

HEART CHANGES IN ELDERLY CHIKUNGUNYA: INTEGRATION REVIEW

Alterações cardíacas em idosos com Chikungunya: revisão integrativa

Alteraciones cardíacas en idosos con Chikungunya: revisión integrativa

Lúcia de Fátima Mororó Noronha¹, Ronaldo Bezerra de Queiroz²

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ABSTRACT

Objective: To identify, evaluate and transmit new data and recommendations to health professionals. **Method:** this is an integrative review of the literature performed in the bases Scopus, Cinahl, Ibecs, Medline and Lilacs. **Results:** 248 articles were initially found, after exclusion of the articles that did not meet the inclusion criteria, 6 were selected. **Conclusion:** We conclude that there is a high mortality rate in elderly patients due to cardiac alterations, a high association of comorbidities and simple diagnostic resources in the phases of cardiac changes by Chikungunya. It is necessary to ensure greater attention to the initial care and follow-up of the elderly with this arbovirose involving better practices in the routine of clinical care, expansion of the use of imaging and laboratory cardiology exams in health units and scientific research by the professionals of Cheers.

Keywords: Chikungunya virus; Old man; Cardiac disorders; Chikungunya fever; Cheers.

RESUMO

Objetivo: identificar, avaliar e transmitir novos dados e recomendações aos profissionais de saúde. **Método:** trata-se de uma revisão integrativa da literatura realizada nas bases Scopus, Cinahl, Ibecs, Medline e Lilacs. **Resultados:** inicialmente foram encontrados 248 artigos, após exclusão dos artigos que não se enquadraram nos critérios de inclusão foram selecionados 6. **Conclusão:** Concluímos que existe um alto índice de mortalidade em idosos por alterações cardíacas, associação elevada de comorbidades e recursos simples de diagnóstico nas fases das alterações cardíacas por Chikungunya. Torna-se necessário garantir uma maior atenção ao atendimento inicial e acompanhamento do idoso com esta arbovirose envolvendo melhores práticas na rotina da assistência clínica, ampliação do uso de exames cardiológicos de imagem e laboratoriais em unidades de saúde e de pesquisas científicas por parte dos profissionais de saúde.

Descritores: Chikungunya vírus; Idoso; Cardiopatias; Febre de Chikungunya; Saúde.

RESUMÉN

Objetivo: identificar, evaluar y transmitir nuevos datos y recomendaciones a los profesionales de la salud. **Método:** se trata de una revisión integrativa de la literatura realizada en las bases Scopus, Cinahl, Ibecs, Medline y Lilacs. **Resultados:** inicialmente se encontraron 248 artículos, después de la exclusión de los artículos que no se encuadrar en los criterios de inclusión fueron seleccionados 6. **Conclusión:** Concluímos que existe un alto índice de mortalidad en ancianos por alteraciones cardíacas, asociación elevada de

- 1 Physician graduated from the Federal University of Paraíba - UFPB, Master's student in Professional Gerontology at the Federal University of Paraíba - UFPB, Infectologist.
- 2 Doctor graduated from the Federal University of Paraíba - UFPB, Doctor from the Postgraduate Program in Nursing at the Federal University of Paraíba / UFPB, Neurologist at the Federal University of Paraíba - UFPB.

comorbilidades y recursos simples de diagnóstico en las las fases de las alteraciones del corazón por Chikungunya. Se hace necesario garantizar una mayor atención a la atención inicial y acompañamiento del anciano con esta arbovirosa involucrando mejores prácticas en la rutina de la asistencia clínica, ampliación del uso de exámenes cardiológicos de imagen y de laboratorio en unidades de salud y de investigaciones científicas por parte de los profesionales de la salud salud.

Descriptores: Chikungunya virus; personas de edad avanzada; enfermedades del corazón; Fiebre de Chikungunya; Salud.

