

# A Retrospective Study of Seroprevalence of Chikungunya in Patients Attending Microbiology Department of MGM Medical College, Jamshedpur: A Tertiary care Hospital of Kolhan Region of Jharkhand

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## ABSTRACT

**Background:** Chikungunya virus, an alphavirus belonging to the Togaviridae family, caused large scale outbreaks in several parts of southern, western and eastern India in 2006. We report Chikungunya outbreak in Jamshedpur region in 2011.

**Objective:** To know the seroprevalence and seasonal trends of Chikungunya infection among the patients of the disease who attended to MGM Medical College, Jamshedpur, A tertiary care hospital during 2011 to 2014.

**Materials & Methods:** Present retrospective observational studies were conducted in the Microbiology Department of Mahatma Gandhi Medical College, Jamshedpur from August 2011 to December 2014.

**Result:** Serum samples of 323 patients presenting with fever, arthralgia, rash etc. were tested for anti-Chikungunya IgM antibody using MAC ELISA. 148/324 (47.9%) samples were positive for anti Chikungunya IgM antibody. More males were affected compared to females. The most common age group affected was 29-49 year. Characteristically, pediatrics age group was least affected. The number of cases increased with increasing age group.

**Conclusion:** Screening for Chikungunya infection in the endemic areas, especially in monsoon season would improve the quality of arboviral surveillance and potentially aid in clinical management of the disease.

**Keywords:** Chikungunya Virus, Togaviridae, Seroprevalence, Trend, Immuno Globulin ELISA.


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## INTRODUCTION

Chikungunya Ribonucleic Acid (RNA) virus belongs to alphavirus genus of the family Togaviridae, it is spread by the bite of infected *Aedes aegypti* and *Aedes albopictus* mosquitoes.<sup>1</sup> It breeds in fresh water. Chikungunya is endemic to various parts of Africa and Asia. Outbreaks were reported in these areas during 1960 to 1982.<sup>2</sup> In 2006 Around 1.38 million Indian population was affected by this disease.<sup>3</sup> The states that first affected (both sexes) were Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu, Gujarat, and Kerala.<sup>4</sup>

In India, the Chikungunya virus was first isolated in 1963 in Kolkata<sup>5</sup> followed by epidemics in Chennai, Pondicherry and Vellore in 1964; in Visakhapatnam, Rajahmundry and Kakinada in Andhra Pradesh in 1965 and in Nagpur, also in 1965. The last officially recorded outbreak in India was reported in Barsi in Maharashtra in 1973.<sup>6</sup> In this region experienced a large number of outbreaks of Chikungunya in the year 2011.

## Transmission Cycle of Chikungunya Virus

The *Aedes* mosquito prefers to breed in water-filled receptacles, usually close to human habitation. They often rest in dark rooms (e.g. in bathrooms and under beds) and breed in small pools that collect in discarded human waste. Although they are most active during daylight hours, biting from dawn to dusk, mosquitoes will feed throughout the day indoors and during overcast weather.

Chikungunya viruses are mainly transmitted to humans through the bites of infective female *Aedes* mosquitoes. The mosquitoes generally acquire the virus while feeding on the blood of an infected person. After virus incubation for eight to ten days, an infected mosquito is capable, during probing and blood feeding, of transmitting the virus for the rest of its life. There is no way to tell if a mosquito is carrying the Chikungunya virus.

Infected humans are the main carriers and multipliers of the virus, and serving as a source of the virus for uninfected mosquitoes.

The virus circulates in the blood of infected humans for several days, at approximately the same time that they have Chikungunya fever (see also clinical symptoms). *Aedes* mosquitoes may acquire the virus when they feed on an individual during this period. (Figure: 1). Chikungunya characterized by acute fever with or without chills, headache, nausea, abdominal pain,

photophobia, conjunctival injection, skin rash, and disabling arthralgia. The patients suffering from Chikungunya develop a stooped posture because of severe arthritis affecting feet, ankles, hands and wrists.<sup>7</sup> CHIKV infection associated with neurological complications has also been reported, but till date remains poorly documented.

