

## Original Research Article

# Concurrent dengue and typhoid infection: study from a tertiary care centre in Muzaffarnagar, India

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## ABSTRACT

**Background:** Acute febrile illness is a common presenting complaint during the rainy season. Rains predispose to both water and vector borne diseases. Co-infection of dengue with malaria, leptospirosis, typhoid, scrub typhus and other arboviral diseases can occur in endemic areas. Such dual infections are difficult to diagnose and create a diagnostic dilemma for the treating physician. Here in this study authors attempt to find out rates of concurrent dengue and typhoid infection.

**Methods:** This retrospective study was done between August to November 2017. 403 patients presenting with acute febrile illness were studied. Diagnosis of dengue was done by rapid card test detecting NS1 antigen, IgM and IgG antibodies. Serodiagnosis of *Salmonella* infection was done by tube Widal test.

**Results:** : Out of 403 febrile sera samples tested 154 (38.2%) were positive for dengue (either NS1 antigen or IgM antibodies or both), 71(17.6%) were positive for Widal test O and H titres  $\geq 1:160$ ) and 28 (6.9%) were positive for both dengue as well as *Salmonella* (Widal test).

**Conclusions:** Acute febrile illnesses with diagnostic dilemma may be seen in cases of co-infection. Only better clinical judgement and right choice of laboratory tests can diagnose these diseases timely and prevent fatal outcomes.

**Keywords:** Concurrent infection, Dengue, Febrile, Typhoid

## INTRODUCTION

Febrile illness is a common clinical syndrome for dengue, typhoid, Japanese Encephalitis, chikungunya, leptospirosis, influenza and malaria. Dengue presents with flue like symptoms with high grade fever, generalized body ache, nausea and vomiting. A systemic review and meta-analysis of dengue fever in India in 2017, estimated the overall prevalence of laboratory confirmed dengue infection among clinically suspected patients was 38.3%.<sup>1</sup> Like dengue typhoid fever also presents with similar symptoms. Incidence in India being 9.7% with highest incidence in children of age group 2-4 years.<sup>2</sup>

Concurrent infections of dengue with malaria, leptospirosis, typhoid, scrub typhus and other arboviral disease can occur in endemic areas. They are becoming a major health problem and similarity of symptoms further makes accurate clinical diagnosis difficult.<sup>3</sup> Although co-infection with Malaria and febrile illness, course of infections has been studied widely, but no data relevant to dengue and typhoid co-infection from our region of Uttar Pradesh as is available. Both of these diseases are endemic and epidemic here. The present study was thus designed to explore the incidence of co-infection in patients presenting with acute febrile illness in and around Muzaffarnagar district of Uttar Pradesh, India.

**METHODS**

A retrospective analysis of 403 patients’ sera with febrile illness from August 2017 to November 2017 were selected for the study. The study was carried out at Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India. Patients hospital records showed that common clinical manifestations in these cases were fever, generalized body ache, nausea, vomiting.

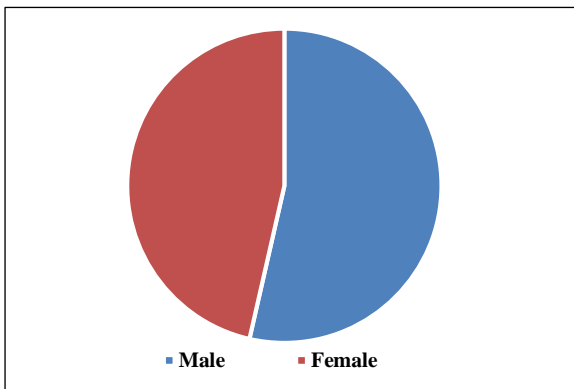
Demographic data including age, sex and detailed history of onset of symptoms were recorded from medical records.

Dengue viral infection was diagnosed by NS1 antigen, IgM antibodies or both positivity by card test (Rapi GEN BIOCREDIT dengue NS1Ag+Ab Duo) along with decrease in platelet count.

