

Juvenile Idiopathic Arthritis in Chad: Delayed Diagnosis, Clinical Patterns and Limited Access to Biologics

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Abstract

Background: Juvenile idiopathic arthritis (JIA) is the leading cause of chronic inflammatory rheumatism in children, yet data from Central Africa

remain scarce. This study aimed to describe the clinical patterns, diagnostic delay and access to biologic therapies in children with JIA in Chad.

Methods: Retrospective study (2020–2024) including 85 ILAR-confirmed JIA cases among 111 pediatric systemic diseases. Data included clinical, biological, radiologic, CHAQ, JADAS and treatment patterns.

Results: Mean age at onset was 11.26 years; diagnostic delay averaged 4.2 years. RF-negative polyarthritis and ERA each accounted for 30.6% of cases. Uveitis was noted in 15.3% of patients. CRP was elevated in 63.3% and HLA-B27 positive in 60% of those tested. CHAQ mean was 0.78 ± 0.34 , and JADAS median was 8.4 (IQR 4.3–14.6), indicating significant functional impairment and persistent disease activity in many children. Methotrexate was used in 72.9% of children, biologics in 4.7%. CHAQ and JADAS indicated substantial functional impairment and persistent activity.

Conclusion: JIA in Chad is characterized by long diagnostic delays, significant disability and minimal access to biologics. Improving referral pathways and access to advanced therapies is urgently needed.

Keywords: Juvenile idiopathic arthritis; Chad; ERA; Uveitis; Biologics; Delayed diagnosis; Treat-to-target; Low-resource settings

Introduction

Juvenile idiopathic arthritis (JIA) is the leading cause of chronic inflammatory disease in children, characterized by persistent joint inflammation lasting more than six weeks. (Abdwani et al, 2012; Behrens et al, 2007). It affects approximately 1 in 1000 children worldwide, making it one of the most significant pediatric rheumatic conditions. JIA presents with heterogeneous clinical features and varying disease courses, including joint pain, swelling, and stiffness, which significantly impair daily functioning and quality of life.

The global burden of JIA varies widely depending on geographic region, socioeconomic conditions, and access to specialized healthcare services. In high-income countries, early diagnosis, established pediatric rheumatology services and access to advanced therapies, including biologic agents, have markedly improved outcomes. In contrast, in low-resource settings, delayed diagnosis, lack of specialized care and limited availability of disease-modifying treatments contribute to worse disease progression and prognosis.

In Africa, epidemiological data on JIA remain scarce, with a few studies reported from Senegal, Nigeria, Tanzania and South Africa. (Diomandé et al., 2016; Doualla et al., 2014; Chipeta et al., 2013; Zribi et al., 2023). To our knowledge, no previous study from Central Africa has reported structured disease activity scores (CHAQ/JADAS) or ILAR phenotype

distribution in a pediatric cohort. (Ravelli et al., 2018; Petty et al., 2021). This study aimed to describe diagnostic delays, clinical patterns, biologic access and disease activity in children with juvenile idiopathic arthritis in Chad.

Materials and Methods

Study design and setting

This was a retrospective descriptive study conducted in the Rheumatology units of the Refoundation Hospital of Chad (HRT) and the Rheumatology units of the Centre Hospitalier Universitaire de Reference Nationale (CHU-RN) in N'Djamena.

Study period

The study covered the period from January 2020 to September 2024.

Study population

Patients were identified consecutively from consultation and hospitalization logs of both rheumatology units (CHU-RN and HRT). All pediatric files coded as systemic diseases or chronic arthritis between January 2020 and September 2024 were screened. Children fulfilling ILAR criteria were included consecutively without sampling.

Diagnostic evaluation included standardized clinical examination, available laboratory tests (CBC, ESR, CRP, RF, ANA, HLA-B27 depending on availability), musculoskeletal ultrasound and standard radiographs. Ophthalmological evaluation was offered to all patients with juvenile idiopathic arthritis. In cases considered high-risk (oligoarticular and ANA-positive), regular follow-up was recommended, at least every 3–6 months, depending on the availability of the ophthalmology department. Outside of these recommendations, a slit-lamp examination was performed in cases of ocular symptoms or clinical suspicion.

Missing data were handled using an available-case approach without imputation. Denominators were reported for variables with incomplete testing.

