

COMPARATIVE EPIDEMIOLOGICAL PROFILE OF CHIKUNGUNYA FEVER IN THE STATE OF TOCANTINS AND IN BRAZIL IN THE YEARS 2017 AND 2021

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Abstract: Chikungunya fever is a viral disease transmitted by the *Aedes aegypti* or *Aedes albopictus* mosquito infected with the Chikungunya virus. Symptoms include sudden fever, severe joint pain, arthritis, tenosynovitis, skin rash, myalgia, in addition to severe neurological and cardiac manifestations. The disease is endemic in all Brazilian states since 2014, with high incidence and morbidity. In 2017, it is worth highlighting the Chikungunya fever epidemic that occurred in Brazil, in which cases increased dramatically, causing serious damage to public health. Thus, the present work aims to list and compare the indicators of incidence of Chikungunya fever in the years 2017 and 2021 in the state of Tocantins and in Brazil (in general), in addition to discussing possible justifications for the data found. Given this context, an ecological study was carried out, of an epidemiological and comparative nature, through the collection of data from the Notifiable Diseases Information System (SINAN), followed by the analysis and interpretation of the data obtained. The study analyzed the incidence in Tocantins in the years 2017 and 2021, recording 6,615 and 1,140 cases, respectively, with an incidence of 0.48% and 0.08%. In Brazil, 245,905 cases were registered in 2017 (incidence of 0.11%) and 136,208 in 2021 (incidence of 0.06%). There was a significant drop in incidence indicators in both populations between 2017 and 2021, and the disease had a higher incidence in Tocantins than in the general Brazilian spectrum. In Tocantins, there was a higher incidence of cases in females and the age group with the highest incidence was the elderly. Therefore, in view of the scenario analyzed, it is inferred that Chikungunya fever may have the tropical climate and/or the occurrence of migrations as an expansion factor, in addition to having women and the elderly as the groups most susceptible to infection.

Keywords: Brazil. Epidemiology. Chikungunya fever. Tocantins.

INTRODUCTION

Chikungunya fever is a viral disease transmitted by the bite of the female mosquito *Aedes aegypti* or *Aedes albopictus* infected by the Chikungunya virus (CHIVK), an RNA virus of the genus *Alphavirus* and family *Togaviridae*. Mosquitoes acquire the virus by feeding on the blood of infected people. There are four genotypes of the CHIVK virus: Asian, East-Central-South African (ECSA), West African and Indian Ocean (IOL), among which only the first two are officially present in Brazilian territory (BRAZIL, 2019).

After being bitten by an infected mosquito, the Chikungunya virus is introduced into the human skin and bloodstream, causing high viremia, afflicting macrophages, fibroblasts and endothelial cells, and, upon reaching target organs, gives rise to pathological signs. The virus also replicates in lymphoid organs before (axillary lymph nodes) and/or after passing through the bloodstream (lymph nodes and spleen).

In addition, transmission routes not transmitted by arthropods have been described (vertical transmission) or suspected (sexual transmission) (MATUSALI et al., 2019).

Each spherical viral particle is approximately 70 nm in diameter and is composed of an RNA strand, encapsulated by capsid proteins, surrounded by a host cell-derived lipid bilayer (envelope) with envelope proteins E1 and E2, in addition to structural proteins 6K and E3. The envelope proteins, E2 and E1, play important roles in binding the virus to the host cell membrane and in its subsequent cell invasion, respectively (VU; JUNGKIND; LABEAUD, 2017)..

Chikungunya fever is a viral disease that mainly affects the peripheral joints, causing sudden fever and severe joint pain, which can

persist for weeks or years. Other symptoms include arthritis, tenosynovitis, rash, myalgia and severe neurological and cardiac manifestations, which can lead to death, especially in neonates, patients over 65 years of age or with underlying medical conditions. It can also affect the central nervous system, with serious risks of encephalitis, Guillain-Barré syndrome, meningoencephalitis, seizures and even cerebellar syndrome, leading to impairment of motor functions. In addition, vertical transmission from mother to child during childbirth, although rare, can result in high morbidity rates (MORRISON, 2014).

Clinical diagnosis is based on symptomatology and history of possible vector bites. The specific diagnosis is made with laboratory confirmation, through detection of viral RNA by RT-PCR (Polymerase Chain Reaction with Reverse Transcriptase), isolation of the virus in a biological sample or detection of IgM and IgG immunoglobulins by ELISA (Linked Immunoabsorbents) to Enzyme) (WILL et al., 2021).

So far, there is no antiviral for treatment, which is based on supportive measures, such as the use of antipyretics in case of fever and analgesics. It is important to encourage oral hydration of patients and physical therapy for cases with more severe sequelae of the disease (BRAZIL, 2014).

In 2013, CHIKV was introduced in America and caused a major epidemic wave in several countries in Central America and Caribbean islands. Then, in the second half of 2014, Brazil confirmed by laboratory methods the autochthonous occurrence of chikungunya in the states of Amapá and Bahia, having to face a second disease transmitted by *Aedes aegypti*. Currently, all Brazilian states register autochthonous transmission of the arbovirus, which can also present atypical and/or severe forms, with a high number of deaths

associated with the disease being verified (BRAZIL, 2019).

