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Chikungunya Infection: A Potential Re-Emerging Global Threat

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ABSTRACT

Background- Arboviral diseases, such as chikungunya, dengue and now zika represent a public health problem. Epidemiology of chikungunya and dengue is well known, including its social and climatic factors associated, but only few data and reports of chikungunya are available. The clinical differentiation of chikungunya from dengue is no doubt challenging since both diseases can share clinical signs and symptoms leading to potential misdiagnosis of chikungunya in areas where dengue is endemic resulting in delayed treatment and high morbidity.
Aim & Objective- To assess seroprevalence, clinical presentations and seasonal trends of chikungunya infection in this region.
Material and method- The study was conducted in the Department of Microbiology, Government Medical College, Amritsar from January 2023 to December 2023. The serum samples were subjected to IgM antibody capture enzyme linked immunosorbent assay (MAC-ELISA) for detection of anti-chikungunya virus IgM antibodies.
Result- Overall, 52% (241/465) clinical samples were positive by MAC-ELISA. Females were more affected than males and age group >45 years was mostly affected. Fever (100%) was the primary symptom. Maximum cases were detected in the months of August to October with peak in September month. Majority of the cases were reported from rural area (94.8%).
Conclusion- In this study, seroprevalence of Chikungunya was significantly high. Though Chikungunya is a self-limiting infection, increasing morbidity by Chikungunya virus infection is affecting social and economic status of individual. Thus, a community empowerment to effectively control mosquito population by employing different mosquito control measures along with personal protection is mandatory to tackle future outbreak of the disease.

Keywords: Chikungunya, Neglected disease, re-emerging, IgM antibody capture enzyme linked immunosorbent assay write relevant keywords

INTRODUCTION

Chikungunya fever (CHIKF) is a neglected, re-emerging mosquito-borne debilitating disease characterized by severe arthritis. This disease is caused by the chikungunya virus (CHIKV), an RNA virus, belonging to the Alphavirus genus within the Togaviridae family[1].

Chikungunya virus (CHIKV) was discovered during an outbreak in 1952 on the Makonde highland (Tanzania) and named after the Makonde word: "kungunyala", which means: "bends up", referring to the posture of patients suffering from severe joint pain during CHIKV infection[1].The virus is commonly transmitted by arthropods like mosquitoes Aedes aegypti and Aedes albopictus, where it is maintained in 'sylvatic cycle' but the common reservoirs for the virus are monkeys and other vertebrates[2].

In India, the first wave of CHIKV outbreaks, from the Asian lineage of the virus, was reported from 1963 to 1973. Chikungunya infection emerged in 2004 in Kenya resulting in an outbreak. Re-emergence of Chikungunya virus occurred in 2005, with explosive outbreaks in the southern Indian states of Andhra Pradesh, Karnataka, Tamil Nadu and Kerala, which was attributed to an adaptive mutation in the E1 glycoprotein. The E1 Ala226Val mutation was found to be responsible for a 40-fold increase in transmission by Aedes albopictus mosquitoes without affecting viral fitness in the otherwise main vector Aedes aegypti[3, 4].

Clinical disease manifestations emerge after an incubation period that lasts an average of 2 to 4 days. The symptoms associated with CHIKV infection can be divided into acute and chronic phases. The acute phase is characterized by an abrupt onset high fever, followed hours later by myalgia and generalized arthralgia and arthritis, which are often incapacitating and accompanied by headache and back pain. Polyarthralgia is usually bilateral and symmetrical and occurs more often in the hands, wrists, interphalangeal joints, feet and ankles but may also affect large joints, such as the shoulders and knees. Periarticular swelling, maculopapular rash and facial swelling are often present. Ocular manifestations can also occur and generally achieve satisfactory resolution in six to eight weeks. Chikungunya is usually self-limiting, with clinical manifestations regressing within two weeks. However, in a percentage of those infected, which can vary from 30 to 40%, polyarthralgias may persist for months or even years, representing chronic stage of disease[5, 6].

Although Chikungunya is usually benign, there have been increasingly frequent reports associating Chikungunya with the decompensation of pre-existing diseases, especially acute respiratory distress syndrome, diabetes, hypertension and systemic lupus erythematosus, arthritis, among others[5]. And, also CHIKV has spread from the coast of Kenya throughout the Indian Ocean, Pacific, and Caribbean regions, causing millions of cases of disease in over 50 countries. In other words, CHIKV has reemerged as a true global pathogen.

Therefore, this study was undertaken to assess clinic-epidemiological profile and seroprevalence of chikungunya so as to timely implement preventive measures to eradicate chikungunya virus.

AIM & OBJECTIVE- To assess seroprevalence, clinical presentations and seasonal trends of chikungunya infection in this region.

MATERIALS & METHODS

A retrospective study was conducted in the Department of Microbiology, Government Medical College, Amritsar from January 2023 to December 2023.

