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The prevalence and risk factors of gouty arthritis among fishermen in the Niger Delta region of Nigeria

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Abstract

Aim: This study aimed to explore the prevalence and risk factors of gout among fishermen in the Niger Delta.

Methods: A total of 300 fishermen, aged 25–65 years, were recruited through stratified sampling. Data on demographic characteristics, seafood and alcohol consumption, physical activity, obesity, and family history of gout were collected using structured questionnaires and clinical assessments. Logistic regression analysis was applied to identify significant predictors of gout.

Results: The study found that the prevalence of gout was 27%, with the highest occurrence among participants aged 46–55 years. Significant risk factors included high seafood intake (OR = 3.2, $P < 0.01$), alcohol consumption (OR = 2.8, $P < 0.01$), obesity (OR = 1.9, $P = 0.03$), physical inactivity (OR = 1.7, $P = 0.04$), and family history of gout (OR: 1.5, $P = 0.05$). Seafood consumption was identified as the most significant predictor of gout.

Conclusions: This study revealed a significant prevalence of gout among fishermen in the Niger Delta, with high seafood consumption, alcohol intake, obesity, family history and physical inactivity identified as major contributors. Targeted public health interventions, such as dietary education programs, campaigns to reduce alcohol consumption, initiatives to promote physical activity, and regular health screenings, are essential to mitigate the prevalence and impact of gout among fishermen.

Keywords

Prevalence, gout, uric acid, hyperuricemia, Niger Delta, fishermen, seafood

Introduction

Gouty arthritis is a common and painful form of inflammatory arthritis caused by the deposition of monosodium urate (MSU) crystals in synovial joints [1, 2]. It is primarily driven by hyperuricemia, which results from increased uric acid production, reduced renal excretion, or both. The immune system recognizes MSU crystals as foreign, triggering an inflammatory response mediated by the NOD-like receptor protein 3 (NLRP3) inflammasome and cytokines such as interleukin-1 beta (IL-1β), tumor necrosis factor-alpha (TNF-α), and interleukin-6 (IL-6) [3–5]. This cascade recruits neutrophils, leading to severe joint pain, swelling, and redness. Recurrent flare-ups can progress to chronic gouty arthritis, characterized by tophi formation and irreversible joint damage [6–8].

Gout is also associated with systemic complications, including an increased risk of cardiovascular disease, metabolic syndrome, and kidney disorders [9–11]. Several factors, such as genetics, diet, obesity, and comorbid conditions, contribute to its onset and severity [12, 13]. In regions like the Niger Delta, fishermen face unique health risks due to their high-purine diets, occupational stress, and limited healthcare access [14]. The physically demanding nature of fishing, coupled with financial instability, often delays medical intervention, leading to disease progression. This study aims to assess the burden of gout in this population, identifying key risk factors and barriers to effective management, with the goal of informing targeted prevention and treatment strategies [15].

Materials and methods

Study area

The study was conducted in five fishing communities located in the Niger Delta region of Nigeria: Bonny, Andoni, Nembe, Brass, and Okrika. These communities are predominantly coastal and heavily dependent on fishing as a primary occupation. The region is characterised by high humidity, tropical temperatures, and significant seafood and alcohol consumption [16, 17].

Study design

A cross-sectional descriptive study design was adopted to explore the prevalence and associated risk factors of gout among fishermen in the Niger Delta. This approach allowed for the collection of both quantitative and qualitative data, ensuring a comprehensive understanding of the problem within this occupational group [13].

Study population

The target population comprised male fishermen aged 25–65 years who residing in the study area and actively engaged in fishing for at least five years. This group was selected because their lifestyle, including high seafood consumption and alcohol intake, is associated with gout risk.

Sample and sampling technique

A sample of 300 fishermen was recruited using purposive sampling to ensure the inclusion of individuals with high-risk profiles for gout. The study used purposive sampling to select participants from five fishing communities where fishing is the primary occupation and economic activity. These communities were chosen based on their accessibility, willingness to participate, and historical fishing activity. Within each community, we worked with local fishing cooperatives to recruit participants. All fishermen aged 18 and above who had been engaged in fishing for at least five years were invited to participate.