INTRODUCTION

Chikungunya is described as an emerging and reemerging arbovirus transmitted to humans through the bite of *Aedes* mosquitoes, more precisely by females; The most well-known species are *Aedes Aegypti*, the most common vector in the Americas circulating in the territory since 1635, and *Aedes Albopictus*, which became important when it allowed better adaptation to the Chikungunya virus mutation, contributing to the expansion of the transmissibility of the disease in other parts of the world including Latin America.¹

Chikungunya virus is an RNA particle of the family *Togaviridae* and of the genus *Alphavirus*; It contains in its structure a genome that encodes structural (C, E1 and E2) and nonstructural (NsP1-4) proteins and its framework important glycoproteins for the recognition of organ and tissue cells; after infection, intracellular changes will be permanent with a single serotype, inducing the individual's immunization.¹⁻²

In 1952 the first human epidemic in East Africa was described; in southern Africa (Tanzania, Uganda and Zimbabwe) other cities were hit such as Bangkok, the Philippines, Cambodia, Vietnam, Laos, Myanmar, Malaysia and Indonesia successively until 1990, continuing to Thailand, Singapore and Sri Lanka.³ In 2006, a major outbreak surprised the people of Reunion Island in the Indian Ocean; serious and atypical cases were reported with occurrences never before reported.⁴ Subsequently, in 2013 CHIKV triggered new cyclic outbreaks in countries of the Americas, with Brazil among one of the most affected from 2015 to November 2017 totaling approximately 286,288 confirmed cases and 202 deaths, with a mean age of 75 and 62 years respectively.⁵⁻⁶

The pathophysiology of Chikungunya in humans is inconclusive; histochemical findings found the virus in lymphoids, liver, joints and muscles; however, in persistent infection, the main reservoir is located in macrophages.⁶ The first stage of infection is linked to viral replication and the onset of innate immunity, with a high level of proinflammatory cytokines alpha-interferon and IL-6, IL 1Ra, IL-12, IL-15, IP-10 and MCP-1; shortly thereafter comes a sudden regression of viremia with moderate joint pain becoming undetectable viremia convalescence; however patients may persist with symptoms for some years.⁷⁻⁸

Most frequent laboratory findings correspond to the results of specific serologies expressed by acute phase immunoglobulin M and convalescent G antibody; even in the acute period with viremia, before the fifth day of infection the preferred test is isolation of the Chikungunya virus and the

reverse transcriptase viral polymerase chain reaction and high viral load.⁹ Tests to diagnose Chikungunya fever should be used. in the differential diagnosis with indeterminate febrile syndromes;¹⁰ Cytokines are a valuable exam when related to severe forms of virus infection, forming a prognostic tool.⁸ Clinical manifestations appear after an approximate incubation period. 3 to 10 days; initially a fever associated with nonspecific symptoms common to other viral / bacterial infections such as headache, vomiting, myalgia, abdominal pain and rash, except for severe joint pain and swelling mainly at the distal extremities, characterizing the acute phase for a period of time. 14 days, with continuation of arthralgia for about 3 months, considering the subacute phase.¹¹

Finally the chronic phase is given by the perpetuation of the articular picture for months or years, with periods of attenuation promoting in some subjects, when associated with factors such as comorbidities and advanced age, a decrease in the productive pace at work and / or deficit of quality of life.⁸ Atypical and severe symptoms during the acute course of infection in outbreaks were revealed by compromised systems such as renal, pulmonary, central nervous, ocular and cardiovascular, the latter being highlighted by hospitalizations and high mortality in diagnosed cases of Myocarditis, Pericarditis, Insufficiency. arrhythmia and hemodynamic instability due to the effect of the virus.¹² Attention to the change in the nature of the infection occurred in 2006 during the major epidemic in Reunion Island where most severe cases occurred in patients aged 65 years, alterations. Cardiac disorders were diagnosed during the acute phase, most of them associated with the underlying diseases, with intensive care unit admissions and deaths; From this change it was also observed that these changes may persist for months with the same degree of severity.¹³

Climate change, urban population growth, inadequate solid and liquid waste excrement, migrations and tourism trips, poor housing conditions are risk factors that contribute to new vector infestation,¹ contributing to epidemics with severe cases, hospitalizations and deaths. which, along with advanced age and comorbidities, trigger a worse prognosis although it may also occur in individuals without pathological history.¹⁴

The objective of this study was to identify, evaluate and transmit new data and recommendations to health professionals.

