Differences in Clinical Profiles and Outcomes of Children with Dengue during the 2019 and 2022 Outbreaks: Experience from a Tertiary Hospital, Chattogram, Bangladesh

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Abstract

Background: It was observed that the clinical presentation of dengue fever has been changed with time since its first outbreak in 2000 in Bangladesh. In 2019, Bangladesh experienced the largest dengue outbreak in its history and the 2022 outbreak is the second-largest outbreak since 2000. The study aimed to describe the clinical presentations and outcomes of dengue infected children in 2022 in a tertiary hospital in Bangladesh along with its comparison to previous 2019 outbreak witnessed in this hospital.

Materials and methods: This hospital-based descriptive study was conducted in the largest tertiary care hospital in Chattogram, Bangladesh. A total of 472 (192 in 2019 and 280 in 2022 outbreak) laboratory-confirmed dengue cases were analyzed. The demographic, clinical manifestations and outcomes of the cases of the 2022 outbreak was compared with previous (2019) outbreak by using SPSS windows version 23.

Results: The median age of the children were 8 and 7 years, respectively in 2019 and 2022, with a significantly higher proportion of infant cases in 2022 (11.8% vs. 3.6%) than 2019.Male predominance and higher proportion of patients from urban area were observed in 2019, and the trend was more prominent in 2022 outbreak without any statistical significance. The 2022 outbreak is characterized by a higher proportion of vomiting (60.7% vs. 47.9%), body ache (37.1% vs. 14.5%), hemorrhagic manifestations (19.3% vs. 11.4%), respiratory distress (10.7% vs. 5.2%), and retroorbital pain (8.9% vs. 4.2%) than the 2019 outbreak. Abdominal pain (42.9% vs. 91.7%) and diarrhea (4.6% vs. 7.8%) and shock (9.4% vs 6.1%) were observed less frequently in 2022 outbreak than the 2019. Median length of hospital stay was significantly more during 2022 than the 2019 outbreak (5 days vs. 4 days). There was no case fatality in 2019 outbreak, but 5 (1.8%) patients expired in 2022.

Conclusions: The 2022 outbreak was associated with unusual high number of cases in the last three months of the year. The median age of dengue children has decreased and younger patients were more susceptible.

Key words: Children; Dengue outbreak.

Introduction

Bangladesh is a country that is most adversely affected by dengue almost every year.[1] The first official dengue outbreak was reported in 2000, with 5,551 cases and 93 reported deaths.[2] Since then, several incidents of the outbreak have been observed over the decades. Notably, in 2019, Bangladesh witnessed one of the largest dengue epidemics in its history, with 1,01,354 dengue cases and 164 dengue-related reported deaths.[3] As of 10 December 2022, a total of 60,078 dengue cases and 266 dengue-related deaths were reported in Bangladesh and the 2022 outbreak is the second-largest outbreak since 2000.[4]

In 2022, Bangladesh had a long course of outbreaks which was at its peak, lasting for more than six months, with an increased number of cases and casualties in October and November 2022 which is very unusual in the last twenty-two years. There might be some reasonable factors for this unexpected long Dengue incidence and increased death, like prolonged intermittent rain, late reporting of patients to the hospital at an afebrile critical phase, reinfection by different strains of Dengue virus etc.[5,6]

Regular reporting of the clinico-epidemiological profile is essential for successfully preventing and controlling infectious diseases. Considering a public health threat, this type of reporting is ongoing in Bangladesh for dengue, mainly focusing 2019 outbreak.[7-18] Despite a large number of cases being reported in 2022 in Bangladesh, alarmingly, not much literature is available on the clinico-epidemiological profile of those dengue cases, especially from the pediatric

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age group.[7] From the clinical point of view, identifying shifts in the clinical pattern will improve case-finding and clinical management.[15] This study aimed to give an insight into the clinical presentation of dengue in pediatric age group in 2022 outbreak in Chattogram, Bangladesh, along with its comparison to previous outbreak witnessed in 2019 in the largest tertiary hospital in this region.

Materials and methods

This descriptive study was conducted during the period from August 2022 to January 2023 in Chittagong Medical College Hospital (CMCH), Bangladesh's 2nd largest tertiary care hospital. Admitted infants and children aged one month to 12 years with a confirmed diagnosis of dengue fever (Positive for Dengue NS1 antigen and/or anti-dengue IgM antibodies) were included in the study. Patients with concomitant malaria, typhoid, and COVID-19 were excluded. Prior approval was taken from the Ethical Review Committee of Chittagong Medical College, and the informed consent requirement was waived as the data were collected from the ward register.