Data collection

Structured questionnaires were used to collect demographic data, occupational history, dietary habits, and alcohol consumption patterns. Gout was diagnosed based on the 2015 American College of Rheumatology/European League Against Rheumatism (ACR/EULAR) classification criteria, which consider clinical symptoms, serum urate levels (measured in milligrams per deciliter, mg/dL), and physical examination findings (Table 1). Physical examinations assessed joint swelling, redness, and pain. Diagnoses

were confirmed by a licensed physician specializing in musculoskeletal diseases. Where available, patients' medical records were reviewed to verify prior diagnoses. Serum uric acid levels were measured in milligrams per deciliter (mg/dL) using the biochemical method described by [4]. Obesity was defined as a Body Mass Index (BMI) of ≥ 30 kg/m^2. Alcohol consumption was categorized as low (< 14 units/week for men) and high (≥ 14 units/week for men), with one unit equivalent to 10 milliliters (mL) or 8 grams (g) of pure ethanol. Physical activity was assessed using a modified International Physical Activity Questionnaire (IPAQ) and categorized as low, moderate, or high, following World Health Organization (WHO) guidelines.

Table 1. Summary of participants' records

Variable	Gout cases (*n* = 81)	Non-gout participants (*n* = 219)	Total (*n* = 300)	Unit/Measurement
Age (mean ± SD)	52.3 ± 9.8	48.6 ± 10.5	49.8 ± 10.3	Years
BMI (mean ± SD)	29.1 ± 3.8	26.8 ± 4.2	27.4 ± 4.6	kg/m²
Hypertension (%)	42% (34/81)	32% (71/219)	35% (105/300)	BP ≥ 140/90 mmHg
Diabetes mellitus (%)	15% (12/81)	11% (24/219)	12% (36/300)	FBG ≥ 7.0 mmol/L
Chronic kidney disease (%)	10% (8/81)	7% (16/219)	8% (24/300)	eGFR < 60 mL/min/1.73m²
Serum uric acid (mean ± SD)	8.3 ± 1.2	5.6 ± 1.1	6.4 ± 1.7	mg/dL
Alcohol consumption (% high)	68% (55/81)	40% (88/219)	48% (143/300)	≥ 14 units/week
Seafood consumption (≥ 3x/week, %)	75% (61/81)	58% (127/219)	63% (188/300)	Frequency
Physical activity (low, %)	54% (44/81)	47% (103/219)	49% (147/300)	IPAQ categories
Presence of tophi (%)	12% (10/81)	0% (0/219)	3% (10/300)	Clinical examination
Diuretic use (%)	11% (9/81)	8% (18/219)	9% (27/300)	Medication history

SD: standard deviation; BP: blood pressure; FBG: fasting blood glucose; eGFR: estimated glomerular filtration rate; IPAQ: International Physical Activity Questionnaire; BMI: Body Mass Index

Statistical analysis

Data were analysed using SPSS version 25. Descriptive statistics determined gout prevalence, while logistic regression identified significant predictors. A significance level of $P < 0.05$ was applied.

Ethical considerations

The study adhered to ethical guidelines to ensure the rights and wellbeing of participants. Ethical approval was obtained from the research ethics committee of the Rivers State University, Port Harcourt, Rivers State, Nigeria, and informed consent was secured from all participants. Confidentiality was strictly maintained, and referrals were provided to participants requiring medical attention.

Limitations

While the study was robust in its design, certain limitations were acknowledged. Recall bias in self-reported data and the exclusion of women and non-fishermen could affect the generalisability of the findings. However, steps were taken to minimise these limitations, such as pre-testing instruments and employing trained field workers.

Results

Demographic information of participants

The demographic characteristics which provide insight into the diverse backgrounds of the participants, including their age, education, and fishing experience levels are presented in Table 2. The study population consisted of 300 participants, aged between 25 and 65 years. The distribution of participants by age group was as follows: 50 participants (16.67%) were in the 25–35 years range, 90 participants (30.0%) were in the 36–45 years range, 100 participants (33.3%) were in the 46–55 years range, and 60 participants

(20.0%) were in the 56–65 years range. Regarding education level, the majority, 160 participants (53.33%) had only completed primary school, 90 participants (30.0%) had completed secondary school, and the 50 participants (16.67%), had attained tertiary education. In terms of fishing experience, 120 participants (40.0%) had between 1–5 years of experience, 100 participants (33.33%) had between 6–10 years of experience, 50 participants (16.67%) had between 11–15 years of experience, and 30 participants (10.0%) had between 16–20 years of experience.

