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Assessment of Clinical Profile and Treatment Outcome of Children With Dengue and Co-Infections

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Abstract

In developing nations such as India, diseases like dengue, malaria typhoid are endemic and often manifest as acute undifferentiated fever. In areas where multiple infectious agents coexist, the incidence of co-infections is higher. In tropical regions, seasonal variations increase the risk of individuals being co-infected with dengue and other infectious diseases such as rickettsia, malaria enteric fever. This study aimed to examine the association of co-infections in children diagnosed with dengue. In this retrospective hospital-based study, case records of all patients diagnosed with dengue and admitted during this period were reviewed. The study included patients admitted to ward and ICU who tested positive for NS1, IgM, or IgG. Patients with dengue-like symptoms but serologically negative were excluded. A total of 245 patients were admitted with serologically confirmed dengue during the study period. Of these, 143 (58.37%) were female and 102 (41.63%) were male, 215 (87.76%) were from rural areas 30 (12.24%) were from urban areas. Among the 245 patients, 33 had co-infections. Of these, 19 (57.58%) had enteric fever, 8 (24.24%) had malarial fever, 3 (9.09%) had rickettsial fever 2 (6.06%) had urinary tract infections (UTIs). Co-infection was more frequent in patients with dengue with warning signs and severe dengue, which was statistically significant ($p<0.05$). Children with co-infections had longer hospital stays mortality was higher among patients with severe dengue and co-infections. Co-infections with enteric fever, malaria, rickettsia UTIs are not uncommon in patients with dengue fever. Children with co-infections present with more severe dengue and have extended hospital stays.

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Key Words

Dengue, malaria, co-infection, children

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INTRODUCTION

In developing countries such as India, Dengue, Malaria and Enteric Fever are endemic and often manifest as acute undifferentiated fever. In regions where multiple infectious agents are endemic, co-infection is more common. Children with co-infections can complicate the diagnosis of acute febrile illness. The primary causes of acute febrile illness in these regions include Dengue fever, rickettsial fever, typhoid fever, malaria, urinary tract infections (UTIs) respiratory tract infections. Co-infection, defined as the simultaneous infection of a host by multiple pathogens, can lead to atypical or severe clinical presentations in children, delaying diagnosis and resulting in a poor prognosis[1-3].

In tropical countries, seasonal variations increase the likelihood of co-infections, such as Dengue with rickettsia, malaria typhoid. Dengue is recognized as the most rapidly spreading mosquito-borne viral disease globally, while malaria remains the most prevalent cause of fever. Distinguishing between these two conditions is critical due to their clinical similarities and the potential for Dengue fever to progress unexpectedly to severe Dengue. Both Dengue fever and malaria can present with thrombocytopenia, which is considered a marker of disease severity, a poor prognostic indicator is associated with an increased probability of malaria. Enteric fever continues to be a significant public health concern worldwide and is a major cause of morbidity in developing regions[4-6].

The aim of this study is to investigate the relationship between co-infection and Dengue fever in pediatric patients. Specifically, the objectives are to evaluate the length of hospital stay for children suffering from Dengue fever with co-infections, to examine the correlation between the severity of the illness and the associated mortality rates to determine the mortality rates in children with Dengue fever who have concurrent infections.

MATERIAL AND METHODS

This retrospective study was carried out within the pediatric wards and ICU. The study focused on meticulously reviewing the case records of all patients diagnosed with Dengue fever who were admitted to the hospital during the specified time frame. Inclusion criteria for the study encompassed patients admitted to both the Pediatric ward and Pediatric Intensive Care Unit (PICU) who tested positive for Dengue virus NS1 antigen, or exhibited positive results for IgM or IgG antibodies. Patients with symptoms resembling Dengue fever but testing negative on serological assays were excluded from the study cohort.

A comprehensive total of 245 patients were deemed eligible and enrolled in this investigation following the necessary approval from the institutional ethics committee. The study's methodology involved utilizing descriptive data analysis to classify and delineate the various clinical presentations associated with Dengue fever, along with exploring potential associations with co-infections. Statistical analysis of the gathered data was conducted using Epi info software, complemented by the application of the chi-square test to ascertain significant findings and associations within the study population.

RESULTS AND DISCUSSIONS

The most affected age group was 51-60 years. Of the 124 patients, 124 were male and 30 were female, yielding a male-to-female ratio of 4.13:1 (Table 1).

