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Original Research Article

SEROPREVALENCE OF CHIKUNGUNYA IN AND AROUND A TRIBAL DISTRICT FROM WESTERN INDIA

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ABSTRACT

Background: India sees most of the chikungunya cases occurring in the urban areas as compared to rural towns and villages with a previous survey showing a four times higher seroprevalence in urban areas as compared to the rural setting. Previously, outbreaks of chikungunya have been reported from a tribal region in Maharashtra where it was believed that the disease was imported into the region from outside. Tribal areas could have a greater impact of chikungunya outbreak considering the general lack of access to quality healthcare, lower education and disease awareness among the communities. **Aims and Objectives**: The study was conducted in a tribal district from Gujarat to estimate the seroprevalence of chikungunya in this region. **Materials and Methods:** The present study was a cross sectional study in which data of chikungunya IgM antibody ELISA test conducted for laboratory diagnosis in suspected chikungunya cases from 2019 to 2021 was retrospectively analysed. **Results:** A total of nine (4.5%) specimens out of 202 were reactive for the Chikungunya IgM antibodies. Most suspected cases reported in the most monsoon months in 2021. Seroprevalence in males was twice as compared to females. **Conclusions:** The study indicates a need for continued surveillance in this region to keep the disease burden under check. Awareness campaigns targeting the vector control strategies could also increase the awareness among the residents to prevent the vector breeding during the monsoon season.

INTRODUCTION

Chikungunya, a debilitating disease, caused by an RNA virus called Chikungunya virus (CHIKV) belonging to the togaviridae family.[1] It is an enveloped virus containing a single stranded positive sense RNA of approx. 11.8kb.[2] It is transmitted through the bite of the mosquito belonging to the genus *Aedes* and the species prevalent in India include *Aedes aegypti* and *Aedes albopictus*. The disease has shown continued presence in the tropics and became a public health problem in India since its re-emergence in 2005.[3] There are two main cycles in its transmission epidemiology, an urban cycle comprising of human mosquito human cycle and a sylvatic cycle involving the spread of virus from animals to humans through the mosquito vector, i.e. *Aedes* spp.[4] India sees most of the cases occurring in the urban areas as compared to rural towns and villages,[5] with a previous survey showing a four times higher seroprevalence in urban areas as compared to the rural setting.[6]

The disease exhibits a triad of symptoms that include fever, rash and joint pains. The joint pains may persist well beyond the duration of fever in the patient, i.e. for weeks to months or years[7] that may result in significant morbidity, including neuropsychiatric manifestations.[8] Previously, outbreaks of chikungunya have been reported from a tribal region in Maharashtra where it was believed that the disease was imported into the region from outside.[9] Tribal areas could have a greater impact of chikungunya outbreak considering the general lack of access to quality healthcare and the higher possibilities of lower education and disease awareness among the communities.[10]

Due to a limited reach of the healthcare infrastructure in the rural and tribal belts in many parts of the country, there is a general lack of evidence of the burden of Chikungunya in these areas. The situation further complicated with the emergence of the COVID-19 pandemic where much of the resources and focus was shifted away to address this public health emergency of national and global concern. The present study was conducted in a tribal district from Gujarat to estimate the seroprevalence of chikungunya in this region.

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MATERIALS AND METHODS

The present study was a retrospective cross sectional study conducted at a tertiary care centre from district Dahod, a tribal district in Gujarat. The study was conducted for a period of three years, i.e. from January 2019 till December 2021. All suspected cases of chikungunya reporting to the institute were included in the study retrospectively. The clinical definition of a suspected case was as per the World Health Organization criteria, i.e. acute febrile illness with a body temperature of >38.5°C and severe arthralgia or arthritis that is not explained by other medical conditions.[11] A suspected (clinical) case was further labelled as a confirmed case of chikungunya in the presence of laboratory confirmation of infection.

The laboratory confirmation was done using ELISA in the Microbiology laboratory where acute phase (IgM) antibodies were detected using NIV Chikungunya (CHIK) IgM Capture ELISA kit supplied by the National Institute of Virology (NIV Pune, India). Blood specimens were collected in vacutainers without additives from suspected chikungunya patients attending the OPD clinics as well as admitted in various wards of the hospital. These blood specimens were transported to the laboratory and were processed immediately or stored at 2-8°C until tested by ELISA as per instructions provided in the kit literature. Basic demographic profile of the patients was accessed from the hospital records after obtaining due ethical clearance from the Institutional Ethical Committee (IEC) vide letter number 046/02-MicroB dated 02-December-2021. The data was entered in Microsoft Excel 2016 (Microsoft Corp., USA) for analysis.