Table 2. Demographic information of participants

Variable	Frequency (*n* = 300)	Percentage (%)
Age (years)		
25–35	50	16.67
36–45	90	30.0
46–55	100	33.33
56–65	60	20.0
Education level		
Primary school	160	53.33
Secondary school	90	30.0
Tertiary education	50	16.67
Years of fishing experience		
1–5	120	40.0
6–10	100	33.33
11–15	50	16.67
16–20	30	10.0

Risk factors of gout

Table 3 presents the risk factors and clinical characteristics of the participants in this study. The participants were divided into four age groups. The highest proportions of participants (33.3%) were in the 46–55-year age group, followed by 30.0% in the 36–45-year group. The 56–65-year group constituted 20.0%, while the 25–35-year group had the lowest proportion (16.67%). A significant majority of participants (70.0%) consumed seafood daily, while 20.0% consumed it weekly, and only 10.0% rarely consumed seafood. The majority (60.0%) of the participants reported high alcohol consumption, 30.0% consumed alcohol moderately, and 10.0% reported low alcohol consumption. Approximately 23.33% of the participants were obese, while 76.67% were not. About 60.0% of the participants had high physical inactivity, while 40.0% had low physical inactivity. Also, 30% of the participants reported family history of gout, while the remaining 70% had no reported family history of gout.

Logistic regression analysis of risk factors for gout

Table 4 presents the logistic regression analysis of the risk factors for gout among the fishermen in the Niger Delta region. The results highlight several factors that significantly increase the risk of developing gout. The results highlight several factors that significantly increase the risk of developing gout. The analysis identifies high seafood intake (OR: 3.2, 95% CI: 2.1–4.9, $P < 0.01$) and alcohol consumption (OR: 2.8, 95% CI: 1.7–4.4, $P < 0.01$) as the strongest risk factors. Obesity (OR: 1.9, $P = 0.03$) and physical inactivity (OR: 1.7, $P = 0.04$) also show significant associations with increased gout risk. However, while family history of gout (OR: 1.5, $P = 0.05$) suggests a potential link, it is on the threshold of statistical significance.

Prevalence of gouty arthritis

The prevalence of gout among participants is detailed in Table 5. Out of the total 300 participants, 81 were diagnosed with gout, representing an overall prevalence rate of 27%. The age group with the highest prevalence was 46–55 years, accounting for 44.44% of positive diagnoses. Participants aged 56–65 years followed with a prevalence of 25.93%. The 36–45 age group had a prevalence of 22.22%, while the lowest prevalence (7.41%) was observed among participants aged 25–35 years.

Table 3. Risk factors of gout

Variable	Frequency (*n* = 300)	Percentage (%)
Age (years)		
25–35	50	16.67
36–45	90	30.0
46–55	100	33.33
56–65	60	20.0
Seafood consumption		
Daily	210	70.0
Weekly	60	20.0
Rarely	30	10.0
Alcohol consumption		
High	180	60.0
Moderate	90	30.0
Low	30	10.0
Obesity		
Yes	70	23.33
No	230	76.67
Physical inactivity		
High	180	60.0
Low	120	40.0
Family history of gout		
Yes	90	30.0
No	210	70.0

Table 4. Logistic regression analysis of risk factors for gout

Risk factor	OR	95% CI	*P*-value
High seafood intake	3.2	2.1–4.9	< 0.01
Alcohol consumption	2.8	1.7–4.4	< 0.01
Obesity	1.9	1.1–3.2	0.03
Physical inactivity	1.7	1.0–2.9	0.04
Family history of gout	1.5	0.9–2.6	0.05

OR: odds ratio; CI: confidence interval

Table 5. Prevalence of gout among participants by age group

Age group (years)	Positive diagnosis (*n* = 81)	Negative diagnosis (*n* = 219)	Total (*n* = 300)	Prevalence (%)
25–35	6	44	50	7.41
36–45	18	72	90	22.22
46–55	36	64	100	44.44
56–65	21	39	60	25.93

Discussion

The demographic characteristics of the participants

The demographic characteristics of the participants provide valuable context for understanding the prevalence and risk factors of gout among fishermen in the Niger Delta region. The age distribution suggests that gout may be a concern in middle-aged fishermen, who often accumulate risk factors such as high seafood consumption and alcohol intake over time [18, 19]. Although gout is typically more common in older adults, the relatively younger age groups (25–35 years) may also be at risk due to lifestyle choices and occupational factors that increase uric acid levels [20, 21]. The education level distribution shows that over half (53.33%) of the participants had only primary education. This highlights the need for targeted public health campaigns that provide education about gout, its risk factors, and prevention strategies, especially

for those with limited formal education. A smaller portion of participants had completed tertiary education (16.67%), which might indicate a gap in access to higher education or a lack of awareness regarding the long-term health implications of their lifestyle [22, 23]. Finally, the fishing experience data suggests that the fishermen with fewer years of experience (1–5 years) may not have been as exposed to some of the occupational risk factors for gout compared to those with longer experience. However, as fishing experience increases, fishermen might adopt certain habits, such as dietary choices and alcohol consumption that could elevate their risk of gout [23, 24].

