Seroprevalence of chikungunya cases in a tertiary-care hospital in Ahmedabad

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Abstract

Background: Chikungunya is viral fever with the main symptom of joints pain for prolong duration. It persists as major public health problem till date.

Objective: To know the seroprevalence, clinical presentation, and seasonal trends of chikungunya infection in a tertiary-care hospital in Ahmedabad, Gujarat, India.

Materials and Methods: A retrospective observational study was conducted at a tertiary-care hospital in Ahmedabad. Totally, 2193 blood samples were received from different wards from suspected cases of chikungunya fever and tested for IgM antibody using ELISA in civil hospital Ahmedabad for duration of 1 year (September 2013 to August 2014).

Result: Of the 2193 cases tested, 724 (33.01%) were positive for IgM antibodies; 33.28% were aged younger than 30 years and 66.71% older than 30 years. All presented with fever (100%), followed by joint pain, headache, body ache, joint swelling, and rash (93.6%, 73%, 39.7%, and 17.4%, respectively). Maximum cases were reported during September to January (31.98%, 35%, 36.41%, 43.34%, and 42.18%, respectively), with male subjects of 41.02% and female subjects, 58.97%.

Conclusion: Seroprevalence of chikungunya in our study (33.01%), which was high in late monsoon and winter, suggests that it continues to be a major health problem in our setup and indicates the need of appropriate strategies to reduce the severity of disease.

KEY WORDS: Chikungunya, seroprevalence, Ahmedabad, viral fever

Introduction

Chikungunya is a flaviviral infection transmitted to humans by *Aedes aegypti* and *Aedes albopictus*.[1] Chikungunya is endemic to various parts of Africa and Asia. Outbreaks were reported in these areas during 1960 to 1982.[2] It was unknown to Indian population till it appeared as a major epidemic in 2006. Around 1.38 million Indian population was affected by this disease.[3] The states that first affected were Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu, Gujarat, and Kerala.[4] All ages and both sexes were affected.[4]

The disease is characterized by acute fever with or without chills, headache, nausea, abdominal pain, photophobia, conjunctival injection, skin rash, and disabling arthralgia. The incubation period ranges between 2 and 10 days. The disease usually affects adults as seen in the 2006 epidemic: of the 333 seropositive patients for chikungunya infection, 299 (90%) were aged older than 15 years.[5] Chikungunya originated from the word "kungunyala" (meaning "that which bends up"). The patient with this disease develops a stooped posture because of severe arthritis, typically affecting the wrists, hands, ankles, and feet. The fever and skin rash are short-lasting, but the joint pains may recur or linger for a long

time, sometimes for as long as 3 years after the onset of disease.[6] The pain may begin in old fracture sites, and worsening of preexisting arthritis may occur. Tender, enlarged lymph nodes are common findings.[7,8]

In 2006, 1.3 million cases were reported in India; however, no mortality were reported except for two reports: one on a subset of patients and one deductive. In one report, among 90 laboratory-confirmed chikungunya cases hospitalized in Ahmadabad, 18 deaths were recorded of which 15 were aged 60 years or older and 5 showed comorbidities. The other report was deductive; based on death records during previous years in Ahmadabad, the excess deaths that occurred during the outbreak period was attributed to CHIKV and a mortality rate of 4.9% was reported.[9,10]

Material and Methods

A retrospective observational study was undertaken in Civil Hospital, Ahmedabad, Gujarat, India, a teaching hospital attached to BJ Medical College, Ahmedabad. The protocol was presented to and approved by Human Research Ethics Committee.

Sample Size

Data of patient's blood samples (totally, 2193) received from different wards of the civil hospital from September 2013 to August 2014 for the diagnosis of chikungunya were included in the study. As such, there are no exclusion criteria.