RESULTS

A total of 202 specimens were tested in the serology section of the Microbiology laboratory during the study period, among which nine were reactive for Chikungunya IgM antibody detection using ELISA, indicating a seroprevalence of 4.5% in the hospital set up. Majority of the suspected cases were males (n=163) among which sera of eight (4.9%) was reactive for IgM antibodies while the rest 39 were females among which sera of one (2.5%) patient was found reactive against chikungunya IgM antibodies.

The month wise distribution (table 1) was estimated and it was observed that the majority of the suspected cases (n=176) reported after the monsoon season between September to December, followed by winter and early summer months (January to May) (n=18). Very few (n=8) reported to the Institute during the months of active monsoon from June to August.

Table 1: Month wise distribution of cases

Month	2019		2020		2021	
	Tested	Positive	Tested	Positive	Tested	Positive
January	2	0	0	0	0	0
February	7	0	0	0	3	0
March	2	0	0	0	3	0
April	0	0	0	0	0	0
May	0	0	1	0	0	0
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	7	0	0	0	1	0
September	0	0	0	0	44	1
October	0	0	1	0	47	4
November	5	1	1	0	69	3
December	0	0	0	0	9	0
Total	**23**	**1**	**3**	**0**	**176**	**8**

The seasonal distribution is given in table 2. Suspected cases surged during the phase of expected vector multiplication and there was no consistent presence of the disease on yearly basis.

Table 2: Seasonal distribution of Chikungunya cases with respect to monsoon

Year	Pre monsoon (Jan-May)		Monsoon (June-Aug)		Post Monsoon (Sep-Dec)	
	Tested	Positive	Tested	Positive	Tested	Positive
2019	11	0	7	0	5	1
2020	1	0	0	0	2	0
2021	6	0	1	0	169	8

DISCUSSION

The district Dahod, in eastern Gujarat, has a predominantly rural and tribal population, with approximately 74% belonging to scheduled tribes (2011 Census). A larger proportion of this area is covered by residual hills and forest, limits healthcare access, especially in remote areas.[12] While chikungunya seroprevalence is tracked through the Integrated Disease Surveillance Programme (IDSP), data are primarily gathered from regions near tertiary care centres, leaving tribal and rural populations underrepresented.

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This study identified a 4.5% chikungunya prevalence between 2019 and 2021 using IgM ELISA, reflecting recent infections within the population. In comparison, a 2017 nationwide survey spanning 15 Indian states utilized IgG ELISA to assess prior exposure, reporting a cumulative seroprevalence of 18%. Regional disparities were evident, with north-eastern and eastern states showing lower seroprevalence (~5%), whereas higher rates were recorded in southern and western regions. These findings underscore the evolving epidemiological landscape of chikungunya in India and highlight the need for targeted surveillance and public health strategies adapted to regional transmission dynamics.[13]

The present study observed a higher chikungunya seroprevalence in males (4.9%) compared to females (2.5%), suggesting possible gender-based differences in exposure risk. Similar patterns have been noted in national and regional studies, where outdoor occupational activities and behavioural factors likely contributed to increased male susceptibility.[13] A study by Medhekar et al. reported sex-related variation in a tertiary hospital setting, with seroprevalence showing male predominance in some areas, though the trend was not uniform across all regions.[14] These findings point to the importance of stratified surveillance and public health messaging that accounts for gender-specific risk factors.

The temporal distribution of suspected chikungunya cases in the present study revealed a distinct seasonal trend, with the majority reported during the post-monsoon period (September to December), followed by winter and early summer months (January to May). In contrast, relatively few cases were documented during the active monsoon season (June to August). This pattern aligns with national observations indicating that chikungunya transmission typically intensifies after the monsoon, coinciding with peak vector density and favourable breeding conditions for Aedes mosquitoes.[15,16] Such seasonality underscores the importance of strengthening surveillance and vector control efforts during the post-monsoon months to mitigate outbreak risks.

The present study has a few limitations. The data was collected from a hospital based setting so is not representative of a community based seroprevalence study that can account for subclinical cases and those that do not seek healthcare at a hospital but may seek alternative care based on traditional medicine etc. Secondly, the data was retrospective in nature so the study was limited to the estimation of seroprevalence of the disease. Additional aspects such as genotypes of the virus and disease progression in the patients could not be analysed.

