

Clinical and epidemiological profile of patients affected by chikungunya admitted to a referral hospital for infectious diseases



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ABSTRACT

Introduction: Chikungunya (CHIK) is an infectious disease caused by the CHIK virus, an alphavirus belonging to the *Togaviridae* family, transmitted through the infected bite of the *Aedes aegypti* and *Aedes albopictus* mosquitoes. **Objective:** To describe the clinical and epidemiological profile of patients affected by chikungunya admitted to a referral hospital for infectious diseases. **Methods:** Cross-sectional and descriptive research with a quantitative approach. The population consisted of neonates, children and adults with a laboratory-

confirmed diagnosis of chikungunya and who were admitted to a referral hospital from 2015 to 2018. Data were collected from medical records and the SINAN and LACEN Information Systems. The analysis was performed through the frequency distribution. Results: The profile of the 52 patients showed that 30 (57%) lived in Fortaleza, 29 (55.8%) were female, the predominant age group was between 0 and 10 years old, with 27 (51%), 24 (46.2%) were brown. 27 (51.9%) did not start their school activities because of their age. As for signs and symptoms, the most prevalent was fever 51 (98%). As for comorbidities, 41 (78.85%) had no comorbidities. As for the admission criterion, 18 (36.4%) were neurological involvement. Regarding the outcome, 49 (94%) were discharged from hospital. Conclusion: Of those hospitalized, there was a higher prevalence in female children in the preschool phase, of mixed color and living in urban areas. Regarding the admission criteria, a large number of patients with neurological impairment were evidenced and who progressed to discharge.

Keywords: Chikungunya Virus, Sociodemographic Variables, Pathological Conditions, Signs and symptoms, Age Group.

1 INTRODUCTION

Chikungunya (CHIK) is a debilitating arthritic disease characterized by sudden fever and severe arthralgia. It is caused by the Chikungunya virus (CHIKV), which is transmitted by the bite of *Aedes Aegypti* and *Aedes Albopictus* mosquitoes. In addition, the disease can be transmitted vertically from mother to fetus or by blood transfusion (MADARIAGA; TICONA; RESURRECION, 2016).

According to the epidemiological bulletin of the state of Ceará, in 2016 there was sustained transmission of *chikungunya* in the state, characterizing an epidemic scenario, with 49,516 suspected cases, of which 63.6% (31,482/49,516) were confirmed, distributed in 139 (75.5%) municipalities (CEARÁ, 2017).

In 2017, there was an increasing trend in reported cases. The incidence rate of suspected cases of *chikungunya* in Ceará was 714.3 cases per 100,000 inhabitants. A total of 64,031 cases were



reported; Of these, 39.9% (25,533/64,031) were confirmed and 8.2% (5,245/64,031) were discarded. Of the confirmed cases, 67.1% (17,131/25,533) were concentrated in the age groups between 20 and 59 years and females were predominant in all age groups, except for those up to 14 years old (CEARÁ, 2017).

The disease can evolve in three phases: acute or febrile (lasting up to 10 days), subacute (11-90 days) and chronic (> 90 days). Approximately 50% of people with acute infection experience develop chronic joint pain that can last for months to years (BRITO *et al.*, 2016).

Severe conditions are often known only after viral circulation in extensive epidemics, often showing an unpredictable impact on morbidity and mortality. Neurological manifestations are fatal complications in patients infected with *chikungunya* virus, even in those without any comorbidity (ROSSO *et al.*, 2016).

Thus, *chikungunya* fever has been constituting new clinical concerns, concerns that should still be observed for a few decades due to the development of the disease itself in those affected, which proves the need for constant updating of studies on the manifestations of the disease. Therefore, the following research question was formulated: What is the clinical and epidemiological profile of patients affected by *chikungunya* admitted to a referral hospital for infectious diseases in the period from 2015 to 2018?.

Therefore, this research seeks to be a source of new concerns not only for the academic community, but also to contribute to broaden research on the subject to the widest range of interested parties.

In the care scenario, there was a lack of studies on this theme, so the importance of surveying the clinical and epidemiological profile of these patients emerged. Given the number and severity of cases during the study period, we intend to contribute to the epidemiological profile.

Thus, the objective of this study is to describe the clinical and epidemiological profile of patients affected by *chikungunya* admitted to a referral hospital for infectious diseases.

