

Pattern of Co-infection with Dengue Fever: An Observational Study

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Abstract

Background: Dengue fever is a major public health problem in Bangladesh. Suspicion, attention, and early tests are necessary to identify concurrent illnesses with dengue. This study was assessed to find out the other infections associated with Dengue fever to minimize morbidity and mortality.

Materials & Methods: Hospitalized patients with fever were initially selected. After clinical and laboratory evaluation, fever with dengue NS₁ or IgM positive cases were included. Among the 175 dengue patients; during follow-up, some patients had a persistent high fever, cough, dysuria, appearance/deepening of jaundice, and other toxic features that could not correlate with dengue. Relevant investigations were done to find out the co-infections among them.

Results: Co-infection was found in 13.1% cases, among 5 to 13 years of age group with female predominance. Dengue NS₁ was found positive in 39.1% and IgM positive in 60.9% of cases. Typhoid fever 39.1%, paratyphoid fever 4.3%, rickettsial fever 13%, HAV infection 26%, HEV infection 8.7%, UTI 4.3%, and bacterial pneumonia 4.3% were found among the cases of dengue fever as co-infection.

Conclusion: The study shows that dengue patients are at a higher risk of having other infections. Thirteen percent of the dengue patients were found associated with different co-infection.

Keywords: Dengue Fever, Co-infection

Introduction

Acute febrile illness is the most common clinical syndrome among children admitted to hospitals in developing countries. Acute febrile illnesses are caused by varieties of bacteria, viruses, and parasites. Children with co-infection present with atypical or serious manifestations may cause a delay in diagnosis and a bad prognosis. Co-infection is the simultaneous infection of a host by multiple pathogen

species. In virology, co-infection includes simultaneous infection of a single cell by two or more virus particles. Co-infections of dengue fever with Chikungunya, malaria, and other arboviruses have been frequently reported from endemic areas.^{1,2} Co-infection of typhoid fever have been documented with various enteric viruses.³ Dual infections tend to have prolonged fever and increased risk of complications & increase morbidity and mortality.⁴ Physicians must be aware of the prevalence of dual infections to make a prompt diagnosis to initiate appropriate treatment. Co-infection of Malaria and Typhoid Fever in a feverish patient caused by two completely different organisms (a parasite for malaria and a bacterium for typhoid fever)⁵ and a combination of typhoid and typhus fever has been reported.⁶ Prevalence of HIV among children with TB is 16%. Pediatric tuberculosis and HIV have overlapping clinical manifestations, which could lead to missed or late diagnosis.⁷ Scrub typhus and malaria co-infection causing severe sepsis.⁸

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Currently, dengue fever is a major public health problem in Bangladesh and India. Co-infection with Dengue fever is rarely reported in our country. Dengue fever, caused by a flavivirus is the most prevalent arboviral disease in tropical and subtropical regions of Asia, the Pacific and Caribbean islands, and Central and South America. The clinical manifestations range from mild flu-like symptoms to Dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). In the initial febrile phase, the symptoms may mimic various other diseases. The overlapping clinical presentations of dengue fever, typhoid fever, paratyphoid fever, typhus or rickettsial fever, malaria, hepatitis A, hepatitis E virus infections, and many other diseases may lead to substantial misdiagnosis. Such misdiagnosis may add to significant morbidity and mortality. A high index of suspicion, careful attention to the clinical course, and early serological tests are necessary to identify the concurrent illnesses with dengue infections; so that the morbidity and mortality can be minimized.

Materials & Methods:

An observational study was done at Dr. M R Khan Shishu Hospital & ICH, Dhaka from May 2019 to October 2019 after taking ethical permission from the ethical review committee.

Children admitted with fever were included in this study. After clinical and laboratory evaluation among the fever patients fever with dengue NS₁ positive and fever with dengue IgM positive who had no history of fever in the last 1 to 3 months were included in our study. Dengue fever with only dengue IgG positive and cases of fever other than dengue was excluded from this study.

During follow-up of these 175 dengue cases, we observed that some dengue patients had persistence of high-grade fever and/or cough or burning micturition or appearance/deepening of jaundice, arthritis/arthralgia & some others toxic features that could not correlate with dengue symptoms. These arouse our suspicion that there might be some associated other infections. Then some relevant investigations were done accordingly to find out co-infections. Blood culture, widal test /febrile antigen test, SGPT, PT, serum bilirubin, anti-HAV IgM, anti-HEV IgM, urine culture, chest radiograph were sent. Dengue with co-infection patients was our study case (N). Data were analyzed using SPSS software v.20.

Results

Categorical variation of our 175 dengue patients, where dengue without co-infection group 152 (86.9%) and dengue with co-infection group 23(13.1%) shown in figure-1. Dengue with co-infection group; age was found 5 years to 13 years. Among the dengue with co-infection patients; male was 8 (34.8%) and female 15 (65.2%). The male-female ratio was 1: 1.53 (Table-I)

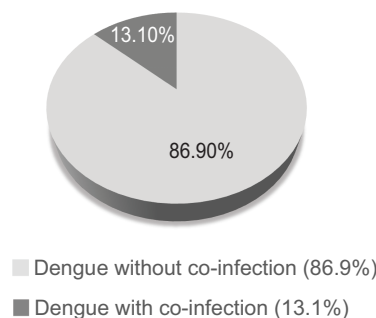


Fig.-1: Pie chart showing co-infection in dengue patient.