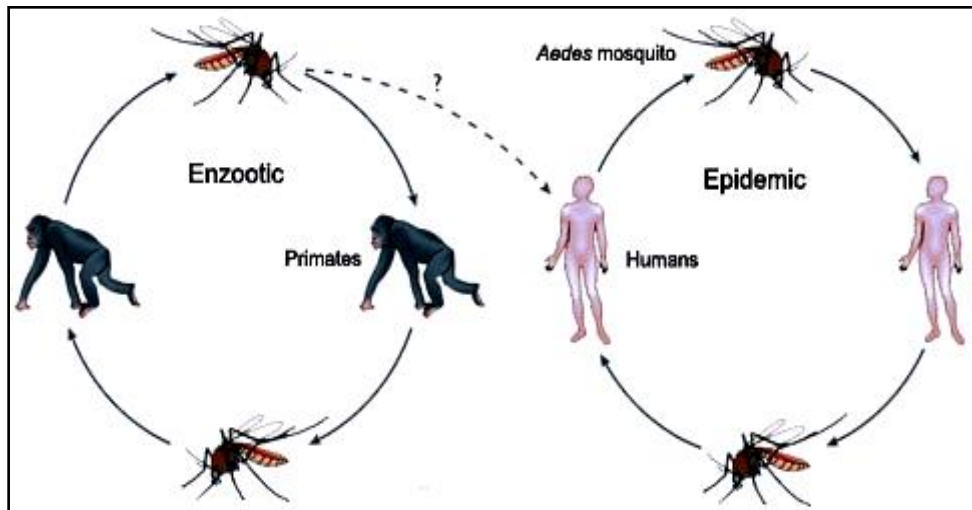


Figure 1: Transmission cycle of Chikungunya Virus

**OBJECTIVE**

To know the seroprevalence and seasonal trends of Chikungunya infection among the patients of the disease who attended to MGM Medical College, Jamshedpur, A tertiary care hospital during 2011 to 2014.

**MATERIALS AND METHODS**

**Study Design:** A retrospective observational study was conducted to find out Sero-prevalence and seasonal trend of Chikungunya from August 2011 to December 2014 at Microbiology Department, MGM Medical College, Jamshedpur, Jharkhand (India).

**Setting & Places:** Department of microbiology, Mahatma Gandhi Memorial Medical College and Hospital, Jamshedpur, was selected.

**Participants:** Indoor, outdoor patients and other government and private hospital suspected of Chikungunya were selected.

**Inclusion Criteria:** Includes the clinical case as per WHO guidelines according to patients who present with Fever and joint

pain were present in all, followed by headache, body ache, joint swelling, and rash.

**Sample Collection:** 323 numbers of Serum and Plasma samples were collected and sent to the Department of Microbiology of MGMMCH, Jamshedpur for analysis. All the samples were tested for IgM antibodies by the National Institute of Virology (NIV) Chikungunya IgM Capture MAC ELISA Kit supplied by NIV, Pune, India. If optical density (OD) value of sample tested exceeded the OD of negative control by a factor of 4.0 (sample OD ≥ Negative OD X 4.0) the sample was considered as positive.

**Permission:** Necessary Permission was sought prior to the conduction of the study.

**STATISTICAL ANALYSIS**

Research data was entered into Microsoft Excel 2007 and analyzed with statistical software SPSS and Microsoft Excel 2007. Prevalence was expressed in percentage. Chi-square tests were used to find out the association with factors. P < 0.05 was set as significant.

