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Original Article

Comparative Analysis of Profile and Outcome of Dengue Patients Admitted in a Pediatric Intensive Care Unit of Chattogram, Bangladesh, during 2022 and 2023 Outbreak

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Abstract

Background: *Bangladesh has been experiencing large dengue outbreaks since 2019, the 2023 outbreak is the largest on record. Comparing dengue profiles and outcomes between outbreaks is crucial for enhancing our understanding of dengue and improving clinical and public health responses to future outbreaks. This study compared the profile and outcome of dengue patients admitted to the Pediatric Intensive Care Unit (PICU) of a tertiary-level hospital in Chattogram, Bangladesh, during the 2022 and 2023 outbreaks.*

Materials and methods: *This record-based study included 81 laboratory-confirmed dengue children admitted to the PICU of Chittagong Medical College Hospital. Using SPSS Windows version 23.0, the demographics, clinical manifestations, and outcomes of the cases were compared between two outbreaks.*

Results: *Twenty-three and 58 patients were admitted between 2022 and 2023, respectively. Median age of children was 5 years in both years. Males were affected more, with a male-female ratio of 1.5:1 in 2022, which was reversed in 2023 with a male-to-female ratio of 0.9:1. Persistent vomiting and abdominal pain was noticed to be significantly higher among patients in 2023. The median length of PICU stay was significantly higher in 2023 than in 2022 (8 vs. 5 days, p<0.001). The PICU mortality rate was lower in 2023 than in 2022 (13.8% vs. 21.7%), though it was not statistically significant.*

Conclusion: *Though the number of PICU-admitted cases is increasing, the mortality rate is decreasing with appropriate management. So, for district-level hospitals in Bangladesh, establishing a pediatric intensive care unit is the demand of time to manage this severe variety of dengue pediatric cases.*

Key words: Children; Clinical outcome; Dengue; Pediatric ICU.

INTRODUCTION

Bangladesh has been experiencing annual dengue outbreaks since 2000 but the epidemics have intensified in recent years.[1] The country reported a total of 52,807 laboratory-confirmed dengue cases and 230 related deaths in the year 2022, which was the second-largest outbreak since 2000.[1,2] The situation worsened in 2023, with 321,179 hospitalizations and 1,705 deaths due to dengue. This made 2023 the deadliest year on record for dengue in Bangladesh.[1,2]

The recent surge in dengue incidence has shown significant year-to-year fluctuations in the timing and enormity of seasonal peaks, with a constantly increasing case fatality rate every year.[1,3] The four structurally similar but antigenically Distinct Dengue Virus (DENV) serotypes (DENV1- DENV4) have been found to be circulating in various types of population.[4,5] Research indicates that the shifting of these serotypes during an outbreak can results in differences in clinical

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characteristics and outcome of dengue infection.[6,7] The recent epidemiology of dengue in Bangladesh has imposed substantial economic and disease burden on patients and healthcare system with increased hospital stay, high morbidity and attendant mortality.[8-10]

Studies on clinical outcomes of children with severe dengue treated in the PICU are still limited to 2019-2022 outbreak in Bangladesh, while findings from the last 2023 outbreak are not availble.[11-13] Comparing the clinical features and outcomes of dengue infections between two outbreaks has is an important research topic.[14] By comparing outbreaks, researchers can identify changes in the clinical presentation of the disease. For example, a study in Bangladesh observed an increase in gastrointestinal symptoms and a decrease in hemorrhagic manifestations over a decade.[15] Insights from such comparisons can help refine treatment protocols. If certain symptoms become more prevalent, healthcare providers can adjust their treatment strategies accordingly. Understanding how the disease evolves can inform public health interventions. Comparing outbreaks can help in better resource allocation by knowing which symptoms are more common can help in stocking necessary medications and preparing healthcare facilities. In this context, this study aimed to compare the clinical profile and outcomes of patients with dengue admitted to the PICU of a large tertiary hoispital during 2022 and 2023 outbreak in Chattogram, Bangladesh.