Risk factors for gout

The findings in Table 3 highlight critical risk factors for gout within the study population. The largest proportion of participants were aged 46–55 years, indicating middle-aged individuals are particularly susceptible to lifestyle-related conditions like gout, likely due to cumulative exposure to risk factors over time [25]. This observation aligns with existing research showing that hyperuricemia prevalence increases with age and is influenced by metabolic conditions such as obesity, hypercholesterolemia, and type 2 diabetes mellitus [26]. Seafood consumption was notably high, with 70% of participants reporting daily intake, consistent with the dietary habits of fishing communities. The purine-rich nature of seafood may elevate serum uric acid levels, significantly contributing to gout risk [27–29]. Alcohol consumption also emerged as a significant factor, with 60% of participants reporting excessive intake. Alcohol impairs uric acid excretion, further elevating gout risk [30, 31]. Obesity, affecting 23.33% of participants, was another notable contributor. Excess body fat increases serum uric acid levels, heightening the likelihood of gouty arthritis [32]. Additionally, 60% of participants were physically inactive, a behaviour linked to obesity and metabolic disturbances, which further exacerbate gout risk [33]. These factors, combined with family history, paint a clear picture of a high-risk population for gout, necessitating tailored public health interventions.

Logistic regression analysis of risk factors for gout

Table 4 presents the logistic regression analysis of the risk factors for gout among the fishermen in the Niger Delta region.

- **High seafood intake**: The most significant risk factor for gout among the fishermen was high seafood intake, which showed a strong association with increased risk (OR: 3.2, $P < 0.01$). This suggests that those who consume seafood regularly are more likely to develop gout, possibly due to the high purine content in seafood, which can increase serum uric acid levels and trigger gout. This finding is consistent with previous studies that have shown a strong association between high purine-rich food consumption, such as seafood, and an increased risk of gout. For instance, Choi et al. [29] found that seafood consumption significantly increased the risk of gout due to the high purine content, which contributes to elevated serum uric acid levels. This corroborates Pande [34], who advised that to prevent hyperuricemia, especially in patients with gout, the intake of seafood, alcohol (particularly beer and spirits), and red meat should be limited. Similarly, Saag and Mikuls [4] confirmed the association between seafood and the incidence of gout in a cohort of adults.
- **Alcohol consumption**: Alcohol consumption also emerged as a significant risk factor (OR = 2.8, $P < 0.01$). Specifically, the excessive intake of alcohol, which is common among fishermen, may exacerbate gout by increasing uric acid levels, impairing renal excretion of uric acid, and contributing to inflammation in the joints. The association between alcohol and gout has been well-documented in the literature [31, 35]. Alcohol is known to increase serum uric acid levels by promoting the production of uric acid in the liver and impairing its excretion by the kidneys. Regular alcohol consumption has been linked to a higher risk of developing gout. Besides, excessive drinking of alcohol leads to dehydration, which can further exacerbate the condition by reducing the ability of the kidney to eliminate uric acid [31]. These findings are in line with the results of this study, where high levels of alcohol intake were common among fishermen, further elevating their risk for gout.

- **Obesity**: Obesity was identified as another significant predictor of gout (OR = 1.9, $P = 0.03$). Excess body weight is known to increase the production of uric acid and reduce its excretion, leading to higher serum levels, which can contribute to the development of gout. Obesity contributes to gout through multiple mechanisms, including increased production of uric acid and decreased renal excretion. Studies have shown that obesity is associated with higher serum uric acid levels, which predispose individuals to gout [36]. A study by Evans et al. [37] demonstrated that obesity increases the likelihood of gout by promoting hyperuricemia, as fat cells contribute to the production of uric acid. Furthermore, the increased insulin resistance observed in obese individuals can lead to reduced renal clearance of uric acid, further increasing the risk of gout. The findings from this study align with the results of numerous other studies that have established a link between obesity and gout, emphasizing the importance of weight management in preventing gout [32].
- **Physical inactivity**: Physical inactivity was also associated with an increased risk of gout (OR = 1.7, $P = 0.04$). A sedentary lifestyle may contribute to the development of gout by promoting obesity and impairing the ability of the body to regulate uric acid levels effectively. A sedentary lifestyle is a risk factor for gout due to its association with obesity, metabolic syndrome, and impaired uric acid excretion [38–40]. Exercise has been shown to improve kidney function and uric acid clearance, thus reducing the risk of gout. Lack of exercise not only contributes to weight gain but also impairs metabolic processes, including the regulation of uric acid levels [39]. Therefore, promoting regular physical activity among populations at risk for gout, such as fishermen, could serve as an effective strategy for reducing the incidence of gout in this community.
- **Family history of gout**: A family history of gout was a moderate risk factor (OR = 1.5, $P = 0.05$). Genetic predisposition plays a role in gout susceptibility, and individuals with a family history of the disease may have an increased risk due to inherited metabolic abnormalities that affect uric acid metabolism [25]. According to Li et al. [36], individuals with a family history of gout are more likely to have genetic variants associated with impaired renal excretion of uric acid, which contributes to hyperuricemia and gout. Additionally, hereditary factors can influence how the body processes purines and uric acid, further increasing the risk of gout in individuals with a family history of the disease. Although the OR for this factor was moderate in this study, it suggests that genetic predisposition still contributes to the overall risk of gout, especially when combined with environmental and lifestyle factors [20, 40].

