

Seroprevalence of Chikungunya virus infection in Ballari and nearby districts of Karnataka

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Abstract

Background and Objective: Chikungunya virus (CHIKV) is an arthropod-borne virus, causes fever and nonspecific clinical manifestations similar to malaria and other bacterial infections, it is not routinely tested at the health facilities and therefore goes undiagnosed and as such its prevalence is likely to be underestimated.

Materials and Methods: The patients with history of fever and arthralgia and clinically suspected were analyzed and Ig M anti chikungunya antibodies were tested by Ig M capture enzyme linked immunosorbent assay.

Results: A total of 449 serum samples from suspected cases of chikungunya infection were received during the study period, out of which 125(21.8%) samples were positive for chikungunya infection. Of the total number of affected 56(44.8%) were males and 69(55.2%) were females.

Conclusion: In Indian scenario there is a need of screening of CHIKV and other arboviruses to prevent the complications as early as possible.

Keywords: Seroprevalence, Chikungunya, Enzyme Linked Immunosorbent Assay.

Introduction

Arthropod-borne viral infections cause major disease burden in tropical and subtropical countries worldwide¹. Chikungunya virus (CHIKV) is an arthropod-borne virus primarily transmitted to humans through the bite of infected mosquitoes of the genus *Aedes*. Chikungunya virus is a member of the genus *Alphavirus* and the family *Togaviridae*. Since its first recognition in 1952–1953, both sporadic cases and major epidemics of CHIKV disease have been reported in Africa, India, South-East Asia and the Western Pacific.⁽²⁾

The meaning of Chikungunya (CHIK) is “that which bends up” describing the stooped posture due to arthritic feature of the disease. The symptoms include sudden onset of crippling arthralgia accompanied with fever, chills, headache, nausea, vomiting, low back pain, and rash lasting for a period of 1-7days.⁽³⁾ Human is the only host serving as reservoir of infection and transmission is sustained by human-mosquito-human cycle through primates.⁽⁴⁾

Although CHIKV causes fever and nonspecific clinical manifestations similar to malaria and other bacterial infections, it is not routinely tested at the health facilities and therefore goes undiagnosed and as such its prevalence is likely underestimated.⁽⁵⁾ Chikungunya virus mutation, adaptation to new vectors, and spread to temperate regions signifies the seriousness of CHIKV as a global threat.⁽⁶⁾ Hence the study was undertaken to know the prevalence of chikungunya virus infection in Ballari and nearby districts of Karnataka.

Materials and Methods

Serum samples were collected from patients attending different wards in hospital or visiting the outpatient departments at VIMS, MCH, VIMS Ballari

and other districts nearby with history of fever and arthralgia during the study period from January 2013 to December 2014. The samples were tested for CHIK IgM antibody using IgM antibody capture ELISA kit produced by NIV (Arbovirus Diagnostic NIV, Pune, India). The diagnostic sensitivity and specificity for the CHIK IgM antibody capture ELISA is 95% and 98%, respectively. The tests were carried out following the manufacturer instruction.

Principle of the test is that IgM antibodies in the patient's serum are captured by anti-human IgM (μ chain specific) coated on the solid surface (wells). In the next step, CHIK antigen is added which binds to captured human IgM in the sample. Unbound antigen is added during the washing step. In the subsequent step biotinylated anti CHIK monoclonal antibodies are added followed by Avidin-HRP. Subsequently, chromogenic substrate (TMB/H₂O₂) is added, the reaction is stopped by 1N H₂SO₄. The intensity of colour/ optical density is measured at 450nm. The sample was considered **positive** for IgM antibody if the OD of the sample exceeds OD of negative control by a factor 3.0 (sample OD \geq negative OD \times 3.0). The sample was considered as **negative** if the OD of the sample tested is less than OD of negative control by a factor 2.0 (sample OD \leq negative OD \times 2.0) Both positive and negative controls were used to validate the test.

