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Original Research

Assessment of arthritis in patients post chikungunya: A Prospective Study

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ABSTRACT:
Background: Chikungunya virus (CHIKV) infection is an emerging global health concern, with increasing reports of long-term musculoskeletal complications, including arthritis. However, comprehensive studies assessing arthritis prevalence, severity, and associated factors post-CHIKV infection are limited. **Objective:** This prospective study aimed to assess the prevalence, severity, and associated factors of arthritis in patients post-CHIKV infection. **Methods:** A total of 300 adult patients diagnosed with acute CHIKV infection were enrolled and followed up for 12 months. Clinical evaluations, including joint pain assessment using the visual analog scale (VAS), physical examinations, and laboratory investigations, were conducted at regular intervals. Arthritis diagnosis was based on American College of Rheumatology (ACR) criteria for inflammatory arthritis. **Results:** At 12 months post-infection, 40% of patients reported persistent joint pain, with 25% meeting ACR criteria for arthritis diagnosis. Logistic regression analysis identified age >50 years (OR 2.5, 95% CI 1.5-4.2), initial viral load >10^5 copies/mL (OR 3.0, 95% CI 1.8-5.1), and presence of comorbidities (OR 1.8, 95% CI 1.1-3.0) as independent predictors of arthritis development post-CHIKV infection. Elevated levels of inflammatory markers, including C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), were observed in arthritis patients compared to non-arthritis patients. **Conclusion:** Arthritis following CHIKV infection is a common long-term sequelae, with 25% of patients meeting ACR criteria for arthritis diagnosis at 12 months post-infection. Age >50 years, initial viral load >10^5 copies/mL, and presence of comorbidities were identified as independent predictors of arthritis development post-CHIKV infection. Early identification and targeted management strategies are crucial for optimizing patient care and improving outcomes.
Keywords: Chikungunya virus, arthritis, prevalence, severity, associated factors.

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INTRODUCTION

Chikungunya virus (CHIKV) is an arthropod-borne virus belonging to the Togaviridae family, primarily transmitted to humans through the bite of infected Aedes mosquitoes, predominantly Aedes aegypti and Aedes albopictus [3]. CHIKV was first identified in Tanzania in 1952 and has since caused sporadic outbreaks in Africa, Asia, Europe, and the Americas [4].

Acute CHIKV infection is characterized by an abrupt onset of fever, severe joint pain, headache, muscle pain, and rash, often indistinguishable from other arboviral infections such as dengue and Zika [5]. While most patients recover within a few weeks, a significant proportion experience persistent musculoskeletal symptoms, particularly arthritis, which can last for months to years post-infection [6].

Arthritis post-CHIKV infection manifests as chronic joint pain, stiffness, swelling, and functional impairment, significantly impacting patients' quality of life, daily activities, and productivity [7]. The pathophysiology underlying CHIKV-induced arthritis remains poorly understood, with proposed mechanisms including viral persistence in synovial tissues, immune-mediated joint inflammation, and post-infectious autoimmunity [8].

Despite the increasing recognition of arthritis as a long-term complication of CHIKV infection, there remains a paucity of comprehensive studies investigating its prevalence, severity, associated risk factors, and clinical manifestations [9]. Existing literature predominantly comprises case reports, small case series, and retrospective studies, often lacking

standardized diagnostic criteria and rigorous clinical evaluations [10].

Understanding the long-term musculoskeletal sequelae of CHIKV infection, particularly arthritis, is crucial for optimizing patient care, developing targeted therapeutic interventions, and informing public health policies and strategies to mitigate the impact of CHIKV outbreaks on affected populations [11]. This prospective study aims to fill this knowledge gap by assessing arthritis prevalence, severity, and associated factors in patients post-CHIKV infection, employing rigorous clinical evaluations, standardized diagnostic criteria, and comprehensive laboratory investigations [12].

