

Rheumatoid Arthritis: A Joint Study of Internal Medicine and Rheumatology at the Zinder National Hospital

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How to cite this paper: Garba, A.A., Souleymane, B., Yacouba, A., Mamane, D., Laouali, M.C., Mamadou, A.K. and Eric, A. (2026) Rheumatoid Arthritis: A Joint Study of Internal Medicine and Rheumatology at the Zinder National Hospital. *Open Journal of Internal Medicine*, 16, 282-296.

<https://doi.org/10.4236/ojim.2026.162022>

Received: August 20, 2025

Accepted: May 26, 2026

Published: May 29, 2026

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Abstract

Objectives: To describe the epidemiological, diagnostic, and prognostic characteristics of rheumatoid arthritis at HNZ. **Materials and Methods:** This was a descriptive cross-sectional study, over 5 years (2018-2023). The study was conducted in the internal medicine department and the rheumatology consultation unit, including all cases of rheumatoid arthritis (RA) classified according to the 2010 ACR/EULAR classification criteria or with synovitis associated with erosion typical of RA. Sociodemographic, clinical, paraclinical, therapeutic, and outcome variables were collected. Data analysis was performed using EPI INFO version 7 software. **Results:** The sample consisted of 117 cases of rheumatoid arthritis (RA) seen in internal medicine and rheumatology consultations. The hospital prevalence was 1.30%. The mean age of the patients was 45.7 years, with a range from 17 to 78 years; the 44 - 53 age group was the largest (29.05%). Females were predominant (80%). A history of RA (18%) and hypertension (17%) was the most frequently reported. The mean time to diagnosis was 15.7 months. Polyarthralgia was reported in 74% of patients. Deformities were present in 52% of patients, the most frequent being hammer fingers (32.47%), boutonniere fingers (31.62%), and ulnar drift (26.49%). Extra-articular manifestations were present in 68% of patients. Band-like epiphyseal demineralization was the most frequently observed radiological finding (65%). Rheumatoid factor (RF) and anti-inflammatory compound (AIC) were positive in 85% and 76.92% of patients, respectively. Methotrexate was used in 85% of patients, followed by hydroxychloroquine (31%) and sulfasal-

azine (18%). With remission or low activity at 6 months in 56.40% of cases.

Conclusion: This study shows that rheumatoid arthritis (RA) is common in the Zinder region. Primarily affecting women, it is characterized by delayed diagnosis, high disease activity, joint deformities, and significant extra-articular manifestations. Early diagnosis and access to targeted therapies could improve the prognosis.

Keywords

Rheumatoid Arthritis, Zinder National Hospital, Niger

1. Introduction

Rheumatoid arthritis (RA) is the most common chronic inflammatory rheumatic disease [1]. A systemic autoimmune disease, it causes persistent inflammation of the synovial membrane, which can lead to osteoarticular destruction and severe extra-articular manifestations. Its prevalence is estimated at between 0.5% and 1% of the world population, with a peak incidence between 40 and 60 years of age and a marked female predominance [2] [3]. In Africa, epidemiological data are variable and often limited to hospital series [4]-[7]. In Niger, few studies have documented the profile of RA. Diagnostically, several criteria have emerged that do not take into account early-stage RA. Currently, diagnosis has undergone profound changes, with both classification and diagnostic criteria, such as the ACR (American College of Rheumatology)/EULAR (European League against Rheumatism) 2010 were developed, with more ambitious therapeutic objectives [3] [8]-[10] [12]-[14]. The management of chronic inflammatory rheumatic diseases represents a significant part of the workload of the internist and rheumatologist at the Zinder National Hospital (HNZ). To improve this management, we focused on the epidemiological, diagnostic, therapeutic, and prognostic aspects of the most common chronic inflammatory rheumatic disease, rheumatoid arthritis.

2. Materials and Methods

2.1. Type of Study and Framework

A cross-sectional descriptive study conducted from January 2018 to December 2023 in the internal medicine department and the rheumatology consultation unit of HNZ.