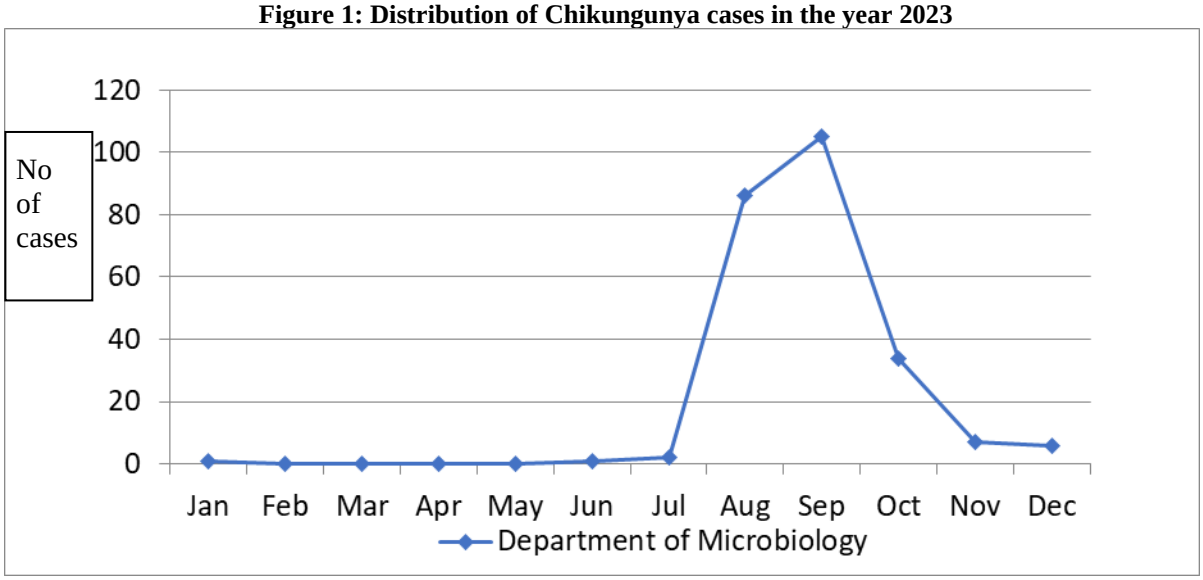
About 5-10 ml of whole blood sample was collected by venipuncture from suspected viral fever patients' and serum was separated by centrifugation (3.000 rpm/5 minutes). The serum was stored at—20°C until use. The search for anti-CHIKV IgM-antibodies was performed using IgM

antibody capture ELISA kit produced by National Institute of Virology (Arbovirus Diagnostic NIV, Pune, India). The sensitivity and specificity for chikungunya IgM antibody capture ELISA are 95% and 98% respectively.

RESULT

A total of 465 samples were tested for IgM antibody at Department of Microbiology, out of which 241(52%) samples tested positive for IgM antibody. The overall seroprevalence was 52%.

Figure 1: Distribution of Chikungunya cases in the year 2023



Maximum cases were reported in the months of August 2023 to October 2023 as depicted in Figure 1.

Females (53%) were more commonly affected than males (47%). Most common age group affected was > 45 years (71%) as compared to lower age group 1- 44 years (29%). The seroprevalence of chikungunya was higher in rural areas (94.8%) than in urban areas (5.2%). Among the patients with positive serology, 241/241 (100%) suffered from fever episodes, joint pain, fatigue, headache. Joint swelling was observed in 145/241 (60%) patients. Body aches were observed in 44/241(18%), rashes were detected in 12/241(5%) patients.

DISCUSSION

The burden of arboviral disease is increasing. Although many arboviruses are known, three Aedes-spp-borne viruses are particularly concerning for humans at a global scale due to recurring large and expanding epidemic outbreaks of dengue virus, Zika virus, and chikungunya virus. These viruses cause a heavy disease burden with mild to potentially life-threatening symptoms, resulting in substantial short-term and long-term morbidity and mortality7. Epidemiological estimates underscore the impact of these viruses, with half of the world population at risk of these infection and around 100–400 million cases and 20 000 deaths reported each year7. The past decade has seen a substantial increase in the burden of arboviruses driven by factors such as the proliferation of mosquito breeding sites, pools of standing water, having a garbage pile nearby and spending at least eight hours per day outdoors8.

The overall seroprevalence of chikungunya reported in this study was 52%, which is significantly high. The results of CHIKV serosurveys previously conducted in countries on different continents had varied from 10.2% to 75% seroprevalence9. The difference between the prevalence found in this study and those reported by other serosurveys may be associated with local environmental conditions and vector competence in transmitting the strain of CHIKV5.Maximum cases were reported in the months of August to October which was preceded by a very rainy period between April and June. The similar observations

were reported by Cunha RV et al5. This can be explained by the fact these environmental factors are crucial to the reproduction and multiplication of the Aedes vector8.

Chikungunya infection was more common among females(61%) than males(39%). Most of the cases were observed in the age group of >45 years (71%). The results of the study coincide with the study done by Vidal OM et al and Kannan M et al respectively. The possible reason for this could be stronger humoral and cellular immune response towards CHIKV infection resulting in potential dissemination of viral particles to lymph nodes, joints and other tissues that may lead to aberrant antigenic response that could worsen the symptomatology in women as compared to men10,11.

Predominant symptoms observed in this study were high grade fever(100%), joint pain (100%) and headache(100%). The study done by Vidal OM et al corresponds with the findings of the present study10.

CONCLUSION

In India, the chikungunya outbreak poses a serious threat to public health. CHIKV is endemic in twenty-four Indian states and six union territories. The unpleasant course of the sickness and long-term consequences that adversely impact quality of life make CHIKF a challenge to the human population even though it causes an acute and self-limiting disease with a very low fatality rate. Creating comprehensive clinical and laboratory diagnostic procedures to distinguish CHIKV infection from other alphaviruses like o'nyong'nyong virus and other flaviviruses like dengue and zika for effective diagnosis is the need of the hour. In order to discover adaptive changes in the viral genome early and to assess risk quickly enough to support the deployment of intervention and control measures aimed at reducing the future effect of CHIKV outbreaks in India, it is imperative that surveillance be on-going. Although there isn't a licensed vaccination on the market yet, a number of viable candidates have been found. In addition to using medications and vaccines, reasonable preventative measures must be implemented like using insect repellents, clearing standing water where mosquitoes can lay their eggs, and minimizing the amount of skin exposed to mosquito bites are the only ways to avoid this illness prevent its re-emergence.

Declaration by Authors

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