

# General Practitioners' Knowledge On The Diagnosis and Management of Gout and Hyperuricemia in Northern Nigeria: A Cross-sectional online Survey

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## Abstract

**Background:** Gout is a common inflammatory arthritis; however, gaps in general practitioners' (GPs) knowledge and confidence regarding its diagnosis and management remain a concern. This study assessed the knowledge, clinical practices, and confidence of GPs in managing gout in Northern Nigeria. **Methods:** A cross-sectional online survey was conducted between 2<sup>nd</sup> and 11<sup>th</sup> September, 2022, among 101 GPs recruited by purposive sampling from 19 states across three geopolitical zones in Northern Nigeria. A self-administered questionnaire, developed using standard gout classification and management guidelines, was pretested and reviewed by rheumatology experts to ensure content validity. The survey was distributed via Nigerian Medical Association WhatsApp platforms, and data were analysed using SPSS version 21. **Results:** The mean (SD) age of respondents was 39.0 (8.2) years, with 75.2% practicing in tertiary health facilities. Most participants (89.1%) had previously diagnosed gout, predominantly based on hyperuricemia (85.6%), while 42.6% reported using joint aspiration. Hyperuricemia was considered synonymous with gout by 13.9% of respondents and essential for diagnosis by 58.4%. Approximately 80% did not recognise fever, low-dose aspirin, or urate-lowering therapy as gout precipitants. Allopurinol was prescribed for acute gout by 69.3%, whereas 20.8% used colchicine. Only 19.8% had received continuing medical education (CME) on gout. Confidence levels were low: 5.1% for diagnosis, 6.1% for acute management, and 7.1% for hyperuricemia management. **Conclusion:** General practitioners in Northern Nigeria exhibit gaps in gout-related knowledge and clinical practice as well as low confidence with its management. Regular CME programs are needed to improve guideline-based management and patient outcomes.

**Keywords:** Gout, knowledge, general practitioners, management, continuous medical education (CME), Northern Nigeria.

## Introduction

Gout is a prevalent inflammatory arthritis commonly encountered and managed by general practitioners.<sup>[1]</sup> The global prevalence and incidence of gout are increasing, with a higher occurrence among males and often associated with obesity, hypertension, diabetes, advancing age, diuretic usage and chronic kidney disease (CKD).<sup>[2-4]</sup> Gout has a complex pathophysiology initiated by the development of asymptomatic hyperuricemia, leading to monosodium urate crystals (MSU) deposition, resulting in acute mono- or oligo-arthritis and chronic tophaceous gout.<sup>[5]</sup> While the definitive diagnosis of gout requires the

demonstration of MSU crystals from joint aspirates using polarized microscopy, this is often not feasible due to limited access to polarized microscopes and expertise in handling them.<sup>[6]</sup> Consequently, many physicians diagnose gout based on clinical presentation.<sup>[6,7]</sup>

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Acute gout is commonly treated using non-steroidal anti-inflammatory drugs (NSAIDs), colchicine, steroids, and interleukin-1 antagonists, depending on the context, while urate-lowering therapy (ULT) primarily utilizes Xanthine Oxidase Inhibitors (Allopurinol and Febuxostat) and other uricosuric and uricolytic agents.<sup>[8]</sup>

Despite the increasing burden of gout globally, the management of gout still needs to be improved.<sup>[9-12]</sup> In the UK, a study conducted in 2012 revealed that only 48.5% of individuals with gout received specific consultation or ULT, with only 37.6% receiving ULT. Among those with incident gout, only 18.6% and 27.3% received ULT within six months and 12 months, respectively.<sup>[10]</sup> Several factors contribute to the inadequate management of gout, including physician- and patient-related factors.<sup>[13]</sup> Physicians often lack knowledge about the diagnosis, complications and guideline-directed treatment of gout and continuous medical education on gout management is infrequently offered.<sup>[13]</sup> Patient barriers to optimal gout management include limited understanding of the condition and its management, concerns regarding adverse effects and costs of medications, avoidance of polypharmacy in patients with comorbidities and stigmatization.<sup>[13,14]</sup>

Studies have shown that limited knowledge among physicians, including general practitioners, leads to reluctance to initiate ULT, inadequate treatment of acute gout, misunderstanding of the need for continued ULT after an acute attack, poor knowledge about adverse effects of gout medications, insufficient patient counselling and education, and misconceptions about the curability of gout.<sup>[11,12,15]</sup> While reports have highlighted a need for better knowledge about gout management among non-rheumatologists, general practitioners, and primary care nurses in Europe and Asia<sup>(11, 12, 15)</sup>, such reports are scarce in Nigeria and most of West Africa.

This survey aims to assess the level of knowledge and confidence on the diagnosis and management of gout among general practitioners in Northern Nigeria.