Table 1: Distribution of Age group according to sex in Year 2011

Age group	SEX		Pearson Chi-Square	df	P-value
	Female no. %	Male no. %			
0-28	55[46.21]	71[37.36]	4.175	3	.243
29-49	49[41.17]	85[44.73]			
50-70	15[12.6]	31[16.31]			
71-84	0[0]	3[1.57]			
Total	119	190			
Total cases	309				
Mean Age			33.71		
Std. Deviation			12.985		

**Table 2: Distribution of Seroprevalence of Chikungunya in Year 2011**

Result	Frequency	Percent
Negative	161	52.1
Positive	148	47.9
Total	309	100.0

**Table 3: Distribution of Age group wise Seroprevalence of Chikungunya in Year 2011.**

Age group	Result		Pearson Chi-Square	df	P-value
	Negative no. %	Positive no. %			
			39.333	3	.000
8-28	92[57.14]	34[22.97]			
29-49	53[32.91]	81[54.72]			
50-70	16[9.93]	30[20.27]			
71-84	0[0]	3[2.2]			
Total	161	148			
Total Cases	309				

**Table 4: Distribution of sex wise Seroprevalence of Chikungunya in Year 2011**

SEX	Result		Pearson Chi-Square	df	P-value
	Negative no. %	Positive no. %			
			3.508	1	.061
Female	54 [33.54%]	65[43.91]			
Male	107[66.45]	83[56.08]			
Total	161	148			
Total Cases	309				

**Table 5: Month & Year wise Seroprevalence of Chikungunya in Year 2011**

Month & Year	Result		Pearson Chi-Square	df	P-value
	Negative no. %	Positive no. %			
			35.974	2	.000
August 2011	91[56.52]	43[29.05]			
September 2011	40[24.84]	86[58.10]			
October 2011	30[18.63]	19[12.83]			
Total	161	148			
Total Cases	309				

**RESULTS**

Table 1 showed the mean age group is 33.71± 12.985 (ranging from 8–84 years) majority of female and male patient from 8-28 to 29-49. (Figure 2)

Table 2 showed that total 309 cases were reported out of which 52.1% were found positive and 47.9% were negative.(Figure-6).

Table 3 showed that prevalence rate of Chikungunya was maximum 81 (54.72%) in 29-49 years age group followed by 8 to 28 years 34 (22.97%) and 30 (20.27%) in 50-70 years and minimum 3 (2.2%) in 71-84 years of age group. (Figure- 3 & 5).

Table 4 showed Out of these 148 positive samples, males were 83(56.08%) and females were 65(56.08%). (Figure: 04 & 5)

Table 5 showed maximum cases were reported during monsoon season August - 2011 to October - 2011 were 86 (58.10%) and

minimum in October 2011 were 19 (12.83%). (Figure 05 & 06)

Table 6 showed that In August 2012 to December 2012 total 03 Asymptomatic Chikungunya cases were reported out of which 100% were negative during this period. No patients were reported in Chikungunya positive. (Figure 05 & 06)

Table 7 showed that In January 2013 to December 2013 total 06 Asymptomatic Chikungunya cases were reported out of which 100% were negative during this period. No patients were reported in Chikungunya positive. (Figure 05 & 06)

Table 8 showed that In January 2014 to December 2014 total 05 Asymptomatic Chikungunya cases were reported out of which 100% were negative during this period. No patients were reported in Chikungunya positive. (Figure 05 & 06)

