Original Article

Exploring variations in dengue symptoms: a comparative study of 2013, 2019, and 2023 in a tertiary care hospital of Bangladesh

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ABSTRACT

Background: *Dengue fever remains a major public health issue in Bangladesh, with repeated outbreaks. This study compares dengue symptoms in a tertiary care hospital during 2013, 2019, and 2023. The purpose of this study is to evaluate the variations in dengue symptoms among Bangladeshi dengue patients from 2013 and 2019 to 2023.*

Methods: *This was a cross-sectional study, conducted on 100 dengue positive patients, admitted between 1st January to 7th August 2023, to the Medicine Department, Holy Family Red Crescent Medical College and Hospital, Dhaka. Demographic data, sign and symptoms and laboratory investigation reports were collected. These data were compared with a previously published study from the same institute comparing dengue symptoms between 2013 and 2019 among admitted dengue patients. The study employed a convenience sampling method for participant selection, and data analysis was carried out using SPSS version 26.*

Results: *Analysis of 100 sero-positive dengue cases reveals a predominant occurrence in the 20 to 40 age group (51%), with the mean age of patients being 34.5 years. Among these cases, a higher prevalence is observed in males (62%) compared to females (38%). Symptomatology exhibits variations over time, with fever being consistently present. Other symptoms such as headache (90%, 23% and 12%), retroorbital pain (45%, 3% and 16%), skin rash (16%, 4% and 1%) and constipation (32%, 1% and 5%) showing fluctuations, respectively in 2013, 2019 and 2023. Notably, a significant proportion of patients in 2023 exhibit normal ultrasound findings (53%).*

Conclusions: *In conclusion, our study provides a comprehensive analysis of Dengue infection dynamics over a decade, highlighting significant variations in clinical manifestations, laboratory findings, and abdominal ultrasound results among Bangladeshi patients. The findings suggest that Dengue remains a considerable public health concern, with fluctuations observed in symptomatology, including fever and other associated symptoms, and changes in laboratory parameters over time.*

Key words: *Dengue, clinical presentation, comparison.*

BIRDEM Med J 2024; 14(3): 131-136
DOI: https://doi.org/10.3329/birdem.v14i3.76237

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Received: February 15, 2024

Revision received: August 2, 2024

Accepted: August 27, 2024

INTRODUCTION

Dengue virus (DENV) is a mosquito borne pathogen transmitted to humans through the bites of infected female *Aedes* mosquitoes, notably *Aedes aegypti* and *Aedes albopictus*. The local risk of transmission is subject to variations influenced by climate, social and environmental factors.[1] DENV exists in four distinct serotypes (DEN 1–4) and during epidemics, the simultaneous circulation of these serotypes heightens the likelihood of an individual being infected multiple times with different serotypes, thereby increasing the risk of more severe disease.[2,3] Dengue infection manifests across a wide spectrum of clinical presentations, ranging from conventional influenza-like symptoms to severe complications such as profound bleeding or plasma leakage, culminating in the potentially life-threatening condition known as dengue shock syndrome.[4]

Billions of people living in the tropical climate of south-east Asia, sub-Saharan Africa and Latin America are vulnerable to dengue virus infection.[5] Almost 390 million people worldwide are infected by the dengue virus annually, resulting in almost 20,000 deaths.[6] Bangladesh is considered as one of the endemic zones for dengue in the south-east Asian region. Historically, the country faced a dengue epidemic in 2000 for the first time, with a reported 5,521 confirmed dengue cases and 92 deaths.[7] Since then, several incidences of dengue outbreaks have occurred in this country, with a reported number of almost 32,000 dengue cases in the last two decades (2000 to 2020).[8] A case-control study conducted in Bangladesh found that living in old houses, temporary city residency, daytime sleeping, plant in resident etc. were found to have a significant association with dengue cases in the south-east part of Bangladesh.[9]

Clinical manifestation of dengue vary depending on the disease severity ranging from nausea, vomiting, rash, body ache, abdominal pain, to hemorrhagic fever and shock syndrome.[10] Fever is present in almost all of the dengue patients followed by gastrointestinal symptoms such as nausea/vomiting (69.6%), severe headache (62.7%), melaena (5.4%) and gum bleeding (3.6%).[8] One study in Bangladesh also mentioned gastrointestinal symptoms being the most common (69.4%) after fever.[11] Patients with gastrointestinal symptoms were more likely to be admitted in intensive care units (ICU).[12] According to a study by Islam et al.[13] in 2019, there have been changes in the presentation and laboratory findings of dengue fever. This study aims to evaluate the variations in dengue symptoms among Bangladeshi dengue patients from 2013 and 2019 to 2023.

