ESI Preprints **Not Peer-reviewed**

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 and Diabetology, University Hospital of 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

Doi: 10.19044/esipreprint.9.2025.p92

Approved: 05 September 2025
Posted: 07 September 2025

Cite As:
Garba, H. A., Bouchrane, R., Bah, A., Mouandilmadji, D. M., Hamid, H. A., Niasse, M., & Diallo, S. (2025). *Metabolic Syndrome and Rheumatic Diseases in Chad: Prevalence, Associated Factors and Clinical Impact.* ESI Preprints.
https://doi.org/10.19044/esipreprint.9.2025.p92

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 (SF-

36, DAS28, BASFI, 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. **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 in 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.

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.

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: DAS28, BASFI, WOMAC, and 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 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 I. Sociodemographic, clinical characteristics and components of metabolic syndrome (n = 330, IDF criteria)

Variables	Résultats	Composantes du syndrome métabolique
Âge moyen (ans, ± ET)	49,8 ± 12,4	-
Sexe féminin (%)	88,7	-
Sexe masculin (%)	11,3	-
IMC moyen (kg/m²)	29,5 ± 4,2	-
Tour de taille (cm)	97,4 ± 10,6	Obésité abdominale : 93,0 %
Tension artérielle moyenne	143/89 mmHg	Hypertension artérielle : 89,7 %
Glycémie à jeun (g/l)	1,25 ± 0,4	Hyperglycémie : 64,8 %
Lipides sériques (triglycérides)	-	Hypertriglycéridémie : 40,0 %
Lipides sériques (HDL)	-	HDL abaissé : 35,7 %
Durée moyenne de suivi (ans)	2,0 ± 0,5	-

Table II. Distribution of rheumatic conditions associated with MS

Affections rhumatismales	n (%)
Connectivites	135 (40,9)
Affections dégénératives	113 (34,3)
Maladies auto-inflammatoires	82 (24,8)

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

Scores évalués	Avant suivi (moyenne ± ET)	Après suivi (moyenne ± ET)	p-value
SF-36 (qualité de vie globale)	48,2 ± 11,5	61,7 ± 13,2	< 0,01
DAS28 (polyarthrite)	5,2 ± 1,1	3,6 ± 0,9	< 0,01
BASFI (spondyloarthrites)	6,1 ± 1,4	4,2 ± 1,0	< 0,01
WOMAC (arthrose)	67,4 ± 15,3	49,6 ± 12,7	< 0,01

Table IV. Comparison of the prevalence of metabolic syndrome in rheumatology in West Africa and Chad

Pays / Référence	Population étudiée	Effectif (n)	Critères utilisés	Prévalence du SM (%)	Composantes dominantes
Tchad (présente étude)	Patients rhumatologiques (HRT)	5000	IDF / OMS	6,6 (IDF) / 4,3 (OMS)	Obésité abdominale, HTA, hyperglycémie
Sénégal (Abandazegoué-Andjembé et al., 2023 – CO06)	Pathologies rhumatologiques (CHU Le Dantec, Dakar)	373	IDF / OMS	8 – 12	Obésité abdominale, HTA, hyperglycémie
Togo (Nouvedji et al., 2023 – CO07)	Patients rhumatologiques (CHU Kara)	74	IDF / OMS	≈ 10	Obésité, dyslipidémie, HTA
Burkina Faso (Savadogo et al., 2022)	Patients vus en consultation de rhumatologie (CHU Bogodogo)	115	IDF / OMS	47,8	Surpoids/obésité, HTA, hyperglycémie
Bénin (Zomalheto et al., 2017)	Lombalgies chroniques (CNHU Cotonou)	82	IDF / OMS	29,3	Obésité abdominale, HTA, hyperglycémie

