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Co-infection of Dengue and Chikungunya viruses: A Serological study from Ananthapuramu District, Andhra Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Introduction: It is observed that the infections of Dengue and Chikungunya were rising in many parts of India. *Aedes aegypti* mosquitoes are common vectors for dengue virus (DENV) and CHIK virus (CHIKV). In areas where both viruses co circulate, they can be transmitted together. The present study was undertaken to study the clinical features of dengue–CHIK coinfection and compare it with mono infection.
Materials and Methods: This study was conducted at Government General hospital, Ananthapuramu on 100 hospitalized suspected patients from July 2021 and November 2021. They were serologically screened for DENV, CHIKV and both by performing RTPCR for dengue and ELISA CHIK IgM for Chikungunya.
Results: Out of the total 100 samples collected from suspected patients, 28 (28%) samples were positive for DENV while 5 (5%) samples were positive for CHIKV. In addition to this, 4 sera were

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positive (4%) for coinfection of DENV and CHIKV. Co infected patients had fever in all cases while rash was seen in only 50% cases. Fever, Myaliga, Arthralgia and thrombocytopenia were seen in many number of co infected cases which signifies the overlapping nature of dengue–CHIK coinfection.

Conclusion: It is concluded that strict control measures should be implemented to stop the spread of these viruses as there in Increase in the number of Dengue and Chikungunya infections and their co circulation.

Keywords: Aedesaegypti; ELISA; RTPCR; dengue; chikungunya co infection.

1. INTRODUCTION

Dengue and Chikungunya are microbial infections caused by RNA virus (arbovirus). Transmitting vector for these viruses is Aedes aegypti. Arthropod vectors like mosquitoes, ticks & flies transmit the virus belonging to the group of arboviruses. As the Dengue and Chikungunya viruses are transmitted by mosquito vector. Epidemics with these viruses affect the same localities in many parts of South Asia [1]. Co-infection with dengue virus (DENV) and chikungunya virus (CHIKV) are being reported in India, Since 1967 [2].

Dengue fever (DF) is a viral disease caused by a *flavivirus* having 4 serotypes as DENV1, DENV2, DENV3, and DENV4 and spreads by bite of *Ae.aegypti* mosquito. The name dengue emerged from the Swahili word for "bone‐breaking fever" [3]. In 1953-1954, the first outbreak of DF was reported in the Philippines followed by fast global spread of epidemics [4]. In India, the first confirmed outbreak occurred in Kolkata in 1963–1964 [5]. Subsequently, many dengue outbreaks were reported from different parts of India.

CHIK fever is a viral disease caused by an alpha virus that is also spread by bite of *Ae. aegypti* mosquito. The name is derived from the Makonde word meaning that which bends up in reference to the stooped posture developed as a result of the arthritic symptoms of the disease [6]. CHIK first established its presence during a 1952–1953 epidemic outbreak in Tanzania [7]. In India, CHIKV was first isolated in Calcutta in 1963. The virus disappeared from our country after last reports from Maharashtra in 1973 [8]. After a gap of 32 years, it was re-emerged in 2006, and caused an explosive outbreak affecting 13 States in India [2]

This study was conducted to study the prevalence of co-infection of DENV & CHIKV to compare the clinical features of DENV–CHIKV coinfection and mono-infection at Government General Hospital, Ananthapuramu.

2. MATERIALS AND METHODS

This study was conducted in the department of Microbiology at Government Medical College, Ananthapuramu during the period from July 2021 to November 2021. Institutional ethical committee approval was taken prior to start of study and informed consent form was taken from all the participants. A total of 100 hospitalized patients were serologically screened for dengue virus (DENV), chikungunya virus (CHIKV) and co-infection of dengue and chikungunya viruses respectively.

Blood samples were collected from patients who have come to General Medicine & paediatrics OPD. Approximately, 2–5 ml of blood was collected, serum separated, and subjected to RTPCR AND ELISA. RTPCR was performed for dengue patients & CHIK IgM ELISA was performed for testing CHIKV infection.

All tests were done by RTPCR and IgM Capture ELISA by using a commercial kit. Mono-infection is defined as positive RTPCR and IgM Capture ELISA for only one of these viral infections either with dengue virus or with chikungunya virus. Co-infection was defined as positive RTPCR and IgM Capture ELISA for both infection, dengue virus and chikungunya virus as well.

