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Original Research Article

Clinical spectrum of dengue fever in patients admitted to a tertiary care hospital in Bangladesh

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ABSTRACT

Background: Dengue fever is a viral infection transmitted by mosquitoes and is a significant public health problem in many tropical and subtropical countries, including Bangladesh. The clinical spectrum of dengue fever can vary widely, ranging from asymptomatic infection to severe and potentially life-threatening illness. In this study, we aimed to describe the clinical spectrum of dengue fever in patients admitted to a tertiary care hospital in Bangladesh. The aim of the study was to observe the clinical spectrum of dengue fever patients.
Methods: This prospective observational study was conducted at the department of medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh. The study duration was 7 months, from June 2022 to December 2022. During this period, a total of 65 cases of dengue fever cases admitted to the hospital for treatment were included in the study, who had a hospital stay of at least 3 days.
Results: The mean age of the participants was 30.78 years, and the male: female ratio was 1:1.95. 86.15% of the participants had no comorbidities, while diabetes and hypertension were observed in 6.15% of patients each. Patients' mean temperature had been high at the first check-up and dropped slowly to normal levels throughout the following check-ups, but the mean platelet count had significantly dropped from the first check-up throughout the following check-ups, improving only at the 6th check-up. ≤20,000 platelet count was observed in 6.15% at the first check-up, 9.23% at the 2nd check-up, 15.38% at the 3rd, 5.41% at the 4th, 15% at the 5^{th,} and 0% at the 6th check-up. The most common warning signs were a positive tourniquet test (21.54%), vomiting (16.92%), and abdominal pain (15.38%). Hospital stay duration was <1 week for 95.38% of participants, and during discharge, only 3 patients had minor complications, with 3.08% mortality.
Conclusions: The study observed a higher prevalence of dengue among younger age groups, and females had a higher prevalence in the study. The regular-interval check-ups revealed that dengue severity progressed slowly, and did not become worse immediately after the infection, rather continued to progress adversely slowly throughout the check-ups. Hospital stay was <1 week for the majority of the participants, and minor mortality was observed in the study.

Keywords: Dengue, Fever, Spectrum

INTRODUCTION

Dengue fever is a viral illness transmitted by mosquitoes that is common in tropical and subtropical regions, including Bangladesh.[1-3] It is characterized by the sudden onset of fever, severe headache, joint and muscle pain, and rash. Some people may also experience nausea, vomiting, and diarrhea. In severe cases, dengue fever can lead to dengue hemorrhagic fever, which can cause bleeding and organ failure.[4,5] Dengue fever is caused by infection with a virus of the same name, which is transmitted by Aedes mosquitoes. Symptoms of dengue fever typically appear 3 to 14 days after being bitten by an infected mosquito.[6-9] The most common symptoms include fever, severe

headache, muscle pain, joint pain, nausea, vomiting, diarrhea, rash, etc. In addition to these symptoms, patients with dengue fever may also experience eye pain, a loss of appetite, and fatigue.[10] According to the World Health Organization (WHO), there are an estimated 390 million dengue infections globally each year, with around 96 million of those resulting in clinical illness. The majority of dengue cases occur in the Asia-Pacific region, followed by the Americas, the Eastern Mediterranean, and the Western Pacific.[11,12] Dengue fever is a major cause of illness and death in many parts of the world, particularly in countries with limited access to healthcare and inadequate vector control measures. The disease is particularly severe in children, who are at a higher risk of developing severe illness and complications. Dengue fever is a significant public health concern in Bangladesh, with outbreaks occurring regularly in the country. According to the WHO, Bangladesh is among the countries with the highest burden of dengue fever globally, with an estimated 50,000 to 100,000 cases occurring each year.[13,14] In recent years, Bangladesh has experienced several major outbreaks of dengue fever. In 2019, the country saw a significant increase in the number of dengue cases, with over 101,000 confirmed cases and 172 deaths reported. This was the highest number of cases recorded in a single year in Bangladesh. The COVID-19 pandemic has also had an impact on the control and management of dengue fever in Bangladesh. In 2020, the country experienced a surge in dengue cases, with over 57,000 confirmed cases and 105 deaths reported. The pandemic disrupted routine vector control activities and disrupted the delivery of healthcare services, which may have contributed to the increase in cases.[15,16] To control and prevent the spread of dengue fever in Bangladesh, the government and public health authorities have implemented a range of measures, including increasing vector control efforts, improving access to healthcare for affected populations, and promoting community awareness about the importance of prevention.[17] The clinical spectrum of dengue fever can vary widely among patients, ranging from mild symptoms to severe illness. In general, patients with mild dengue fever may present with fever, headache, and muscle and joint pain, along with other non-specific symptoms such as nausea, vomiting, and loss of appetite. These patients may not require hospitalization and can recover with supportive care at home. In contrast, patients with severe dengue fever may require hospitalization due to the severity of their symptoms. These patients may have a high fever, severe headache, and abdominal pain, as well as evidence of organ failures, such as bleeding, low blood pressure, and shock. They may also have difficulty breathing and may require oxygen therapy.[18,19] It is important for patients with dengue fever to receive prompt medical attention and proper care, as untreated or poorly managed dengue fever can lead to serious complications and death.