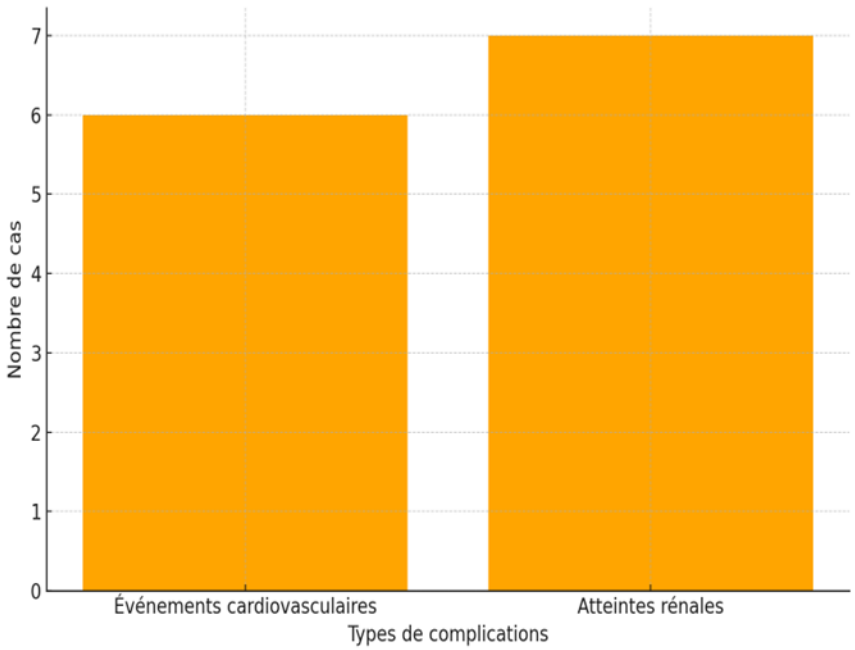

Figure 1. Observed cardio-renal complications

Discussion

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

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.

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.

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 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. Informed consent was obtained from patients, and anonymity was preserved at all stages of research and publication. It was approved by the ethics committee of the Hôpital de la Refondation du Tchad (HRT) – University of N'Djamena.

References:

1. Alberti, K. G. M. M., Eckel, R. H., Grundy, S. M., Zimmet, P. Z., Cleeman, J. I., Donato, K. A., … Smith, S. C., Jr. (2009). Harmonizing the metabolic syndrome: A joint interim statement of the IDF, NHLBI, AHA, and others. Circulation, 120(16), 1640–1645. https://doi.org/10.1161/CIRCULATIONAHA.109.192644
2. Crowson, C. S., Myasoedova, E., Davis, J. M., Matteson, E. L., Roger, V. L., Therneau, T. M., … Gabriel, S. E. (2013). Increased prevalence of metabolic syndrome associated with rheumatoid arthritis in patients without clinical cardiovascular disease. Journal of Rheumatology, 40(11), 1795–1802. https://doi.org/10.3899/jrheum.130197
3. González-Gay, M. A., & González-Juanatey, C. (2017). Inflammation, metabolic syndrome and cardiovascular risk in rheumatoid arthritis: Linking mechanisms to clinical practice. Rheumatology, 56(1), 7–19. https://doi.org/10.1093/rheumatology/kew378
4. Motala, A. A., Esterhuizen, T., Pirie, F. J., & Omar, M. A. K. (2011). The prevalence of metabolic syndrome and determination of the optimal waist circumference cutoff points in a rural South African community. Diabetes Care, 34(4), 1032–1037. https://doi.org/10.2337/dc10-1921
5. Peters, M. J., van Halm, V. P., Voskuyl, A. E., Lems, W. F., Smulders, Y. M., Visser, M., … Nurmohamed, M. T. (2009). Does rheumatoid arthritis equal diabetes mellitus as an independent risk factor for cardiovascular disease? A prospective study. Arthritis & Rheumatism, 61(11), 1571–1579. https://doi.org/10.1002/art.24836
6. Toms, T. E., Panoulas, V. F., John, H., Douglas, K. M. J., & Kitas, G. D. (2012). Metabolic syndrome in rheumatoid arthritis: Association with disease activity, duration and cardiovascular risk factors. Annals of the Rheumatic Diseases, 71(9), 1506–1512. https://doi.org/10.1136/annrheumdis-2011-201280
7. Savadogo, B., Zabsonré/Tiendrébéogo, W. J. S., Kaboré, F., Nzigou, N., Abassiri, K. A. E., Nonguierma, V., Ouédraogo, A., & Ouédraogo, D. D. (2022). Prévalence du syndrome métabolique en consultation rhumatologie en Afrique subsaharienne. Rhumatologie Africaine Francophone, 3(2), 1–5. https://doi.org/10.62455/raf.v3i2.33
8. Abandazegoué-Andjembé, L. C., Khadiri, A., Diallo, S., Niasse, M., Alkassan, Y., Diouf, C., Diaw, C. A. B., Guèye, Y. A. N., & Bouchrane, R. (2023, 8–10 mars). Syndrome métabolique et pathologies rhumatologiques : étude de 373 observations au Sénégal

(CO06). Dans Livre du programme et des résumés, Congrès STR/SARh, Lomé, Togo. Rhumatologie Africaine Francophone, 5(2), p. 21.