## Materials and Methods

### Study design

This cross-sectional online survey was conducted among 101 general practitioners in the three geopolitical zones of northern Nigeria. The region comprises 19 states with an estimated population of 109,477,494 as of 2019 national census.<sup>[16]</sup> Consecutive volunteering participants were recruited by purposive sampling technique.

### Study Protocol

The survey took place between 2<sup>nd</sup> and 11<sup>th</sup> September 2022, utilizing a Google Forms questionnaire designed explicitly by the authors that was reviewed and pre-tested by rheumatology colleagues to ensure content validity. The survey link was disseminated online via each state's Nigerian Medical Association (NMA) WhatsApp platform after obtaining the permissions of the administrators. These platforms serve as the primary means of communication for all doctors in the respective states. Only consenting general practitioners or family physicians, regardless of their practicing institutions, were invited to voluntarily participate in the survey.

### Ethical approval

Institutional ethical approval was not available as this study was a minimal-risk, anonymous online survey involving consenting medical practitioners and did not involve patients or the use of identifiable personal information. The study was conducted in accordance with the principles of the Declaration of Helsinki.

### Survey Questionnaire

The questionnaire was developed by the authors based on a comprehensive review of existing literature and the standard guidelines for gout classification.<sup>[5,17-19]</sup> It consisted of three sections:

#### *Section One: Informed Consent*

Participants were given detailed information about the survey and asked to indicate their consent by clicking the "yes" option to continue.

#### *Section Two: Sociodemographic Characteristic*

This captured sociodemographic information about the

participants, including their age, gender, highest level of qualification, years of practice, practice settings, and geopolitical zone.

### Section Three: Clinical Features and Diagnosis of Gout

Participants were asked if they had ever made a diagnosis of gout and the number of gout cases diagnosed in the past year. Other questions on gout covered include most affected gender, typical sites affected, features used for diagnosis, precipitants and factors associated with them, diagnostic methods employed by participants, and the definitive mode of diagnosing gout. The questionnaire also addressed the participants' awareness of polarized microscopes, gout diagnostic/classification criteria, the role of hyperuricemia, and whether they had a polarized microscope available at their centres.

### Section Four: Management of Gout and Hyperuricemia

Participants were asked about non-pharmacological management approaches, including hydration, avoidance of red meat and alcohol, use of vitamin C, and avoidance of fructose-containing drinks. Additionally, questions about medication used for treating acute attacks, frequency of colchicine and allopurinol use, commonly prescribed doses of colchicine and allopurinol, when to initiate ULT, the preferred drug for ULT, awareness of allopurinol side effects, and dose adjustments of allopurinol in patients with CKD were asked. The response options included "yes," "no," "not sure," and multiple-choice selections. Finally, participants were asked if they had received continuous medical education on gout and to rate their confidence level on a scale of 0 to 10 (0 = less confident, 10 = very confident) regarding their ability to diagnose, treat acute gout, and manage hyperuricemia.

### Pretesting and Review

The questionnaire underwent pretesting with ten (10) medical officers of the general outpatient department and 10 residents from the Department of Medicine at the University of Maiduguri Teaching Hospital. Ambiguous questions identified during the pre-test were corrected and modified by the authors. Furthermore, five rheumatologists reviewed the questionnaire to establish face and content validity.

### Statistical analysis

Descriptive statistics were used for analysis. Continuous variables such as the age of participants, duration of practice and the number of gout cases diagnosed in the past year were expressed as means (Standard Deviation, SD) or median [Interquartile Range, IQR] depending on the normality of the variable. The durations of practice were categorized into six groups of five years each viz:

"1-5", "6-10", "11-15", "15-20", "21-25", and > 25 years. All Categorical variables were expressed as proportions and percentages of the responses. Data were analysed using SPSS version 21.

## Results

### Demographics of the participants

Forty-five (44.6%) (n=101) general practitioners (GPs) were from the Northeast. Their overall mean (SD) age was 39.0 (8.20) years, and they comprised 77 (76.2%) males. Most (53.5%) had MBBS as their highest qualification, with 32 (31.7%) being family medicine fellows. The median [interquartile range-IQR] years of clinical practice was 10.4 [6.1 – 15.5] years, with the majority (75.2%) practicing in tertiary institutions (Table 1).