In our study, a total of 245 patients with serologically confirmed Dengue fever were admitted. Among them, 171 (69.80%) had Dengue without warning signs, 59 (24.08%) had Dengue with warning signs 15 (6.12%) had severe Dengue. Additionally, 33 patients (13.47%) had co-infections. Among these co-infected individuals, 119 (57.58%) had enteric fever, 8 (24.24%) had malarial fever, 3 (9.09%) had rickettsial fever 2 (6.06%) had urinary tract infections (UTIs).

A retrospective study conducted by Meena SS *et al*.[7] focused on the prevalence of concurrent infections among tropical fevers in the pediatric population. Among the 70 Dengue patients in their study, 26 (37.14%) had co-infections. Of these, 3 (11%) had Dengue with enteric fever, 2 (8%) had Dengue with scrub typhus, 3 (11%) had Dengue with malaria 1 (3.8%) had Dengue with both malaria and scrub typhus. These findings align with similar studies from India and Southeast Asian countries, albeit with some differences in incidence rates[8-12].

Bhakri *et al*.[13] compared clinical and hematological parameters between two groups-malaria coinfection versus Dengue monoinfection and found that 20 children (3.3%) were co-infected with malaria.

Hasnat *et al*.[14] study on concomitant infections of typhoid and rickettsia with Dengue fever in acute febrile patients revealed that among 244 patients with acute febrile illnesses, Dengue monoinfection accounted for 44.26%, while coinfections were present in 18.03% (Dengue with typhoid at 7.37% and Dengue with rickettsia at 10.66%).

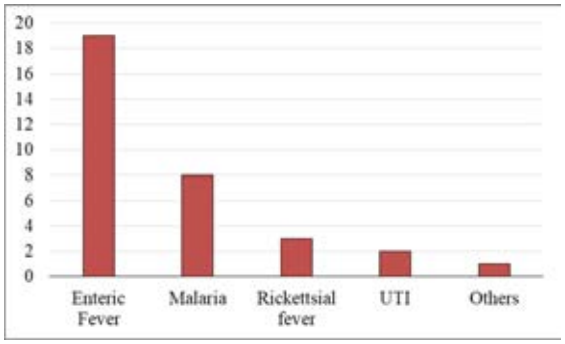

Fig. 1: Types of co-infections in paediatric Dengue case

Table 1: Clinical profile of paediatric Dengue cases

Variable	n	percentage
Dengue fever	212	86.53
Dengue with Coinfection	33	13.47
Total	245	100.00
DF without warning signs (I)	171	69.80
DF with warning signs (II)	59	24.08
Severe DF (III)	15	6.12
Total	245	100.00

Table 2: Co-relation between Dengue with coinfection and category of Dengue

Variable	DF without warning signs (I)	DF with warning signs (II)	Severe DF (III)	p-value
Dengue fever	170	40	2	<0.05
Dengue with coinfection	1	19	13	
Total	171	59	15	

Table 3: Correlation of Dengue category with co-infection

	DF with/without warning signs	Severe DF	p-value
Dengue without Coinfection	209	3	<0.05
Dengue with Coinfection	21	12	
Total	230	15	

Table 4: Duration of Hospital stay and mortality

Outcome measure	Dengue without Coinfection	Dengue with Coinfection	p-value
Hospital Stay (Days); Mean ± SD	5.8 ± 2.3	8.1 ± 3.3	<0.05
Mortality; n (%)	15 (7.17)	8 (38.09)	<0.05

Ghosh *et al*.[15] reported that out of 175 Dengue patients, 152 (86.9%) had Dengue without co-infection 23 (13.1%) had Dengue with co-infection. Among those with co-infection, 9 (39.1%) had typhoid fever, 3 (13%) had typhus/rickettsial fever 1 (4.3%) had a urinary tract infection (UTI), whereas in our study, only 2 patients (6.9%) had UTIs.

We observed that the number of children with coinfections was higher among those with Dengue warning signs and severe Dengue they experienced prolonged hospital stays. Mortality rates were also higher among children with severe Dengue and coinfections. These findings are consistent with observations from studies in Orrisa and Gujarat, India[16,17].

In the study by Meena SS *et al*.[17] the average duration of hospital stay was 13 days (ranging from 8-21 days). However, two patients-one with concurrent Dengue and Malaria infection and another with Dengue and Scrub typhus-succumbed to their infections.

CONCLUSION

In patients with Dengue fever, co-infections with enteric fever, malaria, rickettsia urinary tract infections (UTIs) are not uncommon. It is essential to consider the possibility of co-infection with one or more organisms when managing patients with acute febrile illnesses. Children who experience co-infections often present with more severe manifestations of Dengue fever and may also require a prolonged duration of hospitalization.

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