METHODS

This was a cross-sectional study included 100 dengue patients, admitted between 1st January to 7th August 2023, to the Medicine Department, Holy Family Red Crescent Medical College and Hospital, Dhaka, Bangladesh. Collected data were compared with a previously published study from the same institute comparing dengue symptoms between 2013 and 2019 among admitted dengue patients.[14] Inclusion criteria involved confirmed dengue cases, while exclusion criteria accounted for incomplete records and cases with co-infections. The variables included demographic information, clinical symptoms, disease severity and laboratory investigation reports. Convenience sampling was employed to select participants. All emerging symptoms and signs were documented in a structured questionnaire. Dengue infections were categorized into different sub-types, including dengue with no warning sign, dengue with a warning sign and severe dengue, adhering to WHO criteria.[1,3] The collected data were entered into Microsoft Excel 2013 and analyzed using IBM SPSS Statistics version 26.0.

RESULTS

Total patients were 100 with male predominance (male 62, female 38). Mean age of the patients was 34.5±15.32 years with majority (51%) being in 20-40 years age group. Age distribution of patients having dengue in the years 2013, 2019 and 2023 is shown in Figure.

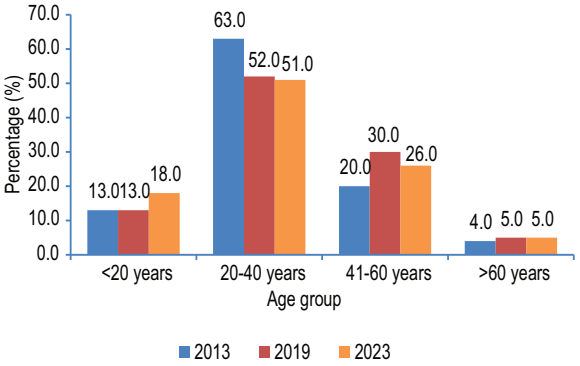

Figure 1. Comparative age distribution of dengue patients in 2013, 2019 and 2023

Dengue with warning signs were 93% in current study and severe dengue in 7% cases. Most (94%) patients tested positive for the NS1 antigen. In 6% cases dengue was diagnosed by clinical features and positive anti-dengue IgM antibodies.

Fever was the most prevalent symptom in all three years affecting 100% of patients in 2013, 2019 and 2023. Headache, retroorbital pain, bodyache and backache show considerable variability between the years studied. Headache declines from 90% in 2013 to only 23% in 2019, while retroorbital pain increases from 3% to 16% during the same period, then decreased in 2023. Gastrointestinal symptoms such as nausea/vomiting, diarrhoea, and constipation varied in prevalence, with nausea/vomiting being the most common gastrointestinal symptom in 2019 but decreasing in 2023. Bleeding manifestations, skin rash, cough, dyspnoea, joint pain and other less common symptoms also display varying prevalence rates across the years. Cough, abdominal pain, altered taste sensation, arthralgia, and lethargy emerge in later years, indicating potential changes in the clinical presentation of dengue over time. The statistical analysis reveals significant changes in the prevalence of various symptoms over time (Table I).

Table I. Comparison of signs and symptoms of dengue on admission

Sings and symptoms	Number of patients 2013 (n=100)	Number of patients 2019 (n=100)	Number of patients 2023 (n=100)	p-value
Fever	100	100	100	-
Headache	90	23	12	<0.001
Retro orbital pain	45	03	16	<0.001
Bodyache	56	39	36	0.001
Backache	48	01	22	<0.001
Nausea/ Vomiting	30	51	33	0.004
Diarrhoea	20	14	22	0.319
Constipation	62	01	5	<0.001
Bleeding manifestations	2	6	3	0.293
Skin rash	16	4	1	0.001
Cough	-	9	19	<0.001
Dyspnoea	-	2	2	0.362
Joint Pain	-	2	-	-
Generalised Itching	30	1	-	<0.001
Anorexia	-	6	8	0.020
Abdominal pain	-	-	21	-
Altered taste sensation	-	-	3	-
Arthralgia	-	-	9	-
Haemoptysis	-	-	2	-
Lethargy	-	-	7	-
Restlessness	-	-	10	-

Leucopenia showed a significant decrease in prevalence from 2013 to 2023 ($p = 0.004$). The proportion of patients with raised hematocrit (HCT > 20%) between (on admission and second investigation) showed a significant decrease over the years ($p = 0.008$). Similarly, elevated serum glutamic-oxaloacetic transaminase (SGOT) levels decreased significantly from 2013 to 2023 ($p<0.001$) (Table II).