2.2. Population

➤ Inclusion Criteria:

- All patients seen in outpatient consultation (medicine or rheumatology) or hospitalized in the internal medicine department of the Zinder National Hospital during the study period and in whom the diagnosis of RA was confirmed according to the clinical and biological approach in accordance with

the ACR/EULAR 2010 criteria, satisfying a total score of at least 6 points out of 10 (for early RA) with normal radiographs and in the absence of a diagnosis of another disease or synovitis associated with typical RA erosion (patients not meeting the conditions for application of the ACR/EULAR criteria).

➤ **Exclusion Criteria:**

- Those whose assessment (biological and/or imaging) was incomplete.

2.3. Variables Studied

The parameters of interest were:

- Sociodemographic data (age, sex, occupation, education level, background).
- Clinical data (number of swollen joints, number of painful joints, morning stiffness, joint deformities, and extra-articular signs).
- Paraclinical data (biology, immunology, imaging).
- Therapeutic data (treatments received).
- Evolutional data at 6 months (Disease Activity Index: DAS 28, Health Assessment Questionnaire: HAQ).

2.4. Statistical Analysis

Data were entered and analyzed using Epi Info 7. For the descriptive analysis, quantitative variables were expressed as means $\pm$ standard deviation or as medians (interquartile ranges) when the distribution was not normal. Qualitative variables were expressed as counts and frequencies. For the analytical part, we first performed univariate analysis using the chi-square test for comparing qualitative variables, the Student's t-test for comparing means, and the Mann-Whitney U test for non-parametric distributions. When a statistically significant relationship existed between dichotomized variables, we performed multivariate analysis using logistic regression when the dependent variable was qualitative. Candidate variables for the multivariate logistic regression models were selected from among the collected variables based on their clinical relevance and data quality. Variables with more than 20% missing data were excluded. The remaining candidate variables underwent a LASSO-type penalized selection procedure with 10 replicates and cross-validation to identify variables independently associated with the outcome. Results were presented as odds ratios (ORs) with 95% confidence intervals, and model fit was assessed using the Hosmer-Lemeshow test. Linear regression was performed when the dependent variable was quantitative. Odds ratios (ORs) were calculated with 95% confidence intervals (CIs). The test was considered significant if the p-value was less than 0.05.

2.5. Ethical Considerations

Patient anonymity and the confidentiality of personal information were protected, and informed consent was obtained. Prior approval was obtained from the HNZ authorities. Research authorization was obtained from the Faculty of Health Sciences.

3. Results

3.1. General Data

During the study period (2018-2023), 8935 patients were seen in internal medicine and rheumatology consultations, including 117 cases of RA, representing a hospital frequency of 1.30%.

3.2. Sociodemographic Data

The mean age of the patients was 45.7 years $\pm$ 12.8 years, with a range of 17 to 78 years; the 40 - 60 age group was the largest (58.12%). Females were the most represented (80%), with a sex ratio of 0.25. Housewives were the most numerous group (68.38%). Those with no formal education were predominant (63%). A history of rheumatoid arthritis (18%) and hypertension (17%) were the most frequently reported conditions (**Table 1**).

Table 1. Distribution of patients according to sociodemographic characteristics, RA study, HNZ, 2018-2023.

Features	Number of Employees (n)	Frequencies (%)	Averages
Age (Years)			
Average Age			45.7 $\pm$ 12.8 [17 - 78]
Age Range			
- [17 - 20[	02	01.71	
- [20 - 40[	33	28.21	
- [40 - 60]	68	58.12	
- >60	14	11.96	
Sex			
Female	94	80.34	
Male	23	19.65	
Occupation			
Housewife	80	68.38	
Merchant	14	11.97	
Teacher	11	09.40	
Education Level			
Not Enrolled in School	74	63.25	
Primary	26	22.22	
Secondary	15	12.82	

Continued

Medical History		
Family History of RA	21	18.00
HTA	20	17.00
Diabetes	09	07.70
Surgical History	06	05.10

HTA: arterial hypertension; PR: rheumatoid arthritis.

