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Knowledge and Diagnostic Practices of General Practitioners Regarding Systemic Autoimmune Diseases in Senegal: A Multicentre Cross-Sectional Study

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Abstract

Introduction: Systemic autoimmune diseases are chronic conditions whose prognosis largely depends on early diagnosis and specialist management. General practitioners (GPs), who are often the first point of contact for patients, play a key role in the recognition and referral of patients. However, data on GPs' knowledge and practices remain limited in sub-Saharan Africa. This study aimed to assess the knowledge and diagnostic practices of Senegalese GPs regarding these diseases. **Methods:** We conducted a multicentre cross-sectional study from January 2022 to November 2023 among GPs working in 20 public and private healthcare facilities in Dakar, Thiès, and Saint-Louis. Data were collected face-to-face using an investigator-developed questionnaire assessing self-reported awareness of the main systemic autoimmune diseases, investigations requested when such diseases were suspected, specialist referral practices, therapeutic practices, and continuing medical education needs. **Results:** A total of 300 GPs were surveyed. The mean age was 27 years, 61% were men, and 71.6% were younger than 30 years. Systemic lupus erythematosus (96%) and rheumatoid arthritis (77%) were the diseases most frequently reported as known, followed by systemic sclerosis (66%) and Sjögren syndrome (66%). The manifestations most frequently considered suggestive of a systemic autoimmune disease were skin lesions (93.2%), joint manifestations (74.3%), sicca symptoms (67.6%), and Raynaud phenomenon (50%). When systemic lupus erythematosus was suspected, 75.4% prescribed anti-double-stranded DNA antibodies, and 59.2% antinuclear antibodies. When rheumatoid arthritis was suspected, 88.5% prescribed rheumatoid factor, compared with 28.9% who requested anti-cyclic cit-

rullinated peptide antibodies. Most GPs (91%) reported referral to a specialist, mainly internal medicine (43.28%) and rheumatology (40.3%). Although 68.9% considered their undergraduate education satisfactory, 80% had never received continuing medical education on these diseases, and 81% expressed interest in such training. **Conclusion:** This study highlights heterogeneity in the self-reported awareness and diagnostic practices of Senegalese GPs regarding systemic autoimmune diseases. Strengthening undergraduate and continuing medical education, together with closer collaboration between GPs and specialists, could facilitate earlier diagnosis and improve patient care pathways.

Keywords

Systemic Autoimmune Diseases, General Practitioners, Diagnostic Practices, Continuing Medical Education, Senegal

1. Introduction

Systemic autoimmune diseases encompass chronic inflammatory conditions such as systemic lupus erythematosus (SLE), rheumatoid arthritis (RA), systemic sclerosis, Sjögren syndrome, idiopathic inflammatory myopathies, mixed connective tissue disease (MCTD), and undifferentiated connective tissue diseases. Despite advances in their understanding and management, these diseases remain associated with substantial morbidity and mortality [1].

Early diagnosis remains challenging because initial manifestations are often heterogeneous and nonspecific. Diagnostic delay may lead to disease progression and severe organ involvement [2] [3]. In this diagnostic pathway, the general practitioner plays a key role by recognising warning signs, initiating first-line investigations, and referring patients early for specialist care. However, a recent review of 47 studies showed that diagnostic pathways in primary care remain characterised by nonspecific presentations, repeated consultations, variable use of investigations, and heterogeneous referral practices [4].

In sub-Saharan Africa, data on the knowledge and practices of primary care physicians in this field remain limited. A recent study conducted in Burkina Faso among GPs and non-rheumatology specialists identified gaps in knowledge regarding RA, highlighting the need to improve the training of non-specialist physicians [5]. Nevertheless, data covering the broader spectrum of systemic autoimmune diseases, particularly from French-speaking West Africa, remain scarce.

The aim of this study was to assess the knowledge, diagnostic practices, referral patterns, and training needs of GPs regarding systemic autoimmune diseases in several healthcare facilities in Senegal.

2. Methods

2.1. Study Design and Setting

We conducted a descriptive, multicentre cross-sectional study from January 1, 2022,

to November 30, 2023, among GPs practising in Senegal. The study involved 20 healthcare facilities in the regions of Dakar, Thiès, and Saint-Louis. Eighteen facilities were located in the Dakar region, and one regional hospital was included in each of Thiès and Saint-Louis. The participating sites represented public and private healthcare settings and included hospitals, health centres, health districts, health posts, private practices, and private clinics. A larger number of facilities were included in Dakar, where the physician workforce is more concentrated. The available study records did not contain sufficient detail to reconstruct a formal sampling frame or the exact facility-selection procedure.