Table II. Comparison of laboratory parameters at admission among dengue patients in 2013, 2019 and 2023

Investigation		Number of patients 2013 (n=100)	Number of patients 2019 (n=100)	Number of patients 2023 (n=100)	p-value
Leucopenia		60	45	37.0	0.004
Platelet count					
	<10 x 10^9/L	0	2	-	
	10-50 x 10^9/L	25	49	52	
	51-100 x 10^9/L	32	23	24	
	100-150 x 10^9/L	27	12	14	
	>150 x 10^9/L	16	14	10	
HCT >20% (raised)		28	15	12	0.008
SGOT (raised)		89	28	22	<0.001

The prevalence of hepatomegaly decreased significantly from 2013 to 2023 ($p < 0.001$), while splenomegaly also showed a significant decrease ($p = 0.001$). Hepatosplenomegaly, ascites, pleural effusion and thickened gall bladder wall exhibited significant differences in prevalence over the years ($p < 0.05$) (Table III).

*Ultrasound report was found of 80 patients in 2019.

DISCUSSION

The investigation into the prevalence of common signs and symptoms among dengue patients in our tertiary care hospital in 2023, with a sample size of 100 patients, provides valuable insights into the clinical presentation of dengue fever in Bangladesh. Present study showed the majority of seropositive dengue cases were in the age groups of 20-40 years followed by 41-60 years. In accordance with this study Ahmad et al.[14] reported in 2013, the highest proportion of dengue cases was observed in the 20-40 age group, accounting for 63% of cases, followed by the <20 age group (13%), 41-60 age group (20%), and those above 60 years (4%). However, by 2019, there was a notable decrease in the percentage of cases within the 20-40 age group, dropping to 52%, while the distribution among other age groups remained relatively stable. In another study, Lasmal et al.[15] reported that the common age group infected by dengue infection was 20-29 years followed by 40-49 age groups with corresponding proportions of 23.97% and 19.83% respectively. Islam et al.[11] reported the mean age of dengue patients of 33.90±15.82 years. In present study 62% were male and 38% were female. Hossain et al.[16] reported male predominance in all the dengue outbreaks reported in Bangladesh. The proportion of male cases was almost double compared to females in all studies. According to a study, male-to-female ratio was as high as 2.7.[17]

Present study showed predominant dengue fever type was dengue with warning signs. The present study findings are very similar to a study done in Bangladesh, 2022 where 94.1% had non-severe dengue and the remaining had severe dengue.[11] Lamsal et al.[15] reported 96.69% of patients had dengue with a warning sign and only 3.31% of patients were suffering from severe dengue based on WHO classification. In another study Uddin et al.[18] reported that, the most common warning signs were a positive tourniquet test (21.54%), vomiting (16.92%), abdominal pain (15.38%) and 1.54% had constipation.

Regarding serology, the majority of patients tested positive for the NS1 antigen (94%), a smaller percentage of patients exhibited recent dengue infection, with 6% testing positive for IgM antibodies. Ismail et al.[19] reported the majority tested positive for NS1 (76%), followed by RT-PCR (20%) and IgM (18.7%). A smaller percentage of patients tested positive for both IgG and IgM (9.3%), NS1 and RT-PCR (13.3%) and NS1 and IgM (8%). Another similar findings reported by Lasmal et al.[15]