3.3. Clinical Data

Eighty-one percent of patients had a diagnostic delay of between 1 and 25 months. The mean diagnostic delay was 15.7 months, with a range of 2 to 120 months. Thirty-seven (37) patients met the ACR/EULAR criteria, the majority of whom (73%) achieved an ACR/EULAR score of 10 points. Eighty (80) patients were seen at a late stage. Polyarthralgia was the main reason for consultation (74.27%). Inflammatory arthralgia was observed in 54% of patients. Morning stiffness lasted longer than 60 minutes in 73% of cases. Joint deformities were present in 52% of cases. The most frequent deformities of the upper limbs were hammer toes (32.47%), boutonniere deformities (31.62%), and ulnar drift (26.49%). Claw toes were the most frequent deformity (31.62%) in the lower limbs. Extra-articular manifestations (EAMs) were present in 68% of patients. In multivariate analysis, hematological abnormalities represented the most frequent EAMs (59%) (Table 2). Dry eye syndrome was significantly associated with rheumatoid arthritis (RA) activity and diagnostic delay ($p < 0.05$). Rheumatoid nodules were associated with diagnostic delay ($p < 0.05$). Anemia was significantly associated with diagnostic delay ($p < 0.05$) (Tables 3-5).

Table 2. Distribution of patients according to clinical characteristics, RA study, HNZ, 2018-2023.

Features	Number of Employees (n)	Frequencies (%)	Average/Median
Diagnostic Time (Months)			
Median Diagnostic Time			8.00 [4.00; 18.0]
ACR/EULAR Score 2010			
6	00	00.00	
7	06	16.00	
8	01	02.70	
9	03	08.10	
10	27	73.00	
Total	37	100.00	
Reasons for Consultation			
Polyarthralgia	101	74.27	
Joint Swelling	23	19.65	
Joint Deformity	12	08.82	

Continued**Functional Signs**

Polyarthralgia	12	66.66
- Inflammatory	63	53.84
- Mixed	54	46.15
Morning Warm-Up	03	16.66
- <60 Minutes	32	27.35
- >60 Minutes	86	73.50

Joint Deformities

Upper Limbs

- Buttonhole Fingers	37	31.62
- Hammer Fingers	38	32.47
- Cubital Gust of Wind	31	26.49
- Swan Neck	24	20.51

Lower Limbs

- Claw Toes	37	31.62
- Peroneal Windbreaker	03	02.56
- Flexible Knee	01	00.85

Extra-Articular Involvement

Hematological Disorders	69	59.00
Dry Syndrome	37	32.00
Fever	26	22.22
Rheumatoid Nodule	22	19.00

Table 3. Factors associated with the occurrence of dry eye syndrome, RA study, HNZ, 2018-2023.

Variables	Dry Syndrome		
	Percentage (%)	OR [IC 95%]	P-Value
DAS 28 Initial			
≤3.2	25.64	1	
>3.2	59.82	1.05 [1.02 - 1.08]	<0.001
DGC Deadline			
≤25	81.20	1	
>25	27.90	1.67 [1.30 - 2.26]	<0.01
HIV-Positive			
Yes	85.00	1	
No	15.00	1.10 [0.35 - 3.10]	0.87

DGC: Diagnostic.

Table 4. Factors associated with the occurrence of rheumatoid nodules, RA study, HNZ, 2018-2023.

Choice of Variables	Rheumatoid Nodule		
	Percentage (%)	OR [IC 95%]	P-Value
DAS 28 Initial			
≤3.2	25.64	1	0.17
>3.2	59.82	1.02 [0.99 - 1.04]	
DGC Deadline			
≤25	81.20	1	<0.01
>25	27.90	1.36 [1.10 - 1.72]	
HIV-Positive			
Yes	85.00	1	0.87
No	15.00	45.0 [37.0 - 53.0]	

Table 5. Factors associated with the occurrence of anemia, RA study, HNZ, 2018-2023.