2.2. Study Population

Eligible participants were GPs working in the selected healthcare facilities during the study period who agreed to participate in the survey. Medical and surgical specialists, physicians undergoing speciality training, and medical students were not included. The available archived documentation did not contain the exact numbers of eligible, invited, or declining GPs; consequently, a formal response rate could not be calculated retrospectively.

2.3. Data Collection

Data were collected face-to-face during the overall study period using an investigator-developed questionnaire administered to the participants. Prior authorisation to conduct the study was sought from the heads of the participating healthcare facilities. The exact dates of individual survey visits and whether recruitment occurred continuously or only during specified visits could not be reconstructed from the available archived documentation.

The questionnaire covered five main domains: participants' sociodemographic and professional characteristics; general awareness of systemic autoimmune diseases; diagnostic practices; referral and therapeutic practices; and continuing medical education needs. It included binary yes/no questions, categorical items, items allowing more than one response, and free-text fields for additional responses.

Awareness was explored through the diseases reported as known by participants, clinical manifestations considered suggestive of systemic autoimmune disease, and investigations requested when SLE, RA, systemic sclerosis, Sjögren syndrome, idiopathic inflammatory myopathy, or mixed connective tissue disease (MCTD) were suspected. The instrument was not based on a previously validated knowledge scale, and no composite knowledge score was calculated. Formal pilot testing could not be verified from the available study records.

Management practices included referral to a specialist, follow-up until diagnostic confirmation, shared follow-up with specialists, treatment instituted after diagnostic confirmation, and difficulties encountered during patient follow-up. Participants were also asked to evaluate their undergraduate education, previous participation in continuing medical education, and their need for additional training.

2.4. Statistical Analysis

Data were analysed using Stata version 16 and Microsoft Excel. The analysis was descriptive. Categorical variables were expressed as frequencies and percentages, whereas quantitative variables were summarised using descriptive statistics. The study report indicated item-level percentages; however, the original individual-level dataset was not available at the time of revision. Exact item-specific numerators and denominators, as well as the precise pattern and handling of missing or inapplicable responses, could therefore not be retrospectively verified for all questionnaire items.

2.5. Ethical Considerations

Before the survey was initiated, letters requesting authorisation to conduct the study were sent to the heads of the participating healthcare facilities. Participation in the survey was voluntary. The available archived documents did not contain a formal ethics committee approval or exemption reference number, and they did not provide sufficient detail to retrospectively verify the consent procedure or the confidentiality safeguards applied to participant-level data. We therefore report only the ethical procedures that could be documented from the available records.

3. Results

3.1. Characteristics of the Participants

A total of 300 GPs participated in the study. The mean age was 27 years, and 71.6% of participants were younger than 30 years. Men accounted for 61% of the study population. Participants worked in hospitals (64%), health centres (16%), private clinics (12%), health districts (4%), private practices (3%), and health posts (1%).

The study population predominantly consisted of physicians with limited professional experience: 28.4% had less than one year of practice, 35.1% had one year, and 10.8% had two years of professional experience; the remaining 25.7% reported between three and ten years of practice.

3.2. Self-Reported Awareness of Systemic Autoimmune Diseases

All participants reported being familiar with systemic autoimmune diseases; however, knowledge varied according to the specific disease. SLE was the most frequently reported as known (96%), followed by RA (77%), systemic sclerosis (66%), and Sjögren syndrome (66%). Idiopathic inflammatory myopathies and MCTD were less frequently recognised, by 31% and 43% of participants, respectively (**Figure 1**).

The clinical manifestations most frequently considered suggestive of a systemic autoimmune disease were skin lesions (93.2%), joint manifestations (74.3%), ocular and/or oral sicca symptoms (67.6%), and Raynaud phenomenon (50%). Constitutional symptoms were reported by 40.5% of physicians, while myopathic symptoms and alopecia were each reported by 39.2%. Serositis was cited by 27%, and recurrent miscarriages by 39.2% of respondents (**Table 1**).

