BURDEN OF DENGUE AND CHIKUNGUNYA CO-INFECTION IN PATIENT ATTENDING TERTIARY CARE HOSPITAL, PUNE

Neha Bagade*,Suvarna.Joshi ** Rajesh Karyakarte***

*Assistant Professor MVJ Medical College and Research Hospital
**Associate Professor BYRAMJEE JEEJEEBHOY GMC PUNE
***Prof &Head of BYRAMJEE JEEJEEBHOY GMC PUNE

Introduction:

Dengue and Chikungunya Arboviruses though belongs to different family (i.e., Flaviviridae & Alfaviridae, respectively) share common mosquito vector for its transmission. (1)
Because of sharing common insect vector chances of co-infection of dengue and chikungunya exists.
At early stages of infection, it is difficult to differentiate Dengue from chikungunya, however, most often request received is only dengue testing. So many laboratories do not test the sample for chikungunya. (2)
Therefore, there are probabilities of missing co-infection of dengue and chikungunya infections. (3)
Co-infection might also be missed by surveillance systems because of diagnostic algorithms (e.g., Pan-American Health Organization (PAHO)) which says that there is no need to test dengue positive samples for chikungunya. (4)
Review of literature revealed no co-infection of dengue and chikungunya infection from Maharashtra particularly, Pune.
Therefore, the present study was undertaken to assess the burden of co-infection of dengue and chikungunya in and around Pune-engue and Chikungunya Arboviruses though belongs to different family (i.e., Flaviviridae & Alfaviridae, respectively) share common mosquito vector for its transmission. (1)Because of sharing common insect vector chances of co-infection of dengue and chikungunya exists.At early stages of infection, it is difficult to differentiate Dengue from chikungunya, however, most often request received is only dengue testing. So many laboratories do not test the sample for chikungunya. (2)Therefore, there are probabilities of missing co-infection of dengue and chikungunya infections. (3)Co-infection might also be missed by surveillance systems because of diagnostic algorithms (e.g., Pan-American Health Organization (PAHO)) which says that there is no need to test dengue positive samples for chikungunya. (4)Review of literature revealed no co-infection of dengue and chikungunya infection from Maharashtra particularly, Pune. Therefore, the present study was undertaken to assess the burden of co-infection of dengue and chikungunya in and around Pune.

Introduction: Arthropod-borne viral infections are a major public health problem in the tropical and subtropical regions across the world including India. Amongst them Dengue and Chikungunya pose a significant threat and share a common insect vector. In last few decades, India has experienced several outbreaks of dengue and chikungunya. Early clinical manifestations of these arboviral infections are similar and difficult to differentiate. Further, there are recent reports of co-infection with dengue and chikungunya viruses. It is therefore essential to know whether there is a co-infection with both viruses. A detailed review of literature revealed only a few studies reporting dual infection. The present study was undertaken to find out the burden of co-infection with dengue and chikungunya viruses in and around Pune.

Objectives: To find out the prevalence of dengue and chikungunya virus co-infection in cases of febrile illness.

Materials and Method: A total of 4145 samples from clinically suspected cases of viral febrile illness were studied over a period of one year(May 2018-May 2019).Each sample was tested for both Dengue and Chikungunya IgM antibodies. Further, all samples were tested for Dengue NS-1 antigen. For detection of IgM antibodies, IgM capture ELISA (MAC-ELISA) test was done using kits manufactured by National Institute of Virology, Pune. NS-1 antigen detection was achieved with ELISA test by kits manufactured by J Mitra Pvt. Ltd.

Results: Out of 4145 samples tested for both Dengue and Chikungunya infection, 1359 (32.78%) showed evidence of infection. A total of 718 samples (52.83%) were positive for Dengue infection alone, while 588 samples (43.26%) were positive for only chikungunya. There were a total of 53 samples (3.89%) that showed presence of IgM antibodies against both Dengue and Chikungunya viruses, indicating co-infection.

Conclusions: The present study highlights the importance of laboratory support for diagnosis of co-infection of Dengue and Chikungunya. Clinically suspected cases of viral febrile illness should be tested for both of these viral infections in endemic areas like India as this will also help in knowing the true burden of dengue and chikungunya co-infection. Further, timely and appropriate management can assist in the prediction and control of outbreaks with both viruses.