Objective

Objectives of the research were: to study the clinical spectrum of dengue fever in patients admitted to a tertiary care hospital in Bangladesh, and to observe the warning signs of severe dengue fever among patients.

METHODS

This prospective observational study was conducted at the department of medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh. The study duration was 7 months, from June 2022 to December 2022. During this period, a total of 65 cases of dengue fever cases admitted to the hospital for treatment were included in the study, who had a hospital stay of at least 3 days. Dengue was confirmed using one or multiple dengue tests among NS1 Ag test, anti-dengue IgG test, and anti-dengue IgM test. Patients were informed regarding the purpose of the study, and informed consent was obtained for their participation in the study. The study had no age or gender limit, and any cases of dengue were included in the study. From admission to discharge, clinical parameters were recorded from the participants at regular intervals to observe disease progression and treatment effects. Data from all patients were collected using a pre-made questionnaire, and collected data were analyzed using the statistical package for the social sciences (SPSS) software V.25.

RESULTS

Among the participants of the present study, the mean age was 30.78 years, with ages ranging from 12-65 years. The highest prevalence was observed in the age group of 20-29 years, with 32.31% prevalence, and 23.08% had been within the age of 10-19 years. Very few participants were over 50 years of age, and only 9.23% had been of 60 years or older (Table 1).

Table 1: Age distribution of the participants (n=65).

Age (in years)	N	%
10-19	15	23.08
20-29	21	32.31
30-39	11	16.92
40-49	7	10.77
50-59	5	7.69
≥60	6	9.23
Age range	12-65	
Mean±SD	30.78±14.72	

Gender distribution of the participants showed a higher female prevalence among the dengue-affected participants, with 66.15% female and 33.85% male incidence (Figure 1).

Multiple dengue test was done for some of the participants, and the NS1 Ag test was positive for 78.46% of participants, 23.08% had been anti-dengue IgG positive, and 15.38% had been anti-dengue IgM positive (Table 2).

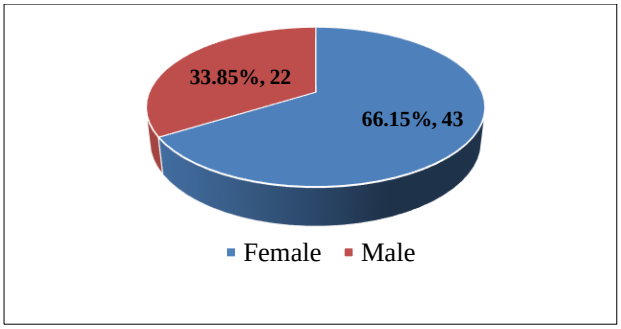

Figure 1: Gender distribution of the participants (n=65).

Table 2: Distribution of participants by positive dengue test results (n=65).

Dengue tests	N	%
NS1 Ag test	51	78.46
Anti-dengue IgG	15	23.08
Anti-dengue IgM	10	15.38

4 out of the 65 participants (6.15%) had diabetes, 4 participants (6.15%) had hypertension, 1 participant (1.54%) had a UTI, and the majority of the participants (86.15%) did not have any additional health conditions (Table 3).

Table 3: Distribution of participants by hospital stay (n=65).