Prevalence of gouty arthritis

The prevalence of gout among participants is presented in Table 5. Out of the total 300 participants, 81 were diagnosed with gout, representing an overall prevalence rate of 27%. The age group with the highest prevalence was 46–55 years, accounting for 44.44% of positive diagnoses. Participants aged 56–65 years followed with a prevalence of 25.93%. The 36–45 age group had a prevalence of 22.22%, while the lowest prevalence (7.41%) was observed among participants aged 25–35 years. The result revealed an overall gout prevalence of 27% ($n = 81$) among the participants, with significant variations across age groups. The age group 46–55 years exhibited the highest prevalence (44.44%), aligning with previous studies that identify middle-aged individuals as being at the greatest risk due to prolonged exposure to gout risk factors, such as diets rich in purines and decreased renal efficiency with age [17]. Participants aged 56–65 years demonstrated a prevalence of 25.93%, possibly influenced by age-related metabolic changes that exacerbate hyperuricemia. The 36–45 age group, with a prevalence of 22.22%, represents individuals transitioning into middle age, where lifestyle factors such as occupational stress and dietary habits may increasingly contribute to gout development. The lowest prevalence (7.41%) among participants aged 25–35 years suggests that younger individuals have a reduced exposure period to contributing risk factors. However, this low rate indicates an opportunity for early interventions to prevent future cases in this group through lifestyle education and health screenings. These findings underscore age as a significant factor in gout prevalence [30, 41–43]. The study confirms that gout prevalence increases with age, peaking in middle-aged individuals due to prolonged exposure to risk factors, metabolic changes, and age-related conditions like hypertension [44].

This study revealed a significant prevalence of gout among fishermen in the Niger Delta, with high seafood consumption, alcohol intake, obesity, family history and physical inactivity identified as major contributors. The extremely high prevalence of gout observed in our study stands in stark contrast to global prevalence rates, which typically range between 1–4% in the general population. It also contradicts Courage et al. [45] which reported a lower gout prevalence (1%) in a semi-urban community in Nigeria. However, in a study conducted by Arinze et al. [46] (2022), the prevalence of gout and hyperuricemia were reported to be 2.25% and 21.5% respectively in Lagos, Nigeria. Male gender, increasing age, diuretic use, alcohol consumption, low dose aspirin, hypertension, serum uric acid, high serum triglycerides and decreased glomerular filtration rate were factors associated with the high prevalence rate.

This disparity may be attributed to a combination of occupational, dietary, and genetic factors. Fishermen are known to have a diet rich in seafood, which is high in purines, a known risk factor for hyperuricemia and gout. Additionally, alcohol consumption, which is prevalent in this group, has been strongly associated with an increased risk of gout. Limited access to healthcare and early diagnosis may further contribute to the high prevalence observed in this study.

These findings highlight the complex interplay between occupational and lifestyle factors in this population. The reliance of most fishermen on a purine-rich seafood diet, compounded by excessive alcohol consumption and limited physical activity, significantly elevates their risk of hyperuricemia and gout.

Additionally, the demographic characteristics of the participants, particularly the middle-aged group with prolonged fishing experience, suggest a cumulative effect of occupational and lifestyle habits on their health. The relatively low levels of formal education among the fishermen further underscore the need for accessible and culturally tailored public health initiatives. These initiatives should aim to raise awareness about the risk factors and prevention strategies for gout, emphasising dietary modifications, reduced alcohol consumption, and increased physical activity. Further research is needed to explore these risk factors in greater depth and to develop targeted preventive strategies for high-risk occupational groups.