The signs and symptoms exhibited by seropositive dengue cases show significant variations across the three years studied. In 2013,[14] fever was universally present among all cases, while headache was the most prevalent accompanying symptom, affecting 90% of patients. Other common symptoms included retroorbital pain (45%), bodyache (56%), and nausea/vomiting (30%). Interestingly, constipation was observed in a majority of cases (62%). However, bleeding manifestations were relatively rare, affecting only 2% of patients. In 2019[14], there was a noticeable decline in the prevalence of headache, dropping to 23%, while the occurrence of retroorbital pain remained low at 3%. Despite this, bodyache (39%) and nausea/vomiting (51%) were still prominent symptoms among dengue cases. Bleeding manifestations showed a slight increase, affecting 6% of cases in 2019. By 2023, in present study symptomatology was observed, with headache decreasing to 12% and retro-orbital pain increasing to 16%. Bodyache (36%) and nausea/vomiting (33%) remained common symptoms, while new symptoms such as cough (19%) and abdominal pain (21%) emerged prominently. Yesmin et al.[2] reported most prevalent signs and symptom among the patients, with 100% of the cases having fever, headache (60.43%), nausea/vomiting (67.48%), diarrhea (36.31%), retro-orbital pain (35.77%), anorexia (43.90%), back pain (28.18%), myalgia (19.78%), generalized weakness (30.35%), rash (17.34%), arthralgia (20.33%) and dehydration (24.12%). Less common symptoms reported were sore throat (13.28%), constipation (8.67%). Lamsal et al.[15] stated the signs and symptoms in seropositive cases of dengue, fever (89.26%), myalgia (61.57%), headache (61.16%), lethargy (57.02%), nausea and vomiting (49.59%), periorbital pain (40.91%), decreased appetite (25.21%), bleeding (23.55%), abdominal pain (22.31%), loose stool (17.35%), rash (12.81%), hypotension (11.16%), cough (3.30%), ascites (3.31%), hepatosplenomegaly (3.31%), central nervous system (CNS) manifestations (2.89%), pleural effusion (2.89%), decreased urine output (1.65%) and itching (1.65%).

Leucopenia, a common finding in dengue, showed a decreasing trend over the years, with 60% of patients in 2013[14], 45% in 2019 and in present study 37% in 2023.

Platelet counts exhibit variability across the years, in 2019[14], there was a higher prevalence of severe thrombocytopenia (<10 x 10^9/L) compared to 2013[14] and 2023. The percentage of patients with a raised hematocrit (HCT >20% between on admission and second investigation) was observed 28% in 2013 and 12% in 2023. Similarly, there was a decrease in the proportion of patients with raised serum SGOT levels. Another similar finding from a study conducted by Lamsal et al.[15] recorded that platelets <100,000 level were significantly linked with severity of dengue infection which is consistent with the present study.[12,16] Therefore, previous study findings recommended that thrombocytopenia and raised transaminases are good markers for the assessment of the severity of dengue viral infection.[17]

Hepatomegaly and splenomegaly, common manifestations of dengue, showed varying prevalence rates across the years studied. Hepatomegaly declines from 31% in 2013 to 7.5% in 2019[14] before increasing to 13% in 2023. Similarly, splenomegaly decreases from 24% in 2013 to 5% in 2019, then rises to 10% in 2023. Hepatosplenomegaly, though not observed in 2013, becomes evident in later years, with 3.75% in 2019 and 5% in 2023. Ascites shows fluctuations, increasing from 10% in 2013 to 16.25% in 2019 before dropping to 2% in 2023. Pleural effusion and thickened gallbladder walls were more prevalent in 2019 compared to the other years. Interestingly, while a significant proportion of patients in 2019 had normal ultrasound findings (25%), this percentage increases substantially to 53% in 2023.

Conclusion

The study conducted in tertiary care hospitals in Bangladesh revealed that dengue cases were most prevalent among individuals aged 20-40 years, with a higher proportion of male patients. The predominant dengue fever type was dengue with warning signs and most patients tested positive for the NS1 antigen. Significant changes in platelet count and SGOT levels were observed over time. While fever remained the most common symptom, there were fluctuations in the prevalence of other symptoms such as headache and gastrointestinal symptoms. The ultrasound findings also varied across the years. These findings emphasize the evolving nature of dengue and the need for ongoing research and surveillance to address the changing patterns of the disease.

Authors' contribution: Conceptualization: MW; Data curation: MAS; Formal analysis: AIL, Hassan. Writing – original draft RMH; Review and editing: all.

Funding: The author(s) received no financial support for the research, authorship, and/or publication of this article.

Conflicts of interest: Nothing of declare.

All authors declare that they have no conflicts of interest.

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