Variables	Anemia		
	Percentage (%)	OR [IC 95%]	P-Value
DAS 28 Initial			
≤3.2	25.64	1	0.56
>3.2	59.82	1.01 [0.98 - 1.03]	
DGC Deadline			
≤25	81.20	1	0.018
>25	27.90	1.36 [1.07 - 1.80]	
HIV-Positive			
Yes	85.00	1	0.71
No	15.00	0.78 [0.20 - 2.76]	

3.4. Paraclinical Data

Arthritis (RA) was seropositive for rheumatoid factor (RF) in 85% of patients. Anti-CCP antibodies were positive in 90 patients (76.92%). Simultaneous elevation of the erythrocyte sedimentation rate (ESR) and the cytochemical syndrome (CRP) was found in 90.59% of cases. Anemia was the most frequent blood count abnormality (43%). Microcytic hypochromic anemia was the most common (35.04%). Band-like epiphyseal demineralization was the most frequently observed radiological finding (65%) (**Table 6**).

Table 6. Distribution of patients according to paraclinical characteristics, RA study, HNZ, 2018-2023.

Features	Number of Employees (n)	Frequencies (%)	Averages/Medians
Inflammatory Syndrome			
VS Average			65.02 ± 29.33 [9 - 160]
Median CRP			13.3 [8.31; 21.0]
ESR and Elevated CRP	106	90.59	
Blood Count			
Anemia	12	66.66	
- Microcytic Anemia	63	53.84	
- Normocytic Anemia	11	09.40	
Hyperleukocytosis	22	19.00	
Thrombocytosis	21	18.00	
Lymphocytosis	13	11.00	
Thrombocytopenia	11	09.40	
Neutropenia	02	01.70	
Immunological Abnormalities			
Rheumatoid Factor Positive	99	84.61	
Anti-CCP Positive Antibodies	90	76.92	
Radiological Anomalies			
Strip Demineralization	76	65.00	
Joint Pinching	74	63.00	
Juxta Articular Erosions	59	50.00	

3.5. Therapeutic Data

Analgesics were the most frequently used symptomatic treatment (77%), followed by corticosteroids (67%). Regarding disease-modifying antirheumatic drugs (DMARDs), methotrexate (dose: 10 to 25 mg per week), synthetic antimalarials (SMAs) (dose: 6.5 mg/kg/day divided into two doses), and... Salazopyrine (dose: 40 mg/kg/day divided into two to three doses) was used in 85%, 31% and 18% of patients respectively (**Figure 1**).

3.6. Evolving Data

RA was moderately active in 52.99% of patients at the time of diagnosis versus 25.64% after 6 months. A significant decrease in the DAS28-VS score was observed after six months of treatment, from 4.32 ± 1.79 at diagnosis to 2.98 ± 0.71 , with a mean change of 1.35 ± 1.67 (paired t-test, $p < 0.001$) (**Table 7**). A high risk factor was the most frequently observed poor prognostic factor, observed in 82.05% of cases (**Table 8**).