Characteristics	Group	N=101 (%)
Age (mean ±SD) years	39.0 (8.2)	
Gender	Male	77 (76.2)
	Female	24 (23.8)
Level of qualification	MBBS	56 (55.4)
	Fellows	32 (31.7)
	MSc	13 (12.9)
	PhD	-
Duration of practice (years)	1 – 5	22 (21.8)
	6 – 10	29 (28.7)
	11 – 15	25 (24.8)
	16 – 20	12 (11.9)
	21 – 25	6 (5.9)
	>25	7 (6.9)
Practice setting	Primary	1 (1.0)
	Secondary	18 (17.8)
	Tertiary	76 (75.2)
	Quaternary	1 (1.0)
	Private	3 (3.0)
	Others	2 (2.0)
Geopolitical zone	Northcentral	29 (28.7)
	Northeast	45 (44.6)
	Northwest	27 (26.7)

N=number, %-percentage, SD-standard deviation, MBBS-Bachelor of Medicine, Bachelor of Surgery, MSc- master's in science, PhD- Doctor of Philosophy

### Aspect on the clinical features and diagnosis of gout

Ninety (89.1%) (n=101) have previously diagnosed gout. The median [IQR] number of gout cases diagnosed in the past one year by a GP in clinical practice was 2.4 [0.7 – 5.0]. Sixty-two (61.4%) were aware that gout is commoner among males while, 43 (42.6%) considered gout to be typically monoarticular but, 83 (85.6%) considered

diagnosing gout based on the presence of hyperuricemia. While 92 (91.1%) considered consumption of red meat as the common precipitant of gout, greater than 80% do not consider fever, use of low-dose aspirin (LDA) and ULT as a precipitant of gout. Obesity was the most chosen comorbidity associated with gout (67.3%), while menopause (26.7%), atherosclerosis (22.7%) and myocardial infarction (8.9%) were considered the least. Only 3 (3.0%) regarded joint aspiration as a means of diagnosing gout in their practice; however, 43 (42.6%) chose it as the definitive means of diagnosing gout, while 57 (56.4%) were aware of at least one diagnostic/classification criteria of gout. Hyperuricemia was considered essential for the diagnosis of gout by 59 (58.4%) of respondents, with 14 (13.9%) considering hyperuricemia as synonymous with gout. About half (51.5%) are aware of polarized microscopes, but only 2 (2.0%) said they had them in their institution.

Table 2: Participants' ability to recognize clinical presentations and precipitants of gout and their ability to make diagnosis using standard diagnostic criteria. (N=101)

Question on clinical features and diagnosis of gout	Yes n (%)	No. n(%)	Not sure n (%)
<b>Have you ever diagnosed a case of gout?</b>	90 (89.1)	11 (10.9)	
<b>Gout commonly affects</b>			
- males	62 (61.4)	36 (35.6)	3 (3.0)
- females	36 (35.6)	62 (61.4)	3 (3.0)
<b>Gout is typically</b>			
- monoarticular (1 joint)	43 (42.6)	57 (56.4)	1 (1.0)
- oligoarticular (2-4 joints)	37 (36.6)	63 (62.4)	1 (1.0)
- polyarticular (>4 joints)	20 (19.8)	80 (79.2)	1 (1.0)
<b>Which of the following features of gout do you mostly use to diagnose gout?</b>			
- Acute onset of joint pain within hours	50 (49.5)	47 (46.5)	4 (4.0)
- Swelling of the 1 <sup>st</sup> Metatarsophalangeal joint	64 (63.3)	33 (32.7)	4 (4.0)
- Fever	8 (7.9)	89 (88.1)	4 (4.0)
- Redness of the joint	35 (34.6)	62 (61.4)	4 (4.0)
- Previous history of similar joint pain	49 (48.5)	48 (47.5)	4 (4.0)
- Hyperuricemia	83 (82.1)	14 (13.9)	4 (4.0)
<b>What are the precipitants of gout you commonly ask in your practice?</b>			
- Use of alcohol in the preceding days	47 (47.0)	53 (52.5)	1 (1.0)
- Excessive consumption of red meat	92 (91.1)	8 (7.9)	1 (1.0)
- History of fever	11 (10.9)	89 (88.1)	1 (1.0)
- Use of diuretics	53 (53.0)	47 (46.5)	1 (1.0)
- Use of low-dose aspirin	12 (11.9)	88 (87.1)	1 (1.0)
- Dehydration	45 (44.6)	55 (54.4)	1 (1.0)
- Use of urate-lowering therapy	17 (16.8)	83 (82.2)	1 (1.0)
<b>Which of the following is/are associated with gout?</b>			
- Hypertension	51 (50.5)	46 (45.5)	4 (4.0)
- Diabetes mellitus	42 (41.6)	55 (54.4)	4 (4.0)
- Metabolic syndrome	66 (65.3)	31 (30.7)	4 (4.0)
- Chronic kidney disease	59 (58.4)	38 (37.6)	4 (4.0)
- Obesity	68 (67.3)	29 (28.7)	4 (4.0)
- Myocardial infarction	9 (8.9)	88 (87.1)	4 (4.0)
- Atherosclerosis	23 (22.7)	74 (73.3)	4 (4.0)
- Menopause	27 (26.7)	70 (69.3)	4 (4.0)
<b>How do you diagnose gout in your practice?</b>			
- Clinically	37 (36.6)	62 (61.4)	2 (2.0)
- By Measuring the serum uric acid	55 (54.5)	44 (43.6)	2 (2.0)
- Using joint aspiration and microscopy	3 (3.0)	96 (95.0)	2 (2.0)
- using X-rays	4 (4.0)	95 (94.1)	2 (2.0)
<b>What is the definitive mode of diagnosis of gout?</b>			
- Clinically	11 (10.9)	89 (88.1)	1 (1.0)
- By Measuring the serum uric acid	40 (39.6)	60 (59.4)	1 (1.0)
- Using joint aspiration and microscopy	43 (42.6)	57 (56.4)	1 (1.0)
- using X-rays	6 (5.9)	94 (93.1)	1 (1.0)
<b>Have you heard of polarized microscopes?</b>	52 (51.5)	46 (45.5)	3 (3.0)
<b>Do you have a polarized microscope in your centre?</b>	2 (2.0)	90 (89.1)	9 (8.9)
<b>Have you heard of any gout diagnostic criteria/guidelines?</b>	57 (56.4)	41 (40.6)	3 (3.0)
<b>Which diagnostic criteria do you commonly use?</b>			
- American College of Rheumatology	42 (41.6)	40 (39.6)	19 (18.8)
- European League of Association of Rheumatology	6 (5.9)	76 (75.2)	19 (18.8)
- National Institute of Clinical Excellence	7 (6.9)	75 (74.3)	19 (18.8)
- British Society of Rheumatology	11 (10.9)	71 (70.3)	19 (18.8)
- Netherlands criteria	1 (1.0)	81 (80.2)	19 (18.8)
- Others (specify)	2 (2.0)	80 (79.2)	19 (18.8)
- Personal experience	37 (36.6)	45 (44.6)	19 (18.8)
<b>Hyperuricemia is essential for the diagnosis of gout.</b>	59 (58.4)	40 (39.6)	2 (2.0)
<b>Hyperuricemia is synonymous with gout</b>	14 (13.9)	71 (70.3)	16 (15.8)