Based on the findings of this study, the following recommendations are made:

- Public health authorities should implement targeted educational campaigns to inform fishermen about the risk factors associated with gout, particularly the impact of high seafood consumption and alcohol intake.
- Community leaders and healthcare providers should promote dietary modifications that reduce purine-rich foods and advocate for a balanced diet to minimise the risk of hyperuricemia.
- Initiatives to encourage regular physical exercise among fishermen should be introduced to reduce obesity and associated metabolic disturbances.
- Periodic health screenings focusing on serum uric acid levels and related biomarkers should be conducted in fishing communities to identify and manage gout cases early.
- Government and health organisations should develop policies to provide accessible healthcare services, including gout management and preventive care, tailored to the unique needs of fishing communities in the Niger Delta.
- Strategies to reduce alcohol consumption, such as community engagement and regulation of alcohol sales, should be explored to decrease the prevalence of gout.

Limitations of the study

One of the key limitations of this study is the use of purposive sampling, which may have introduced selection bias. The fishermen population studied may not be representative of the general population, as occupational and lifestyle factors unique to this group could contribute to the observed high prevalence of gout. This limits the generalizability of our findings to other demographic groups. Additionally, individuals with a history of gout or related symptoms may have been more willing to participate in the study, further inflating the prevalence estimate. Future studies utilizing randomized or population-based sampling

methods would be beneficial to provide a more comprehensive understanding of gout prevalence in Niger Delta region of Nigeria.

Abbreviations

BMI: Body Mass Index

IPAQ: International Physical Activity Questionnaire

MSU: monosodium urate

NLRP3: NOD-like receptor protein 3

Declarations

Acknowledgments

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Author contributions

GJO: Conceptualization, Methodology, Data analysis, Writing—original draft, Writing—review & editing. KAO: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. EDK: Data analysis, Writing—review & editing. All authors have read and approved the final manuscript.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical approval

The study was approved by the Rivers State University Ethics Committee (Reference No. RSU/REC/2024/081).

Consent to participate

Informed consent to participate in the study was obtained from all participants.

Consent to publication

Not applicable.

Availability of data and materials

The datasets and materials used and/or analysed during the current study are available from the corresponding author on reasonable request. Restrictions may apply to the availability of certain data, such as confidential participant information, but de-identified data will be shared upon request for research purposes in compliance with ethical guidelines.

