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Metabolic Syndrome and Rheumatic Diseases in Chad: Prevalence, Associated Factors and Clinical Impact

Garba Harine Abdel Aziz
Department of Rheumatology, Chad Refoundation Hospital (HRT), University of N'Djamena, Chad
Ramadhane Bouchrane
Rheumatology Unit, National Center for Orthopedic Devices (CNAO), Dakar, Senegal
Adama Bah
Department of Rheumatology, Ignace Deen University Hospital, Gamal Abdel Nasser University of Conakry, Guinea
Djikoldinguem Marschall Mouandilmadji
Department of Endocrinology, CHURN, N'Djamena, Chad
Hamid Harine Abdel Aziz
Department of Rheumatology, Chad Refoundation Hospital (HRT), Chad
Moustapha Niasse
Saidou Diallo
Department of Rheumatology, Coud Hospital, Cheikh Anta Diop University of Dakar, Senegal

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Abstract

Objective: To assess the prevalence of metabolic syndrome (MS) and its clinical impact among patients with rheumatic diseases in Chad. **Methods:** A retrospective, cross-sectional, analytical study was conducted at the HRT Rheumatology Department from January 2018 to May 2024. Among 5000 patients, 330 fulfilled IDF and 214 WHO criteria for MS. Clinical, laboratory, and therapeutic data, as well as functional scores (Short Form-36 (SF-36), Disease Activity Score in 28 joints (DAS28), Bath Ankylosing

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Spondylitis Functional Index (BASFI), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)), were systematically analyzed. **Results:** MS prevalence was 6.6% (IDF) and 4.3% (WHO). The cohort was predominantly female (88.7%), with a mean age of 49.8 ± 12.4 years. The most frequent components were abdominal obesity (93.0%), hypertension (89.7%), and hyperglycemia (64.8%). Associated diseases included connective tissue disorders (40.9%), degenerative conditions (34.3%), and autoinflammatory diseases (24.8%). After a mean two-year follow-up, functional and quality-of-life scores improved, although 13 patients developed cardio-renal complications. This retrospective single-center design may limit the generalizability of our findings. **Conclusions:** MS is common among rheumatology patients in Chad and worsens disease prognosis. Systematic screening and multidisciplinary management are essential to improve outcomes and quality of life.

Keywords: Chad; metabolic syndrome; rheumatic diseases; comorbidities; quality of life; Sub-Saharan Africa

Introduction

Metabolic syndrome (MS) is defined as the clustering of several metabolic abnormalities, including abdominal obesity, hypertension, and disturbances in glucose and lipid metabolism. It has become a major public health issue because of its role in the development of cardiovascular diseases and type 2 diabetes (Alberti et al., 2009).

In rheumatology, the presence of MS worsens functional prognosis and increases morbidity. Several international studies have reported a higher prevalence of MS among patients with rheumatoid arthritis, systemic lupus erythematosus, and spondyloarthritis compared with the general population (González-Gay & González-Juanatey, 2017). This association is partly explained by chronic inflammation, which promotes insulin resistance and endothelial dysfunction (Crowson et al., 2013).

In Sub-Saharan Africa, MS is increasing due to nutritional transition and rapid urbanization (Motala et al., 2011). However, little is known about its impact on rheumatic diseases, and, to our knowledge, no large-scale study has been conducted in Chad.

Objective

This study aimed to assess the prevalence of metabolic syndrome and its clinical impact among patients with rheumatic diseases in Chad.

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Methods

This was a retrospective, cross-sectional, analytical study conducted in the Department of Rheumatology at the National Refondation University Hospital (HRT). The study period extended from January 2018 to May 2024.

All 5,000 patient records were systematically screened for metabolic syndrome, and only those with complete clinical and laboratory data were included in the analysis (n = 330 for IDF criteria, n = 214 for WHO criteria).

The study population included all patients followed for rheumatic diseases - whether inflammatory, autoimmune, or degenerative - who had complete medical records.

The diagnosis of metabolic syndrome (MS) was established according to two international definitions. The International Diabetes Federation (IDF, 2005) criteria required the presence of abdominal obesity (waist circumference ≥ 94 cm in men and ≥ 80 cm in women) and at least two metabolic abnormalities (blood pressure ≥ 130/85 mmHg, fasting glucose ≥ 1.10 g/l, triglycerides ≥ 1.50 g/l, HDL < 0.40 g/l in men or < 0.50 g/l in women). The World Health Organization (WHO, 1999) criteria defined MS by the presence of insulin resistance and at least two additional factors (blood pressure ≥ 140/90 mmHg, BMI > 30 kg/m² or waist-to-hip ratio > 0.90 in men and > 0.85 in women, triglycerides ≥ 1.50 g/l, HDL < 0.35 g/l in men and < 0.39 g/l in women).

