Rahman AZM, Baki AA, Khan MSI, Deb B, Chowdhury D et al. Dengue Infection in Children: Clinical Profile and Outcome in Dhaka City. American Journal of Pediatrics. 2019;5(3):111-115.

14. Khan S, Baki MA, Ahmed T, Mollah MAH. Clinical and laboratory profile of dengue fever in hospitalized children in a tertiary care hospital in Bangladesh. Birdem Medical Journal. 2020; 10 (3): 200-203.

15. Islam MA, Ahmed J, Rouf MA. Clinical Profile of Dengue Fever in Children: A study in dhakashishu(children) hospital, Dhaka, Bangladesh. Journal of Dental and Medical Sciences (IOSR-JDMS),2019;18(1):40-44.

16. Mazumder W, Hassan MN, Islam MR. GASTROINTESTINAL MANIFESTATIONS OF DENGUE FEVER IN CHILDREN OF BANGLADESH. EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH. 2021;8(6): 96-101.

17. Sahana KS, Sujatha R. Clinical profile of dengue among children according to revised WHO classification: Analysis of a 2012 outbreak from Southern India. The Indian Journal of Pediatrics. 2015; 82(2): 109-113.

18. Mishra S, Ramanathan R, Agarwalla SK. Clinical profile of dengue fever in children: A study from Southern Odisha, India.Scientifica. 2016; 2016:1-6.

19. Agarwal A, Chandra J, Aneja S, Patwari AK, Dutta AK. An epidemic of dengue hemorrhagic fever and dengue shock syndrome in children in Delhi. Indian Pediatr. 1998; 35 (8): 727-729.

20. Srikiatkhachorn A, Krautrachue A, Ratanaprakarn W, Wongtapradit L, Nithipanya N, Kalayanarooj S et al. Natural history of plasma leakage in dengue hemorrhagic fever: a serial ultrasonographic study. Pediatr Infect Dis J. 2007;26(4):283-290.

21. Adam AS, Pasaribu S, Wijaya H, Pasaribu AP. Warning sign as a predictor of dengue infection severity in children. Med J Indones. 2018;27(2):33-39.

22. National Guideline for Clinical Management of Dengue Syndrome. 4th Edition. 2018 Revised (Printed May, 2020).

https://dghs.gov.bd/index.php/en/publications/guideline.

23. Seneviratne SL, Malavige GN, and Silva HJ. Pathogenesis of liver involvement during dengue viral infections. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2006; 100(7): 608–614.