CONCLUSION

The seroprevalence of chikungunya in this tribal district was observed to be 4.5% in the present, hospital based study, where the seroprevalence in males was roughly twice as compared to females. Majority of the cases were observed in the post monsoon season of 2021, indicating an outbreak pattern of the disease that is not observed every year. The study indicates a need for continued surveillance in this region to keep the disease burden under check. Awareness campaigns targeting the vector control strategies could also increase the awareness among the residents to prevent the vector breeding during the monsoon season.

REFERENCES

1. Bartholomeeusen K, Daniel M, LaBeaud DA, Gasque P, Peeling RW, Stephenson KE, et al. Chikungunya fever. Nat Rev Dis Primers. 2023; 9:17.
2. Cho B, Jeon BY, Kim J, Noh J, Kim J, Park M, et al. Expression and evaluation of Chikungunya virus E1 and E2 envelope proteins for serodiagnosis of Chikungunya virus infection. Yonsei Med J. 2008; 49:828-35.
3. Nagarajan R, Kaviprawin M, Ayyasamy L, Parasuraman G, Murhekar M. Seropositivity of Chikungunya in an outbreak setting, India: A systematic review and meta-analysis. J Family Med Prim Care. 2025; 14:1529-1546.
4. Ojeda Rodriguez JA, Haftel A, Walker, III JR. Chikungunya Fever. [Updated 2023 Jun 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK534224/ (Last accessed 24-07-2025).
5. Paulson W, Kodali NK, Balasubramani K, Dixit R, Chellappan S, Behera SK, et al. Social and housing indicators of dengue and chikungunya in Indian adults aged 45 and above: Analysis of a nationally representative survey (2017-18). Arch Public Health. 2022; 80:125.
6. Kumar MS, Kamaraj P, Khan SA, Allam RR, Barde PV, Dwibedi B, et al. Seroprevalence of chikungunya virus infection in India, 2017: a cross-sectional population-based serosurvey. Lancet Microbe. 2021;2:e41-e47.
7. Goupil BA, Mores CN. A Review of Chikungunya Virus-induced Arthralgia: Clinical Manifestations, Therapeutics, and Pathogenesis. Open Rheumatol J. 2016; 10:129-140.
8. Bhatia MS, Gautam P, Jhanjee A. Psychiatric Morbidity in Patients with Chikungunya Fever: First Report from India. J Clin Diagn Res. 2015;9:VC01-VC03.
9. The Times of India, Chikungunya strikes tribal areas, nine test positive. Available from: https://timesofindia.indiatimes.com/city/nashik/chikungunya-strikes-tribal-areas-nine-test-positive/articleshow/56225562.cms (Last accessed 24-07-2025).
10. Deb Roy A, Das D, Mondal H. The Tribal Health System in India: Challenges in Healthcare Delivery in Comparison to the Global Healthcare Systems. Cureus. 2023;15:e39867.
11. World Health Organization: Chikungunya outbreak toolbox. Available from: https://www.who.int/emergencies/outbreak-toolkit/disease-outbreak-toolboxes/chikungunya-outbreak-toolbox (Last accessed 24-07-2025).
12. District administration, Dahod, Government of Gujarat. Dahod district official information. Available from: https://dahod.nic.in/about-district/ (Last accessed 24-07-2025).
13. Kumar MS, Yadav PD, Raut CG, Sahay RR, Sharma H, Radhakrishnan V, et al. Seroprevalence of chikungunya virus infection in India, 2017: a cross-sectional population-based serosurvey. Lancet Microbe. 2021;2:e41–7.
14. Medhekar P, Hirani N, Ingale H, Chowdhary A. Seroprevalence of chikungunya infection in a tertiary care hospital in Mumbai. Indian J Appl Res. 2018; 8:1–3.
15. Ministry of Health and Family Welfare. National Guidelines for Clinical Management of Chikungunya Fever. New Delhi: NCVBDC; 2023. Available from: https://www.ncvbdc.mohfw.gov.in/Doc/National%20Guidelines%20for%20Clinical%20Management%20of%20Chikungunya%20Fever%202023.pdf (Last accessed 24-07-2025).
16. Mopuri R, Kakarla SG, Mutheneni SR. Chikungunya Disease: A Concise Review and Its Transmission Model for India. In: Mopuri R, Kakarla SG, Mutheneni SR, editors. Human Viruses: Diseases, Treatments and Vaccines. Springer; 2021. p.165–85.

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