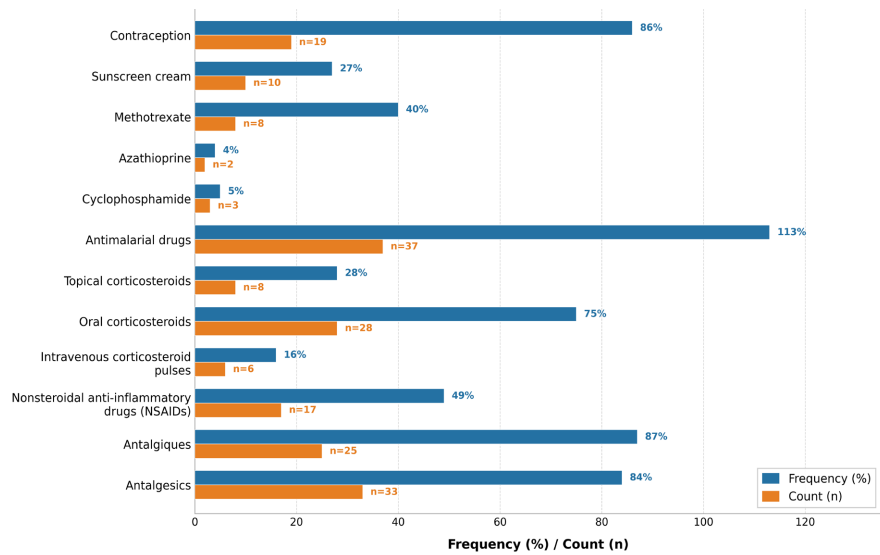


Figure 1. Distribution of patients according to therapeutic characteristics, RA study, HNZ, 2018-2023.

Table 7. Distribution of patients according to disease progression characteristics, RA study, HNZ, 2018-2023.

Categories	Number (%)		
PR Activity	Initial	After 6 Months	P-Value
PR Very Active	24 (20.51)	03 (2.56)	
Moderately Active PR	62 (52.99)	30 (25.64)	
PR Weakly Active	11 (9.40)	35 (29.91)	
PR in Remission	06 (5.12)	31 (26.49)	
DAS28-VS	4.32 ± 1.79	2.98 ± 0.71	<0.001
HAQ	1.73 ± 0.255 [1.09 - 2.17]	1.30 ± 0.182 [1.01 - 1.82]	

Table 8. Distribution of patients according to poor prognostic factors, RA study, HNZ, 2018-2023.

Categories	Effective	Percentage (%)
Rheumatoid Factor > 30 IU/ml	96	82.05
citruinated Peptide Antibodies > 30 IU/ml	88	75.21
Sedimentation Rate > 60 mm	61	52.13
C-Reactive Protein > 30 mg/l	16	16.23
Number of Swollen Joints > 14	16	13.67

4. Discussion

4.1. Epidemiological Aspects

The prevalence of RA in the general population is between 0.5% and 1% [8] [10]. In our series, the hospital prevalence of this condition was 1.3%. This frequency

is reported with varying degrees of frequency in hospital series. Thus, Andia *et al.* in Niamey (Niger) in 2016 [4] found similar results. However, our prevalence is lower than that of Garba *et al.* [7] in Chad (N'Djamena) in 2026, who find 4.22%, and Salissou *et al.* [14] in Maradi (Niger) in 2019, who reported 3.7%. This prevalence remains higher than that of the first series of PR documented in Niamey (Niger) by Adehossi *et al.* [13] in 2010 (8 cases over 1 year) and that of Houzou *et al.* [15] in Lomé (Togo) (0.45%).

The preferred age range found in this study was 40 - 60 years. Our data are consistent with those in the literature, which state that RA can occur at any age but is most commonly seen between 40 and 60 years of age [3] [8].

The mean age of patients at diagnosis was 45.7 years. This data is consistent with that of Andia *et al.* [4] (45.9 years), but differs from that of the cohorts of Kakpovi *et al.* [6] (42 years old) and Ouédraogo *et al.* [11] (48.27 years).

Women represented 80% of the sample with a sex ratio of 0.25, consistent with data from the literature. reported by other African series [4]-[6] [14].

Housewives were the most affected in this series (68.38%). This could be explained by the functional impairment caused by the illness, the impact of which on household activities necessitates a consultation.