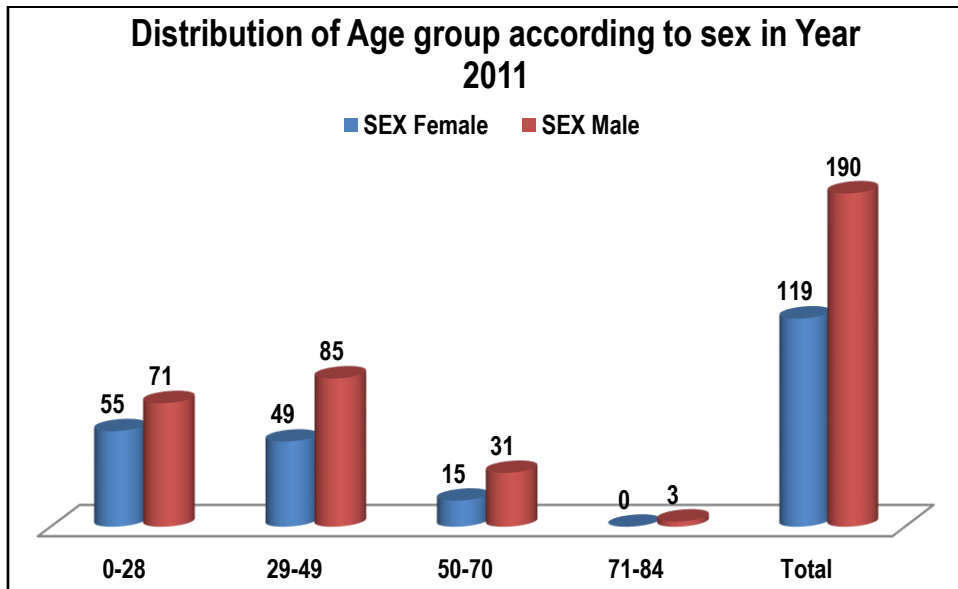


Figure 2: Distribution of Age group according to sex in Year 2011

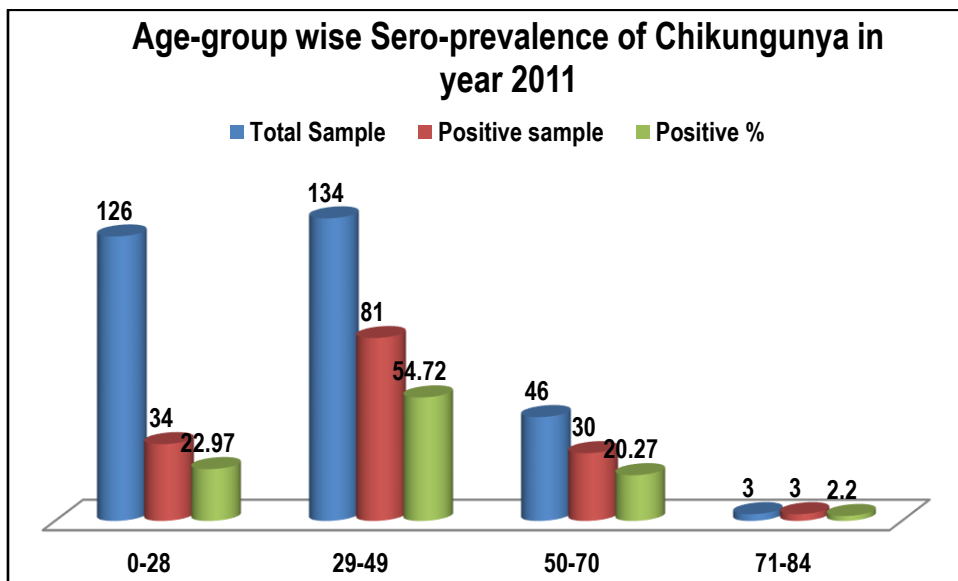


Figure 3: Age-group wise Sero-prevalence of Chikungunya in year 2011

