

Seroprevalence of Chikungunya among Febrile Patients in a Tertiary Care Hospital

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ABSTRACT

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Chikungunya fever is a self-limiting viral fever caused by an arbovirus transmitted to human through mosquitoes. The sudden onset of very high fever along with rash and severe arthralgia are main symptoms. It still persists as major public health problem. Aim of the study is to know the seroprevalence of chikungunya infection in a tertiary-care hospital in Chamarajanagar, Karnataka, India. Data was collected from Microbiology Laboratory registers retrospectively for a period of one year from June 2016 to May 2017. Blood samples were collected from suspected cases of chikungunya fever and tested for IgM antibody using ELISA. Analysis was done using MS Excel. A total of 1432 chikungunya suspected serum samples were tested, of which 117 (8.17%) samples were positive for IgM antibody. Maximum number of positive cases was in age group of 18-45 years 71 (60.68%) with no significant difference between males 64 (54.70%) and females 53(45.30%). Seroprevalence of chikungunya in our study was 8.17% which suggests that it still exists in our setup and indicates the need of appropriate strategies to reduce the severity of disease.

Introduction

Chikungunya fever is a tropical arboviral disease caused by chikungunya virus (CHIKV) that belongs to the family *Togaviridae*, genus *Alphavirus* (Tatjana Vilibic-Cavlek *et al.*, 2015). The meaning of Chikungunya (CHIK) is “that which bends up” describing the stooped posture due to arthritic feature of the disease (Divya *et al.*, 2016). It is transmitted to humans by *Aedes aegypti* and *Aedes albopictus* (Alessandra Lo Presti *et al.*, 2014). During epidemics, humans are the primary reservoirs. Monkeys, rodents, birds, and cattle have been identified as animal reservoirs (Norbert G. Schwarz *et*

al., 2012). Vertical transmission of disease from mother to child has also been documented (Meghna R. Sebastian *et al.*, 2009).

Clinical manifestations are very variable, from asymptomatic illness to severe debilitating disease. Children are among the group at maximum risk for severe manifestations of the disease and some clinical features in this group are distinct from those seen in adults (Meghna R. Sebastian *et al.*, 2009). Common signs and symptoms of an acute infection include polyarthralgia, high

fever, asthenia, headache, vomiting, rash and myalgia. The Chikungunya infection often leads to prolonged joint pain, contributing to the long-lasting disease burden (Sanyaolu *et al.*, 2016). The disease is rarely fatal but is associated with significant morbidity.

The illness has an approximate incubation period of 1–2 weeks (Kibet Sergon *et al.*, 2008). The acute phase lasts for 2- 3 days and may remit for 1- 2 days after a gap of 4- 10 days resulting in a “saddle back” fever curve (Mohanty *et al.*, 2013). Most infections completely resolve within weeks but there are reported cases of CHIK V induced arthralgia lasting for months or even for years in the form of recurrent or persistent episodes (Narayan Shrihari *et al.*, 2012).

The virus was first isolated in blood samples obtained during an epidemic of a "dengue-like" disease that occurred between 1952 and 1953 in Tanzania (Cunha *et al.*, 2017). CHIKV is an emerging arbovirus that is widespread in tropical regions and is spreading rapidly to temperate climates with recent epidemics in Africa and Asia and also documented outbreaks in Europe and America (Akinola *et al.*, 2017). It was unknown to Indian population till it appeared as a major epidemic in 2006. Around 1.38 million Indian populations were affected by this disease. The states that first affected were Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu, Gujarat, and Kerala. All ages and both sexes were affected (Sakhiya *et al.*, 2015). Resurgence of chikungunya has been attributed to various factors including globalization, increase in the mosquito population, loss of herd immunity and the mutation A226V in the E1 gene causing a significant increase in CHIKV infectivity for *Ae. Albopictus* (Cecilia, 2014).

In India, National Institute of Virology (NIV), Pune, is a WHO collaborating center for arboviral diseases. It is engaged in diagnosis,

outbreak investigations and preparations of reagents for diagnosis of arboviral infections (Mohanty *et al.*, 2013). Infections with CHIKV are confirmed by the detection of the virus, viral RNA, or CHIKV-specific antibodies in patient samples. Enzyme-linked immunosorbent assays (ELISAs) detect both anti-CHIKV immunoglobulin (Ig) M and IgG antibodies from either acute- or convalescent-phase samples.

Testing of samples from imported cases found that CHIKV-specific IgM antibodies develop rapidly (typically present by 5–7 days after illness onset but noted as early as the day of illness onset) and persist for several months (Erin Staples *et al.*, 2009). Chikungunya virus mutation, adaptation to new vectors, and spread to temperate regions signifies the seriousness of CHIKV as a global threat (Divya *et al.*, 2016). Hence the study was undertaken to know the seroprevalence of chikungunya virus infection.