Functional disability and disease activity assessment

Functional disability was assessed using the validated French version of the Childhood Health Assessment Questionnaire (CHAQ). Disease activity was assessed using the Juvenile Arthritis Disease Activity Score (JADAS). In the prospective component of the study, CHAQ and JADAS were assessed at baseline and at the last follow-up visit. Because of the retrospective component, complete quantitative CHAQ and JADAS scores were not available for all patients. When complete numerical scores were unavailable, categorical outcomes were reported. Missing data were not imputed.

Statistical analysis was descriptive. Data were processed in Microsoft Excel 2016. Quantitative variables were summarized as means $\pm$ SD or medians (IQR), and qualitative variables as counts and percentages.

Ethical considerations

The study protocol was carried out in compliance with the anonymity and confidentiality of patient data. Authorization to collect and use the data was obtained from the Management of the Refoundation Hospital of Chad (HRT), from the National Reference University Hospital Center (CHU-RN), and from the research officer of the Faculty of Human Health Sciences of the University of N'Djamena.

Results

1. General population:

During the study period, 111 pediatric systemic disease cases were identified, of which 85 (76.%) met ILAR criteria. Mean age at symptom onset was 11.26 ± 3.9 years, mean age at diagnosis 15.4 ± 4.1 years, corresponding to a diagnostic delay of 4.2 years (IQR 3–6 years).

2. ILAR subtypes:

The most frequent subtypes were RF-negative polyarthritis (30.6%), ERA (30.6%), oligoarticular JIA (18.8%), and RF-positive polyarthritis (17.6%). Among the 36.5% with axial involvement, 82% belonged to the ERA subtype, while the remaining cases were polyarticular. The classification as juvenile spondyloarthritis associated with enthesitis (ERA) was retained according to the ILAR criteria, regardless of the presence of axial involvement. Axial involvement was reported separately as an associated clinical manifestation.

3. Articular involvement:

Peripheral joints: 91.8%; axial skeleton: 36.5%; enthesitis: 56.5%.

4. Extra-articular manifestations:

Observed in 28% of patients: uveitis (15.3%, 13/85), lymphadenopathy (5.9%), hepatomegaly/pleurisy (2.4%), myocarditis/onycholysis (1.2%).

5. Laboratory findings:

Elevated CRP: 54/85 (63.3%). RF positive: 18/85 (21.2%). ANA: 6/12 tested (50%). HLA-B27: 12/20 tested (60%). ASLO elevated: 10/85 (11.8%).

6. Sequence of evaluation:

Children underwent a standardized evaluation sequence: (1) clinical assessment, (2) laboratory tests, (3) radiography, (4) ultrasound when indicated, (5) ophthalmologic screening when available (35/85 tested = 41%).

7. Treatment:

Analgesics/NSAIDs: 100%. Corticosteroids according to severity. Methotrexate: 62(72.9%), Hydroxychloroquine : 29. Sulfasalazine: 6. Etanercept: 4 (4.7%).

8. Outcomes (CHAQ/JADAS):

Functional disability was assessed using CHAQ. Among patients with available CHAQ data, 32% had a CHAQ score ≥ 1.0 , 44% had a score between 0.5 and 0.9, and 24% had a score < 0.5 . The mean CHAQ score was 0.78 ± 0.34 . Disease activity assessed using JADAS was inactive in 28% of patients, low in 35%, moderate in 29%, and high in 8%. The median JADAS score was 8.4 (IQR 4.3–14.6).

Three deaths were recorded during the study period. One death was related to macrophage activation syndrome (MAS) in a patient with systemic JIA. The second death was associated with severe infection and dyspnea. The third occurred in a bedridden patient with advanced disease. The patient who developed MAS was classified as having systemic JIA. MAS was considered a complication of systemic JIA rather than a distinct ILAR subtype.

Table 1: Distribution of patients according to JIA clinical subtypes

JIA clinical subtype	Number (n)	Percentage (%)
Oligoarticular JIA	6	7.1
RF-negative polyarticular JIA	26	30.6
RF-positive polyarticular JIA	15	17.6
Systemic JIA (Still's disease)	7	8.2
Enthesitis-related arthritis (ERA)	26	30.6
Undifferentiated JIA	5	5.9
Total	85	100.0

Macrophage activation syndrome (MAS) was considered a complication of systemic JIA and was not classified as a distinct ILAR subtype

Table 2: Observed Extra-articular Manifestations

Manifestation	Number (n)	Percentage (%)
Uveitis	13	15.3
Lymphadenopathy	5	5.9
Hepatomegaly	2	2.4
Pleurisy	2	2.4
Myocarditis	1	1.2
Onycholysis	1	1.2