METHODS

It is an Integrative Literature Review, chosen for research as a method. For the methodological conduction, the following steps were used: sampling, classification of the studies, definition of the selected information from the reviewed publications, evaluation of the extracted studies and presentation of the research results.

After identifying the theme, the guiding question was elaborated: What were the scientific productions found in the literature about cardiac alterations in the elderly with

Chikungunya? In order to gather bibliographic material on the subject, searches were conducted in the following databases: Latin American and Caribbean Health Sciences Literature (LILACS), Spanish Literature Index (IBECS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and SciVerse Scopus (SCOPUS).

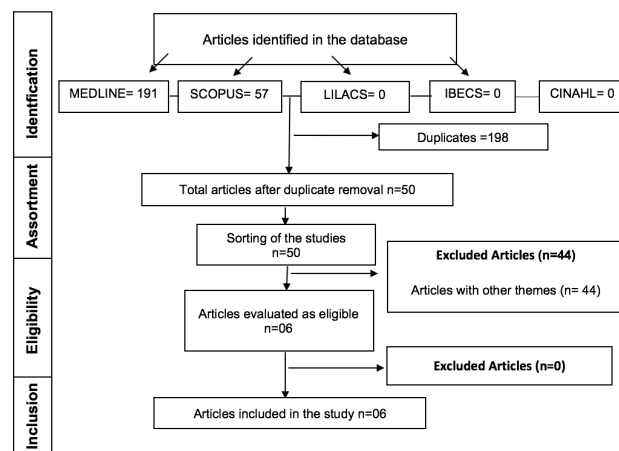
The databases were chosen because they include national and international publications. The controlled descriptors “Chikungunya” and “Elderly” and “Heart Diseases” were used; The search was performed in the following languages: Portuguese, English, Spanish; neatly: *Vírus Chikungunya/ Febre de Chikungunya; Chikungunya vírus/ Chikungunya Fever; Virus Chikungunya/Fiebre Chikungunya; Idoso; Elderly/Age/age,80 and over; anciano e Cardiopatas; Heart Diseases; Cardiopatas*, which were interconnected through the boolean operator AND.

Inclusion criteria were as follows: articles published from 2006 to 2017, in Portuguese, English, and / or Spanish, whose titles and / or abstracts identified aspects related to cardiac alterations in the elderly with Chikungunya, available in full, for free and online.

In the data collection were excluded editorials, letters to the editor, reflective studies, experience reports, duplicate publications, as well as studies that did not address the theme relevant to the objective of the review. The analysis of the publications, which sought to meet the criteria of relevance and consistency of content, resulted in the articles selected for this study.

Of the 248 articles identified and successively selected in the databases in accordance with the previously established criteria were identified: SCOPUS a total of 57 articles and MEDLINE a total of 191 articles, then 198 were excluded for duplicate and 44 for not presenting study content in the title and / or abstract, for being experimental publications or involving other arboviruses / books, ending with an effective sample of 6 articles.

Figure 1 - Search sequence in the databases / virtual libraries of articles on Cardiac Alterations in Chikungunya Elderly. Research Data, 2006-2017



RESULTS

The data obtained through the material extracted from the publications were organized in spreadsheets, with the information according to relevance and equivalence the thematic categories that constitute the main intention, then the thematic appreciation phase of the referred data. We tried to select the cardiac manifestations. owned by Chikungunya, except for the article Serious acute chikungunya virus infection requiring intensive care during the reunion island outbreak in 2005-2006.¹⁸

There may be underreporting due to limitations of scientific knowledge or association with comorbidities stating secondary cause in death, observation made in large epidemic that reached Pernambuco in 2016 with only 54 recorded deaths and an absolute excessive number of deaths when compared to the last four years.