n=number, %-percentage

Table 2 shows the response to all the questions on clinical features and diagnosis of gout.

## Treatment of gout and hyperuricemia

As shown in Table 3, majority (79.2%) of the respondents offer non-pharmacological treatment of gout, with almost all (96.0%) asking their patients to avoid the intake of red meat; however, only a few (11%) and (20%) ask their patients to avoid fructose-containing drinks and seafood, respectively.

Table 3: Participants' responses on their ability to manage gout and their knowledge of when medications are instituted and their side effects. (N=101)

Questions on the treatment of gout/hyperuricemia	Yes n (%)	No n (%)	Not sure n(%)
<b>Are you aware of non-pharmacological treatment of gout?</b>	80 (79.2)	19 (18.8)	2 (2.0)
<b>Which of the following advice do you frequently give to your patients?</b>			
- Drink much water	75 (74.3)	24 (23.8)	2 (2.0)
- Avoid intake of red meat	97 (96.0)	2 (2.0)	2 (2.0)
- Avoid the use of fructose-containing drinks	11 (10.9)	88 (87.1)	2 (2.0)
- Avoid the intake of alcohol or beer	31 (30.7)	68 (67.3)	2 (2.0)
- Avoid the use of vitamin C	3 (3.0)	96 (95.0)	2 (2.0)
- Avoid the intake of sea-foods	20 (19.8)	79 (78.2)	2 (2.0)
<b>Which medications do you often use in the acute treatment of gout?</b>			
- NSAIDs	77 (76.2)	22 (21.8)	2 (2.0)
- Colchicine	54 (53.5)	45 (44.6)	2 (2.0)
- Steroids	29 (28.7)	70 (69.3)	2 (2.0)
- Allopurinol	70 (69.3)	29 (28.7)	2 (2.0)
- Paracetamol	10 (9.9)	89 (88.1)	2 (2.0)
- Tramadol	5 (5.0)	94 (93.1)	2 (2.0)
- Biologics	2 (2.0)	97 (96.0)	2 (2.0)
<b>How often have you used colchicine in your practice?</b>			
- Never	33 (32.7)	65 (64.4)	2 (2.0)
- Very Rarely	7 (6.9)	92 (91.1)	2 (2.0)
- Rarely	34 (33.7)	65 (64.4)	2 (2.0)
- Frequently	21 (20.8)	78 (77.7)	2 (2.0)
- Always	4 (4.0)	95 (94.1)	2 (2.0)
<b>How often do you use Allopurinol in acute attacks of gout?</b>			
- Never	18 (17.8)	80 (79.2)	3 (3.0)
- Very Rarely	9 (8.9)	89 (88.1)	3 (3.0)
- Rarely	14 (13.9)	84 (83.2)	3 (3.0)
- Frequently	47 (46.5)	51 (50.5)	3 (3.0)
- Always	10 (9.9)	88 (87.1)	3 (3.0)
<b>When do you institute treatment for hyperuricemia?</b>			
- When the serum uric acid is greater than the upper limit of normal	67 (66.3)	29 (28.7)	5 (5.0)
- When the person has an acute gouty attack	52 (51.5)	44 (43.6)	5 (5.0)
- If the person has chronic kidney disease	29 (28.7)	67 (66.3)	5 (5.0)