Data collection included sociodemographic characteristics (age, sex, occupation), clinical parameters (rheumatic disease, body mass index, blood pressure, waist circumference), laboratory data (fasting glucose, lipid profile), as well as therapeutic and functional information. Clinical and prognostic evaluation was based on validated scores: Disease Activity Score in 28 joints (DAS28), Bath Ankylosing Spondylitis Functional Index (BASFI), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and Short Form-36 (SF-36).

Statistical analyses were performed using SPSS software, version 25.0. Quantitative variables were expressed as means ± standard deviation, and qualitative variables as frequencies and percentages. Comparisons were made using the Chi-square test or Student's t test, with statistical significance set at $p < 0.05$.

Results

A total of 5000 rheumatology patient records were systematically analyzed. The study population consisted of 88.7% women, with a mean age of 49.8 ± 12.6 years.

The prevalence of metabolic syndrome (MS) was 6.6% according to IDF criteria and 4.3% according to WHO criteria. The most frequent

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components were abdominal obesity (93%), hypertension (89.7%), and hyperglycemia (64.8%).

Regarding associated rheumatic diseases, connective tissue disorders accounted for 40.9%, degenerative diseases for 34.3%, and autoinflammatory conditions for 24.8%.

Functional outcomes and quality of life were assessed using the SF-36, DAS28, BASFI, and WOMAC. A significant improvement was noted during follow-up, reflecting the benefits of multidisciplinary care.

However, 13 cardio-renal complications were identified: 6 cardiovascular (heart failure, coronary artery disease) and 7 renal (chronic kidney disease, proteinuria).

Table 1: Sociodemographic, clinical characteristics and metabolic syndrome components (n = 330, IDF criteria)

Variables	Results	Components of the Metabolic Syndrome
Mean age (years, ± SD)	49.8 ± 12.4	-
Female sex (%)	88.7	-
Male sex (%)	11.3	-
Average BMI (kg/m²)	29.5 ± 4.2	-
Waist size (cm)	97.4 ± 10.6	Abdominal obesity: 93.0%
Average blood pressure	143/89 mmHg	High blood pressure: 89.7%
Glycémie à jeun (g/l)	1.25 ± 0.4	Hyperglycemia: 64.8%
Serum lipids (triglycerides)	-	Hypertriglyceridemia: 40.0%
Serum lipids (HDL)	-	HDL lowered: 35.7%
Average follow-up duration (years)	2.0 ± 0.5	-

Table 2: Distribution of rheumatic diseases associated with metabolic syndrome

Rheumatic conditions	n (%)
Connectivites	135 (40.9)
Degenerative diseases	113 (34.3)
Autoinflammatory diseases	82 (24.8)

Table 3: Evolution of functional and quality-of-life scores (before and after follow-up, n = 330)

Scores assessed	Before follow-up (mean ± SD)	After follow-up (mean ± SD)	p-value
SF-36 (overall quality of life)	48.2 ± 11.5	61.7 ± 13.2	< 0.01
DAS28 (polyarthritis)	5.2 ± 1.1	3.6 ± 0.9	< 0.01
BASFI (spondyloarthritis)	6.1 ± 1.4	4.2 ± 1.0	< 0.01
WOMAC (osteoarthritis)	67.4 ± 15.3	49.6 ± 12.7	< 0.01

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Table 4: Comparison of metabolic syndrome prevalence in rheumatology in West Africa and Chad

Country / Reference	Study population	Workfoce (n)	Criteria used	Prevalence of MS (%)	Dominant components
Chad (present study)	Rheumatology Patients (HRT) Rheumatology	5000	IDF / OMS	6.6 (IDF) / 4.3 (OMS)	Abdominal obesity, hypertension, hyperglycemia
Senegal (Abandazegoué-Andjembé et al., 2023 – CO06)	Rheumatology Conditions (Le Dantec University Hospital, Dakar)	373	IDF / OMS	8 – 12	Abdominal obesity, hypertension, hyperglycemia
Togo (Nouvedji et al., 2023 – CO07)	Rheumatology Patients (Kara University Hospital)	74	IDF / OMS	≈ 10	Obesity, dyslipidemia, hypertension
Burkina Faso (Savadogo et al., 2022)	Patients Seen in Rheumatology Consultations (Bogodogo University Hospital)	115	IDF / OMS	47.8	Overweight/obesity, hypertension, hyperglycemia
Benin (Zomalheto et al., 2017)	Chronic Low Back Pain (Cotonou University Hospital)	82	IDF / OMS	29.3	Abdominal obesity, hypertension, hyperglycemia
Congo 32. N'Soundhat, N. E. L., & Teddy, T. (2025	Centre Médical France-Congo (CMFC)	1149	NCEP-ATPIII	15.9	Hyperglycemia Abdominal obesity,hypertension