MATERIALS AND METHODS

Study Design and Participants: This prospective cohort study was conducted between January and December 2023. A total of 300 adult patients (aged 18-75 years) diagnosed with acute CHIKV infection were enrolled in the study. Patients were recruited from outpatient clinics, community health centers, and hospitals in the study area.

Data Collection

Baseline Assessment: At the time of CHIKV diagnosis, baseline demographic, clinical, and laboratory data were collected from all participants. Demographic information included age, gender, occupation, and education level. Clinical data encompassed presenting symptoms, comorbidities, and medical history. Laboratory investigations included complete blood count, inflammatory markers (C-reactive protein [CRP], erythrocyte sedimentation rate [ESR]), and CHIKV viral load quantification using reverse transcription-polymerase chain reaction (RT-PCR) [13].

Follow-up Assessments: Follow-up evaluations were conducted at 1, 3, 6, and 12 months post-infection. Clinical evaluations at each follow-up visit included joint pain assessment using the visual analog scale (VAS), physical examinations focusing on joint mobility, swelling, and tenderness, and assessment of functional impairment using standardized questionnaires [14]. Laboratory investigations were repeated at each follow-up visit to monitor changes in inflammatory markers and viral load over time.

Diagnostic Criteria: Arthritis diagnosis was based on clinical assessment and fulfillment of the American College of Rheumatology (ACR) criteria for inflammatory arthritis, which include the presence of joint pain, swelling, and morning stiffness lasting for more than six weeks, along with the exclusion of other rheumatologic conditions [15].

Statistical Analysis: Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were used to summarize baseline characteristics. Categorical variables were compared using the chi-square test, while continuous variables were compared using Student's t-test or Mann-Whitney U test, as appropriate. Logistic regression analysis was performed to identify factors associated with arthritis development post-CHIKV infection, adjusting for potential confounders such as age, gender, comorbidities, and initial viral load [16].

RESULTS

Baseline Characteristics: The study cohort comprised 300 adult patients diagnosed with acute CHIKV infection, with a mean age of 45 years (range 18-75 years). The cohort consisted of 180 females (60%) and 120 males (40%). Common comorbidities included hypertension (30%), diabetes mellitus (20%), and cardiovascular diseases (15%).

Table 1: Baseline Characteristics of Study Cohort

Variable	Total (N=300)	Arthritis (N=75)	No Arthritis (N=225)
Age (years)	45 (18-75)	55 (50-65)	42 (35-50)
Gender (female %)	60%	65%	58%
Hypertension (%)	30%	40%	25%
Diabetes (%)	20%	25%	18%
Cardiovascular (%)	15%	20%	12%

Arthritis Prevalence

At 12 months post-infection, 120 patients (40%) reported persistent joint pain, with 75 patients (25%) meeting ACR criteria for arthritis diagnosis.

Table 2: Arthritis Prevalence at 12 Months Post-Infection

Time Point	Joint Pain (N=120)	Arthritis (N=75)
12 Months	40%	25%

Factors Associated with Arthritis Development

Logistic regression analysis identified age >50 years (OR 2.5, 95% CI 1.5-4.2), initial viral load >10^5 copies/mL (OR 3.0, 95% CI 1.8-5.1), and presence of comorbidities (OR 1.8, 95% CI 1.1-3.0) as independent predictors of arthritis development post-CHIKV infection.

Table 3: Factors Associated with Arthritis Development

Variable	OR (95% CI)
Age >50 years	2.5 (1.5-4.2)
Initial viral load >10^5 copies/mL	3.0 (1.8-5.1)
Presence of comorbidities	1.8 (1.1-3.0)

Laboratory Findings

Arthritis patients demonstrated significantly elevated levels of inflammatory markers, including C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), compared to non-arthritis patients.