Chart 1 - Distribution of studies on cardiac changes in the elderly with Chikungunya according to title, database and year of publication. João Pessoa (PB), 2006 - 2017.

Title	Database	Local	Year
<i>Cardiovascular involvement and manifestations of systemic Chikungunya virus infection: A systematic review.</i> ¹⁹	MEDLINE	USA	2017
<i>Chikungunya Fever Cases Identified in the Veterans Health Administration System, 2014.</i> ¹⁷	MEDLINE	USA	2016
<i>Prospective Study of Chikungunya Virus Acute Infection in the Island of La Réunion during the 2005-2006 Outbreak.</i> ¹⁵	MEDLINE	France	2009
<i>Atypical Chikungunya virus infections Clinical manifestations, mortality and risk factors for severe disease during the 2005-2006 outbreak on Reunion.</i> ¹⁶	SCOPUS	UK	2009
<i>Serious acute chikungunya virus infection requiring intensive care during the reunion island outbreak in 2005-2006.</i> ¹⁸	SCOPUS	France	2008
<i>Electrocardiographic alterations in patients with chikungunya fever from Sucre, Colombia A 42-case series.</i> ¹⁴	SCOPUS	Colombia	2016

After selecting the articles covering the theme to be explored, we gathered the data of greatest scientific interest in the order given.

Chart 2 - Distribution of studies on cardiac changes in the elderly with Chikungunya according to first author, objectives, variables, method and main results. João Pessoa (PB), 2006 - 2017.

