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Original Research Article

Seroprevalence of Dengue and Chikungunya Virus Co-Infection in a Tertiary Care Hospital, Warangal, Telangana

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Abstract:

Introduction: Dengue and Chikungunya are rapidly spreading viral infections and they have common clinical presentation. Chikungunya is often misdiagnosed, tested rarely. Thus, the individuals suspected with dengue and/or chikungunya should be tested for both especially in the endemic areas. With this a study was taken to detect the seroprevalence of the current coinfection.

Materials and Methods: This was a prospective study conducted in the Kakatiya Medical College, Hanamkonda, from August 2022 to March 2023. Clinically suspected patients of dengue and/or chikungunya patients from various inpatient departments of MGM Hospital, Warangal were included. Serum samples were tested for the NS1 antigen and IgM antibodies of dengue and chikungunya both by ELISA method.

Results: out of the 3096 samples, the coinfection positivity was 8.6%. Dengue positivity was 10.27% and 4% (123) were chikungunya positive. Majority of coinfection was found in < 10 years group. In the dengue mono-infection the male female ratio was 1.33 and it was 1.15 among the chikungunya mono-infection. Fever was detected in all. The seasonal distribution of DENV and CHIKV coinfection was predominated in September followed by November.

Conclusion: Due to the increase prevalence of these viral infections, all the clinically suspected cases should be tested for both the pathogens especially in the endemic area. This may help to implement proper mosquito control measures as well as spread of the infections.

Keywords: Chikungunya, Dengue, coinfection.

Introduction

Globally there is an increased incidence of dengue; around half the world's population are at risk. The dengue risk is reported in 128 countries, but there is high burden in Asia. India is one of the major contributors. [1] In India, from 1990 onwards, there have been frequent Dengue epidemics which tend to have seasonal patterns, with transmission often peaking during and after rainy seasons. [1] Climate change, urbanisation, change in behaviour, mass gathering, migration of humans and animals, development of air transport and extensive agriculture have all been suggested to have contributed to the rapid worldwide spread of vector-borne diseases. [2]

In India, Chikungunya (CHIK) infected areas overlap with Dengue (DEN) endemic areas. Both these viruses are vector borne, *Aedes aegypti* and *Aedes albopictus* are the mosquito's transmit these infections. In 1967, the DEN CHIK coinfection were reported in Calcutta. [3] However, more than thirty years later, in 2006, the coinfection was reported, 13 states were victimised. [4] Since that time, various

studies have been reported on this coinfection. Due to common clinical presentation and higher incidence rate of DEN, always CHIK being misdiagnosed. According to the recent reports, there is clinical severity among the coinfected individuals with high mortality when compared to the mono-infection. Thus, regular surveillance these viruses should be done in the endemic areas. [5] Therefore, the present study was conducted with an aim to find the prevalence of DEN CHIK coinfection in a tertiary health care setup.

Methods

It was a prospective research conducted in Virology Research and Diagnostic Laboratory, Kakatiya Medical College, Hanamkonda. Study was conducted from August 2022 to March 2023. Study protocol was approved by the institutional ethics committee. An informed consent was taken from the participants.

Individuals of all age groups, those submitted informed consent with typical clinical history of fever >39°C with chills, rashes, joint pain, nausea/vomiting, headache and myalgia were included in the research. In case of minors, consent was collected from the parents. Non cooperative individuals were not considered in this study. Convenient sampling was considered in this research. Individuals those satisfied the inclusion criteria during the study period were considered in this research.

Blood samples were collected from inpatients admitted in different wards from nearby localities at MGM Hospital, Warangal. Blood sample was collected by venue puncture by observing the universal (standard) safety precautions. Blood was collected form large median cubital or basilic or cephalic vein. After selecting the vein, tourniquet was applied 3 – 4 inches above the collection site. The puncture site was cleaned with 70% alcohol pad, moving in and outward spiral movement; the area was allowed to dry before proceeding. Slowly sample will be collected by puncturing the vein. Approximately, 2–5 ml of blood was collected and sent to VRDL, Kakatiya Medical College, Hanamkonda.

In the laboratory, immediately after receiving the specimen, serum was separated. The serum was tested for IgM antibodies for DEN and CHIK, respectively by MAC-ELISA kit method. Simultaneously nonstructural protein 1 (NS1) antigen of DEN was also detected by ELISA, kits supplied by NIV, Pune. If there is any delay in the processing of the specimen, the serum was stored as per the manufacturer guidelines.

Statistical analysis: The data were analysed using SPSS version 21. The data was presented in mean, percentage.

Results

Total 3096 samples were collected; coinfection positivity was 8.6% (265) and male female ratio was 1.2. DEN positivity was 10.27% (318) and 4% (123) were CHIK positive. Age wise, majority of DENV and CHIKV coinfection was found in < 10 years (26.8%). The highest DEN was detected in 10 – 20 years (25.7%) group and highest (19.5%) CHIK was found in < 10 years and 51 – 60 years, respectively (Table 1). Whereas the male female ratio was 1.33 and 1.15 among the DEN and CHIK infection, respectively (Table).