Comorbidities	N	%
Diabetes	4	6.15
Hypertension	4	6.15
UTI	1	1.54
None	56	86.15

The patients had undergone checkups at regular intervals until their discharge. At the first check-up among 65 participants, the mean temperature was 101.038º Fahrenheits, the mean systolic BP was 102.41 mmHg, the mean diastolic BP was 70.43 mmHg, the mean oral fluid intake was 1.576 liters, mean IV fluid intake was 1.865 liters, mean packed cell volume (PCT) was 39.22%, mean platelet count was 1,25,984.38 and mean lymphocyte count was 31.15%. At the second check-up with 65 participants, the mean temperature had decreased to 99.489, mean systolic BP had increased to 105.95 mmHg, mean diastolic BP, oral fluid intake, and IV fluid intake stayed relatively the same, mean PCV decreased slightly to 37.63%, while mean platelet count had decreased significantly to 7,64,12.7 and mean lymphocyte count had increased to 42.31%. The mean temperature continued to decrease to normal levels throughout the following check-ups, and systolic and diastolic BP continued to increase slightly at the following check-ups. The mean platelet count stayed within the 70,000-80,000 range till the 5th check-up and increased to 1,43,777.78 at the 6th check-up with 9 participants. Mean lymphocyte count had dropped drastically at the 3rd check-up with 65 participants but increased again at the following check-ups with fewer participants (Table 4).

A platelet count of 1,50,000 to 4,50,000 is considered normal for adults, and a platelet count of ≤20,000 is considered a severe deficiency. At the first check-up, 6.15% had ≤20,000 platelet count, and 55.38% had a platelet count within 20,001 to 1,00,000. At the second check-up, the majority (66.15%) had a 20,001-1,00,000 platelet count, and 9.23% had a severely low platelet count of 20,000 or lower. By the third check-up, 15.38% had a severely low platelet count (≤20,000), and 61.45% had a low platelet count of 20,001-1,00,000. By the 4th check-up among 37 participants, severely low platelet count was observed in 5.41% of cases, while by the 5th check-up, among 20 participants, 15% had ≤20,000 platelet count. By the 6th check-up, none had severely low platelet counts, but 6 out of 9 had low platelet counts and the remaining 3 had platelet counts within an acceptable range (Table 5).

Table 4: Mean±SD distribution of clinical features among participants at different interval check-ups (n=65).

Variable	Mean (%)	SD (%)
1st check-up (65)		
Temperature	101.038	1.2026
Systolic BP	102.41	15.339
Diastolic BP	70.43	10.186
Oral fluid intake (l)	1.576	0.496
IV fluid intake (l)	1.865	0.3502
PCV (HCT)	39.22	4.90
Platelet count	125984.38	271403.729
Lymphocyte count	31.15	14.82
2nd check-up (65)		
Temperature	99.489	1.489
Systolic BP	105.95	11.437
Diastolic BP	70.66	8.683
Oral fluid intake (l)	1.682	0.445
IV fluid intake (l)	1.884	0.3035

Continued.

Variable	Mean (%)	SD (%)
PCV (HCT)	37.63	4.68
Platelet count	76412.7	60401.515
Lymphocyte count	42.31	13.94
3rd check-up (65)		
Temperature	98.42	1.0398
Systolic BP	107.69	11.398
Diastolic BP	73.61	9.236
Oral fluid intake (l)	1.729	0.4491
IV fluid intake (l)	1.828	0.3816
IV fluid intake (l)	37.01	5.05
Platelet count	74346.15	64976.281
Lymphocyte count	13.48	12.00
4th check-up (37)		
Temperature	98.429	0.7928
Systolic BP	109.35	11.156
Diastolic BP	73.81	10.279
Oral fluid intake (l)	1.784	0.4646
IV fluid intake (l)	1.795	0.4249
PCV (HCT)	38.21	4.31
Platelet count	76657.89	56797.067
Lymphocyte count	46.58	12.05
5th check-up (20)		
Temperature	98.339	0.6518
Systolic BP	111.58	13.023
Diastolic BP	75.58	6.345
Oral fluid intake (l)	1.65	0.4323
IV fluid intake (l)	1.775	0.5495
PCV (HCT)	38.20	3.64
Platelet count	74000	61295.65967
Lymphocyte count	47.15	13.66
6th check-up (9)		
Temperature	98	0
Systolic BP	118.89	17.638
Diastolic BP	77.78	7.12
Oral fluid intake (l)	1.56	0.527
IV fluid intake (l)	1.722	0.441
PCV (HCT)	38.62	4.57
Platelet count	143777.78	175034.838
Lymphocyte count	NA	

Table 5: Platelet count distribution of the participants at different interval check-ups (n=65).