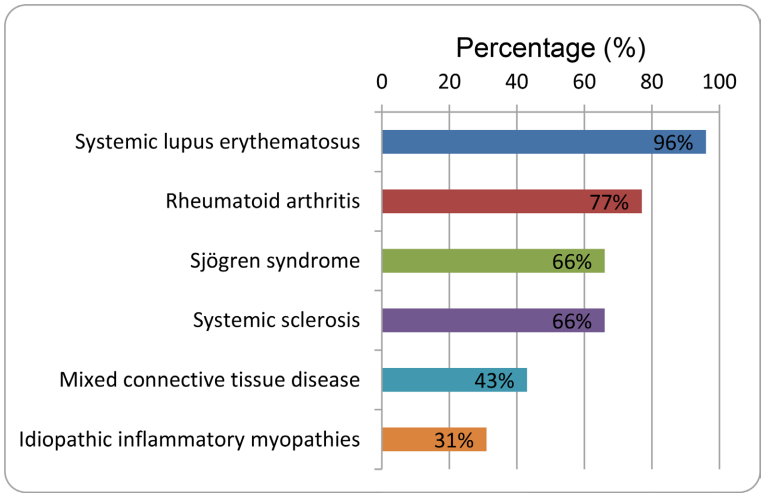

Figure 1. Frequency of the main systemic autoimmune diseases reported as known by general practitioners.

Table 1. Clinical manifestations and diagnostic investigations among general practitioners when a systemic autoimmune disease is suspected.

Domain	Parameter	Physicians, %
Suggestive clinical manifestations	Skin lesions	93.2
	Joint manifestations	74.3
	Ocular and/or oral sicca symptoms	67.6
	Raynaud phenomenon	50.0
	Constitutional symptoms	40.5
	Myopathic symptoms	39.2
	Alopecia	39.2
	Recurrent miscarriages	39.2
	Serositis	27.0
If systemic lupus erythematosus is suspected	Anti-dsDNA antibodies	75.4
	Antinuclear antibodies	59.2
	Anti-Sm antibodies	21.3
If rheumatoid arthritis is suspected	Rheumatoid factor	88.5
	Antinuclear antibodies	38.5
	Anti-dsDNA antibodies	30.8
	Anti-CCP antibodies	28.9
If systemic sclerosis is suspected	Anti-Scl antibodies	65.5
	Antinuclear antibodies	31.0
If Sjögren syndrome is suspected	Anti-SSA/SSB antibodies	73.1

Continued

If idiopathic inflammatory myopathy is suspected	Serum CK	84.6
	Manual muscle testing	69.2
	Serum LDH	69.2
If mixed connective tissue disease is suspected	Anti-Scl-70 antibodies	65.5
	Antinuclear antibodies	31.0

Note: Percentages are reported as in the original descriptive study results. Because the original individual-level dataset was unavailable during revision, item-specific numerators/denominators and the exact pattern of missing responses could not be retrospectively verified for all items.

3.3. Diagnostic Practices

The investigations prescribed varied according to the suspected disease (Table 1).

When SLE was suspected, 75.4% of physicians prescribed anti-double-stranded DNA (anti-dsDNA) antibodies, 59.2% prescribed antinuclear antibodies (ANA), and 21.3% prescribed anti-Sm antibodies.

When RA was suspected, rheumatoid factor was requested by 88.5% of participants, compared with 28.9% who requested anti-cyclic citrullinated peptide (anti-CCP) antibodies. ANA and anti-dsDNA antibodies were prescribed by 38.5% and 30.8% of physicians, respectively.

When systemic sclerosis was suspected, 65.5% prescribed anti-Scl antibodies and 31% prescribed ANA. For Sjögren syndrome, anti-SSA/SSB antibodies were requested by 73.1% of physicians.

For idiopathic inflammatory myopathies, 69.2% of physicians performed manual muscle testing, 84.6% requested serum creatine kinase (CK), and 69.2% requested lactate dehydrogenase (LDH).

When MCTD was suspected, 31% prescribed ANA, and 65.5% prescribed anti-Scl-70 antibodies.

3.4. Referral and Patient Management

More than two-thirds of physicians (68%) reported having followed at least one patient until diagnostic confirmation of a systemic autoimmune disease. When such a disease was suspected, 91% reported referring the patient to a specialist. The reported distribution of referral specialities was internal medicine (43.28%), rheumatology (40.3%), and dermatology (16.42%) (Table 2).

3.5. Undergraduate and Continuing Medical Education

Undergraduate education on systemic autoimmune diseases was rated as good by 68.9% of participants and excellent by 5.4%, whereas 18.9% considered it poor and 6.8% reported not having received such teaching (Table 2).

In contrast, 80% of physicians had never attended continuing medical education on systemic autoimmune diseases, and 81% expressed interest in receiving

Table 2. Referral, management, reported difficulties, and training needs of general practitioners.

