

# Prevalence of Coinfection of Enteric Fever with Dengue in Paediatric Age Group: A Descriptive Observational Study

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## Abstract

**Background:** Treatment and diagnosis are difficult when dengue and typhoid illness co-occur. Without test proof, it can be challenging to accurately diagnose and treat these two disorders due to their comparable symptoms and differential diagnoses. They both pose a diagnostic problem, particularly in young patients, because they are endemic in India and mirror clinical presentation. When treating patients with dengue, clinicians must be well aware of the possibility of concomitant typhoid fever. Only a few isolated cases of dengue and typhoid co-infection have been reported. The objective is to find out prevalence of coinfection of enteric fever with dengue in paediatric age group and its age and gender association. **Material and Methods:** A total of 1608 blood samples from pediatric age group were collected having history of fever. The study was carried out at Department of Microbiology at Government Medical College, Dharashiv. **Results:** Dengue and Typhoid coinfection was found in 120 cases out of 1608 paediatric patients showing the prevalence of Dengue and Typhoid coinfection as 7.5% in our study. Distribution of coinfection prevalence according to age group and gender showed that out of 99 male cases of coinfection, majority were from 6-10 years age group i.e. 49.5% followed by 33.3% from 1-5 years and 17.2% from 11-15 years age group. Out of 21 female cases of coinfection, majority were from 11-15 years age group i.e. 38.1% followed by 33.3% from 1-5 years and 28.6% from 11-15 years age group. **Conclusion:** Prevalence of Dengue and Typhoid coinfection as 7.5% in our study. Prevalence was more in male cases of coinfection with majority cases were from 6-10 years age group i.e. 49.5% and out of 21 female cases of coinfection, majority were from 11-15 years age group i.e. 38.1%.

**Keywords:** prevalence, coinfection, enteric fever with dengue, paediatric.

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## INTRODUCTION

Acute febrile illness is one of the common causes of hospital admissions in India burdening an already stretched healthcare system. The common causes of acute febrile illness in India are infectious diseases like Dengue, malaria, Dengue and typhoid fever, if not managed timely may result in potentially fatal outcomes.<sup>[1-4]</sup> The epidemiology, course of infection, and consequences of dengue co-infection with enteric fever were shown to be similar to those of other acute febrile diseases.<sup>[5]</sup> The genus Flavivirus has four serotypes (DEN1-4) that cause dengue fever. Aedes mosquitoes carry this virus, which is among the most common arthropod-borne illnesses, to people. The clinical presentation of dengue may resemble other illnesses that cause acute fever in dengue-endemic regions.<sup>[6]</sup>

The clinical characteristics listed above are present in many different types of acute febrile sickness, such as typhoid, various viral diseases, malaria, etc. This becomes crucial when handling instances that have a protracted fever course. Dengue and enteric fever coinfection has been reported in a number of investigations.<sup>[7,8]</sup>

Treatment and diagnosis are difficult when dengue and typhoid illness co-occur. Without test proof, it can be challenging to accurately diagnose and treat these two disorders due to their comparable symptoms and differential

diagnoses.<sup>[9]</sup>

They both pose a diagnostic problem, particularly in young patients, because they are endemic in India and mirror clinical presentation. When treating patients with dengue, clinicians must be well aware of the possibility of concomitant typhoid fever. There are very few isolated cases of dengue and typhoid co-infection.<sup>[10,11]</sup>

**Objective:** To find out prevalence of coinfection of enteric fever with dengue in paediatric age group and its age and gender association.

## MATERIALS AND METHODS

A total of 1608 blood samples from pediatric age group were collected having history of fever. The serum was separated. The

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Lord's Med Dengue Combo (Ag + Ab) Rapid test kits were procured and tests for Dengue NS1 Antigen and Dengue IgM/IgG test were performed using immunochromatographic assay. The study was carried out at Department of Microbiology at Government Medical College, Dharashiv.

The AGD Seropak Stained Antigen kit were procured and tested for *Salmonella typhi* and *S. paratyphi* Antibody by Widal test using the principle of Slide Agglutination

**Statistical analysis:** Data was collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was

expressed in terms of proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/Fischer's exact test. A p value of  $<0.05$  was considered as statistically significant whereas a p value  $<0.001$  was considered as highly significant.

## RESULTS

Dengue and Typhoid coinfection was found in 120 cases out of 1608 paediatric patients showing the prevalence of Dengue and Typhoid coinfection as 7.5% in our study.

**Table 1: Distribution according to prevalence of coinfection**

		Frequency	Percent
Coinfection Dengue and Typhoid	Positive	120	7.5
	Negative	1488	92.5
	Total	1608	100.0

**Table 2: Distribution according to age group**

		Frequency	Percent
Age group in years	1 to 5	40	33.3
	6 to 10	55	45.8
	11 to 15	25	20.8
	Total	120	100.0

Distribution of the coinfection cases according to age group revealed that majority were from 6-10 years i.e. 45.8% followed by 1-5 years age with 33.3% and least i.e. 20.8% from 11-15 years age group.