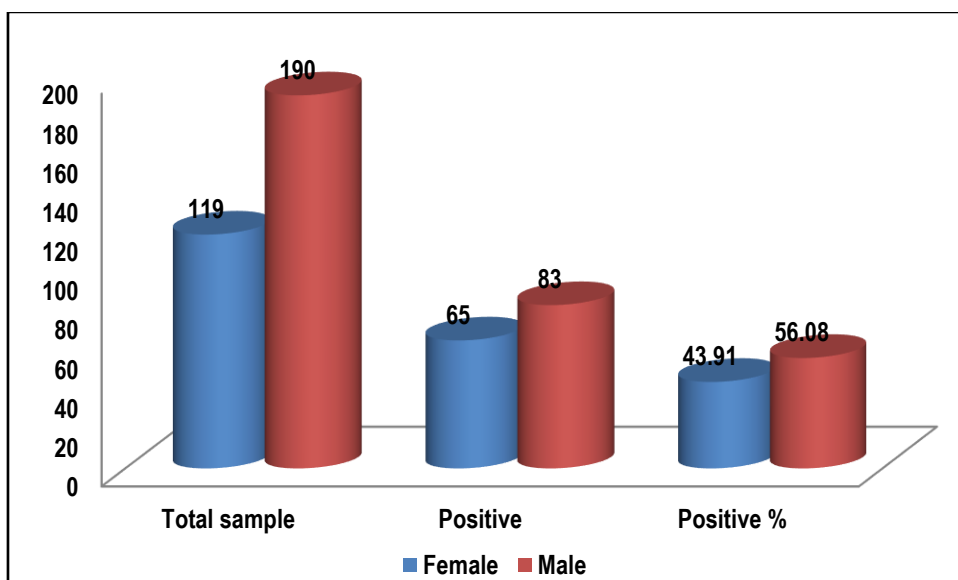


Figure 4: Sex wise Seroprevalence of Chikungunya in Year 2011

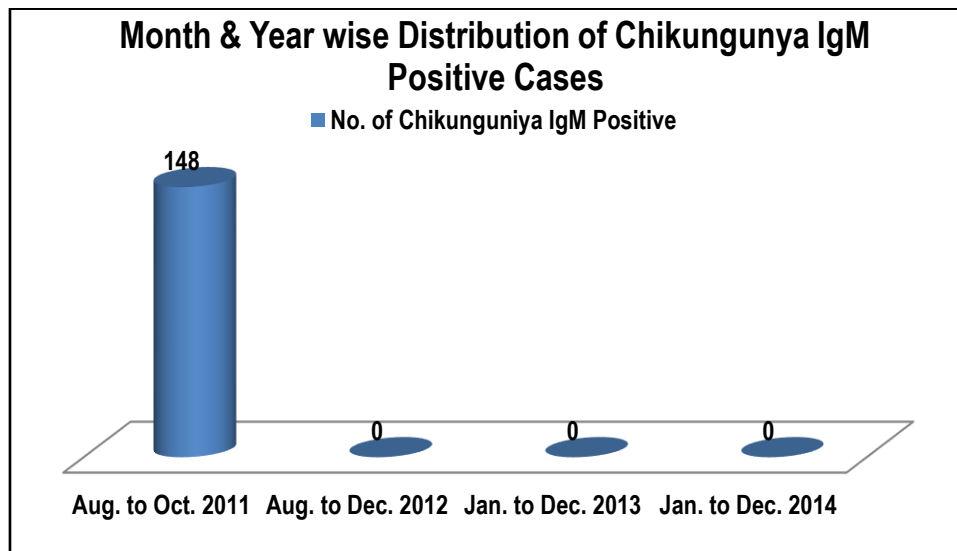


Figure 5: Month & Year wise distribution of Chikungunia Cases.