Platelet count	N	%
1st check-up (65)		
≤20,000	4	6.15
20,001-1,00,000	36	55.38
1,00,001-1,50,000	14	21.54
1,50,001-2,50,000	8	12.31
>2,50,00	3	4.62
2nd check-up (65)		
≤20,000	6	9.23
20,001-1,00,000	43	66.15
1,00,001-1,50,000	10	15.38
1,50,001-2,50,000	3	4.62

Continued.

Platelet count	N	%
>2,50,00	3	4.62
3rd check-up (65)		
≤20,000	10	15.38
20,001-1,00,000	40	61.54
1,00,001-1,50,000	9	13.85
1,50,001-2,50,000	4	6.15
>2,50,00	3	4.62
4th check-up (37)		
≤20,000	2	5.41
20,001-1,00,000	27	72.97
1,00,001-1,50,000	7	18.92
1,50,001-2,50,000	1	2.70
>2,50,00	0	0.00
5th check-up (20)		
≤20,000	3	15.00
20,001-1,00,000	11	55.00
1,00,001-1,50,000	3	15.00
1,50,001-2,50,000	3	15.00
>2,50,00	0	0.00
6th check-up (9)		
≤20,000	0	0.00
20,001-1,00,000	6	66.67
1,00,001-1,50,000	1	11.11
1,50,001-2,50,000	1	11.11
>2,50,00	1	11.11

Warning signs of an adverse outcome or disease progression were observed in some of the participants, as 21.54% had been tourniquet test positive, 16.92% had been vomiting, 15.38% had abdominal pain and 1.54% had constipation (Table 6).

Table 6: Distribution of participants by presenting warning signs of severe dengue (n=65).

Warning signs	N	%
Vomiting	11	16.92
Tourniquet test positive	14	21.54
Constipation	1	1.54
Abdominal pain	10	15.38
Encephalitis	2	3.08

Table 7: Distribution of participants by observed clinical features (n=65).

Clinical features	N	%
Abdominal pain	1	1.54
Acute pancreatitis	1	1.54
Headache	3	4.62
Vomiting	5	7.69
Nausea	1	1.54
Plural effusion	2	3.08
Hepatomegaly	1	1.54
None	51	78.46

The majority (78.46%) of the participants had no associated clinical features, while some patients had multiple clinical features present. Among them, 7.69% had vomiting, 4.62% had a headache, and 3.08% had pleural effusion, abdominal pain, acute pancreatitis, nausea, and hepatomegaly each was observed in 1 patient (Table 7).

The majority (95.38%) of the participants had been discharged within a week of hospital stay, while 3.08% had stayed in the hospital for 1-2 weeks, and 1.54% of the participants had a hospital stay of >2 weeks (Figure 2).

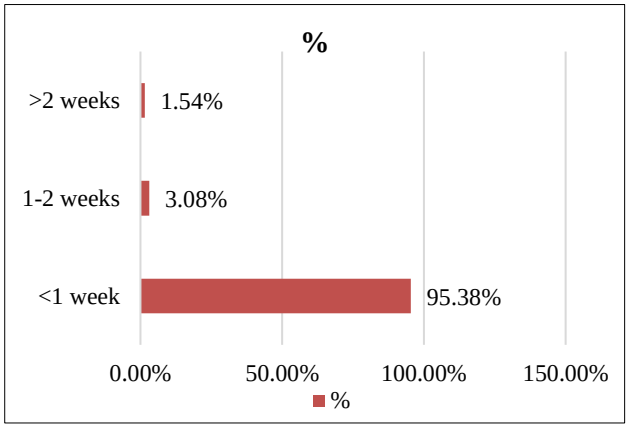

Figure 2: Distribution of participants by the duration of hospital stay (n=65).

The majority of patients (92.31%) improved during their stay, while a small percentage experienced anorexia (1.54%), mild abdominal pain (1.54%), or mild anemia (1.54%). 3.08% mortality was observed in our study (Table 8).

Table 8: Distribution of participants by status during discharge.