Aims and Objectives :
1)To find out the prevalence of dengue and chikungunya virus co-infection in cases of febrile illness.

2)To assess the clinical manifestations of dual infection

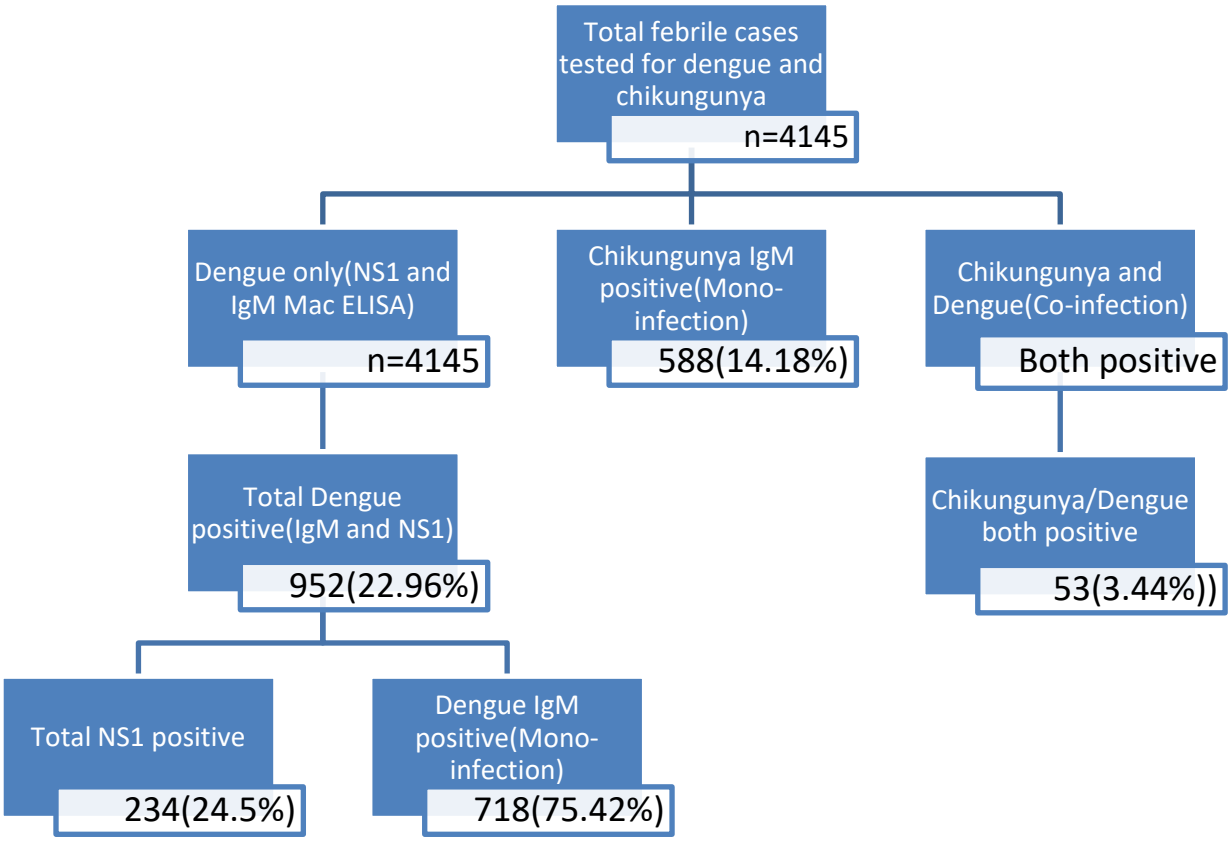
Materials and methods :

A total of 4145 samples collected from clinically suspected cases of viral febrile illness over a period of one year. Detailed history was collected

Each sample was tested for both Dengue and Chikungunya IgM antibodies. As well as NS1 antigen

Kits used : NS-1 antigen ELISA test kit manufacture by J Mitra Pvt. Ltd.
.Dengue and Chikungunya IgM-capture ELISA (MAC-ELISA) test kits - both manufactured by National Institute of Virology, Pune.
NS-1 antigen ELISA test kit manufactured by J Mitra Pvt. Ltd