Table-I

Showing the gender distribution of the dengue cases with co-infection(N= 23)

Gender	Number (%)
Male	8 (34.8%)
Female	15 (65.2%)

Among the dengue with co-infection group; typhoid fever 9(39.1%), paratyphoid fever 1(4.3%), typhus/ rickettsial fever 3(13%), Hepatitis A virus infection 6(26%), Hepatitis E virus infection 2(8.7%), urinary tract infection 1(4.3%), bacterial pneumonia 1(4.3%) was found as co-infection (Table-II).

Table-II

Showing the pattern of co-infection with dengue fever (N= 23)

Diagnosis	Number (%)
Typhoid fever	9 (39.1%)
Paratyphoid fever	1 (4.3%)
Typhus/ Rickettsial fever	3 (13.1%)
Hepatitis A virus	6 (26.1%)
Hepatitis E virus	2 (8.7%)
Urinary Tract infection	1 (4.35%)
Bacterial pneumonia	1 (4.35%)

Among the cases of dengue fever with co-infection group; anti dengue IgM was found positive in 14 (60.9%) cases and dengue NS₁ positive in 9(39.1%). During screen for co-infection blood culture was found positive for salmonella typhi 4(17.4%), salmonella paratyphi A 1(4.3%). Widal test was reactive (high rising titer) in 5(21.7%), weil-Felix reaction (high rising titer) 3(13%), anti HAV IgM positive 6(26%), anti HEV IgM positive 2(8.7%). Urine culture was found positive for E.coli 1(4.3%) and blood culture positive for Streptococcus Pneumoniae 1(4.3%) (Table-III).

Table-III

Showing the pattern of co-infection in dengue fever (N=23)

Screening Test	No (%)
Enteric fever	
Culture + ve for S. Typhi	4(17.4%)
Culture + ve for S. paratyphi A	1(4.3%)
Widal test reactive	5(21.7%)
Typhus fever	
Weil-Felix reaction	3(13%)
Acute viral hepatitis	
Anti HAV IgM positive	6(26%)
Anti HEV IgM positive	2(8.7%)
Urinary tract infection	
Urine culture + ve for E.coli	1(4.3%)
Bacterial pneumonia	
Blood culture + ve for	
Streptococcus Pneumoniae	1(4.3%)

Discussion

In this study co-infection was found in 23(13.1%) cases of dengue fever with male-female ratio was 1:1.5. In this study, among the 23 dengue with co-infection patients; nine patients had typhoid fever and one patient paratyphoid fever. In a tertiary care center in Chennai Vigna et al. reported two confirmed cases of dengue with typhoid co-infection.⁹ Bansal R. et al. also reported two confirmed case of typhoid with dengue as co-infection.¹⁰ Three patients also having typhus/rickettsial fever with dengue fever.¹⁰ Weil-Felix reaction was found reactive with a high rising titer. Dengue and scrub typhus co-infection was observed in a study abroad where scrub typhus was positive.¹¹

Co-infections can vary with different geographical locations and countries. Full screening resulted in 104

publications that met the eligibility criteria and reported Malaria/Dengue, Dengue/Chikungunya, and Malaria/Dengue/Chikungunya co-infections. Most studies were reported from India.¹² A study in Karnataka, India report two children with concurrent dengue and vivax malaria.¹³ In our study no malaria case was found as co-infection.

One patient having urinary tract infection in our study with dengue fever. Dengue and concurrent urinary tract infection was also reported by Wiwinitkit S et al. in their study.¹⁴

One patient having dengue with bacterial pneumonia diagnosed by blood culture positive for Streptococcus Pneumoniae was found in this study. Miyata N et al. experienced a case of bacterial pneumonia following dengue fever as a complication and that cavity-forming pneumonia due to Staph. aureus.¹⁵ Staphylococcus aureus pneumonia and dengue virus co-infection found in another study.¹⁶

In our study dengue with acute viral hepatitis (Hepatitis A virus infection) was found in 6 patients, diagnosed by positive Anti HAV IgM. Goal G. reported a case of 4 years old boy partially recovered from HAV infection subsequently suffered from dengue virus infection. His condition was complicated by acute fulminant hepatic failure and that was probably the first pediatric fatal case of Hepatitis A virus (HAV) with dengue virus co-infection.¹⁷ Dengue fever and hepatitis A infection as a concurrent infection was also found in a four year old girl.¹⁸ From Karnataka, India Bhat YR. reported one case of co-infection of dengue with Hepatitis A virus with marked alternations in liver function.¹³

In this study dengue with acute Hepatitis E virus infection was also found in two patients. In Pakistan, Yakoob J. et al. reported a case where dengue fever which occurred concomitantly with Hepatitis A and Hepatitis E virus infection.¹⁹

In the case of dengue fever and hepatitis, widal test may be falsely positive. Anti HEV IgM positive may be falsely positive in dengue fever. So, a clinical correlation was done in these cases in our study.

Limitation

It was a single-center study with small sample size. The severity and outcome of co-infections could not have mentioned in our study. Concurrent other viral infections with dengue virus could not be identified as virus isolation could not be possible in our settings.

Conclusion

The study shows that dengue patients are at a higher risk of having other infections. Thirteen percent of dengue patients were found associated with co-infections. Typhoid fever, paratyphoid fever, rickettsial fever, viral hepatitis A & E, bacterial pneumonia, and urinary tract infection were found as co-infection with dengue fever. So, dengue patients should be closely monitored and should be managed accordingly when associated with co-infections.

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