Status during discharge	N	%
Improved	60	92.31
Anorexia	1	1.54
Mild abdominal pain	1	1.54
Mild anemia	1	1.54
Mortality	2	3.08

DISCUSSION

Dengue fever is a viral infection caused by the dengue virus and transmitted by mosquitoes. It is a significant public health problem in many tropical and subtropical countries, including Bangladesh. In this discussion, we will examine the clinical spectrum of dengue fever in patients admitted to a tertiary care hospital in Bangladesh. The clinical spectrum of dengue fever can vary widely, ranging from asymptomatic infection to severe and potentially life-threatening illness. In general, dengue fever is characterized by the sudden onset of fever, headache, muscle and joint pain, and rash. Other common symptoms may include nausea, vomiting, and loss of appetite. In severe cases, dengue fever can progress to dengue hemorrhagic fever or dengue shock syndrome, which can cause bleeding, low blood pressure, and organ failure. Among the present study participants, the majority had been from the younger age groups, with a mean age of 30.78 years. This high prevalence of dengue among the younger population was understandable, as they are the most active overall, and tend to visit many places during the daytime. Other studies have also observed a similarly increased prevalence of dengue among younger patients.[20,21] The present study had a higher female prevalence, with about a 33% male incidence rate. This low male prevalence was contradictory to the findings of other studies, where male predominance was observed.[22,23] No clear cause behind this could be determined, but the study place might have played an important role in this. For some of the participants, all three dengue tests were done, and the dengue NS1 Ag test was positive for 78.46% of participants, 23.08% had been anti-dengue IgG positive, and 15.38% had been anti-dengue IgM positive. The anti-dengue IgG test is used to determine past infection, the anti-dengue IgM test is used to determine current or recent infection, and the NS1 antigen test is used to detect the presence of the virus in the early stages of infection. All three tests can help diagnose dengue. The majority of the participants had no prior comorbidities, while diabetes and hypertension were observed in 6.15% of patients each. Diabetes is a common comorbidity among many diseases, but the lower incidence of such comorbidities in the present study was mostly due to the high female prevalence, as diabetes occurs more among the male participants of our country.[24]

After admission to the hospital for dengue, regular check-ups were conducted to measure patients' basic clinical characteristics, and among them, the mean temperature was highest at the first check-up and represented a normal temperature from the 3rd check-up. On the other hand, mean blood pressure (systolic and diastolic) showed gradual improvement throughout all check-ups. The mean platelet count of the 65 patients was highest at the first check-up but had drastically decreased at the second check-up. The mean platelet count stayed below the normal range up to the 5th follow-up, and showed an increase into the normal range at the 6th check-up, with 9 participants. This low platelet count was influenced by the characteristic of dengue fever, where the platelet count drops significantly a while after the infection. In terms of platelet count, severely low platelet count (≤20,000) was observed in increasingly higher incidence throughout the first three check-ups, which showed the increasing severity of the disease. Platelet counts of 1,00,000 or lower also observed an increase in prevalence at these check-ups. After the 3rd check-up, those patients who had reached a stable level were discharged from the hospital and dropped down to 37 patients by the 4th check-up, 20 by the 5th, and 9 by the 6th check-up. By the 6th check-up, none of the participants had platelet counts of 20,000 or less, and 66.67% had platelet counts of <1,00,000. Very few of the participants had some form of warning signs for the adverse progression of the disease, and vomiting was a warning sign for 16.92% of the participants. 21.45 of the participants had been tourniquet tested positive, and 15.38% had abdominal pain, and 3.08% had encephalitis. Warning signs were determined after observing the clinical parameters of the dengue patients alongside the complications. Vomiting and abdominal pain are common warning signs in many studies.[25-28]

78.46% of the participants had no clinical complications alongside dengue fever, but some had multiple clinical features. Vomiting was the most common clinical feature. The rate of associated complications was significantly lower compared to other studies of similar nature.[17,18,22]

The low severity of dengue among the participants was reflected in the hospital stay duration, where 95.38% had been discharged within 1 week of admission, and only 1 patient had >2 weeks of hospital stay. During discharge, 92.31% had clinically improved, and 3.08% mortality was observed among the participants. This reflects a good outcome compared to other studies with a significant mortality rate among dengue-affected participants.

Limitations

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

The study observed a higher prevalence of dengue among younger age groups, and females had a higher prevalence in the study. The Ns1 Ag test was the most common detector of dengue-positive patients in the present study. The regular-interval check-ups revealed that dengue severity progressed slowly, and did not become worse immediately after the infection, rather continued to progress adversely slowly throughout the check-ups. Hospital stay was <1 week for a majority of the participants, and very few mortality was observed in the study.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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