- When the person has tophaceous gout	35 (34.7)	61 (60.4)	5 (5.0)
- If the person has renal stones (Uric acid stones)	36 (35.6)	60 (59.4)	5 (5.0)
- If the person has repeated attacks of gout	49 (48.5)	47 (46.5)	5 (5.0)
<b>Which drug do you use for urate-lowering therapy?</b>			
- Colchicine	25 (24.8)	67 (66.3)	9 (8.9)
- Allopurinol	84 (83.2)	8 (7.9)	9 (8.9)
- Probenecid	20 (19.8)	72 (71.3)	9 (8.9)
- Lesinurad	3 (3.0)	89 (88.1)	9 (8.9)
- Uricase	9 (8.9)	83 (82.2)	9 (8.9)
<b>Which of the following medications can also be used for urate -lowering therapy?</b>			
- Losartan	20 (19.8)	50 (49.5)	31 (30.7)
- Fenofibrate	16 (15.8)	54 (53.5)	31 (30.7)
- High dose salicylic acid	10 (9.9)	60 (59.4)	31 (30.7)
- Febuxostat	54 (53.5)	16 (15.8)	31 (30.7)
<b>Are you aware of the allopurinol hypersensitivity reaction?</b>	58 (57.4)	40 (39.6)	3 (3.0)
<b>Do you dose adjust allopurinol based on the eGFR of the patients?</b>	50 (49.5)	39 (38.6)	12 (11.9)
<b>Have you ever had continuous medical education (CME) on the diagnosis and management of gout and hyperuricemia in the past?</b>	20 (19.8)	74 (73.3)	7 (6.9)

N=number, %-percentage, NSAIDs= non-steroidal anti-inflammatory drugs, eGFR=estimate glomerular filtration rate

Seventy (69.3%) (n=101) respondents use allopurinol for acute gout attacks and only 21

(20.8%) frequently use colchicine. Few (28.7%) respondents usually institute urate-lowering therapy (ULT) in patients with CKD. Most (83.2%) respondents use allopurinol for ULT, while only a few are aware that Losartan (19.8%) and Fenofibrate (15.8%) can be used. The minimum and maximum doses of allopurinol prescribed by the respondents were 100mg and 300mg, respectively. While 58 (57.4%) respondents are aware of allopurinol hypersensitivity reaction, only a few (6% to 30.7%) are aware of the various features of the condition. About half (49.5%) of the respondents adjust the allopurinol dose according to eGFR.

Only a few (19.8%) of the respondents had ever received continuous medical education on gout. In response to the participants' confidence in their ability to diagnose, treat acute gout and manage hyperuricemia, only 5.1%, 6.1% and 7.1%, respectively, were very confident (Figures 1, 2 and 3).

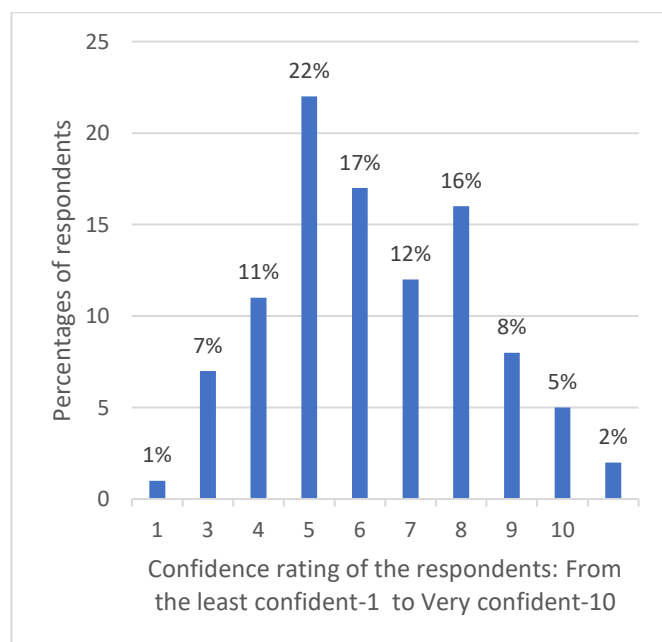


Fig 1: Respondents' ability to diagnose gout, rated from the least confident (1) to very confident (10)