In 2017, there was an epidemic of Chikungunya fever in Brazil, with high rates of incidence and morbidity. Transmission by the *Aedes aegypti* mosquito and the lack of a specific vaccine made it difficult to control the epidemic. This epidemic, which mainly affected the Northeast, had a significant impact on public health (SILVA, 2020).

Given this scenario, it is important to analyze the epidemiology of Chikungunya fever in 2017, compared to 2021, in the state of Tocantins (located in the northern region of the country, typically more prone to the proliferation of CHIKV vectors) and in Brazil, in general. Thus, it is expected that it will be possible to assist in the identification of more vulnerable groups, in the development of more effective prevention and control strategies, in addition to guiding public health policies.

OBJECTIVES

The present study aimed to list and compare the incidence rates referring to the epidemiological data of notification of Chikungunya fever in the years 2017 and 2021 of DATASUS in the state of Tocantins and in Brazil (in general).

METHOD

From this perspective, an ecological study was carried out, with a quali-quantitative approach and an exploratory nature. A priori, a literature review was carried out using Ministry of Health manuals and current articles about Chikungunya fever. Subsequently, from the collection of the numbers of cases of Chikungunya fever through the Information System for Notifiable Diseases (SINAN) of the Department of Informatics of the Unified Health System (DATASUS), an epidemiological and comparative analysis was carried out, followed by the interpretation of

the resulting information. Incidence was used as an indicator, calculating from the number of cases available on SINAN and from the total population of the analyzed group (IBGE data available on DATASUS).

RESULTS AND DISCUSSIONS

The study presented a total of 6,615 and 1,140 cases of Chikungunya fever, respectively, in the years 2017 and 2021 in the state of Tocantins, with an incidence of 0.48% and 0.08%. In Brazil, 245,905 cases were registered in 2017 and 136,208 in 2021, with an incidence of 0.11% and 0.06%, respectively. Therefore, there is a significant drop in incidence indicators in both populations between 2017 and 2021.

Furthermore, in order to compare the rates in the state of Tocantins and in Brazil, the average incidence rates for 2017 and 2021 were calculated for each: TO: 0.28%; BR: 0.085%. It appears that Chikungunya fever had a higher incidence in Tocantins compared to the general Brazilian spectrum.

As for gender, the difference in incidence between men (M) and women (F) in the state of Tocantins in the years 2017 and 2021 was analyzed. In 2017, 2,527 cases were registered in men and 4,078 in women (M: incidence of 3.22/1000 inhabitants; F: incidence of 5.33/1000 inhabitants). In 2021, 449 cases were registered in men and 659 in women (M: incidence of 0.57/1000 inhabitants; F: incidence of 0.86/1000 inhabitants). Thus, there is a higher incidence of cases in females in both years studied.

Finally, an analysis of the incidences between age groups in the state of Tocantins in 2017 was carried out. It was observed that the age groups with the highest and lowest incidences were, respectively, elderly (from 60 years old) and under 19 years.

The present epidemiological study on chikungunya fever in the state of Tocantins

showed groups with a higher incidence of the disease, with females and the elderly being the most affected. Based on the results obtained, some hypotheses can be raised to justify such findings.

In the case of females, it is possible to consider that greater exposure to the *Aedes aegypti* mosquito, which transmits Chikungunya fever, may be related to daily activities, such as work in outdoor areas and the practice of outdoor physical activities. Furthermore, pregnant or breastfeeding women may have a more fragile immune system, which could facilitate CHIVK virus infection (NUNES et al., 2015).

As for the elderly, a possible justification for the higher incidence of Chikungunya fever may be related to the deficit of the immune system resulting from aging. In addition, it is possible that these individuals have greater difficulty in protecting themselves from exposure to the mosquito (DOURADO et al., 2019; ALVES, 2020).

In addition, the higher incidence of the disease in the state of Tocantins compared to the general Brazilian scenario, both in 2017 and in 2021, can be explained by the climatic characteristics of the region. The state has a predominantly tropical climate, with high temperatures and high humidity, which favors the proliferation of mosquitoes that carry the disease. Furthermore, the presence of forest areas and the lack of basic sanitation in some regions may also contribute to such proliferation, increasing the population's exposure to the disease (SILVA, 2019).