Results:
1)Details of Chikungunya and Dengue infection

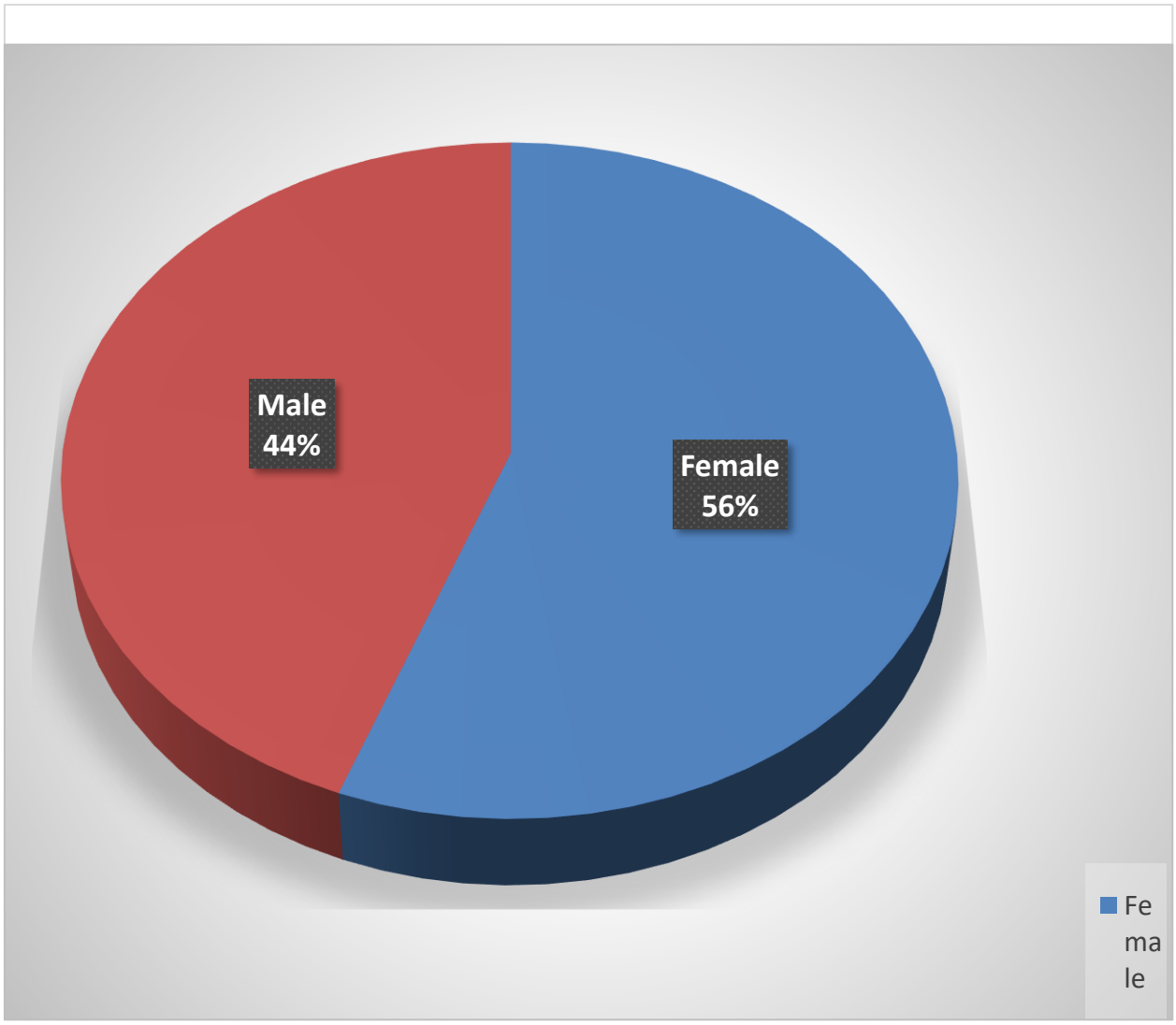


2)Clinical features of patients having co-infection infection of Chik and Dengue)

Clinical feature	**Precentage**
Fever	100% (53/53)
Joint pain	24.52%(13/53)
Weakness	16.98% (9/53)