AUTHOR	GOALS	VARIABLES	METHOD	MAIN RESULTS
1. Alvarez, Bolívar-Mejía A, Rodríguez-Morales AJ, Ramirez-Vallejo. ⁹	Identify new cardiac findings, ECG changes, and CHIKV echocardiography	Cardiological manifestations. Laboratory Findings, Ultrasound and ECG CHIKV Infection.	Systematic Review: 40 articles selected from a total of 737.	Low estimates of heart rate changes and ECG details in Acute Disease. High estimate of mortality from cardiac complications. Characterization of cardiac involvement phases by clinical, laboratory and radiographic findings related to the time of infection. (Table 4 - Cardiovascular Findings according to Medical Record, Ex. Physician, ECG, Laboratory, X-ray, Echo and contrast-enhanced cardiac MRI).
2. Perti Perti, Lucero-Obusan, Schirmer, Winters, Holodni. ⁷	Investigate Risk Factors for Hospitalization. Virus strain analysis.	CHIKV tests. Age. Comorbidities. Physical exam.	Chikungunya case study in the Veterans Health Administration System in USA in 2014 through Public Health Surveillance and Research groups. Sample: 252 patients from 860.	A higher number of hospitalizations in the elderly and for heart failure were detected. Incorrect use of CHIKV tests related to time of illness.
3. Staikowsky et al. ¹⁵	Identify Clinical Markers criteria of severity in the acute phase and also characteristics that help the differential diagnosis with other febrile arthralgias. Compare by testing the risk situation of patients in the viremic or postviremic phase	Age. Gender. symptoms. comorbidities. Anamnesis. Biological Parameters.	Prospective Study from March to May 2006 at Groupe Hospitalier Reunion Regional Hospital. Sample: 1030 patients with febrile arthralgia underwent clinical examination, questionnaires and emergency blood collection, and according to the results were grouped: A, A1 A2, B; A1-With Viremia RT-PCR +; A2-Without Viremia. B-Without CHIKV (RT-PCR - and IgM - 180 patients belonged to GA1 and 86 to GA2	Foram classificados o percentual de casos quanto a idade, sexo e comorbidades de acordo com os resultados dos testes, identificando estes fatores na fase aguda virêmica e não virêmica Grupo A1=180 Grupo A2=34 Grupo B =46 Na viremia: Descompensação Ins. Cardíaca (3) e arritmias (6) pre existente; Pericarditis (2), Sind. Acute Coronary Artery (4) and Myocarditis (2) Comorbidades and severity: in persons 65 years and older.
4. Economopoulou et al. ¹⁶	To determine the incidence and mortality of atypical Chikv viral infections. Identify Risk Factors for Serious Disease	Case reports, medical record, laboratory results	Data collection through the Reunion Island Hospital Surveillance System during the 2005-2006 epidemic period. Record of 610 atypical cases	We identified 610 atypical cases, 222 were severe cases, 65 died, 546 had underlying diseases (226 - Cardiovascular, 147 - Neurological, 150- Respiratory). Risk factors: Hypertension, Cardiac or Respiratory. The overall mortality rate - 10.6 (10.6%) and increased with age.
5. Lemant et al. ¹⁸	Expand scientific knowledge on clinical manifestation and laboratory findings in the acute phase in ICU chikv patients in Reunion Island 2005-2006	Cardiovascular manifestation, ECG and ECO findings in CHIKV patients	Review of articles. It included articles on epidemiology, pathogenesis, classical and mainly atypical disease with cardiovascular impairment. Articles containing arbovirus dengue.	Thirty-three patients, of which 58% were divided: 14- Encephalopathy, 1-Hepatitis, 1-suspected Guillan Barré, 1-myocarditis.8- Acute underlying D.-associated disease. 6-Exacerbation of previous pictures. Common denominator: 0.5% evolving to atypical form has advanced age and / or comorbidities. Cardiac MRI: in elderly with persistent changes of 12 months leading to consider the possibility of having developed Dilated Cardiomyopathy. Mortality -48%
6. Zuluaga-Gómez Vanegas-Isaza. ¹⁴	Describe ECG changes found in CHIKV myocarditis	Laboratory Clinic Age ECG	Survey on patients treated at Sucre-Colombia Healthcare Institutions 4,904 with CHIKV from 09/14 to 07/15	42 cases, chest pain, palpitations and fever; 22 patients: sex F 60 years older; ECG: 71.4 (71.4%) changes: Repolarization disorder 21.4 (21.4%), Left Ventricular Hypertrophy 20 (20%), U-wave presence 13.3 (13.3%) and progression R 10 waves (10%). Estimated prevalence of suspected (0.86%) myocarditis. Hypotension and tachycardia were observed in fatal cases.

The age of the subjects involved in the studies ranged from young to elderly, with ages equal to or above 60 years related to cardiovascular impairment.

DISCUSSION

Comorbidities are more frequent with advanced age, cited in all review articles.

Gómez et al.,¹⁴ highlight that a large number of patients were young with no apparent risk of cardiovascular impairment. Another study¹⁸ finds atypical cases of Chikungunya in people aged 60 years on average with

probable development for severe cases.¹⁶ Patients from 15 years of age were included in a study with febrile arthralgia and according to the positivity of Chikungunya tests correlated with age at the stages of infection, with subjects older than 65 years prevailing in the group of acute and viremic infections. In article¹⁵, the relationship between age and acute disease was relevant, showing that the elderly, vulnerable group by association with other morbidities or by their own physiology are not preventing exposure to mosquito bites, probably due to misinformation about disease severity.

Regarding the nature of the diagnostic methods, the six articles referred to Chikungunya's cardiac involvement as a serious manifestation especially for the elderly. Two articles¹⁸⁻¹⁹ broadly considered these media found on radiography, electrocardiogram, echocardiography, cardiac enzyme measurement, magnetic resonance imaging and cardiac biopsy, which, associated with clinical and comorbidities, indicate since an incipient heart failure, progressing to myocarditis and later. a Dilated Heart Disease, related to the time of the disease; however, they may go directly from the early to the more severe phase.¹⁸⁻¹⁹ The results in Table 3 are set out.