MATERIALS AND METHODS

This descriptive observational study was conducted in Chittagong Medical College Hospital (CMCH) Bangladesh's 2nd largest tertiary care hospital. 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. All of the admitted infants and children aged one month to 12 years in the PICU with a confirmed diagnosis of dengue fever (Positive for Dengue NS1 antigen and/or anti-dengue IgM antibodies) from January 2022 to December 2023 were included in the study. Patients with incomlete record were excluded.

Data regarding demographic characteristics, clinical features, vital parameters, laboratory features, PICU mortality and length of stay in PICU were collected by using a structured case record. Patients were classified and treated as per the national guideline.[16]

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 2023 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 81 patients aged between 1 month to 12 years were admitted in the PICU from January 2022 to December 2023 (23 in 2022 and 58 in 2023 outbreak). The median age of the patients were similar between two years. Male predominance and higher proportion of patients from urban area were observed in 2022, and the trend was reverse in 2023 outbreak without any statistical significance.

Table I Comparison of demographic characteristics of children with dengue fever between 2022 and 2023

Variables	Year 2022 (n=23)	Year 2023 (n=58)	p value
Age, years			
≤1 year	4 (17.4)	7 (12.1)	0.248*
>1 year-5 year	8 (34.8)	27 (46.6)	
>5 year-10 year	5 (21.7)	18 (31.0)	
>10 year-12 year	6 (26.1)	6 (10.3)	
Median (IQR)	5.0 (1.5-10.5)	5.0 (2.0-7.0)	0.838†
Sex			
Male	13 (56.5)	27 (46.6)	0.418*
Female	10 (43.5)	31 (53.4)	
Residence			
Rural	7 (30.4)	24 (41.4)	0.361*
Urban	16 (69.6)	34 (58.6)	

Data were expressed as frequency (%) if not mentioned otherwise.

IQR: Interquartile range. *Chi-square test; †Mann-Whitney U test.

A comparison of clinical manifestations between two outbreaks is described in Table II. The recent outbreak is characterized by a higher proportion of fever, abdominal pain and vomiting (Table II).

Table II Clinical characteristics of the PICU admitted dengue patients

Variables	Year 2022 (n=23)	Year 2023 (n=58)	p value†
Fever	23 (100.0)	58 (100.0)	1.0
Headache	7 (30.4)	12 (20.7)	0.357
Abdominal pain	5 (21.7)	29 (50.0)	0.025
Persistent vomiting	14 (60.9)	50 (86.2)	0.012
Myalgia	5 (21.7)	9 (15.5)	0.501
Backpain	6 (26.1)	8 (13.8)	0.187
Diarrhoea	7 (30.4)	30 (51.7)	0.082
Retro-orbital pain	4 (17.4)	6 (10.3)	0.385
Skin rash	6 (26.1)	11 (19.0)	0.478
Bleeding spot	7 (30.4)	12 (20.7)	0.351
Mucosal bleeding	3 (13.0)	6 (10.3)	0.751

Data were expressed as frequency (%). †Chi-square test.

The median length of PICU stay was 4.0 (3.0-5.5) days and 8.0 (6.0-12.0) days in 2022 and 2023, repectively. The difference was statistically significant ($p<0.05$) (Figure 1).

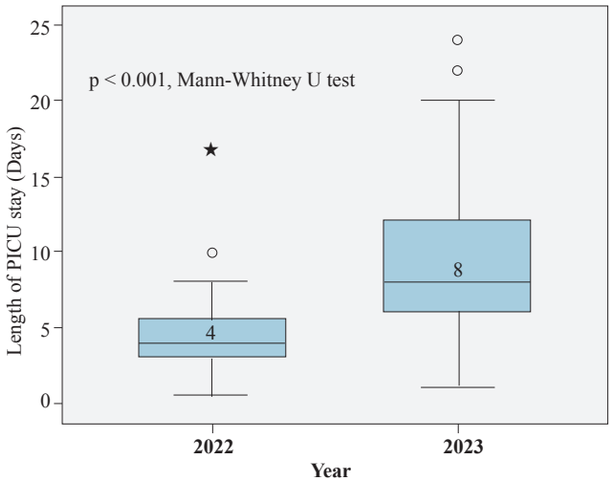

Figure 1 Comparison of length of PICU stay of the dengue infected children during 2022 and 2023

Five patients expired out of 23 PICU-admitted dengue children in 2022 and eight patients expired out of 58 PICU-admitted children in 2023. Thus, the in-hospital mortality rate was 21.7% and 13.8%, respectively, in 2022 and 2023. However, the difference failed to reach statistical significance ($p>0.05$).