**Table 3: Distribution according to gender**

		Frequency	Percent
Gender	Male	99	82.5
	Female	21	17.5
	Total	120	100.0

Distribution according to gender revealed that 82.5% were males and 17.5% were females.

**Table 4: Distribution of coinfection prevalence according to age group and gender**

		Male		Female		Total
		Number	Percent	Number	Percent	
Age group in years	1 to 5	33	33.3	7	33.3	40
	6 to 10	49	49.5	6	28.6	55
	11 to 15	17	17.2	8	38.1	25
	Total	99	100.0	21	100.0	120

Distribution of coinfection prevalence according to age group and gender showed that out of 99 male cases of coinfection, majority were from 6-10 years age group i.e. 49.5% followed by 33.3% from 1-5 years and 17.2% from 11-15 years age group. Out of 21 female cases of coinfection, majority were from 11-15 years age group i.e. 38.1% followed by 33.3% from 1-5 years and 28.6% from 11-15 years age group.

49.5% followed by 33.3% from 1-5 years and 17.2% from 11-15 years age group. Out of 21 female cases of coinfection, majority were from 11-15 years age group i.e. 38.1% followed by 33.3% from 1-5 years and 28.6% from 11-15 years age group. [Table 4] Jose P. et al,<sup>[12]</sup> in their study reported that total of 1630 children were admitted with fever during the study period. Of these, 606/1630 (37.1%) were diagnosed to have dengue fever with positive dengue serology. The prevalence of coinfection i.e. 37.1% was higher as compared to our study findings.

Both dengue and typhoid fever are notifiable diseases in India, known to be increasingly reported during the monsoons.<sup>[10]</sup> Vigna et al,<sup>[13]</sup> published a case report on two such patients who also presented with high-grade fever, myalgia, and gastrointestinal symptoms: nausea, vomiting, and abdominal pain. Both typhoid and the "dengue with warning signs" group of patients exhibit these symptoms.

## DISCUSSION

Dengue and Typhoid coinfection was found in 120 cases out of 1608 paediatric patients showing the prevalence of Dengue and Typhoid coinfection as 7.5% in our study. [Table 1] Distribution of coinfection prevalence according to age group and gender showed that out of 99 male cases of coinfection, majority were from 6-10 years age group i.e.

Both typhoid and dengue can develop into consequences including septic shock and multiorgan failure if they are not identified and treated very once. While treating cases of dengue or typhoid with or without unusual characteristics, coinfection should always be considered because both diseases are endemic in India.<sup>[13]</sup>

In the few Indian studies that are currently available, coinfection rates among patients with acute febrile illness have been reported to be as high as 34 and 7.8%.<sup>[14,15]</sup> During the feverish stage of DENV infection, Bhatti et al,<sup>[16]</sup> reported false positive results for S. Typhi IgM that were culture negative for typhoid.

Numerous writers from around the world have reported Dengue fever and enteric fever are two of the main causes of morbidity and mortality.<sup>[17-20]</sup>

Three (0.30%) of the 883 dengue infection cases in a study conducted in Cambodia by Kasper et al,<sup>[21]</sup> also had typhoid illness. Thirteen (4.1%) of 310 patients with fever had both dengue and typhoid fever, according to a study by Baba et al,<sup>[22]</sup> from Nigeria. According to a study done in Delhi, 7.8% of dengue cases had typhoid coinfection. In vitro, dengue virus can reduce T-cell proliferation in response to mitogens, albeit the exact processes are still unknown. Dengue's disruption of the intestinal mucosal barrier could be another factor contributing to the rise in gram-negative sepsis.

In India, typhoid fever is endemic and most common in metropolitan areas. In some endemic locations, the annual incidence is close to 1% of the population. Typhoid fever has a reported incidence of 214.2 cases per 100,000 people annually in the 5–15 age range.<sup>[23]</sup> The dengue virus generates epidemics and occasional instances in India throughout the year, peaking between August and November during the humid season. It can be difficult to diagnose coinfections with common endemic diseases, particularly when dengue outbreaks are occurring. Numerous co-infections with dengue, such as chikungunya, melioidosis, and malaria, have been documented from tropical nations. In patients with atypical symptoms, dual infections with other endemic illnesses like leptospirosis and viral hepatitis B have also been documented.<sup>[24]</sup>

## CONCLUSION

Prevalence of Dengue and Typhoid coinfection as 7.5% in our study. Prevalence was more in male cases of coinfection with majority cases were from 6-10 years age group i.e. 49.5% and out of 21 female cases of coinfection, majority were from 11-15 years age group i.e. 38.1%.

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## Conflicts of interest

There are no conflicts of interest.

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