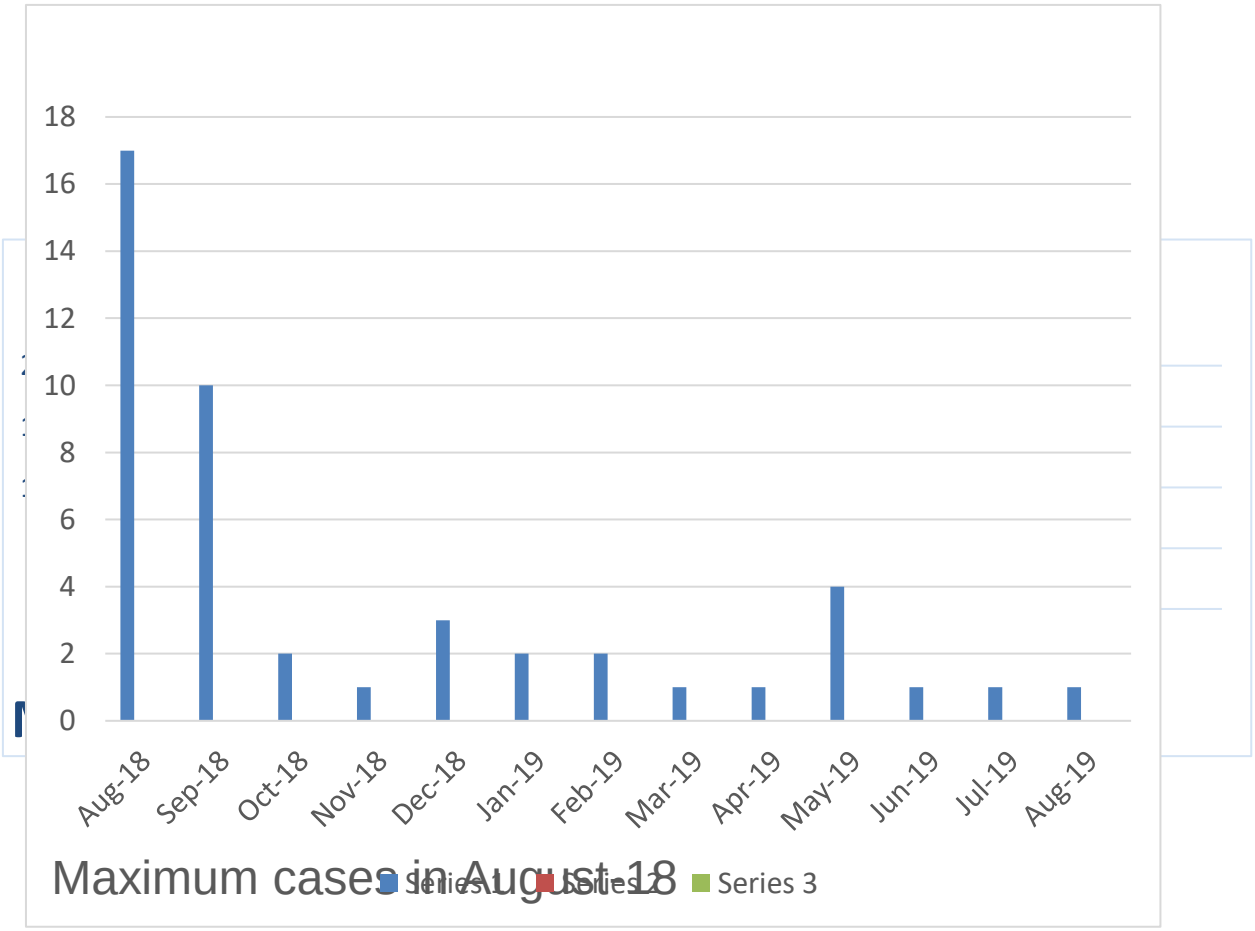
Backache	7.54% (4/53)
Headache	7.54% (4/53)
Epistaxis	3.77% (2/53)
Retro-orbital pain	3.77% (2/53)