Serodiagnosis of *Salmonella typhi* infection was conducted by Widal test which is a slide agglutination test and detects antibodies against O and H antigens of *salmonella typhi* and H antigens of *salmonella paratyphi A and B*.<sup>4</sup> Titer value of  $\geq 1:160$  for both O and H was considered as clinically significant in single acute phase samples which is the base line titer for this region.<sup>5</sup>

**RESULTS**

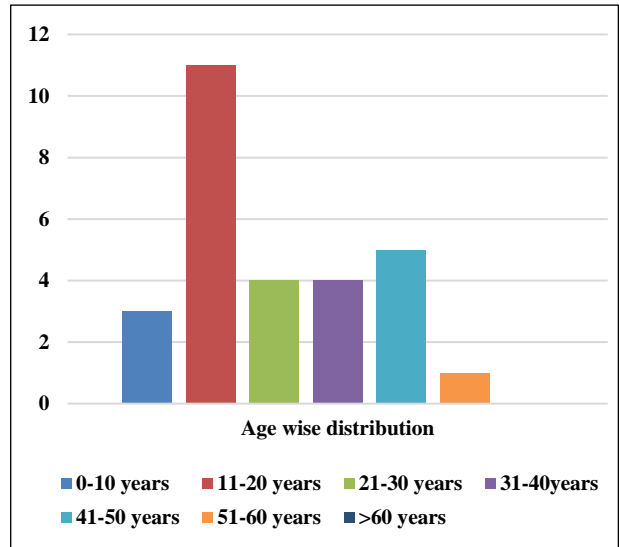
In the present study 403 febrile sera samples were tested in which 154 (38.2%) were positive for dengue (either NS1 Ag or IgM Ab or both), 71 (17.6%) were positive for Widal test only (O and H titers  $\geq 1:160$ ) and 28 (6.9%) were positive for both dengue as well as Salmonella (Widal test). Out of these 28, 15 (53.6%) were male and remaining 13 (46.4%) were female (Figure 1).



**Figure 1: Sex wise distribution of co-infected patients (n=28).**

More males were co-infected as compared to females. Amongst male most commonly co-infected age group was 11-20 years, amongst female also same age group was maximally co-infected. The various age groups tested were 0-10 years (3), 11-20 years (11), 21-30 years (4), 31-40 years (4), 41-50 years (5) and only 1 patient

was above 50 years. Maximum numbers of co-infection were seen in age group 11-20 years which was 11 out of 28 co-infected followed by 41-50 years (Figure 2).



**Figure 2: Age wise distribution of co-infected patients (n=28).**

**DISCUSSION**

Both dengue and typhoid are major public health problem in India especially during the rainy season. Dengue presents clinically after an incubation period of 3-14 days, as fever of sudden onset with headache, retrobulbar pain, conjunctival congestion, pain in the back and limbs, lymphadenopathy and maculopapular rash. With typhoid the clinical course may vary from a mild undifferentiated pyrexia to a rapidly fatal disease. Onset is usually gradual with an incubation period of 3-56 days with step ladder fever, headache, malaise, anorexia, abdominal discomfort with either constipation or diarrhea. Since both dengue and typhoid have varied clinical presentations these diseases are often under reported or misdiagnosed. If not diagnosed and treated promptly both dengue and typhoid can progress into life-threatening complications like hemorrhage, circulatory collapse, intestinal perforation etc.<sup>6</sup> Usually in presence of one febrile undifferentiated fever the other may go unnoticed or may not be pursued by the clinician especially in resource limited settings. However, there is evidence that dual or concurrent infections do occur due to host related factors, environmental factors or agent related factors or vector adaptability.<sup>7-11</sup> Several studies have brought about cases of co-infection of dengue with other febrile illnesses like leptospirosis, malaria and other arboviral diseases.<sup>12-17</sup> Maximum dengue patients were from age group 11-20 years due to the fact that these patients have more outdoor activity so are more susceptible to infections (both dengue and typhoid). The rate of co-infection in present study is 6.9% which is much higher than many other earlier studies. Kasper et al, and another study from South India reported rates of co-infection to as low as

0.3% and 0.6% respectively.<sup>12,16</sup> However in a study from New Delhi the rate of co-infection was high as in present study. They reported a rate of 7.8%.<sup>17</sup> High rates in these parts of North India may be explained by the fact that both the diseases are endemic here. Further studies regarding this issue need to be done. Authors believe that increasingly infectious diseases are presenting with dual infections, so there is a need to heighten awareness among clinicians to the changing dynamics of disease manifestations. The present study has its own limitations of it being a retrospective study. Secondly, Widal test has its own limitations in diagnosis of typhoid fever. Thirdly co-relation with blood culture was not done. As blood culture was not done in these patients there is a possibility that more cases could have been detected.

## CONCLUSION

The present study concludes that concurrent infections of typhoid and dengue are common. These infections should be properly diagnosed, and timely medication should be provided to reduce complications and also to avoid mortality.

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