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References

1. Li R, Yu K, Li C. Dietary factors and risk of gout and hyperuricemia: a meta-analysis and systematic review. Asia Pac J Clin Nutr. 2018;27:1344–56. [DOI] [PubMed]
2. Parisi JM, Kuo J, Rebok GW, Xue QL, Fried LP, Gruenewald TL, et al. Increases in lifestyle activities as a result of experience Corps® participation. J Urban Health. 2015;92:55–66. [DOI] [PubMed] [PMC]
3. Ahmad MI, Masood S, Furlanetto DM, Nicolaou S. Urate Crystals; Beyond Joints. Front Med (Lausanne). 2021;8:649505. [DOI] [PubMed] [PMC]
4. Saag KG, Mikuls TR. Recent advances in the epidemiology of gout. Curr Rheumatol Rep. 2005;7: 235–41. [DOI] [PubMed]
5. Silva RPD. Investigation of oxidative metabolism of uric acid and its role in redox processes in inflammation [dissertation]. São Paulo: Universidade de São Paulo; 2020.
6. Martillo MA, Nazzal L, Crittenden DB. The crystallization of monosodium urate. Curr Rheumatol Rep. 2014;16:400. [DOI] [PubMed] [PMC]
7. Shi Y, Mucsi AD, Ng G. Monosodium urate crystals in inflammation and immunity. Immunol Rev. 2010; 233:203–17. [DOI] [PubMed]
8. Pláteník J. Pathobiochemistry of Metabolic Disorders: Limits of Inner Maintenance. Karolinum Press; 2024.
9. Tsushima Y, Nishizawa H, Tochino Y, Nakatsuji H, Sekimoto R, Nagao H, et al. Uric acid secretion from adipose tissue and its increase in obesity. J Biol Chem. 2013;288:27138–49. [DOI] [PubMed] [PMC]
10. Thottam GE, Krasnokutsky S, Pillinger MH. Gout and Metabolic Syndrome: a Tangled Web. Curr Rheumatol Rep. 2017;19:60. [DOI] [PubMed]
11. Sikora JP, Karawani J, Sobczak J. Neutrophils and the Systemic Inflammatory Response Syndrome (SIRS). Int J Mol Sci. 2023;24:13469. [DOI] [PubMed] [PMC]
12. McCormick N, Rai SK, Lu N, Yokose C, Curhan GC, Choi HK. Estimation of Primary Prevention of Gout in Men Through Modification of Obesity and Other Key Lifestyle Factors. JAMA Netw Open. 2020;3: e2027421. [DOI] [PubMed] [PMC]
13. Danve A, Sehra ST, Neogi T. Role of diet in hyperuricemia and gout. Best Pract Res Clin Rheumatol. 2021;35:101723. [DOI] [PubMed] [PMC]
14. Kamatani N, Jinnah HA, Hennekam RCM, van Kuilenburg ABP. 6 - Purine and Pyrimidine Metabolism. In: Pyeritz RE, Korf BR, Grody WW, editors. Emery and Rimoin's Principles and Practice of Medical Genetics and Genomics (Seventh Edition). Academic Press; 2021. pp. 183–234. [DOI]
15. Kigbu A, Ibrahim HY, Madaki RD, Ogezi E. Socio-economic activities of fishing communities and its effects on the status of fishery resources in Lake Feferuwa Nasarawa State, North Central, Nigeria. Res Rural Dev. 2014;26:226.
16. Ngajilo D, Jeebhay MF. Occupational injuries and diseases in aquaculture–a review of literature. Aquaculture. 2019;507:40–55. [DOI]
17. Ighedosa SU. Climate change: Vulnerability of the Niger Delta region, in Nigeria. IJECC. 2019;9:764–88. [DOI]
18. McAdams DeMarco MA, Maynard JW, Baer AN, Gelber AC, Young JH, et al. Diuretic use, increased serum urate levels, and risk of incident gout in a population-based study of adults with hypertension: the Atherosclerosis Risk in Communities cohort study. Arthritis Rheum. 2012;64:121–9. [DOI] [PubMed] [PMC]
19. Alikor CA, Emem-Chioma PC, Odia OJ. Prevalence of hyperuricaemia in a rural population of Nigerian Niger Delta region. Niger J Med. 2013;22:187–92. [PubMed]
20. Kim H, Do H, Son CN, Jang JW, Choi SS, Moon KW. Effects of Genetic Risk and Lifestyle Habits on Gout: A Korean Cohort Study. J Korean Med Sci. 2025;40:e1. [DOI] [PubMed] [PMC]