Collection of Data: Method for Detection of IgM Antibody Against Chikungunya

Blood samples were centrifuged, serums separated, and then proceeded by IgM Elisa to detect antibody. All reagents were brought to room temperature before 30 minutes of performing test. Sandwich (qualitative) ELISA technique was used for the accurate qualitative measurement of IgM class antibodies against chikungunya virus in human serum and plasma. The sensitivity and specificity for the CHIK IgM antibody capture ELISA is 95.00% and 97.22%, respectively. A 96-well plate was precoated with anti-human antibodies to bind to corresponding antibodies of the sample. Controls or test samples are added to the wells and incubated. Following washing, the chikungunya virus antigen was added and incubated. After washing again, biotinylated chikungunya virus antibodies were added, followed by incubation. After washing for one more time, streptavidin peroxidase (SP) conjugate were added to the wells, which binds to the biotinylated chikungunya virus-specific antibodies. TMB is then catalyzed by the SP to produce a blue color product that changes to yellow after adding an acidic stop solution. The density of yellow coloration is directly proportional to the amount of chikungunya virus IgM sample captured in the plate. The intensity of color/optical density (OD) was monitored at 450 nm. The sample was considered positive for IgM antibody if the OD of the sample exceeded OD of negative control by a

Table 1: Signs and symptoms of patients positive cases for chikungunya

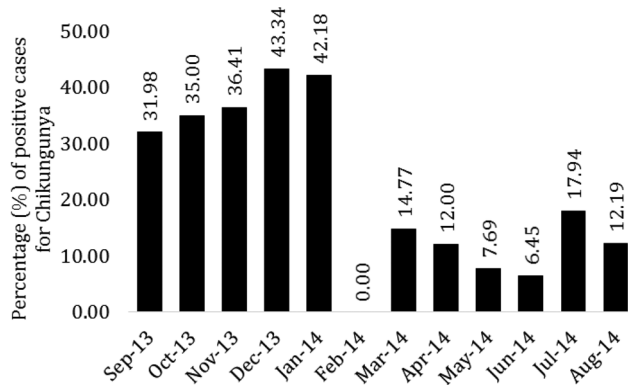| Signs and symptoms	Positive cases for chikungunya (%)
Fever	100
Joint pain	100
Headache	93.6
Body ache	73
Joint swelling	39.7
Rash	17.4

Figure 1: Monthwise distribution of positive cases for chikungunya.

factor 4.0 (sample OD ≥ negative OD × 4.0). Both positive and negative controls were used to validate the test.

Results

Of the 2193 cases tested, 724 (33.01%) are positive for IgM antibodies; 33.28% are aged younger than 30 years and 66.71% older than 30 years. All presented with fever (100%, followed by joint pain, headache, body ache, joint swelling, and rash (93.6%, 73%, 39.7%, and 17.4%, respectively). Maximum cases were reported during September 2013 to January 2014 (31.98%, 35%, 36.41%, 43.34%, and 42.18%, respectively), with male subjects of 41.02% and female subjects, 58.97% [Table 1; Figures 1–3].

Discussion

In this study, the rate of chikungunya was very high in September to January, during late monsoon and winter; no positive cases were found in February; and, again, there was an increase in March, followed by reduction up to June, increase in July, and decrease in August. The variation in the number of cases in different seasons is because of high vector density during the rainy season. Similar findings were observed in different studies as well.[11–13]