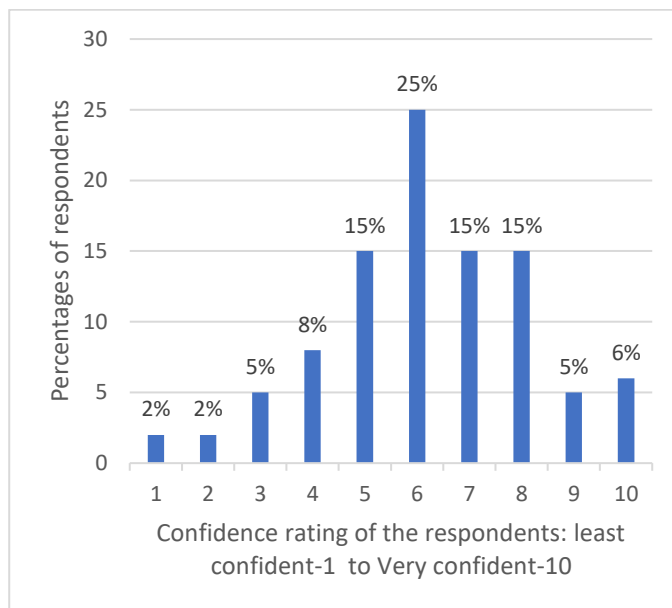


Fig 2: Respondents' ability to treat acute gout, rated from the least confident (1) to very confident (10)

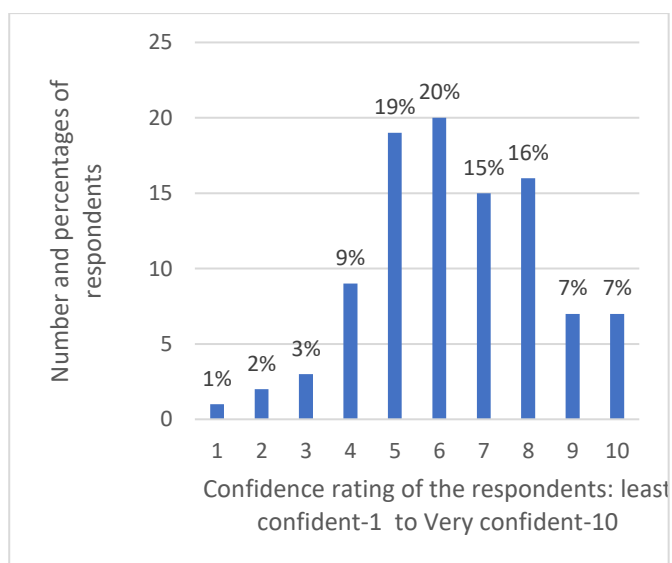


Fig 3: Respondents' ability to treat hyperuricemia, rated from the least confident (1) to very confident (10)

## Discussion

### Key Findings

Gout is a common inflammatory arthritis encountered in clinical practice and is frequently managed by general practitioners (GPs), particularly in resource-limited settings where access to rheumatologists is restricted [1]. Despite the availability of established diagnostic and management guidelines, studies have shown that

both healthcare providers and patients have suboptimal knowledge of gout, resulting in delayed diagnosis, inappropriate treatment, and increased disease burden. [9–13] This study provides important local data on the knowledge and practices of GPs in northern Nigeria about the diagnosis and management of gout, and identifies key areas requiring targeted intervention.

### Comparison with Previous Studies

Gout management in northern Nigeria is largely undertaken by young to middle-aged GPs, similar to reports from Beijing and Saudi Arabia, [1,20] but the majority of practitioners in our study had less than 20 years of clinical experience compared with those in Beijing. [1] This has implications for training exposure, as early-career physicians may rely more on experiential learning.

Although hyperuricemia is widely recognised as central to gout pathogenesis, [1,21] misconceptions regarding its diagnostic role persist. Most participants relied on serum uric acid levels, with limited use of joint aspiration and polarized microscopy. While awareness of diagnostic criteria was higher in northern Nigeria than reported in Beijing [1], practical application remains low, likely due to knowledge gaps and infrastructural limitations including lack of polarized microscopes. [1,12,15]

### Clinical Implications

Knowledge of gout precipitants was incomplete. While alcohol and dietary excess were commonly recognised, awareness of fructose-containing beverages, seafood, renal dysfunction, diuretics, and genetic factors was limited. [10,12,14] This is clinically significant, as lifestyle modification is central to effective urate-lowering therapy.