2 LITERATURE REVIEW

Chikungunya is an arbovirus caused by the CHIKV virus, of the *Togaviridae* family and the genus *Alphavirus*. Viremia persists for up to ten days after the onset of clinical manifestations. Transmission occurs through the bite of female *Aedes Aegypti* and *Aedes albopictus* mosquitoes infected by CHIKV. Cases of vertical transmission can occur almost exclusively in the intrapartum of viremic pregnant women and often cause severe neonatal infection. Transfusion transmission may occur, but it is rare if the protocols are observed (BRASIL, 2017a).

In 2016, 271,824 probable cases of *chikungunya* fever were registered in Brazil (incidence rate of 133.0 cases/100,000 inhabitants), distributed in 2,829 municipalities, of which 151,318 (55.7%)



were confirmed. In 2017, there were 3,754 probable cases of *chikungunya* fever and an incidence rate of 1.8 cases/100,000 inhabitants; of these, 564 (15.02%) were confirmed. Among the federative units, the states of Ceará (11.4 cases/100,000 inhabitants) and Tocantins (9.2 cases/100,000 inhabitants) stand out. In 2017, 1 death from *chikungunya fever was confirmed* in Bahia (BRASIL, 2017b).

In 2020, 13,636 probable cases were reported (incidence rate of 6.49 cases per 100 thousand inhabitants) in the country. The Northeast and Southeast regions have the highest incidence rates, 8.71 cases/100,000 inhabitants and 7.72 cases/100,000 inhabitants, respectively. The state of Espírito Santo concentrates 22.2% of the probable cases of *chikungunya* in the country, Bahia concentrates 22.6% cases and Rio de Janeiro concentrates 19.0% of the cases (BRASIL, 2020).

According to Reyes, Lechuga and Garces (2015), the transmission cycle is of the human-mosquito-human urban type. This cycle requires infection of female mosquitoes by feeding on the blood of a susceptible vertebrate and viremic host, followed by an extrinsic incubation period and adequate transmission to another vertebrate host during a rear supply. In these events, travelers play an essential role in transmission, since they can carry the causal agent to areas where mosquitoes can transmit the infection.

The signs and symptoms are clinically similar to those of dengue fever – acute-onset fever, joint and muscle pain, headache, nausea, fatigue and rash. The main clinical manifestation that differentiates it is severe joint pain, which can often be accompanied by edema. After the initial phase, the disease can evolve in two subsequent stages: subacute and chronic phases. *Chikungunya* has an epidemic character with a high rate of morbidity associated with persistent arthralgia, resulting in reduced productivity and quality of life (BRASIL, 2017a).

CHIKV can present with atypical manifestations such as: cardiovascular, ocular, gastrointestinal, renal, and neurological impairments, including altered level of consciousness, changes in cranial nerves, seizures, psychosis, hemiparesis, paraplegia, involuntary movements, and Guillain-Barré syndrome (ROSSO *et al.*, 2016).

The laboratory diagnosis of CHIKV infection can be made directly, through viral isolation and viral RNA testing in different clinical samples, or indirectly through the search for specific antibodies (BRASIL, 2017b).

According to Chrusri *et al.* (2011), neurological complications are the main causes of death and deficiency in CHIKV, thus causing prolonged hospitalization and secondary complications such as: electrolyte imbalance, pressure injuries, urinary tract infection, aspiration pneumonia and renal changes.

The current disease landscape requires obtaining up-to-date, reliable, and accurate data to warn of the occurrence of outbreaks and related epidemics. Knowledge of the main actions resulting from the implementation of the national Chikungunya surveillance and prevention system may indicate



whether its operation is efficient, in addition to subsidizing, with the results obtained, health planning and decision-making (SILVA *et al.*, 2018).

During 2022, there were 108,730 probable cases of *chikungunya* (incidence rate of 51 cases per 100 thousand inhabitants) in Brazil. Compared to 2019, there was a 35.2% increase in cases registered for the same period analyzed. When compared to 2021, there was an increase of 95.7% cases up to the respective week (BRASIL, 2022).