4.2. Clinical Aspects

A history of RA was found in 18% of patients. This is consistent with data from some authors who have described familial forms of RA [13] [16]. This finding corroborates the involvement of genetic factors in the pathogenesis of the disease. The other most frequently reported comorbidities in our study were hypertension (17%) and diabetes (7.7%). These comorbidities are reported to varying degrees in the literature. For example, Garba *et al.* [5] found hypertension and diabetes in 29% and 5% of patients in their series, respectively. Kapovi *et al.* [6] They also found hypertension (10.9%) and diabetes (4.3%) as comorbidities in the patients in their series. Cardiovascular risk factors are generally the leading causes of morbidity and mortality in rheumatoid arthritis. Hence, the importance of regular and systematic cardiovascular risk assessment [17] [18].

The average diagnostic delay (15.7 months) remains high, as already reported in Niger [5] [14] and in Togo [6]. This diagnostic delay could be explained by self-medication and the use of traditional medicine, as shown in the work of Garba *et al.* [5].

In addition to arthralgia, morning stiffness with a loosening time exceeding one hour was present in 73% of patients. These results are comparable to those of a series [19]. A Senegalese study reported a frequency of prolonged morning stiffness in 81% of patients. Rheumatoid arthritis was deforming in 52% of patients. The deformities were predominantly hammer toes (32.47%), boutonniere toes (31.62%), ulnar flexor digitorum profundus (26.49%), and claw toes (31.62%). Similar results were previously observed by Nigerian authors [5] [14]. Several lines of evidence agree that diagnosis should be made before these deformities develop,

as early diagnosis provides a window of therapeutic opportunity for a better functional and structural prognosis [17] [20]. This early diagnosis can be reinforced by Doppler ultrasound or joint MRI, allowing the detection of subclinical synovitis even before the onset of structural lesions [20] [21]. These techniques are not available in our setting. Delayed consultation would explain the frequency of these deformities and result in a loss of opportunity for these patients.

Extra-articular manifestations (EAMs) were observed in 68% of cases, the most frequent being hematological (59%), dry eye syndrome (32%), and rheumatoid nodules (19%). The frequency of these EAMs varies from one study to another. Kakpozi *et al.* [6] reported these MEA. In 48% of patients in their series, the most frequent MEAs were hematological (27.2%), pulmonary (6.5%), and cutaneous (rheumatoid nodules: 2.2%). The most frequent MEAs, as described by Salissou *et al.* [14], are dry eye syndrome (23.9%), rheumatoid nodules (3.1%), and Felty syndrome (3.1%). Some data in the literature suggest that these MEAs are correlated with RA activity [22] [23]. In our series, dry eye syndrome was significantly associated with disease activity ($p < 0.001$). Some observations in the literature show that these MEAs are more frequent in patients seropositive for rheumatoid factor [24]. In our series, we did not find this association. Some authors support the existence of a relationship between the long duration of RA and the occurrence of MEAs [25] [26]. In our series, dry eye syndrome ($p < 0.001$) and rheumatoid nodules ($p = 0.01$) were significantly associated with the diagnostic delay.

4.3. Paraclinical Aspects

Standard radiography performed on the majority of our patients showed the classic band-like demineralization (65%), erosions (63%), and joint space narrowing (50%). These lesions are consistent with scientific data [27]. On this subject, Jean *et al.* [12] reported the same lesions with 45.8% band demineralization, 29.2% erosions, and respectively 33.3% of joint space narrowing. Among these radiological lesions, erosions are of great diagnostic value, particularly those of the head of the 5th metatarsal (Brown's sign) [20] [27]-[29]. Thus, for the European League Against Rheumatism (EULAR), a typical RA erosion is sufficient to support the diagnosis [21] [30].

Markers were observed in 90.59% of cases in our series. These results are similar to those reported in the general literature [5] [13] [14]. This could be explained by the fact that 73% of our patients had moderately to very active rheumatoid arthritis at the time of diagnosis.