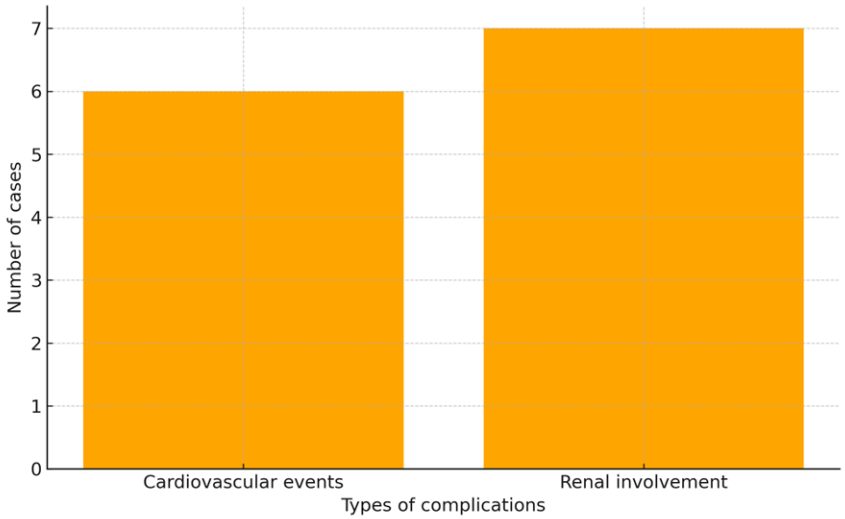

Figure 1. Cardio-renal complications observed

Discussion

In this study, the prevalence of metabolic syndrome (MS) among patients with rheumatic diseases in Chad was 6.6% according to IDF criteria

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and 4.3% according to WHO criteria. These rates fall within the lower range of African data.

In Senegal, Abandazegoué-Andjembé et al. reported a prevalence between 8 and 12% in a cohort of 373 patients, close to our findings. In Togo, Nouvedji et al. found similar rates (~10%), confirming a relatively moderate frequency of MS in West Africa. By contrast, data from Burkina Faso (Savadogo et al.) and Benin (Zomalheto et al.) showed much higher prevalence, 47.8% and 29.3%, respectively. These discrepancies are likely explained by methodological differences (hospital-based targeted populations, smaller sample sizes) and by lifestyle-related factors such as urbanization, obesity, dietary habits, and physical inactivity. These findings are consistent with recent studies that have explored in greater depth the interactions between chronic inflammation, metabolic syndrome, and rheumatic diseases (Bagheri-Hosseinabadi et al., 2024; Luo et al., 2024; Grzechnik et al., 2023).

The predominance of women in our cohort (88.7%) and the mean age (49.8 years) are consistent with findings from Senegal and Togo, where inflammatory rheumatic diseases mainly affect women in early or middle adulthood. The dominant MS components were similar to those described in the subregion, with abdominal obesity and hypertension predominating, sometimes associated with marked dyslipidemia (as reported in Togo).

The clinical improvement observed during follow-up (better SF-36, DAS28, BASFI, WOMAC scores) reflects the benefits of multidisciplinary care. However, the occurrence of 13 cardio-renal complications underlines the significant prognostic burden of MS, also reported in other African studies. These observations are in line with recent recommendations and studies highlighting the importance of systematic screening and integrated management of patients with metabolic syndrome associated with rheumatic diseases (Santos-Moreno et al., 2022; Luo et al., 2024; Grzechnik et al., 2023).

Despite its limitations - retrospective design, single-center setting, lack of standardized laboratory tests - this study represents the first documented report from Chad. Its main contribution lies in providing a regional perspective: while MS prevalence is relatively low in Chad and Senegal, it remains an emerging and concerning comorbidity in West African rheumatology, warranting systematic screening and integrated management. Similar trends have been reported in Congo, highlighting the increasing prevalence of metabolic syndrome in rheumatology outpatient consultations in the region (N'Soundhat &Teddy, 2025).

Conclusion

This first study from Chad highlights that metabolic syndrome affects a substantial proportion of patients with rheumatic diseases. Its main components - abdominal obesity, hypertension, and hyperglycemia - are

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consistent with regional data. MS acts as an aggravating factor, warranting systematic screening and integrated management to improve prognosis and patient quality of life.

Authors' Contributions

All authors contributed to the design of the study, data collection, analysis, and manuscript writing. They approved the final submitted version and agreed to take responsibility for its content.

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: The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. It was approved by the ethics committee of the Hôpital de la Refondation du Tchad (HRT) – University of N'Djamena. Informed consent was obtained from patients, and anonymity was preserved at all stages of research and publication.

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