In the state of Ceará, 1,811 suspected cases of *chikungunya* were reported in 43.5% (80/184) of the state's municipalities, with 16.0% (286/1,811) confirmed. Confirmed cases occurred in people aged between 01 and 92 years, 54.2% (155/286) in the age groups of 20 to 49 years, and females were predominant in 68.2% (195/286) of the cases. One death from *chikungunya* was confirmed in February, a 76-year-old male patient living in the municipality of Barbalha (CEARÁ, 2022).

According to São Paulo (2021), neonates are one of the groups at risk of severe infection associated with neurological signs. When infected during maternal-fetal transmission, they are usually asymptomatic at birth, with clinical manifestations that can be mistaken for neonatal sepsis starting between 3 and 7 days later. In addition to neurological alterations (meningoencephalitis, edema, and cerebral hemorrhage), with a risk of persistent damage, fever, prostration, diffuse pain (diffuse hyperalgesia syndrome), severe skin lesions, hemorrhages, pericarditis, and hemodynamic instability may be observed. Children under the age of 2 also tend to have serious illnesses.

The fight against *chikungunya* arbovirus must involve all actors in society, in which there are intervention policies that will involve various sectors, including society, not leaving it only in the hands of the health area.

In addition to vector control measures, effective and continuous surveillance of this arbovirus in the country is also extremely necessary through the maintenance and integration of continuous entomological and epidemiological surveillance, in order to know the current situation of this arbovirus in each region. Thus, it will be possible to analyze the evolution of diseases in the national territory and identify the main sources of disease, in order to plan appropriate measures for control, prevention and awareness of the population. (LIMA-CAMARA, 2016).

3 CHIKUNGUNYA VIRUS DISEASE

3.1 HISTORY AND EPIDEMIOLOGY

3.1.1 Methodology

This is a cross-sectional study, with a quantitative approach, which aims to determine the distribution of diseases or health-related conditions according to time, place and/or characteristics of individuals. The data used for analysis are obtained on a secondary basis from medical records obtained from the Medical Archive and Statistics Service (SAME) and complemented the information not found



through the forms of the Notifiable Diseases Information System (SINAN) - Dengue and *Chikungunya* Fever.

The study was conducted at a referral hospital for infectious diseases, a tertiary public institution and a referral institution for the state of Ceará.

The initial sample consisted of previous data from 81 suspected cases, through a survey in the Medical Archive and Statistics Service (SAME) regarding the number of hospitalized patients with a diagnostic hypothesis of CKIKV in the period, with the study population consisting of 52 confirmed cases of *chikungunya* who were hospitalized in an infectious diseases referral hospital in the period from 2015 to 2018.

A total of 52 medical records that met the following inclusion criteria were included in the study:

- a) Neonate patients, children and adults who were hospitalized at Hospital São José;
- b) Hospitalization period from January 1, 2015 to December 31, 2018;
- c) Laboratory-confirmed cases through IgM serology for CHIKV.

A total of 29 medical records were excluded from the study. There were 4 exclusion criteria:

- a) Medical records not located
- b) Serology with inconclusive results;
- c) Poorly completed medical records with insufficient or illegible information.

Initially, a survey was carried out at the Medical Archive and Statistics Service (SAME) regarding the number of patients hospitalized with CKIKV in the year 2015 to 2018. Subsequently, the medical records were consulted, and the pertinent information that was not included in them was searched in the Notifiable Diseases Information System (SINAN) and in the Central Public Health Laboratory (*LACEN*). The medical records that were not located were manually requested from the SAME, and two search attempts were defined.

The information was collected during the months of August and September 2018 through a form validated by the Notifiable Diseases Information System (SINAN) - Dengue and *Chikungunya* Fever. The variables that were used were: sociodemographic: name, age, race/color, sex, education, municipality of residence; clinical-epidemiological data: clinical signs, pre-existing diseases, serology; Laboratory data: date of admission, confirmation/discard criteria, clinical presentation, and case evolution.

As this is a descriptive statistic, the results were analyzed in absolute numbers and percentages, and presented in the form of tables and figures.

The research was carried out in accordance with the principles of Resolution 466/2012 of the National Health Council (CNS), ensuring the confidentiality of information, as well as other aspects. Ethical precepts were present in all stages of the study, as is recommended for research involving



human beings. The authorization for the handling of the data and the beginning of the collection occurred after the agreement of the term of consent and the faithful depositary.