9. Nouvedji, K. A., Diallo, M. L., Lokou, P., Gbedey, G., Tiadjéri, M., Koffi-Tessio, V. E. S., Tagbor, C., Dzono-Assoumou, J. G., Fianyo, E., Kakpovi, K., Houzou, P., Oniankitan, O., & Mijiyawa, M. (2023, 8–10 mars). Syndrome métabolique et affections rhumatismales à Kara (CO07). Dans Livre du programme et des résumés, Congrès STR/SARh, Lomé, Togo. Rhumatologie Africaine Francophone, 5(2), pp. 21–22.
10. Zomalheto, Z., Gounongbe, M., & Dossou-Yovo, H. (2017). Influence of metabolic syndrome in low back pain in Benin people. Open Journal of Rheumatology and Autoimmune Diseases, 7(3), 153–157. https://doi.org/10.4236/ojra.2017.73015
11. Alkassan, Y. (2019). Syndrome métabolique et pathologies rhumatismales : étude de 330 observations (Mémoire de médecine, Université Cheikh Anta Diop). Bibliothèque numérique UCAD, cote memm_2019_0658.
12. Toms TE, Panoulas VF, Douglas KMJ, Griffiths HR, Kitas GD. Methotrexate therapy associates with reduced prevalence of the metabolic syndrome in rheumatoid arthritis patients over the age of 60 - a cross-sectional study. Arthritis Res Ther. 2009;11(5):R110. doi:10.1186/ar2765
13. Grzechnik K, Targońska-Stępniak B. Metabolic syndrome and rheumatoid arthritis activity. Nutrients. 2023;15(8):1825. doi:10.3390/nu15081825
14. Özmen M, Yersal Ö, Öztürk S, Ataman Ş. Prevalence of the metabolic syndrome in rheumatoid arthritis. Eur J Rheumatol. 2014;1(1):1–4. doi:10.5152/eurjrheum.2014.001
15. Šalamon L, Morović-Vergles J, Marasović-Krstulović D, et al. Differences in the prevalence and characteristics of metabolic syndrome in rheumatoid arthritis and osteoarthritis: A multicentric study. Rheumatol Int. 2015;35:2047–57. doi:10.1007/s00296-015-3307-0
16. Luo P, Xu W, Ye D, et al. Metabolic syndrome is associated with an increased risk of rheumatoid arthritis: A prospective cohort study including 369,065 participants (UK Biobank). J Rheumatol. 2024;51(4):360–7. doi:10.3899/jrheum.2023-0349
17. Chung CP, Oeser A, Solus JF, Avalos I, Gebretsadik T, Shintani A, Stein CM. Prevalence of the metabolic syndrome is increased in rheumatoid arthritis and is associated with coronary atherosclerosis.

Atherosclerosis. 2008;196(2):756–63. doi:10.1016/j.atherosclerosis.2007.01.004
18. Dao HH, Do QT, Sakamoto J. Increased frequency of metabolic syndrome among Vietnamese women with early rheumatoid arthritis: A cross-sectional study. Arthritis Res Ther. 2010;12(6):R218. doi:10.1186/ar3203
19. Pandey PK, Misra R, Agarwal V. Prevalence of metabolic syndrome in treatment-naïve rheumatoid arthritis patients. Arch Rheumatol. 2017;32(4):317–24. doi:10.5606/ArchRheumatol.2017.6318
20. Hee JY, Tan YZ, Fong W-W, et al. Metabolic syndrome and its effect on the outcomes of rheumatoid arthritis: A multi-ethnic cohort in Singapore. Int J Rheum Dis. 2022;25(8):935–42. doi:10.1111/1756-185X.14338
21. Apostolopoulos D, Vincent F, Hoi A, Morand E. Associations of metabolic syndrome in systemic lupus erythematosus. Lupus Sci Med. 2020;7(1):e000436. doi:10.1136/lupus-2020-000436
22. Loganathan A, Kamalaraj N, El-Haddad C, Pile K. Systematic review and meta-analysis on prevalence of metabolic syndrome in psoriatic arthritis, rheumatoid arthritis and psoriasis. Int J Rheum Dis. 2021;24(9):1112–20. doi:10.1111/1756-185X.14147
23. Abourazzak FE, Mansouri S, Najdi A, et al. Prevalence of metabolic syndrome in patients with rheumatoid arthritis in Morocco: A cross-sectional study of 179 cases. Clin Rheumatol. 2014;33(11):1549–55. doi:10.1007/s10067-014-2570-x
24. Eldin AB, ElBakry SA, Morad CS, Aly MH. The impact of metabolic syndrome on rheumatoid arthritis in a cohort of Egyptian patients. Egypt Rheumatol. 2018;40(1):7–10. doi:10.1016/j.ejr.2017.09.005
25. Tekaya R, Rouached L, Ben Ahmed H, et al. Prevalence of metabolic syndrome in rheumatoid arthritis and association with disease outcomes: A Tunisian study. Indian J Rheumatol. 2022;17(4):359–63. doi:10.4103/injr.injr_122_21
26. Cai W, Tang X, Pang M. Prevalence of metabolic syndrome in patients with rheumatoid arthritis: An updated systematic review and meta-analysis. Front Med. 2022;9:855141. doi:10.3389/fmed.2022.855141
27. Grundy SM, Cleeman JI, Daniels SR, Donato KA, Eckel RH, Franklin BA, Costa F. Diagnosis and management of the metabolic syndrome: An AHA/NHLBI scientific statement. Circulation. 2005;112(17):e285–90. doi:10.1161/CIRCULATIONAHA.105.169404