To describe the characteristics of the dengue cases median (Interquartile range, IQR) and percentage were used when appropriate. Differences in clinical characteristics and outcomes between 2022 and 2019 cases were compared using the Pearson Chi-square, Fisher's exact test for categorical variables and the Mann–Whitney U test for continuous variables. For statistical testing, statistical software SPSS version 23.0 was used and p-values of <0.05 were considered statistically significant.

Results

A total of 280 patients aged between 1 month to 12 years were admitted in the pediatric ward from August 2022 to January 2023 (Outbreak 2022) and in the previous 2019 outbreak 192 children were admitted from July to December 2019. The median age was lower in the recent outbreak with a significantly higher proportion of infants than the 2019 outbreak. Male predominance and higher proportion of patients from urban area were observed in 2019 and the trend was more prominent in 2022 outbreak without any statistical significance.

Table I Demographic characteristics of the dengue patients in 2022 outbreak with comparison of previous outbreak

Variables	Outbreak 2019 (n=192)	Outbreak 2022 (n=280)	p value
Age, Years			
1 year	7 (3.6)	33 (11.8)	
>1 year-5 year	57 (29.7)	73 (26.1)	
>5 year-10 year	95 (49.5)	113 (40.4)	0.005[*]
>10 year-12 year	33 (17.2)	61 (21.8)	
Median (IQR)	8.0 (4.6-10.0)	7.0 (4.0-10.0)	0.306[†]
Sex			
Male	114 (59.4)	175 (62.5)	0.494[*]
Female	78 (40.6)	105 (37.5)	
Residence			
Urban	127 (66.1)	196 (70.0)	0.367[*]
Rural	65 (33.9)	84 (30.0)	

Data were expressed as frequency (%) if not mentioned otherwise. IQR: Interquartile Range.

*Chi-square test, [†]Mann-Whitney U test. Significant values were in bold face.

In the recent outbreak, an increased number of cases were found in the months of October, November and December (Figure 1).
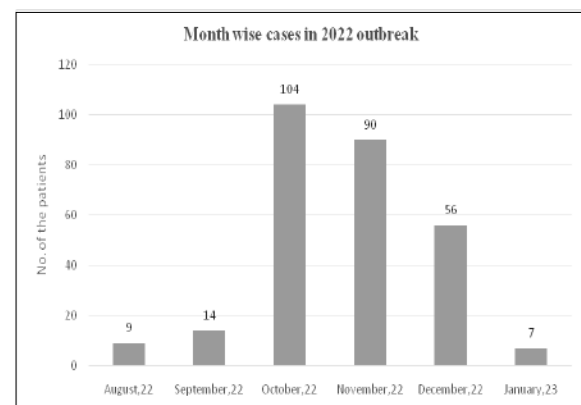

Figure 1 Month wise case distribution of the dengue cases admitted in 2022 outbreak

A comparison of clinical manifestations between two outbreaks is described in Table II. The recent outbreak is characterized by a higher proportion of vomiting, body ache, hemorrhagic manifestation, respiratory distress, and retroorbital pain. On the other hand, abdominal pain, diarrhea and shock were observed less frequently in 2022 outbreak than the previous one (Table II).

Table II Clinical of the dengue patients in 2022 outbreak with comparison of previous outbreak

Clinical features	Outbreak 2019 (n=192)	Outbreak 2022 (n=280)	p value
Fever	192 (100.0)	280 (100.0)	NA
Abdominal pain	175 (91.7)	120 (42.9)	<0.001*
Vomiting	92 (47.9)	170 (60.7)	0.006*
Body ache	28 (14.5)	104 (37.1)	<0.001*
Hemorrhagic- manifestation	22 (11.4)	54 (19.3)	0.023*
Cough	4 (2.1)	15 (5.4)	0.075‡
Respiratory distress	10 (5.2)	30 (10.7)	0.034*
Retroorbital pain	8 (4.2)	25 (8.9)	<0.001*
Diarrhoea	15 (7.8)	13 (4.6)	0.152*
Shock	18 (9.4)	17 (6.1)	0.178*

Data were expressed as frequency (%) if not mentioned otherwise. IQR: Interquartile Range.

*Chi-square test, ‡Fisher's exact test, Not applicable.