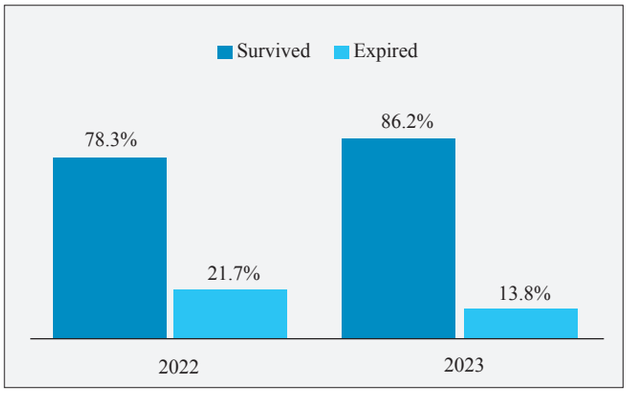

Figure 2 Comparison of case fatalities between 2022 and 2023

DISCUSSION

Recently, the changing behavior of vectors, climate changes, and human activities have contributed to more significant and unusual dengue outbreaks in Bangladesh.[17-19] The investigation into the clinical profile and outcome among critically ill dengue patients admitted to the PICU of a tertiary care hospital in 2022 and 2023 provides valuable insights into the clinical presentation of dengue fever in Bangladesh.

Compared to the 2022 outbreak, the proportion of children from 1-10 years, male children and children from the rural areas were more than in the 2023 outbreak. Though the demographic characteristics were statistically similar between the two years, a higher proportion of cases from rural areas in 2023 indicates that dengue, classified as an urban disease, has become widespread. However, a recent study conducted in rural communities in Bangladesh identified a moderate level of knowledge and unsatisfactory practices regarding dengue.[20] In the present study, boys were more affected than girls and male female ratio was 1.3:1 in 2022, which agreed with the previous studies.[12,13] In contrast, in 2023 higher proportion of fmeale children were admitted than the male in the study site.

Fever was the most common presenting complain seen in 100% cases in both years which is comparable to earlier studies.[9,10-12,21] There were fluctuations in the prevalence of other symptoms such as gastrointestinal symptoms and persistant vomiting, pain abdomen and diarrhoea were more frequent in 2023 compared to 2022. These findings emphasize the evolving nature of dengue and the need for ongoingresearch and surveillance to address the changing patterns of the disease.

The median length of PICU stay was significantly higher in 2023 than the year 2022 (8 vs. 4 days) indicating more severe disease in the last year. In contrast, mortality rate shows revarse trend. Earlier study in Bangladesh observed a mortality rate in PICU admitted children was around 21%, which was lower in the present study in 2023.[11,12] Due to the ongoing training in Bangladesh, the physicians are experienced day by day in dealing with the complicated dengue cases, which might be the reason for reduced mortality rate recently.

LIMITATIONS

There were some limitations to the consideration of our study. This study was a single-center study with a small sample size, that might not reflect the overall situation of critically ill pediatric dengue patients in Bangladesh. Moreover, it was not possible to determine the difeerences in the hematological and biochemical paramters between two outbreaks.

CONCLUSION

Last two year admitted dengue patients observed almost same clinical except more frequent gastrointestinal features in 2023. Compared to 2022, number of PICU admitted cases are more in 2023 with comparatively better outcome in 2023. A large scale multi-center study is recommended for national evaluation of the actual scenario and establishment of PICU is crucial for district-level hospital like ours.

DISCLOSURE

All the authors declared no competing interest

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