Pharmacological management revealed major gaps. Although NSAID use for acute attacks aligns with international practice [1,5,21], colchicine was underutilised, and allopurinol was frequently prescribed during acute flares by our respondents in contrast to current guidelines. This practice was more common than reported in South China and Beijing [1,14,15], and contrasts with specialist rheumatologists' practices. [15] For long-term management, although allopurinol was correctly identified as first-line

ULT, dosing rarely exceeded 300 mg, despite evidence that higher doses are often required. [22,23] Concerns about adverse effects, including hypersensitivity reactions, continue to influence prescribing behaviour. [14]

Management of gout in patients with CKD was also suboptimal. Despite evidence supporting safe allopurinol use with dose adjustment, [26,27] fewer than half of respondents were aware of dosing principles in CKD. Similar challenges have been reported elsewhere [28,29] and may reflect conflicting guideline recommendations and limited high-quality evidence. [17,18]

A major actionable finding was the lack of continuing medical education (CME) on gout. Most participants had never received CME, reflected in low confidence levels. Previous studies report similar findings [11,12,28] while educational interventions have been shown to improve guideline adherence and patient outcomes. [22,30]

### Strengths and Limitations

Although the questionnaire was guideline-based and expert-reviewed, it may not have captured all aspects of gout care. The modest sample size limits generalizability, but the wide geographic coverage provides valuable baseline data. No formal scoring system was applied, though clear practice gaps were evident. A potential response bias due to the online nature of the study is possible.

### Conclusion

Gout in northern Nigeria is predominantly managed by young GPs with important deficiencies in diagnosis, pharmacological management, and confidence, largely driven by limited access to CME. Strengthening CME programmes, improving diagnostic capacity, and integrating guideline-directed gout management into medical training are essential to improving patient outcomes. Future studies with larger nationwide samples are recommended to evaluate the impact of CME interventions on GP knowledge.

## What is known about this topic?

- General practitioners need more knowledge regarding the diagnosis and management of gout.
- Patients are not involved in decision-making on how they will be managed.
- Uric acid-lowering agents are not optimally used in the management of gout by general practitioners.

## What this study adds

- This study adds to the armamentarium of data on how general practitioners, patients' first point of call, diagnose and manage gout.
- It demonstrates that general practitioners need to be UpToDate with the classification and management of gout through continued medical education.

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## References

1. Liu M, Gao Z, Zhang X, Yuan X, Lu Y, Meng J. General practitioners' knowledge of gout and its management: a case study in Beijing. *Prim Health Care Res Dev.* 2021;22:e54.
2. Butler F, Alghubayshi A, Roman Y. The epidemiology and genetics of hyperuricemia and gout across major racial groups: a literature review and population genetics secondary database analysis. *J Personalized Med.* 2021;11(3):231.
3. Dehlin M, Jacobsson L, Roddy E. Global epidemiology of gout: prevalence, incidence, treatment patterns and risk factors. *Nat Rev Rheumatol.* 2020;16(7):380-90.
4. Pisaniello HL, Lester S, Gonzalez-Chica D, Stocks N, Longo M, Sharplin GR, Dal Grande E, Gill TK, Whittle SL, Hill CL. Gout prevalence and predictors of urate-lowering therapy use: results from a population-based study. *Arthritis Res Ther.* 2018;20(1):1-0.
5. Dalbeth N, Choi HK, LAB Joosten, PP Khanna, H. Matsuo, F. Perez-Ruiz, and LK Stamp. Gout. *Nat Rev Dis Primers.* 2019;5(69):1-7.
6. Janssens HJ, Franssen J, Van de Lisdonk EH, van Riel PL, van Weel C, Janssen M. A diagnostic rule for acute gouty arthritis in primary care without joint fluid analysis. *Arch Intern Med.* 2010;170(13):1120-6.
7. Kienhorst LB, Janssens HJ, Franssen J, Janssen M. The validation of a diagnostic rule for gout without joint fluid analysis: a prospective study. *Rheumatology (Oxford).* 2015;54(4):609-14.
8. Jenkins C, Hwang JH, Kopp JB, Winkler CA, Cho SK. Review of urate-lowering therapeutics: From the past to the future. *Front Pharmacol.* 2022;13.
9. Keenan RT. Limitations of the current standards of care for treating gout and crystal deposition in the primary care setting: a review. *Clin Ther.* 2017;39(2):430-41.
10. Kuo CF, Grainge MJ, Mallen C, Zhang W, Doherty M. Rising burden of gout in the UK but continuing suboptimal management: a nationwide population study. *Ann Rheum Dis.* 2015;74(4):661-7.
11. Spencer K, Carr A, Doherty M. Patient and provider barriers to effective management of gout in general practice: a qualitative study. *Ann Rheum Dis.* 2012 Sep 1;71(9):1490-5.
12. Vaccher S, Kannagara DR, Baysari MT, Reath J, Zwar N, Williams KM, Day RO. Barriers to care in gout: from prescriber to patient. *J Rheumatol.* 2016;43(1):144-9.
13. Doherty M, Jansen TL, Nuki G, Pascual E, Perez-Ruiz F, Punzi L, So AK, Bardin T. Gout: why is this curable disease so seldom cured?. *Ann Rheum Dis.* 2012;71(11):1765-70.
14. Lee ZC, Santosa A, Khor AY, Sriranganathan MK. The Singapore Experience With Uncontrolled Gout: Unmet Needs in the Management of Patients. *Cureus.* 2023;15(3).
15. Li QH, Dai L, Li ZX, Liu HJ, Zou CJ, Ou-Yang X, Lu M, Li T, Li YH, Mo YQ,