Requirement of ICU support was similar between 2022 and 2023 outbreaks, but length of stay was significantly more during 2022 than 2019. There was no case fatality in 2019 outbreak, but 5 (1.8%) patients expired in 2022 (Table III).

Table III Outcome of the dengue patients in 2022 outbreak with comparison to previous outbreak

Variables	Outbreak 2019 (n=192)	Outbreak 2022 (n=280)	p value
Need PICU support	18 (9.4)	26 (9.3)	0.998*
Length of stay	4.0 (4.0-5.0)	5.0 (4.0-6.0)	0.013†
Mortality	0 (0)	5 (1.8)	0.083‡

Data were expressed as frequency (%) if not mentioned otherwise. IQR: Interquartile Range. *Chi-square test, ‡Fisher's exact test, †Mann-Whitney U test.

Discussion

In 2019 Bangladesh faced its worst outbreak in history, with infection reaching all parts of the country.[19] Again, in 2022, another surge was observed, with the 2nd highest dengue cases in a year since 2000. National data suggest that 2022 has a long course of the outbreak, which is at its peak lasting for more than six months, with an increased number of cases and casualties in October and November 2022 which is very unusual in the last twenty-two years.[5] Present study findings confirmed this as the highest number of cases were admitted in October, followed by November and December 2022.

One significant epidemiological shift in 2022 was the higher number of infant cases than in the 2019 outbreak. Since 2000, the proportion of males was persistently more in all outbreaks and this male preponderance was more prominent in 2022 outbreak than 2019 outbreak.[15]

Another notable finding of 2019 was a high prevalence of dengue among children from rural areas, which implies a rural expansion of the 2019 outbreak in Bangladesh and supports the evidence of the recent rural expansion of the virus in Southeast Asian countries.[20] However, in 2022, the urban-to-rural ratio increased, indicating admission of comparatively fewer rural dengue cases than in 2019.

Present analysis revealed that the 2022 outbreak was characterized by fever in all patients, with associated features being vomiting, abdominal pain, body aches, and hemorrhagic manifestation. These are the general features of dengue fever and are well correlated with other similar studies.[13,14,16,17,21] But in 2022, the hemorrhagic manifestationwas relatively more common, and abdominal pain,diarrhea and shock were less common than in the 2019 outbreak. A statistically increased frequency of diarrhoea and abdominal pain over the last decade was observed among dengue cases, which was not observed in the 2022 outbreak among children.[15]

Present study findings indicated that the 2022 outbreak was more severe than the 2019 outbreak, evidenced by comparatively more extended hospital stays (Median hospital stay was one day longer) and a higher case fatality rate, consistent with the national figures. In Bangladesh, respectively, 194 and 266 dengue-related deaths were reported in the year 2019 and 2022.[3,4] A serological survey in the studied hospital in 2019 revealed that four dengue virus serotypes co-circulate in concurrent dengue infections and suggested that concurrent multiple DENV infections could contribute increased dengue disease severity in dengue outbreaks in Bangladesh.[6]

Limitations

A significant limitation of the study involved missing data due to the inability to be filled out by the study physicians systematically. Moreover, it was not possible to investigate patients thoroughly

and identify the serotypes of dengue cases, primarily due to a lack of facilities and funds. Lastly, a detailed feature-by-feature comparison of the two outbreaks was impossible due to inadequate details in the records.

Conclusions

A comparison of clinical manifestation and outcome of dengue fever in Bangladesh between 2019 and 2022 outbreak showed that infant dengue cases were common in the recent outbreak than the previous one. Moreover, the recent outbreak is characterized by a higher proportion of vomiting, body ache, hemorrhagic manifestation, respiratory distress, and retroorbital pain. On the other hand, abdominal pain, diarrhea and shock were observed less frequently in 2022 outbreak than the previous one. Length of hospital stay was longer in 2022 than 2019 outbreak.

Recommendation

Future studies of this kind with large number of patients may aid in the adaptation and up-gradation of the national guidelines and management strategies for future outbreaks in the country.

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Contribution of authors

AKD: Conception, data collection, manuscript drafting and final approval.
ZC: Acquisition of data, critical revision and final approval.
MJBAC-Design, interpretation of data, drafting and final approval.
MSA: Acquisition of data, critical revision and final approval.
MD: Data collection, manuscript drafting and final approval.
SS-Data analysis, drafting and final approval.
PC: Acquisition of data, critical revision and final approval.
SD: Data collection, manuscript drafting and final approval.

Disclosure

The authors declared no conflicts of interes.

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