In our series, anemia was the most frequently reported blood count abnormality and also the most common MEA, present in 43% of patients. These results are consistent with those of Ankush *et al.* [31], who report 67% anemia in their series and those of Umaina *et al.* [32] (65%). This anemia is most often microcytic, as in our study (35%), can be normocytic, but rarely macrocytic. Microcytic anemia is primarily inflammatory. This anemia, common to all chronic inflammatory dis-

eases, is thought by some authors to be associated with rheumatoid arthritis activity [33]. The data from our study are consistent with those of Nikolaisen *et al.* [34], who found no correlation between anemia and disease activity in their cohort.

Rheumatoid factors (RF) were positive in 85% of patients, and anti-cyclic citrullinated peptide antibodies (Anti-CCP) were positive in 76.92%. These results are comparable to data in the literature. Indeed, Silmani *et al.* [35] in Algeria reported 78.5% positive rheumatoid factors and 69% positive anti-CCP antibodies; Andia *et al.* [4] in Niger, 60% of RF were positive, and 4% were anti-CCP; Garba *et al.* [5] in Niger, 64.70% of RF were positive, and 100% were anti-CCP; Salissou *et al.* [14] in Niger, 36% of RF tests were positive and 46% were anti-CCP; Ouédraogo *et al.* [11] in Ouagadougou reported 71.9% RF tests and 87.8% were anti-CCP. This difference in results between studies, particularly regarding anti-CCP, could be explained by the rate at which this testing was performed, which varied from one study to another and depended on the financial resources available to most of our patients at the time of diagnosis.

4.4. Therapeutic Aspects

In the literature, methotrexate is considered the standard first-line treatment. However, other molecules such as leflunomide, sulfasalazine, synthetic antimalarials, and corticosteroids can be used in this line [36]. In our series, all patients were on DMARDS, with 85% on methotrexate, 31% on APS, and 18% on Sulfasalazine. These therapeutic data are reported differently by several studies. In the cohort of Andia *et al.* [4], 60% of patients are on methotrexate and 40% on APS; Kakpovi *et al.* [6], 40.2% on methotrexate, 12% on APS, and 5.4% on Sulfasalazine; Garba *et al.* [5], 64.70% were on methotrexate and 11.76% on antipsychotics. Some learned societies advocate early treatment and even consider it a therapeutic emergency [17] [37]. Diagnostic delays in our cohort, as in other African series, could limit the application of these recommendations [5] [6] [14].

4.5. Evolutionary Aspects

Functionally, the mean initial HAQ score of our patients was 1.73 ± 0.255 [1.09 - 2.17] versus 1.30 ± 0.182 [1.01 - 1.82] at 6 months. Our results differ from those of Salissou *et al.* [14], who reported a mean initial HAQ score of 2.38 ± 0.54 [0.625 - 2.875] versus 0.64 ± 0.58 [0.125 - 2.50] at 6 months. Regarding disease activity, 73% of patients had moderately to very active RA at the time of diagnosis. The outcome was marked by remission or low disease activity in 56.40% of patients after six months of treatment ($P < 0.05$). According to the French Society of Rheumatology [17], when the therapeutic goal is not reached after 6 months of treatment, in the presence of poor prognostic factors, the addition of targeted therapy (biological or synthetic) may be indicated. In our series, the goal was not reached after 6 months in 43.60% of patients with at least very high rheumatoid factors (82%) as a poor prognostic factor. In practice, these very expensive tar-

geted therapies are not available in Niger in general, and in Zinder in particular.

5. Conclusion

This first joint internal medicine/rheumatology study included 117 patients with rheumatoid arthritis (RA). The aim of this work was to investigate the epidemiological, clinical, paraclinical, therapeutic, and prognostic characteristics of this disease at the Zinder National Hospital (HNZ). The study revealed that RA is common (1.30%) in the region. It primarily affects women with a mean age of approximately 46 years. Delayed diagnosis, high activity levels, functional impairment, and extra-articular manifestations characterized the patients in this study. Early diagnosis is crucial for therapeutic efficacy, functional prognosis, and overall survival.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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