Results

A total of 449 serum samples from suspected cases of chikungunya infection were received during the study period from January 2013 to December 2014. Out of which 125(21.8%) samples were positive for chikungunya infection. Of the total number of affected

56(44.8%) were males and 69(55.2%) were females. (Table 1)

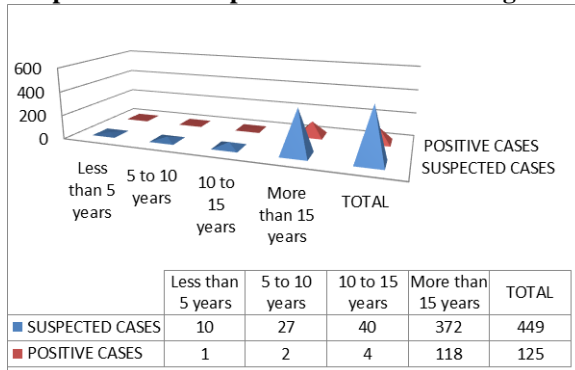
Age-wise distribution of clinically suspected cases of chikungunya showed that the infection was more common in more than 15 years age group. (Graph 1)

Fever and joint pain was seen in all the cases, headache in 89.6%, and body pain in 85.7% of seropositive cases. Joint swelling and rashes were observed in 30.4% and 8% seropositive cases respectively. (Graph 2) A seasonal peak was seen in the months of July to September. (Table 2)

Table 1: Year-wise and Sex-wise distribution of clinically suspected and seropositive cases of Chikungunya

Year	Total suspected		Total positive	
	Male	Female	Male	Female
2013	156	149	43	50
2014	58	86	13	19
Total	214	235	56(44.8%)	69(55.2%)
	449		125(21.8%)	

Graph 1: Age-wise distribution of clinically suspected and seropositive cases of Chikungunya



Graph 2: Clinical presentation of Chikungunya seropositive cases

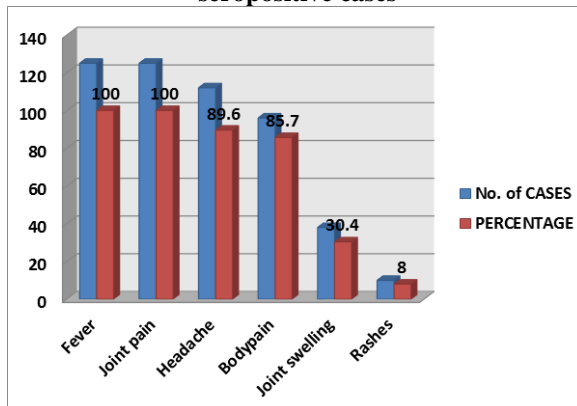


Table 2: Seasonal variation of Chikungunya seropositive cases

Months	Total no. of samples tested	No. of seropositive cases
Jan-Mar	46	17
Apr-June	141	32
July-Sept	165	46
Oct-Dec	97	30
Total	449	125

Discussion

Since no effective vaccines or therapeutics are available, early detection and proper diagnosis plays the key role in the effective control of Chikungunya infection. The development of immunoglobulin M antibody (IgM) capture enzymelinked immunosorbent assay has been a major achievement in serology as it provided a rapid and reliable technique for the diagnosis of arboviruses. Indirect immunofluorescent antibody technique is another reliable technique for detection and identification of viral antigens from clinical samples.⁽⁷⁾

A total of 449 serum samples from suspected cases of chikungunya infection were received during the study period, out of which 125(21.8%) samples were positive for chikungunya infection. The study also showed that mostly affected age group was 15-45 years. Less than 5 years age group was least affected.

In the gender distribution, the number of affected females was more than males. These findings were correlated with similar study done by Mohanty et al,⁽³⁾ Balasubramaniam et al⁽⁸⁾ and Dwibedi et al.⁽⁹⁾ However, in the study conducted by Sharma et al,⁽¹⁰⁾ it was found that the age group 5-9 years had highest percentage of morbidity and males were more frequently affected than females.

In our study, clinical presentation of Chikungunya seropositive cases showed that fever and joint pain was the most common symptom in all the cases. Headache was seen in 89.6%, and body pain in 85.7% of seropositive cases. Joint swelling and rashes were observed in 30.4% and 8% seropositive cases respectively. Similar findings were correlated with other studies conducted by Mohanty et al⁽³⁾ and Balasubramaniam et al⁽⁸⁾ showed that fever and joint pain was the most common symptom.

In our study, in between 2013 and 2014 found that there was seasonal variation peaking in the months of July to September which coincided with the monsoon and post-monsoon periods when the vector density peaks.

Conclusion

In Indian scenario due to low socio-economic conditions, overcrowding and poor sanitary conditions which facilitate the presence of the *Aedes* vector species and contribute to the spread of the CHIKV to wider areas. Therefore, screening of CHIKV and other arboviruses is necessary to prevent the complications as early as possible.

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