The research project was approved by the Research Ethics Committee (REC) of the São José Hospital for Infectious Diseases with CAAE:96237218500005044.

4 RESULTS AND DISCUSSION

In the present study, it was possible to find the profile of 52 hospitalized patients; The clinical and epidemiological characterization in more detail is presented in the following tables:

Table 1 - Distribution of socioeconomic data of patients with Chikungunya *Fortaleza CE, 2015-2018.*

CHARACTERISTICS	N	%
GENDER		
Male	23	44,2
Female	29	55,8
AGE GROUP		
0 to 10 years	27	51,9
11 to 19 years old	7	13,5
20 to 29 years old	1	1,9
30 to 39 years old	3	5,8
40 to 50 years old	2	3,8
51 to 60 years old	1	1,9
Over 60 years old	11	21,1
SCHOOLING		
Illiterate	1	1,9
Complete Elementary School	2	3,9
Incomplete Elementary School	4	7,7
Complete High School	3	5,8
Incomplete High School	1	1,9
Nothing is on record	14	26,9
Not applicable	27	51,9
RACE		
Brown	24	46,2
Black	01	1,9
Nothing is on record	27	51,9
MUNICIPALITY OF RESIDENCE		
Fortress	30	57,7
Metropolitan Region	12	23,1
Interior	10	19,2

Source: Survey data, 2020

The profile of the hospitalized patients who participated in the study shows that 29 cases (55.8%) were female and 23 (44.2%) were male. Regarding the most frequent age group, 51% of the cases, 27 people, were aged between 0 and 10 years, and 21.1% of the cases, 11 people, were over 60 years old (Table 1).

In a study published at the São José Hospital for Infectious Diseases, by Beserra *et al.* (2019), with 14 children hospitalized with positive IgM serology for CHIKV, there was no gender prevalence. Another study conducted in Ceará by Pinto *et al.* (2019), which included 3,080 patients, found a higher prevalence of female hospitalized patients.



The predominance of cases in females and the age group of children and the elderly can be discussed by the greater exposure to the vector due to the fact that they spend a longer period at rest inside their homes, exposing themselves more to mosquitoes during the vector's activity times than men of productive age, who generally spend most of the day moving outside their homes (QUEIROZ *et al.*, 2021).

Regarding schooling, we can observe that, of the 52 patients, 27 (51.9%) did not apply because they had not yet started their studies, 14 (26.9%) did not have records of schooling in the medical records researched, and 4 (7.7%) had incomplete elementary school (Table 1). According to Guzman *et al.*, in 2016, 34.4% had incomplete primary education.

Regarding race, 24 cases (46.2%) were brown and 1 (1.9%) was black. It was observed that most cases (51%) did not have records in the medical records studied. Regarding the municipality of residence, 30 cases (57%) lived in Fortaleza and 12 cases (23%) in the metropolitan region (Table 1).

The disorderly growth of cities, together with climate change, provides artificial oviposition sites for the proliferation and dissemination of mosquitoes, especially *Ae. Aegypti* (LIMA-CAMARA, 2016).

Table 2 - Signs and symptoms, underlying diseases, hospitalization criteria, length of hospital stay, and evolution of patients with *Chikungunya* Fortaleza, CE, 2015-2018.

CHARACTERISTICS	N	%
Symptomatology*		
Fever	51	98,0
Exantema	32	61,5
Intense arthralgia	32	61,5
Myalgia	18	34,6
Headache	06	11,5
Retroorbital pain	06	11,5
Arthritis	02	3,8
Conjunctivitis	01	1,9
Pre-existing conditions*		
Absence of Comorbidities	41	78,85
Systemic Arterial Hypertension	05	9,6
Diabetes	04	7,7
Hepatopathies	01	1,9
Hematologic Diseases	01	1,9
Hospitalization criteria*		
Neurological involvement	18	34,61
Vesicobocular rash	09	17,3
Persistent vomiting	07	13,5
Newborns	07	13,5
Decompensation of underlying disease	07	13,5
Mucous membrane bleeding	06	11,5
Signs of shock	02	3,8
Dyspnea	01	1,9
Length of hospital stay		
1 to 10 days	45	86
11 to 20 days	02	04
Above 30 days	05	10



Evolution/Outcome	N	%
Discharge	49	94
Death	02	04
Transfers	01	02

*The above symptoms and criteria may be repeated.