3)Bar diagram showing seasonal distribution of cases of Co-infection



4) Bar diagram showing seasonal distribution of cases of Co-infection

5)Bar diagram showing distribution of cases of co-infection



DISCUSSION

- In , there are a hyper-endemic regions for dengue and chikungunya where they share common mosquito vector.
- Due to more prevalence of dengue infection usually test request was received for dengue only. Because of which real burden of chikungunya alone or its co-infection with dengue is often missed.
- In the present study, out of 4145 sample tested 53 (3.44%) were found to have both chikungunya and dengue co-infection while studies by Chakravati et al., Mukherjee et al., and Kaur et al., show co-infection of 3.42%, 2.38%, and 3.60%, respectively. (5,6)
- The common clinical features seen in cases of co-infection were fever (100%) and joint pain (24.52%)
- Other studies: Fever (100%) and rash (30%) was seen in the study conducted by Maninder et al. Rash was not a significant finding in our study. Singh et al. found fever (100%) and weakness (22.6%) to be present.
- Female preponderance (54%) was noted in our study. Same findings were seen by Balasubramanium et al. (7) and Dwibedi et al. (8) while, it was not seen in the study by Kalawat et al.
- Maximum co-infected patients were in the age group between one and twenty years, while it was seen in the age-group of 21 to 40 years in the study by Kaur et al. The study by Singh et al showed that the age-group showing co-infection to be 20 to 30 years.
- In our study maximum cases were seen during month of August compared with other studies where it was November (Singh et al.)
- Dengue mono-infection was found to be predominant (22.96%) in our study. It was 20.2% in the study carried out by Shailpreet et al.
- Chikungunya mono-infection was seen in 14.18% patients in our study, while it is 24.58% in the study carried out by Puspha et al.

Summary & Conclusion

- Co-infection of 3.4% seen in the present study.
- As per the CDC guidelines before starting non-steroidal anti-inflammatory drugs (NSAID) for fever and polyarthralgia in cases of chikungunya, dengue infection should be rule out as these drug can further complicate the dengue illness.

- Also dual infections can lead to long term artharalgia and other joint complications of chikungunya
- Therefore, we suggest that every suspected case of dengue/chikununya should be tested for both infections.
- The present study highlights the fact that co-infection exists in and around Pune and there is need of more effective surveillance to monitor the spread of these arbovirus infections for timely implementation of control strategies

REFERENCES

1. Chang LJ, Dowd KA, Mendoza FH, Saunders JG, Sitar S, Plummer SH, et al. VRC 311 Study Team. Safety and tolerability of chikungunya virus-like particle vaccine in healthy adults: a phase 1 de-escalation trial. Lancet.2014.384(9959):2046-52.DOI:10.1016/S0140-6736(14)61185-5 PMID:25132507
2. Deeba F, Afreen N, Islam A, Naqvi IH, Broor S, Ahmed A, Parveen S. Co-infection with Dengue and Chikungunya Viruses. In: Rodriguez- Morales A, editor. Current Topics in Chikungunya. London-United Kingdom: InTech; 2016. [Last accessed on 2018 Jan 30]. DOI:10.5772/64308.
3. Bharaj P, Chahar HS, Pandey A, Diddi K, Dar L, Guleria R, et al. Concurrent infections by all four dengue virus serotypes during an outbreak of dengue in 2006 in Delhi, India.Virol J 2008:5:1
4. Capinha C, Rocha J, Sousa CA. Macroclimate determines the global range limit of Aedes aegypti.Ecohealth2014;1 1:420-8.
5. Cecilia D. Current status of dengue and Chikungunya in India.WHO South East Asia J Public Health 2014;3:22-6. Chahar HS, Bharaj P, Dar L, Guleria R, Kabra SK, Broor S. Co-infections with chikungunya virus and dengue virus in Delhi,India.Emerg Infect Dis.2009;15(7):1077.80.DOI:10.3201/eid1507.080638 PMID:19624923
6. Pan American Health Organization. Number of reported cases of Chikungunya in countries or territories of the Americas 2013-2014. U.S; 2015. [Access date: 07/02/2018] Available at:
7. Volk SM, Chen R, Tsetsarkin KA, Adams AP, Garcia TI, Sall AA, et al. Genome-scale phylogenetic analyses of chikungunya virus reveal independent emergences of recent epidemics and various evolutionary rates.J Virol.2010;84(13):6497-504.DOI:10.1028/JVI.01603-09 PMID:20410280