3. RESULTS

Of the 100 consecutive hospitalized patients screened for both viral infections, 4 (4%) were positive for both DENV and CHIKV, A total of 33 (33%) patients demonstrated serologic evidence of infection with only one of these viruses, 28 (28%) were mono-infected with DENV and 5 (5%) were mono-infected with CHIKV. The remaining 63 (63%) patients were negative for both viruses Table 1.

Age wise distribution of the DENV infected and CHIKV infected samples revealed that majority of the patients were in the productive age group of 0-10 years [Fig. 1].

From the gender distribution of the positive samples, it was observed that a higher percentage of mono-infected patients with DEN-V and CHIKV were males. However, there was no gender-based difference of infections among males and females of co infected patients [Fig. 2].

Clinical comparison of the cases showed that fever (100%) was present in all patients while rash was seen more commonly in DENV–CHIKV co-infection (50%) patients as compared to those with CHIK (40%) and dengue (39.2%). Furthermore, myalgia & arthralgia predominated among CHIK patients (80%). Thrombocytopenia was more common in CHIKV mono-infection (100%) as compared to DENV mono-infection (75%) [Fig. 3].

Tables 1. Negative for Both Viruses

Diagnostic test	Frequency (n)
No. of positive dengue samples	28 (28%)
No. of positive chikungunya samples	05 (5%)
No. of samples with co infects	04 (4%)