Table 3: Laboratory and Immunological Findings

Parameter	Number Positive	Percentage (%)
Elevated CRP	54	63.3
RF positive	18	21.2
ANA positive	6 / 12	50
HLA-B27 positive	12 / 20	60
Elevated ASLO	10	11.8

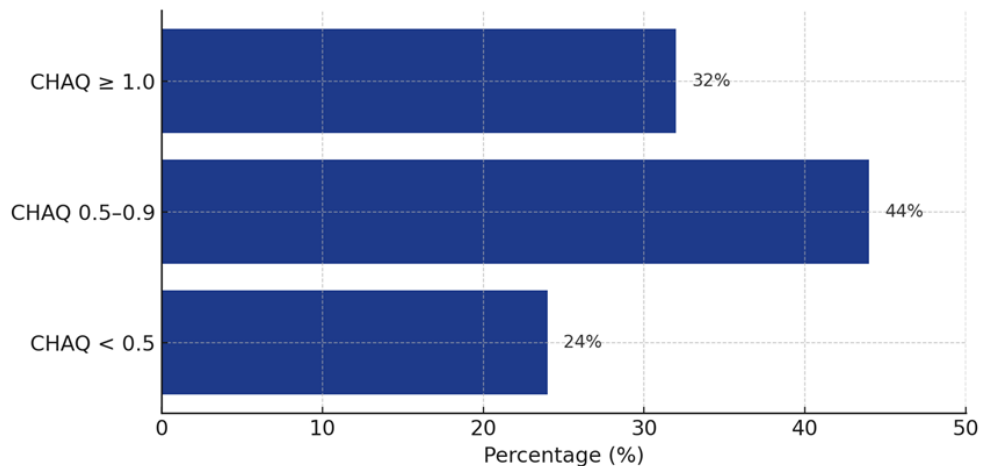


Figure 1: Distribution of CHAQ scores among children with juvenile idiopathic arthritis (n = 85). Scores ≥ 1 indicate severe functional disability, scores between 0.5–0.9 moderate disability, and scores < 0.5 minimal functional limitation

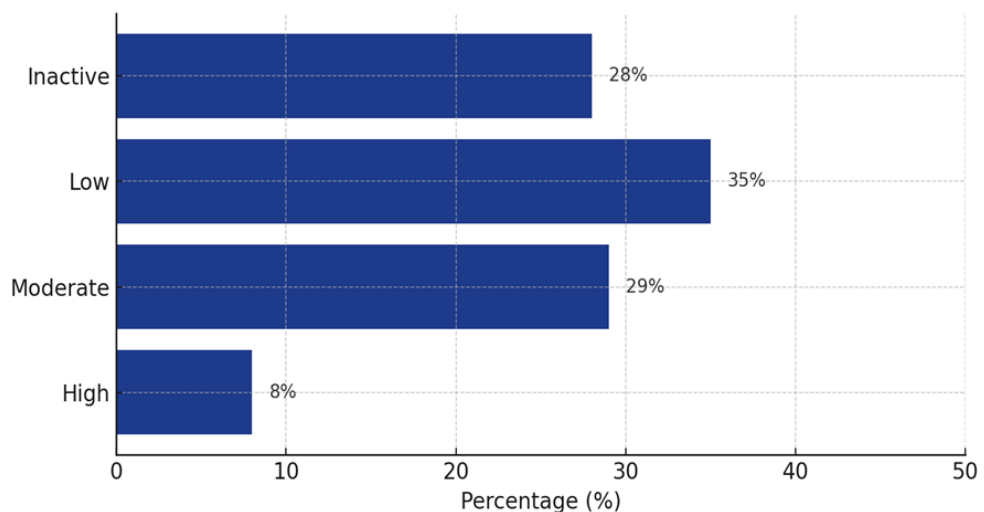


Figure 2: Distribution of JADAS activity categories among children with juvenile idiopathic arthritis (n = 85). Low to moderate disease activity predominated, reflecting persistent inflammation despite conventional treatments

Discussion

This study, involving 85 children followed for juvenile idiopathic arthritis (JIA) in Chad, represents one of the few Central African cohorts dedicated to this condition. (Bouayed et al., 2022; Aït El Hadj et al., 2021). Our findings confirm the significant burden of JIA in pediatric rheumatology and highlight several characteristics typical of low-resource settings, including diagnostic delay, predominance of severe subtypes, and limited access to

immunologic testing and biologic therapy. (Consolaro et al., 2012; Huemer et al., 2021).