Patients in the acute phase of Chikungunya should have an ECG and renew it over the long term. In one article¹⁴ 71.4 (71.4%) of these patients presented electrocardiographic changes in 42 confirmed cases of CHIKV in Sucre,¹⁴ describing the main findings (Chart 3). We believe that there are limited health services due to lack of scientific knowledge about the risks of CHIKV in the elderly or even the absence of electrocardiographic equipment, making the first assessment of the patient with this arbovirolosis failed, as the findings of this test help to assess the degree of cardiac impairment of the disease, essential for effective treatment.

Table 3 - Main Findings

FASES	ALTERAÇÕES DE EXAMES	PROGRESSÃO CARDIOLÓGICA
Phase I PRECONGESTIVE or PRODROMIC ACUTE	ECG: T-wave inversion (DII, III, AVF, V5-V6), ST tracking elevation RX: Cardiomegaly ECO: Biventricular Hypertrophy, Dyskinesia of ventricular wall movements. CPK: May increase Ejection fraction: may decrease	INCIPIENT HEART FAILURE
PHASE II ARRITHMIC SUB ACUTE	ECG: Premature atrial and ventricular extrasystoles, Atrial fibrillation, Ventricular fibrillation.	MYOCARDITIS
PHASE III SEVERE HEART FAILURE After the acute and subacute period	ECO: I.C Right-Left MRI: Intramyocardial / subepicardial foci With increased signal intensity suggestive of necrosis	DILATED CARDIOPATHY

Source: Research Data, 2006 - 2017.

Table 4 - Major ECG changes in Chikv patients, Sucre - Colombia - 2016

Distúrbios de Repolarização	
1	AV block
2	Left anterior hemiblock
3	Left ventricular hypertrophy
4	U waves
5	Bradyarrhythmia
6	Left QRS axis offset

Distúrbios de Repolarização	
7	QRS axis shift rightward
9	Poor R-wave progression in precordial bonding
8	ST segment depression in lower wall
09	Tachyarrhythmia
10	Posterior hemiblock
11	Rhythm disturbance
12	Atrial fibrillation
13	Ectopic atrial tachycardia
14	Early repolarization of the inferior wall
15	Acute inferior wall myocardial infarction
16	Sinus tachycardia

Source: Research Data, 2006 - 2017.

Regarding comorbidities related to Chikungunya, one of the studies¹⁵ showed that of 214 patients positive for the disease, 139 had comorbidities, prevailing Hypertension and Diabetes Mellitus; also included Ischemic Heart Failure, Heart Failure, Dyslipidemia Obesity and Pulmonary Disease; in this same group of patients 93 people were 65 years of age or older, although no age-related data correlated with the aforementioned conditions.¹⁵ In another study¹⁶ of 226 patients with Chikungunya and cardiovascular impairment, 49 (49%) had underlying heart condition, 61 (61%) hypertension and 48 (48%) Diabetes Mellitus.¹⁶ In another investigation, all suspected myocarditis had no history of chronic heart disease.¹⁴

In one study,¹⁷ the risk factor assessment factor for hospitalization in Puerto Rico-2014, of 148 patients with Chikungunya, found that 82 were hospitalized and the major causes were due to advanced age, heart failure and tachycardia.¹⁷ A significant number of hospitalized patients reported in one of the surveys¹⁵ were over 65 years of age and had comorbidities, also considered as factors of severity.¹⁵ These assessments reflect that a high number of elderly with this comorbid arbovirus are prone to frequent hospital admissions. One study emphasizes that hypotension and tachycardia were present in a small series of fatal cases of arbovirolosis;¹⁴ another study mentions that hypertension and hyperglycemia cannot be considered as predisposing factors for cardiac impairment.¹⁸ Another study reported the impossibility of researching these factors, but expresses hypertension and diabetes mellitus in cases with cardiac involvement.¹⁶