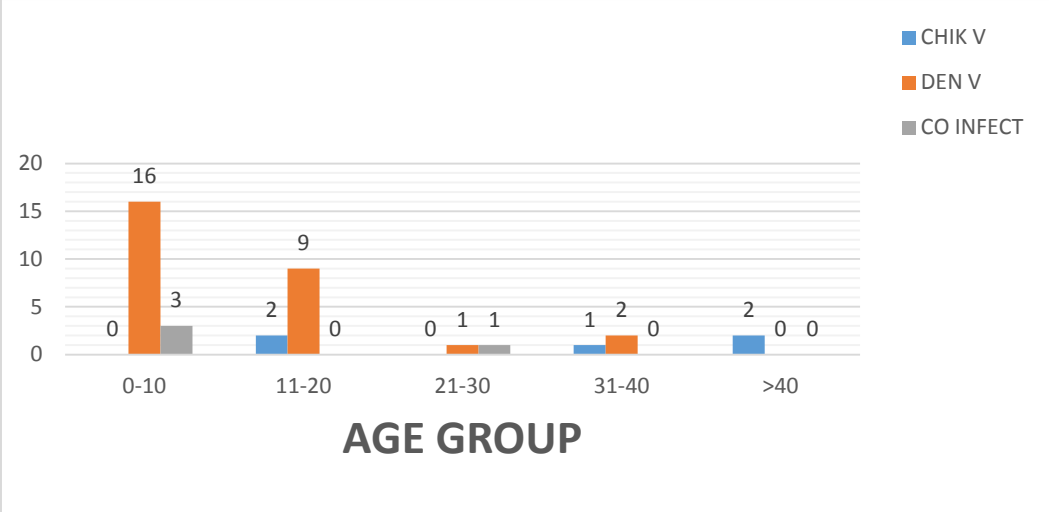

Fig .1. Age distribution of cases

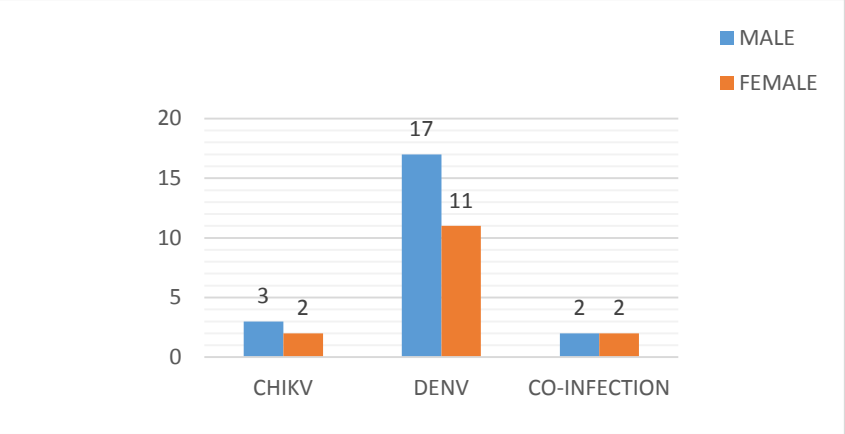

Fig. 2. Sex distribution of patients

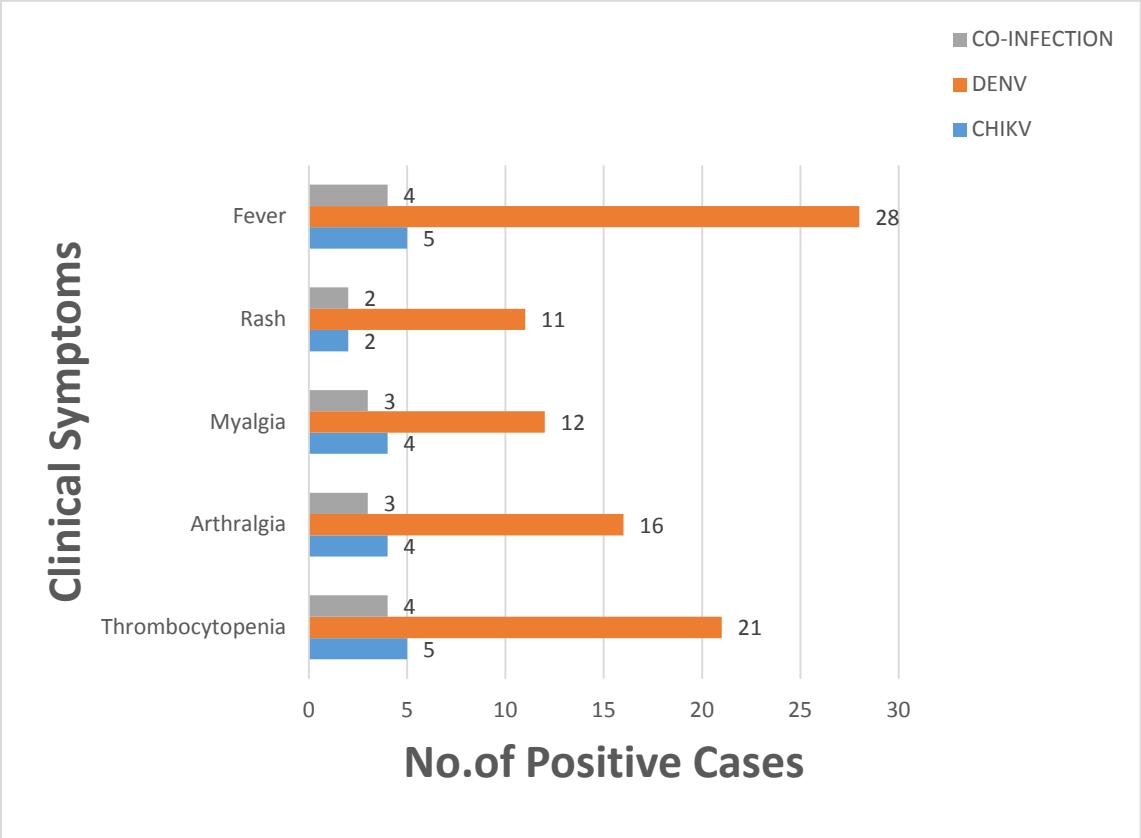

Fig. 3. comparison of clinical signs and symptoms of Dengue virus, Chikungunya virus and co-infection

4. DISCUSSION

Even coinfections may result in illness with overlapping signs and symptoms, making diagnosis and treatment difficult for physicians. As mosquitoes are abundantly present, they may become infected with both types of viruses and often get transmitted to human beings as coinfections following the mosquito bite. It is important to diagnose the type of virus with which the patient is infected because it can help the clinician in proper treatment and management of the patient against complications like haemorrhages, ARDS, renal failure and arthritis. Hence, diagnosis of the type of infection can help the clinician in proper management of the patients during treatment and follow-up.

In our study the prevalence of co-infection has been reported as 4%. Whereas the prevalence of coinfection reported in the previous studies by Kalawat, *et al*. as 2.7% [9], by Omarjee, *et al*. as 2.8% [10] and by Taraphdar, *et al*. as 12.4% [11]

The CHIKV & DENV was slightly more prevalent in males as compared to the females, which was supported by the findings of Kalawat, *et al*.[12] and other research studies [13-16]

5. CONCLUSION

In clinically suspected cases of dengue or CHIK fever, it is recommended to test for both viruses as they co circulate and cause overlapping symptoms. Hence, strict control measures should be implemented to stop the spread of these viruses as there in Increase in the number of Dengue and Chikungunya infections and their co circulation.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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