Domain	Variable	Physicians, %
Referral and follow-up	Referral to a specialist when a systemic autoimmune disease is suspected	91.0
	Has followed a patient until diagnostic confirmation	68.0
	Shared follow-up with a specialist	53.0
Reported referral specialty	Internal medicine	43.28
	Rheumatology	40.30
	Dermatology	16.42
Therapeutic management	Treatment is instituted after diagnosis	54.0
Reported first-line treatment	Corticosteroids	40.0
	Non-steroidal anti-inflammatory drugs	33.0
	Non-corticosteroid immunosuppressive agents	15.0
	Analgesics	12.0
Reported difficulties	Long-term follow-up	56.8
	Self-reported limited knowledge of systemic autoimmune diseases	48.7
	Use of appropriate therapies/management of complications	25.7
Undergraduate medical education	Excellent	5.4
	Good	68.9
	Poor	18.9
	No relevant undergraduate teaching was received	6.8
Continuing medical education	Never attended CME on systemic autoimmune diseases	80.0
	Interested in receiving CME	81.0
Preferred training format	Two-year master's programme	54.0
	Periodic medical training	46.0
Barriers to CME	Unaware of available training programmes	65.0
	Busy schedule*	30.0
	High cost*	10.0

Note: Percentages are reported as in the original descriptive study results. Because the original individual-level dataset was unavailable during revision, item-specific numerators/denominators and the exact pattern of missing responses could not be retrospectively verified for all items. Abbreviations: CME, continuing medical education; NSAIDs, non-steroidal anti-inflammatory drugs. *Among physicians who were aware of the existence of these training programmes.

such training. Regarding preferred formats, 54% favoured a two-year master's programme and 46% preferred periodic medical training sessions.

Among the barriers to continuing medical education, 65% of physicians reported being unaware of available training programmes. Among those who were aware of such programmes, 30% cited a busy schedule and 10% considered the cost to be too high.

4. Discussion

This multicentre study involving 300 Senegalese GPs yielded three main findings. First, the major systemic autoimmune diseases were frequently reported as known. Second, referral to a specialist was a widely adopted practice. Third, despite an overall favourable perception of undergraduate education, most participants had never received continuing medical education on these diseases.

SLE was the most frequently recognised disease (96%), followed by RA (77%), systemic sclerosis and Sjögren syndrome (66% each), while idiopathic inflammatory myopathies (31%) and MCTD (43%) were less frequently recognised. This heterogeneity may partly reflect differences in the frequency of these diseases in clinical practice and their often polymorphic presentation. Systemic autoimmune diseases may initially present with nonspecific symptoms and involve multiple organ systems, making their recognition particularly challenging in primary care. A recent review of the diagnostic pathway of rheumatic diseases in general practice similarly highlighted the diversity of initial presentations and the heterogeneity of investigation and referral practices [4]. A recent study from Burkina Faso assessing physicians' knowledge and practices regarding RA also identified knowledge gaps among non-rheumatologists [5].

Diagnostic investigation patterns were among the most important findings of our study. When SLE was suspected, 75.4% of physicians prescribed anti-dsDNA antibodies, whereas only 59.2% requested ANA. In suspected RA, rheumatoid factor was widely prescribed (88.5%), whereas only 28.9% of participants requested anti-CCP antibodies. In addition, 30.8% prescribed anti-dsDNA antibodies when RA was suspected. These findings suggest uneven knowledge of the relative relevance of different autoantibodies. The 2010 ACR/EULAR RA classification criteria include both rheumatoid factor and anti-CCP antibodies in the serological domain [6], whereas the 2019 EULAR/ACR SLE classification criteria use ANA positivity as an entry criterion [7]. Although these criteria are primarily classification criteria and should not be regarded as diagnostic algorithms for primary care, they illustrate the respective roles of these biomarkers in the assessment of these diseases.

A particularly notable discrepancy concerned mixed connective tissue disease. In our study, 65.5% of physicians reported prescribing anti-Scl-70 antibodies when MCTD was suspected. However, anti-U1-RNP antibodies are the major serological marker of MCTD [8]. This finding clearly illustrates the gap that may exist between familiarity with the name of a disease and knowledge of the relevant immunological investigations. It supports educational approaches focused on clinical and immunological reasoning rather than the isolated memorisation of lists of autoantibodies.

Importantly, investigation patterns should not be interpreted solely as indicators of physicians' knowledge. Contextual factors not assessed in our survey may also have influenced test ordering, including the local availability of immunological assays, access to laboratory facilities, patients' out-of-pocket costs, and differences in diagnostic resources across healthcare settings. Similarly, referral patterns

may have been influenced by the local availability and accessibility of internists, rheumatologists, and other specialists. These contextual determinants should therefore be considered when interpreting the observed diagnostic and referral practices.