Source: Survey data, 2020

It can be observed that the most frequent symptoms presented were 51 cases (98.0%) with fever, followed by 32 cases of rash and arthralgia (61.5%) (Table 2). Ribeiro *et al.* (2019), in their study, evidenced the prevalence of fever in cases of dengue and *chikungunya*, corroborating our study. *Chikungunya* virus infection produces a sudden-onset, debilitating febrile state

In a study conducted in the same hospital with children, of the 14 children hospitalized for CHIKV with positive IgM serology, 13 had rashes (92.8%); among these, 8 (57.1%) had rashes with characteristics of vesicobullous rash (BESERRA *et al.*, 2019).

In another study conducted in the municipality of Mossoró, arthralgia was the most frequent symptom (81.9%), followed by fever (68.81%) and myalgia (47.69%) (QUEIROZ *et al.*, 2021).

We also observed that, among the 52 patients, 41 (78.85%) of them did not have comorbidities and 11 patients had pre-existing diseases, of which 5 cases (9.6%) were systemic arterial hypertension and 4 cases (7.7%) had diabetes (Table 2).

Simião *et al.* (2019), in a similar study, found the most frequent symptoms in their study: fever (90.8%), headache (76.1%), arthralgia (75.6%) and myalgia (66.7%). Among those who reported baseline diseases, systemic arterial hypertension (SAH) (59%) and diabetes mellitus (DM2) (25%) predominated.

Pinto *et al.* (2019), in their study, found a high prevalence of hypertension and DM2 in the patients studied, in such a way that DM2 was the second most common comorbidity after hypertension and was associated with increased length of hospital stay in patients with comorbidities.

Regarding the criteria for hospitalization, neurological involvement stands out with 18 cases (34.6%) and vesicobullous rash with 9 cases (17.3%). Of the hospitalized patients, 45 (86%) remained for an average of 10 days and 5 (10%) for more than 30 days. Regarding clinical evolution/outcome, 49 people (94%) were discharged from hospital.

In this study, the main criterion for hospitalization was neurological involvement, described in 18 (34.61%) patients. According to Lima *et al.* (2020), neurological complications account for up to 25% of atypical cases and up to 60% of severe atypical cases of CHIKV infection with a high proportion of deaths, as reported by several other authors, thus suggesting that these complications may be more severe than previously recognized. Cases of *chikungunya* stood out with high morbidity, mortality, and incidence of severe diseases, including encephalitis and meningoencephalitis.

A myriad of clinical neurological syndromes related to CHIKV have been described in the literature: encephalitis, meningitis, meningoencephalitis, myelitis, Guillain-Barré syndrome, acute



disseminated encephalomyelitis (ADEM), optic neuritis, etc. (META *et al.*, 2018). In Ceará, there are numerous case series of *chikungunya* and neurological complications, with emphasis on encephalomyelitis and meningitis I (FERREIRA *et al.*, 2020).

5 CONCLUSION

The objective of this study was to describe the clinical and epidemiological profile of patients affected by *chikungunya*. Of the hospitalized patients, a higher prevalence was characterized in female children in the preschool phase, brown and living in urban areas. From the hospitalization criteria, a large number of patients with neurological involvement were evidenced and who were discharged.

We reinforce the need for further studies of greater scope in order to contribute to the construction of knowledge about the role of CHIKV in the region, as well as the need for investigations of epidemiological data, reflecting in the assistance for the elaboration and establishment of plans and strategies for control, prevention and health care by management agencies that assisted the multidisciplinary team in its strategies in the care of this clientele

As a limitation of the study, the inconsistency of information in the medical records emerged, an expected difficulty in the face of secondary data, but it requires interventions, as it mainly hinders the effectiveness of public policies.

We suggest the inclusion of neurological screening and timely recognition of severe cases with complications and, consequently, the possibility of interfering with the determinants to contain the occurrence of deaths.

According to Meta *et al.* (2018), in endemic areas, *chikungunya* virus should be tested in all patients presenting with acute neurological disease and all mothers presenting with fever, arthralgia, or rash; neonates with suspected infection should be followed for at least 2 years for evidence of neurodevelopmental delay, regardless of initial presentation.



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