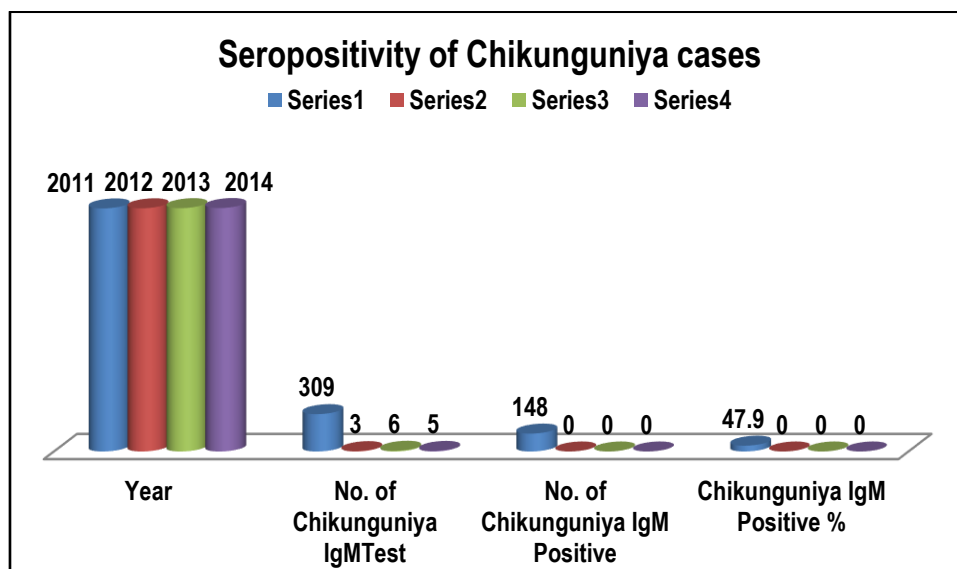


Figure 6: Seropositivity of Chikungunya Cases in year 2011 to 2014.

Table 6: Distribution of Chikungunya cases in year 2012

Period from Aug 2012 to Dec 2012	Sample no. %
Total Positive	00
Total Negative	03
Total	03

Table 7: Distribution of Chikungunya cases in year 2013

Period from Jan 2013 to Dec 2013	Sample no. %
Total Positive	00
Total Negative	06
Total	06

Table 8: Distribution of Chikungunya cases in year 2014

Period from Jan 2014 to Dec 2014	Sample no. %
Total Positive	00
Total Negative	05
Total	05

## DISCUSSION

In present study, we have observed that over the period of four year positivity rate of Chikungunya was very high in August 2011 to October 2011, during monsoon and late monsoon and no positive cases were found in November 2011 to December 2011. No such positive cases were found in Year 2012, 2013, and 2014. The variation in the number of cases in different seasons and year is because of high vector density during the rainy season. Similar findings were observed in studies as well.<sup>8-10</sup>

In year 2011 a total of 309 serum and plasma samples from suspected cases of Chikungunya infection were received during the study period, out of which 148(47.9%) samples were Chikungunya IgM positive. Present study of Sero prevalence 47.9% is similar to chakravert anita et al<sup>11</sup> Sakhiya et al<sup>12</sup> A. Dinkar et al.<sup>13</sup>

The age group (29-49 years; 54.72%) was most affected with Chikungunya when compared with older age group. While if we take gender into consideration, male subjects were more affected (56.08%) compared with female subjects (43.91%). These findings were much similar to the pattern shown by Dwibedi et al. and Mohanty et al.

Fever and joint pain, headache, body ache, joint swelling, and rash were present in all. Similar pattern were observed in Mohanty et al. study.

Chikungunya virus affects humans of all age groups worldwide. In this study, there was no mortality and most affected belonged to the age group of 29-49 years. The *Aedes* mosquito may be a potential for the spread to other areas. In this region, low socio-economic 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. Since no effective vaccines or therapeutics are available, for early detection and effective control of Chikungunya infection. The development of IgM capture enzyme linked immunosorbent assay has been a major achievement in serology for the diagnosis of arboviruses.

In this study, majority of the Chikungunya positive patients were from the urban areas of Jamshedpur. This suggests that Chikungunya infection is no more a rural area infection but it is also extending outside of Jamshedpur, which may become a cause for concern to health authorities. This study calls for a careful vigil to prevent the possible transportation of the vector between different areas.

## CONCLUSION

Chikungunya has a major public health problem. Seroprevalence of Chikungunya in our study 47.9%, which was high in monsoon and late monsoon, this requires appropriate strategies and continuous monitoring of the viral circulation in both endemic and nonendemic areas and rapid implementation of Chikungunya control programme. For these infections early detection and access to proper medical care will cause lower fatality rate.

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