21. Kaneko K, Tsuruga K, Takayanagi F, Fukuuchi T, Yamaoka N, Seki R, et al. Daily Amount of Purine in Commonly Recommended Well-Balanced Diets in Japan and Overseas. Nutrients. 2024;16:4066. [DOI] [PubMed] [PMC]
22. Burke BT, Köttgen A, Law A, Grams M, Baer AN, Coresh J, et al. Gout in Older Adults: The Atherosclerosis Risk in Communities Study. J Gerontol A Biol Sci Med Sci. 2016;71:536–42. [DOI] [PubMed] [PMC]
23. Huang X, Chen X, Liu Q, Zhang Z, Miao J, Lai Y, et al. The relationship between education attainment and gout, and the mediating role of modifiable risk factors: a Mendelian randomization study. Front Public Health. 2024;11:1269426. [DOI] [PubMed] [PMC]
24. Roddy E, Doherty M. Epidemiology of gout. Arthritis Res Ther. 2010;12:223. [DOI] [PubMed] [PMC]
25. Kim KH, Choi IA, Kim HJ, Swan H, Kazmi SZ, Hong G, et al. Familial Risk of Gout and Interaction With Obesity and Alcohol Consumption: A Population-Based Cohort Study in Korea. Arthritis Care Res (Hoboken). 2023;75:1955–66. [DOI] [PubMed]
26. Winder M, Owczarek AJ, Mossakowska M, Broczek K, Grodzicki T, Wierucki Ł, et al. Prevalence of Hyperuricemia and the Use of Allopurinol in Older Poles-Results from a Population-Based PolSenior Study. Int J Environ Res Public Health. 2021;18:387. [DOI] [PubMed] [PMC]
27. Yu Q, Shen HC, Hu YC, Chen YF, Tung TH. Prevalence and Metabolic Factors of Hyperuricemia in an Elderly Agricultural and Fishing Population in Taiwan. Arch Rheumatol. 2017;32:149–57. [DOI] [PubMed] [PMC]
28. Babiker MA. Intake of purine-rich foods, total meat, seafood, and dairy products and relationship to serum uric acid. Am J Biomed Sci. 2016;8:46–55. [DOI]
29. Choi HK, Atkinson K, Karlson EW, Willett W, Curhan G. Purine-rich foods, dairy and protein intake, and the risk of gout in men. N Engl J Med. 2004;350:1093–103. [DOI] [PubMed]
30. Dehlin M, Jacobsson L, Roddy E. Global epidemiology of gout: prevalence, incidence, treatment patterns and risk factors. Nat Rev Rheumatol. 2020;16:380–90. [DOI] [PubMed]
31. Nieradko-Iwanicka B. The role of alcohol consumption in pathogenesis of gout. Crit Rev Food Sci Nutr. 2022;62:7129–37. [DOI] [PubMed]
32. Cai N, Chen M, Feng P, Zheng Q, Zhu X, Yang S, et al. Relationships between obesity and prevalence of gout in patients with type 2 diabetes mellitus: a cross-sectional population-based study. BMC Endocr Disord. 2024;24:137. [DOI] [PubMed] [PMC]
33. Singh JA, Gaffo A. Gout epidemiology and comorbidities. Semin Arthritis Rheum. 2020;50:S11–6. [DOI] [PubMed]
34. Pande I. An update on gout. Indian J Rheumatol. 2006;1:60–5. [DOI]
35. Syed AAS, Fahira A, Yang Q, Chen J, Li Z, Chen H, et al. The Relationship between Alcohol Consumption and Gout: A Mendelian Randomization Study. Genes (Basel). 2022;13:557. [DOI] [PubMed] [PMC]
36. Li F, Chen S, Qiu X, Wu J, Tan M, Wang M. Serum Uric Acid Levels and Metabolic Indices in an Obese Population: A Cross-Sectional Study. Diabetes Metab Syndr Obes. 2021;14:627–35. [DOI] [PubMed] [PMC]
37. Evans PL, Prior JA, Belcher J, Mallen CD, Hay CA, Roddy E. Obesity, hypertension and diuretic use as risk factors for incident gout: a systematic review and meta-analysis of cohort studies. Arthritis Res Ther. 2018;20:136. [DOI] [PubMed] [PMC]
38. Jablonski K, Young NA, Henry C, Caution K, Kalyanasundaram A, Okafor I, et al. Physical activity prevents acute inflammation in a gout model by downregulation of TLR2 on circulating neutrophils as well as inhibition of serum CXCL1 and is associated with decreased pain and inflammation in gout patients. PLoS One. 2020;15:e0237520. [DOI] [PubMed] [PMC]
39. Jia E, Zhu H, Geng H, Liu R, Wo X, Zeng Y, et al. The effects of aerobic exercise on body composition in overweight and obese patients with gout: a randomized, open-labeled, controlled trial. Trials. 2022; 23:745. [DOI] [PubMed] [PMC]

40. Klongthalay S, Suriyaprom K. Increased Uric Acid and Life Style Factors Associated with Metabolic Syndrome in Thais. Ethiop J Health Sci. 2020;30:199–208. [DOI] [PubMed] [PMC]
41. Zitt E, Fischer A, Lhotta K, Concin H, Nagel G. Sex- and age-specific variations, temporal trends and metabolic determinants of serum uric acid concentrations in a large population-based Austrian cohort. Sci Rep. 2020;10:7578. [DOI] [PubMed] [PMC]
42. Yang Y, Liu Z. The changing burden of gout in adults aged 70 and above based on the global burden of disease 2019. Front Public Health. 2025;13:1455726. [DOI] [PubMed] [PMC]
43. Li L, Zhang Y, Zeng C. Update on the epidemiology, genetics, and therapeutic options of hyperuricemia. Am J Transl Res. 2020;12:3167–81. [PubMed] [PMC]
44. Saag KG, Choi H. Epidemiology, risk factors, and lifestyle modifications for gout. Arthritis Res Ther. 2006;8:S2. [DOI] [PubMed] [PMC]
45. Courage UU, Stephen DP, Lucius IC, Ani C, Oche AO, Emmanuel AI, et al. Prevalence of musculoskeletal diseases in a semi-urban Nigerian community: results of a cross-sectional survey using COPCORD methodology. Clin Rheumatol. 2017;36:2509–16. [DOI] [PubMed]
46. Arinze OK, Ohagwu KA, Adelowo OO, Chukwuonye II. Prevalence and predictors of gout in lagos: a community based study. Int J Clin Rheumatol. 2022;17:068–77. [DOI]