Another factor that can influence the incidence of the disease in the state is the migration of infected people. The state is a transit region for many people traveling from the Northeast – where Chikungunya fever is most prevalent – to other parts of the country. Thus, there may be a constant flow of infected people arriving in Tocantins, increasing the

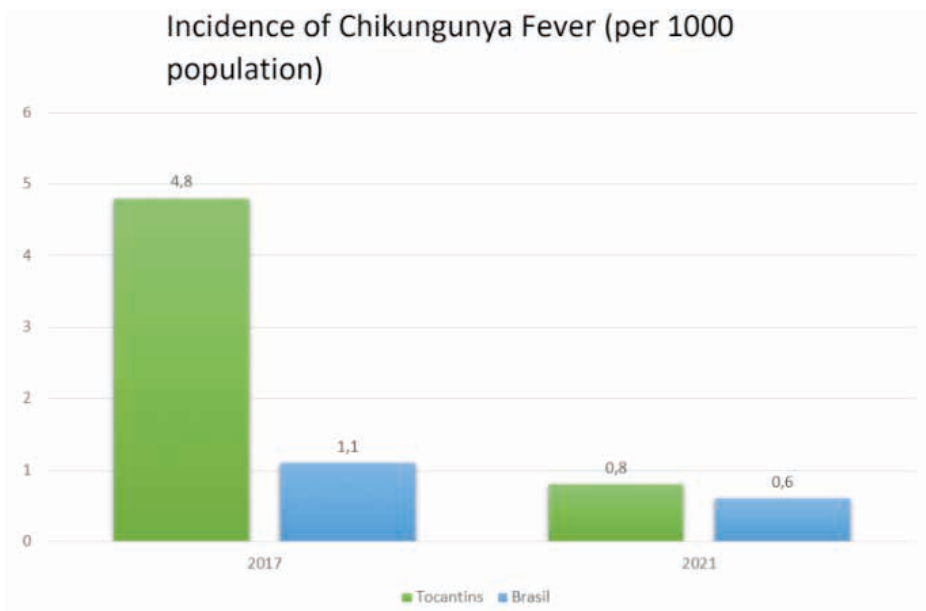


Figure 1 – Incidence of Chikungunya Fever (per 1000 inhabitants) in Tocantins and Brazil, in 2017 and 2021

Source: Prepared by the authors from the Notifiable Diseases Information System (SINAN)/DATASUS (2022).

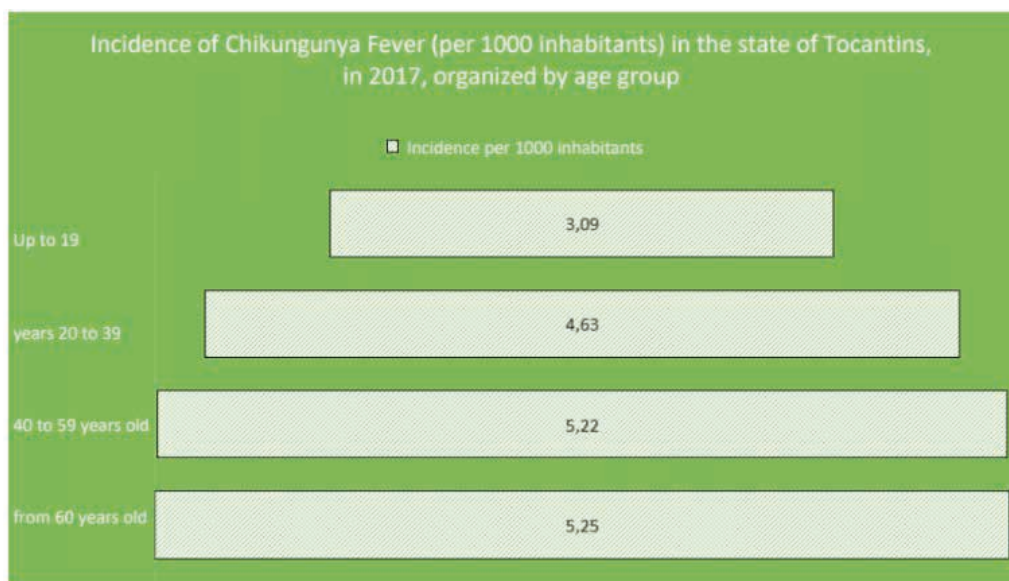


Figure 2 – Incidence of Chikungunya Fever (per 1000 inhabitants) in the state of Tocantins, in 2017, organized by age group

Source: Prepared by the authors from the Notifiable Diseases Information System (SINAN)/DATASUS (2022).

incidence of the disease in the region (PORTO et al., 2019).

FINAL CONSIDERATIONS

In summary, the present epidemiological study showed a significant drop in the incidence indicators of Chikungunya fever in the state of Tocantins and in Brazil, from 2017 to 2021. However, it was found that the state had a higher incidence of the disease compared to the panorama general population, in the two years analyzed, suggesting the need for specific measures to prevent and control the disease in the region.

The results also showed that females and the elderly were the groups most affected by

Chikungunya fever, and some hypotheses were raised to justify such findings, such as greater exposure to the *Aedes aegypti* mosquito and the immune system deficit related to aging. In addition, the climatic characteristics of the region and the migration of infected people were also identified as possible factors that contribute to the higher incidence of the disease in the state.

Thus, considering the importance of Chikungunya fever as an emerging disease and the need for prevention and control, it is essential that effective public policies are implemented to minimize the impact of the disease on the population.

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