- Schumacher HR. Questionnaire survey evaluating disease-related knowledge for 149 primary gout patients and 184 doctors in South China. *Clin Rheumatol.* 2013;32:1633-40.
16. Wikipedia contributors. Demographics of Nigeria. Wikipedia, The Free Encyclopedia. June 8, 2023,12:24UTC. Available at: [https://en.wikipedia.org/w/index.php?title=Demographics\\_of\\_Nigeria&oldid=1159127290](https://en.wikipedia.org/w/index.php?title=Demographics_of_Nigeria&oldid=1159127290). Accessed June 10, 2023.
  17. FitzGerald JD, Dalbeth N, Mikuls T, Brignardello-Petersen R, Guyatt G, Abeles AM, Gelber AC, Harrold LR, Khanna D, King C, Levy G. 2020 American College of Rheumatology guideline for the management of gout. *Arthritis Care Res (Hoboken).* 2020;72(6):744-60.
  18. Richette P, Doherty M, Pascual E, Barskova V, Becce F, Castañeda-Sanabria J, Coyfish M, Guillo S, Jansen TL, Janssens H, Lioté F. 2016 updated EULAR evidence-based recommendations for the management of gout. *Ann Rheum Dis.* 2017;76(1):29-42.
  19. Dalbeth N, Gosling AL, Gaffo A, Abhishek A. Gout [published correction appears in *Lancet.* 2021;397(10287):1808]. *Lancet.* 2021;397(10287):1843-1855. doi:10.1016/S0140-6736(21)00569-9
  20. Alqarni NA, Hassan AH. Knowledge and practice in the management of asymptomatic hyperuricemia among primary health care physicians in Jeddah, Western Region of Saudi Arabia. *Saudi Med J.* 2018;39(12):1218.
  21. Spaetgens B, Pustjens T, Scheepers LE, Janssens HJ, van der Linden S, Boonen A. Knowledge, illness perceptions and stated clinical practice behaviour in management of gout: a mixed methods study in general practice. *Clin Rheumatol.* 2016;35:2053-61.
  22. Rees F, Jenkins W, Doherty M. Patients with gout adhere to curative treatment if informed appropriately: proof-of-concept observational study. *Ann Rheum Dis.* 2013;72(6):826-30.
  23. Becker MA, Schumacher Jr HR, Wortmann RL, MacDonald PA, Eustace D, Palo WA, Streit J, Joseph-Ridge N. Febuxostat compared with allopurinol in patients with hyperuricemia and gout. *N Engl J Med.* 2005;353(23):2450-61.
  24. Akpabio AA, Dung-Gwom PS, Olaosebikan BH, Adelowo OO. Frequency and associations of chronic kidney disease among gout patients from a University Teaching Hospital in Nigeria. *Reumatologia/Rheumatology.* 2018;56(1):17-23.
  25. Yerima A, Sulaiman MM, Adamu AA. Pattern of gout and its association with chronic kidney disease in Maiduguri, northeastern Nigeria. *Clin Rheumatol.* 2023;11:1-8.
  26. Stamp LK, Barclay ML. How to prevent allopurinol hypersensitivity reactions? *Rheumatology.* 2018;57(suppl\_1):i35-41.
  27. Hande KR, Noone RM, Stone WJ. Severe allopurinol toxicity: description and guidelines for prevention in patients with renal insufficiency. *Am J Med.* 1984;76(1):47-56.
  28. Cottrell E, Crabtree V, Edwards JJ, Roddy E. Improvement in the management of gout is vital and overdue: an audit from a UK primary care medical practice. *BMC Fam Pract.* 2013;14:1-1.
  29. Mikuls TR, Farrar JT, Bilker WB, Fernandes S, Saag KG. Suboptimal physician adherence to quality indicators for the management of gout and asymptomatic hyperuricaemia: results from the UK General Practice Research Database (GPRD). *Rheumatology.* 2005;44(8):1038-42.
  30. Weaver AL, Cheh MA, Kennison RH. How PCP education can impact gout management: the gout essentials. *J Clin Rheumatol.* 2008;14(5S):S42-6.