Table: Age wise distribution of the study participants.

Age	Coinfection			DEN			CHIK		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
< 10	35	36	71	55	33	88	14	10	24
10-20	26	26	52	48	34	82	7	9	16
21-30	18	12	30	24	20	44	9	3	12
31-40	28	12	40	18	15	33	3	4	7
41-50	11	10	21	12	14	26	8	10	18
51-60	14	19	33	13	9	22	14	10	24
>60	13	5	18	12	11	23	11	11	22
Total	145	120	265	182	136	318	66	57	123

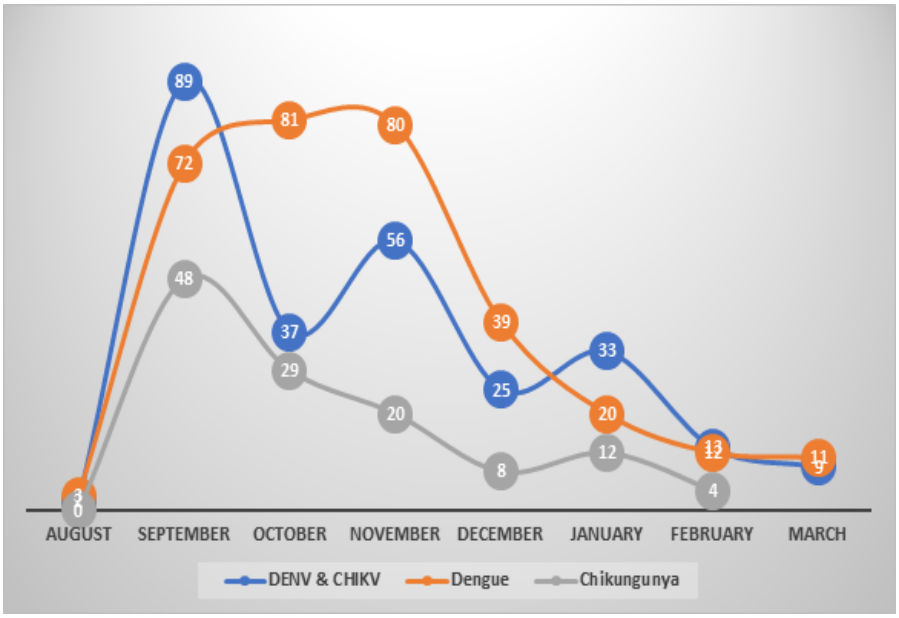

Figure 1: Seasonal distribution of the study participants

Fever was detected in all (100%); myalgia was prevalent (79.03%) among DEN individuals while arthralgia was common (82%) among the CHIK individuals. The seasonal distribution of DENV and CHIKV coinfection was predominated in September followed by November (Figure).

Discussion

DEN and CHIK have common clinical features such as high‑grade fever, rashes, nausea, headache, and body pain. Hence it is not always easy to differentiate the two infections clinically. In India, the actual numbers of DEN could be grossly underreported as the majority of the cases are mild/asymptomatic and/or misdiagnosed. [1]

The male female ratio was 1.2, 1.33 and 1.2, respectively in the coinfection, DEN and CHIK infections (Table 1). In a recent report published from North India also reported similar findings. [6] The exact reason for this is not reported by the investigators. But this may be due to more outdoor activity among the male. In the present study, the prevalence of DEN and CHIK coinfection was 8.6%. Similar prevalence was reported by Banwari et al. [4] and Naidu AP et al. [7] Whereas another study, the prevalence was reported to be 12.2%. [8]

In our study, majority of the DENV CHIKV coinfection was high in < 10 years followed by 10 – 20 years. These findings are similar to Turuk et al. [9] But a 21 – 40 years was reported to be the prevalent age group as per the literature. [4,7] Fever was the common symptom in followed by headache, joint pain and myalgia. Maximum number of cases were observed during monsoon months as it favours vector breeding and thereby increasing the number of mosquitoes resulting DEN and CHIK cases. Fever was reported to be the commonest clinical finding in the literature also.

Seasonal variation of this coinfection is maximum in September followed by November; whereas the highest number of DEN was found in October and highest CHICK was found in September (Figure). Similar findings are reported in the literature. [4,9,10] May be more mosquito population is the common cause for this high prevalence. PCR is considered to be the gold standard for the diagnosis of these viral infections. [11] But this was not included in this research which may be limitation of the current study.

Due to the increase prevalence of these viral infections, all the clinically suspected cases should be tested for both the pathogens especially in the endemic area. This may help to implement proper mosquito control measures as well as spread of the infections.

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