The assessment of clinical findings on the perception of cardiac impairment in Chikungunya arbovirus was not well characterized in all studies except one article¹⁹ in which changes are cited more broadly, symptoms and signs in the medical record respectively: pain in the chest, chest, fatigue, dyspnea, palpitations, exercise intolerance, pallor, nausea, cough, lipothymia, syncope, dizziness and maleolar edema; tachycardia, ectopic beats, crackling or snoring in the lung base, galloping heart rhythm, tachypnea, jugular engorgement, and high blood pressure.¹⁹ In another investigation, all patients had chest pain, palpitation, and fever and were considered to be infectious endocarditis as

their first suspicion. Another study defined atypical cases as those of patients presenting with clinical manifestations extra fever and arthralgia and as severe case those requiring follow-up of vital signs; thus an atypical case may develop into a severe one; All symptoms and signs in elderly Chikungunya patients should be valued, especially if they are within underlying clinical conditions, using previously non-hormonal anti-inflammatory drugs and habits such as abusive alcohol intake.¹⁶

The CHIKV heart diseases cited in the review articles were: Heart Failure, Myocarditis, Dilated Cardiomyopathy,¹⁸⁻¹⁹ Acute Myocardial Infarction,¹⁷ Arrhythmias, Angina¹⁶ and suspected Myocarditis (0.86%) out of a total of 4,904 treated with CHIKV. In Sincelejo-Colombia, 2015.¹⁴ Cardiac alterations can be placed as a pre-existing condition: Pericarditis, Myocarditis, Acute Coronary Syndrome and Heart Failure diagnosed during the viremic phase.¹⁵ We are facing two strands, the first one, the virus directly causes cardiac alterations by its severe inflammatory reaction in the myocytes,¹⁸⁻¹⁹ in the second, viral infection aggravates the underlying cardiac conditions.¹⁵

Chikungunya mortality was as follows in the review articles: 6 deaths, mean age 78 years, with atypical picture, of approximately 252 laboratory-confirmed subjects,¹⁷ in the epidemic studied mortality was 22 (22%) due to cardiac impairment, highlighting in advanced age, as shown in a systematic review study with a sample of 40 articles in which they report that 10% of the total happened in Reunion Island - Indian Ocean.¹⁹ Another study still referring to the same epidemic previously mentioned observed that of 222 cases. from 610 atypical cases, 65 deaths occurred, a percentage of 29 (29%), mostly in the elderly.¹⁶

Comorbidities are frequent in this age group, thinking not only about hypertension, diabetes mellitus, dyslipidemia, but pre-existing heart failure and the fragility of their organ systems, although it is known that these conditions are not mandatory requirements for cardiovascular compromise by CHIKV.

The articles showed the relationship between the elderly and the cardiac alterations due to Chikungunya virus, the frequency was not relevant, but with a high mortality rate. The virus may develop severe heart disease of fatal evolution in the subacute and chronic phases depending on the degree of injury and underreporting may be occurring, prevailing as the main cause of death.

There is a lack of national research on the subject, the most cited epidemic in the studies for this review was twelve years ago, during this period scarce pertinent articles were produced, making it difficult to contribute to guidance to health professionals and improvements in health services that serve this population.

CONCLUSION

We conclude that there is a high mortality rate in the elderly with Chikungunya due to cardiac alterations when associated with comorbidities, especially Systemic Arterial

Hypertension. It is important to perform Electrocardiogram for the diagnosis in the initial phase of these situations. It is necessary to ensure careful attention to the first care and monitoring of the elderly with this arbovirus involving best practices in the routine of clinical care. The research was limited to a small number of articles with the studied theme covering results of insufficient cardiac, imaging and laboratory exams in health services that assist the elderly with CHIKV, implying incomplete scientific productions, constituting a non-substantial theoretical basis for new studies. research and consequently impaired guidance to health professionals.

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Corresponding author

Lúcia de Fátima Mororó Noronha

Address: Profa. Maria das Graças Barros de Araújo, 120 Bancários, João Pessoa/PB, Brazil

Zip code: 58051-569

E-mail address: luciamororo@hotmail.com

Telephone number: +55 (83) 98680-0065

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