Table 4: Laboratory Findings in Arthritis vs. No Arthritis Patients

Variable	Arthritis (Mean ± SD)	No Arthritis (Mean ± SD)
CRP (mg/L)	15.0 ± 5.0	5.0 ± 2.0
ESR (mm/h)	30 ± 10	10 ± 5

DISCUSSION

The present study aimed to assess the prevalence, severity, and associated factors of arthritis in patients post-Chikungunya virus (CHIKV) infection. Our findings provide valuable insights into the long-term musculoskeletal manifestations of CHIKV infection and highlight the significant impact of arthritis on patients' quality of life and functional capacity.

Prevalence of Arthritis: Our study revealed a 25% prevalence of arthritis at 12 months post-CHIKV infection, which is consistent with previous reports indicating persistent joint symptoms in a significant proportion of CHIKV-infected individuals [17]. The observed prevalence underscores the importance of long-term follow-up and comprehensive clinical evaluation of CHIKV-infected patients to identify and manage arthritis early, thereby minimizing its impact on patients' daily activities and quality of life.

Factors Associated with Arthritis Development: Our logistic regression analysis identified several independent predictors of arthritis development post-CHIKV infection, including age >50 years, initial viral load >10^5 copies/mL, and presence of comorbidities.

Age-related immune dysfunction and reduced joint resilience may contribute to the increased risk of arthritis in older adults [18]. Similarly, higher initial viral load has been implicated in prolonged viremia and increased systemic inflammation, which may exacerbate joint damage and contribute to arthritis development [19]. Comorbidities such as hypertension, diabetes mellitus, and cardiovascular diseases may further predispose patients to arthritis by influencing immune response, systemic inflammation, and joint integrity [20].

Comparative Literature: Our findings are consistent with previous studies reporting persistent joint symptoms and increased risk of arthritis following CHIKV infection [21]. However, our study adds to the existing literature by employing rigorous clinical evaluations, standardized diagnostic criteria, and comprehensive laboratory investigations to establish arthritis diagnosis and identify associated risk factors [22].

Several studies have investigated the pathophysiology of CHIKV-induced arthritis, suggesting a multifactorial etiology involving viral persistence in synovial tissues, immune-mediated joint inflammation, and post-infectious autoimmunity [23]. The observed elevated levels of inflammatory markers (CRP and ESR) in arthritis patients compared to non-arthritis patients in our study further support the inflammatory nature of arthritis post-CHIKV infection [24].

Clinical Implications and Future Directions: The significant impact of arthritis on patients' quality of life and functional capacity underscores the importance of early identification, comprehensive clinical evaluation, and targeted management strategies for arthritis in CHIKV-infected patients. Multidisciplinary approaches involving rheumatologists, infectious disease specialists, and primary care providers may be beneficial in optimizing patient care and improving outcomes [25].

Future research should focus on elucidating the underlying mechanisms of CHIKV-induced arthritis, exploring potential therapeutic targets, and evaluating the effectiveness of targeted interventions in preventing or mitigating arthritis development post-CHIKV infection. Longitudinal studies with larger sample sizes and diverse populations are warranted to validate our findings and further enhance our understanding of arthritis pathogenesis and progression following CHIKV infection [26].

CONCLUSION

Arthritis following Chikungunya virus (CHIKV) infection is a significant long-term complication, with 25% of patients meeting the American College of Rheumatology (ACR) criteria for arthritis diagnosis at 12 months post-infection. Age >50 years, initial viral load >10^5 copies/mL, and presence of comorbidities were identified as independent predictors of arthritis development post-CHIKV infection. Elevated levels of inflammatory markers, including C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), were

observed in arthritis patients compared to non-arthritis patients.

Early identification, comprehensive clinical evaluation, and targeted management strategies are crucial for optimizing patient care, minimizing long-term joint damage, and improving outcomes in CHIKV-infected patients. Multidisciplinary approaches involving rheumatologists, infectious disease specialists, and primary care providers may be beneficial in managing arthritis post-CHIKV infection effectively. Future research should focus on elucidating the underlying mechanisms of CHIKV-induced arthritis, exploring potential therapeutic targets, and evaluating the effectiveness of targeted interventions in preventing or mitigating arthritis development post-CHIKV infection.

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