The mean diagnostic delay of 4.2 years in our cohort is considerably longer than that reported in high-income countries (6 to 12 months). This delay, also documented in West and Southern Africa, appears even more pronounced in Central Africa. It is explained by the absence of pediatric rheumatologists, poor recognition of JIA in primary care, and limited access to immunologic investigations. In our series, ERA and RF-negative polyarthritis were the predominant subtypes, each accounting for 30.6% of cases. This pattern resembles observations from Senegalese and Nigerian cohorts, where ERA appears proportionally more frequent than in Europe. The diagnostic delay observed in our cohort was substantially longer than that generally reported in high-income settings. Similar prolonged diagnostic delays and limited access to biologic therapies have been reported in several African cohorts. In contrast, European, North American and some Asian cohorts generally benefit from earlier diagnosis and greater access to biologic therapies. However, these comparisons should be interpreted cautiously because of differences in study design, sample size, referral patterns, diagnostic practices, healthcare systems and access to specialized pediatric rheumatology services.

Extra-articular manifestations were present in 28% of children, comparable to West African reports (20–30%). Uveitis (15.3%) aligns with Tunisian and Nigerian data. However, its frequency may be underestimated due to constrained access to ophthalmologic evaluation. Immunologic tests were incomplete (ANA available for 12 children, HLA-B27 for 20), reflecting structural limitations of the Chadian health system. Similar constraints are reported across African cohorts. (Singh et al., 2022; Huemer et al., 2021). Methotrexate remained the most widely used disease-modifying treatment, in line with international recommendations. Only four children received etanercept, emphasizing the financial and logistical barriers to biologic therapies. (Nigrovic et al., 2022; Pipitone et al., 2023).

CHAQ and JADAS scores indicate that a large proportion of children still had active disease despite conventional therapy, a trend also observed in other African cohorts. (Wallace et al., 2008; Lovell et al., 2013). Three deaths and one case of macrophage activation syndrome (MAS) were reported, illustrating the potential severity of JIA in low-resource contexts. (Ravelli et al., 2020; Petty et al., 2021). A major strength of our study is that it represents one of the largest Central African series. Limitations include its retrospective design, incomplete immunologic data, and inconsistent ophthalmologic evaluation. (Shimizu, T., et al. 2015). Due to the sample size, the retrospective nature of the study, and the heterogeneity of the immunological data, no robust multivariate model could be performed. We opted for descriptive analyses to

ensure the reliability of the results and avoid statistical biases related to missing data. (Wallace, C. A., et al., 2008). Our findings highlight the high prevalence of severe JIA subtypes in Chad, associated with considerable diagnostic delay and limited resources. (Garba et al., 2025; Wei et al., 2020). One death was related to MAS in a patient with systemic JIA, while the other deaths were associated with severe infection with dyspnea and advanced disease in a bedridden patient, respectively. These events highlight the potential severity of JIA in a low-resource setting characterized by delayed diagnosis, limited access to specialized care, and restricted availability of advanced therapies. MAS was considered a complication of systemic JIA rather than a distinct ILAR subtype. Strengthening awareness among primary care providers, improving access to immunologic diagnostics, and considering regional strategies for biologic therapy access are necessary to improve outcomes.

Conclusion

This study, one of the few Central African cohorts dedicated to juvenile idiopathic arthritis, highlights the high prevalence of severe disease. The substantial diagnostic delay, limited laboratory resources, and restricted availability of biologic therapies significantly influence disease outcomes. The predominance of ERA and RF-negative polyarthritis, along with notable extra-articular manifestations, illustrates the clinical burden observed. Despite methotrexate being the main treatment, many children continued to present with active disease. These findings emphasize the need to strengthen primary healthcare training and improve access to immunologic investigations. They also underscore the importance of developing regional strategies to enhance access to biologic therapies. Based on these findings, we recommend early screening of persistent arthritis (>6 weeks) at the primary care level, systematic ophthalmologic monitoring every 3–6 months in at-risk phenotypes (oligoarticular and ANA-positive), and regional strategies to facilitate access to biosimilars for children with persistent active disease. These measures could significantly reduce diagnostic delays and improve long-term outcomes in low-resource settings.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

Funding Statement: The authors did not obtain any funding for this research.

Declaration for Human Participants: This retrospective descriptive study was conducted in accordance with the principles of the Declaration of Helsinki and with respect for patient anonymity and confidentiality. Authorization to collect and use the anonymized patient data was obtained from the management of the Refoundation Hospital of Chad (HRT), the National Reference University Hospital (CHU-RN), and the research officer of the Faculty of Human Health Sciences of the University of N'Djamena, Chad.

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