Materials and Methods

A retrospective study was conducted at Chamarajanagar Institute of Medical Sciences, Chamarajanagar from June 2016 to May 2017.

The age, gender and clinical details of patients and results of CHIK kit tests were collected from the laboratory registers. The data were entered into Excel for analysis. Permission was obtained from the institution. As the study was based on secondary data, there were no ethical issues.

Blood samples were collected from suspected cases of chikungunya. The serum was separated by centrifugation of the whole blood sample and tested for CHIK IgM antibody using IgM antibody capture ELISA kit produced by NIV (Arbovirus Diagnostic NIV, Pune, India). The tests were carried out following the manufacturer instruction.

Results and Discussion

A total of 1432 chikungunya suspected serum samples were tested, of which 117 (8.17%) samples were positive. Although all ages are affected, maximum number of positive cases was in age group of 18-45 years 71 (60.68%) followed by age groups 1- 18 years 29(24.79%) and >45 years 17(14.53%). There was no significant difference between males 64 (54.70%) and females 53(45.30%) (Tables 1 and 2).

CHIKV is a flaviviral infection transmitted to humans through the bite of an infected female mosquito of the genus *Aedes*. Since, its first

identification in the year 1952–53, both sporadic cases and major epidemics of CHIKV infection have been reported (Anuja P. Kawle *et al.*, 2017). In India CHIKV outbreak was first reported in 1963 in Kolkata which accounted nearly 200 Deaths (Sai Gopal DVR *et al.*, 2013). Major outbreaks that increased concerns about CHIKV occurred in India in 2005, where it affected 1.4 million people. More than one million cases of CHIKV infection were reported from different regions of India during January 2006 to August 2007, with most patients coming from Kerala and Tamil Nadu (Braira Wahida *et al.*, 2017).

Table.1 Seroprevalence of chikungunya cases

Total no. of samples tested	No. of positive samples NO. (%)
1432	117(8.17%)

Table.2 Age and gender wise distribution of chikungunya cases

Age (years)	No. of positive samples NO. (%)	Gender	
		M NO. (%)	F NO. (%)
1 - 18	29(24.79)	10(08.55)	19(16.24)
18 - 45	71(60.68)	43(36.75)	28(23.93)
> 45	17(14.53)	11(09.40)	06(05.13)
Total	117(100)	64(54.70)	53(45.30)

Chikungunya is associated with joint pains lasting up to six months and the morbidity and disability caused due to chikungunya are enormous (Dikid *et al.*, 2013). Typically, joint damage fluctuates over time, but always affects the same parts of the body, mostly the extremities (hands, ankles, knuckles).

The mortality rate is low (0.4%), but is higher in babies less than 1 year old (2.8%) and increases in the elderly with concurrent diseases (Girish Shakuntal *et al.*, 2016). In some patients, Chikungunya can progress to

cause chronic arthritis. The risk factors identified in the literature for persistent joint pains are age over 60 years, high viral load during acute illness, those with C- Reactive Proteins (CRPs) closer to upper limit of normal, absence of thrombocytopenia and only mild elevation of transaminases were more likely to develop persistent arthralgia (Vikram Londhey *et al.*, 2016).

In this study, there was no significant difference between males 54.70% and females 45.30%. In some studies, men

appeared to be more susceptible to dengue infection whereas in others, women were more affected, and no gender differences were noted in others. This inconsistency may relate to gender differences in exposure to infection due to community-specific habits, customs or behaviours (Sissoko *et al.*, 2008 and Azami *et al.*, 2013).

This study showed seroprevalence of 8.17% with maximum number of positive cases in the age group of 18-45 years 60.68%. One of the study revealed differences in awareness of chikungunya, cause of the disease, vector responsible, mode of transmission, biting time and elimination of breeding of mosquitoes statistical significant among high and low incidence wards of all the States (Nagpal *et al.*, 2012). The geographical distribution had a significant influence on the prevalence of antibodies to the virus. This might be explained by the possible impact of ecological characteristics of the areas on the natural cycles of the arthropod-borne viruses under consideration (Narayan Shrihari *et al.*, 2012). Chikungunya fever is self-limiting disease and treatment is mainly supportive (Arunasree *et al.*, 2015).

Infection with CHIKV is an emerging public health threat that should be addressed through prevention. Because there is no vaccine against CHIKV, the cornerstone of prevention is to reduce *Ae. aegypti* mosquito populations by vector control strategies, mass education of the community by medical and paramedical staff at primary health centers, clearing stored water (mainly in construction sites) and personal protective measures (Kibet sergon *et al.*, 2007 and B. Arunasree *et al.*, 2015).

Chikungunya fever is self-limiting disease. Its existence in our setup indicates efforts have to be made through community awareness, vector control measures and early institution of supportive therapy.

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