Referral to specialists was, however, a favourable finding. When a systemic autoimmune disease was suspected, 91% of physicians referred patients to a specialist, mainly to internal medicine (43.28%) and rheumatology (40.3%). More than half of the participants (53%) also reported participating in shared follow-up with specialists. These findings suggest good awareness of the need for specialist management of these complex diseases. The literature emphasises the importance of early referral of patients with suspected inflammatory rheumatic or systemic disease in order to reduce diagnostic and therapeutic delays [4] [9]. Interventions combining the education of primary care physicians, referral criteria, and collaboration with rheumatologists may also improve the timeliness of specialist referral [10].

More than two-thirds of the physicians had previously followed at least one patient until diagnostic confirmation, and 54% reported that treatment was instituted after diagnosis. Corticosteroids and non-steroidal anti-inflammatory drugs were the most frequently reported therapeutic classes. However, the questionnaire did not distinguish whether these treatments were independently initiated by GPs, prescribed following specialist advice, or continued within a shared-care arrangement. These findings should, therefore, not be interpreted as evidence of autonomous GP prescribing. In addition, the survey did not specify the disease involved, disease activity, treatment indication, or monitoring procedures.

The main difficulties reported by participants were long-term patient follow-up (56.8%), limited knowledge of systemic autoimmune diseases (48.7%), and the use of therapies and management of complications (25.7%). These challenges are consistent with the complexity of chronic diseases that often require multidisciplinary management and the use of immunosuppressive therapies requiring specific monitoring.

The need for training is therefore one of the main practical messages of this study. Although 74.3% of physicians rated their undergraduate education as good or excellent, 80% had never attended specific continuing medical education on systemic autoimmune diseases, and 81% expressed an interest in such training. Lack of awareness of available training opportunities was reported by 65% of participants, while time constraints and cost constituted additional barriers. These findings suggest that improving professional skills depends not only on developing new training programmes but also on improving their visibility, accessibility, and compatibility with the professional constraints of GPs. Short, periodic training sessions focusing on warning signs, appropriate use of immunological investigations, and referral indications may be particularly well suited to the needs identified in our population.

Our study has several strengths. It included a relatively large number of GPs and

simultaneously assessed several systemic autoimmune diseases, whereas many published studies focus on a single condition. It also provides original data from a West African setting, which remains underrepresented in the international literature.

Several limitations should nevertheless be considered. This was a descriptive study, and the investigator-developed questionnaire did not use a validated score to objectively classify participants' knowledge levels; formal pilot testing could not be verified in the available records. Responses were self-reported, and face-to-face data collection may have introduced social desirability bias. The sampling frame, exact facility-selection procedure, detailed survey-visit schedule, and numbers of eligible, invited, and declining GPs could not be reconstructed from archived documentation, so a formal response rate could not be calculated. In addition, the original individual-level dataset was unavailable during revision, preventing retrospective verification of item-specific denominators and the exact pattern of missing responses. The survey did not assess contextual determinants such as the availability and cost of immunological tests, laboratory access, or local specialist availability, nor did it distinguish independent GP treatment initiation from treatment prescribed following specialist advice or delivered as part of shared care. Finally, participants were particularly young and had limited professional experience, and national representativeness cannot be assumed. These factors may limit the generalisability of the findings to all GPs practising in Senegal.

5. Conclusions

This multicentre study shows relatively broad self-reported awareness of the main systemic autoimmune diseases among GPs surveyed in Senegal, particularly SLE and RA. However, considerable heterogeneity was observed in diagnostic practices, particularly in the use of immunological investigations. Referral to specialists appeared to be well integrated into clinical practice, although there remains a substantial need to strengthen GPs' knowledge and diagnostic skills.

These findings support the development of accessible continuing medical education programmes focused on the recognition of warning signs, the appropriate use of immunological investigations, and referral criteria. Strengthening collaboration between GPs, internists, and rheumatologists could contribute to earlier diagnosis and improved care pathways for patients with systemic autoimmune diseases in Senegal.

Author Contributions

Conceptualization: A.C.N. and M.P.; Methodology: A.C.N. and M.P.; Investigation: M.P.; Formal analysis: M.P. and A.C.N.; Data curation: M.P.; Writing—original draft preparation: A.C.N. and M.P.; Writing—review and editing: A.C.N., M.P., A.F., N.D., M.A.N., M.D. and A.P.; Supervision: A.C.N.; Project administration: A.C.N. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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

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