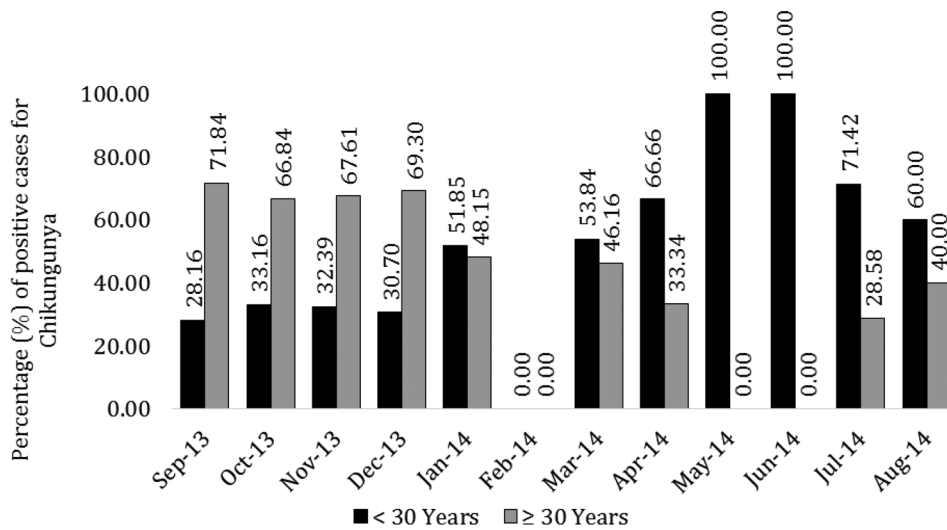The younger age group (<30 years; 33.28%) was most affected with chikungunya when compared with older age

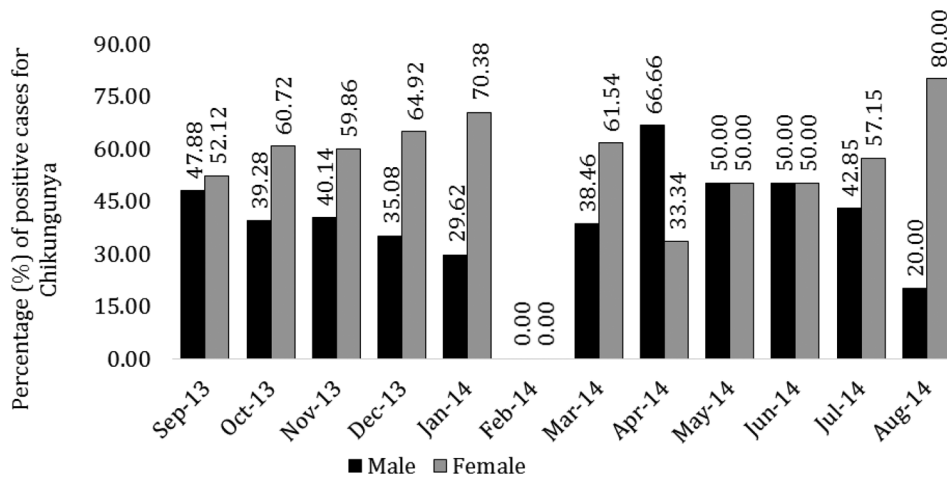**Figure 2:** Age- and monthwise distribution of positive cases for chikungunya.

Figure 3: Gender- and monthwise distribution of positive cases for chikungunya.

group (≥30 years; 66.71%). While if we take gender into consideration, female subjects were more affected (58.97%) compared with male subjects (41.02%). These findings were much similar to the pattern shown by Balasubramaniam et al.,[11] Dwibedi et al.,[12] and Mohanty et al.[13]

Fever and joint pain were present in all, followed by headache, body ache, joint swelling, and rash in descending order. Similar pattern were observed in study done by Mohanty et al.[13]

Chikungunya affects humans of all age groups worldwide. In this study, there was no mortality but the morbidity was high with loss of work as the population most affected belonged to the age group of >30 years. The virus is spreading to new areas in this part of the state, as there is no herd immunity to the virus. The *Aedes* mosquito is present in varying density in different regions of the state and may be a potential

for the spread to other areas. In Indian setting, low socioeconomic conditions, overcrowding, and poor sanitary conditions facilitated by the presence of the *Aedes* vector species contribute to the spread of the chikungunya virus to wider areas. Therefore, screening of chikungunya, dengue, and other arboviruses is necessary, because, although the clinical features are similar, the outcomes may vary.

Conclusions

Seroprevalence of chikungunya in our study (33.01%), which was high in late monsoon and winter, suggests that it continues to be a major health problem in our setup and indicates the need of appropriate strategies to reduce the severity of disease.

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