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Research Article

Gout and Chronic Renal Failure in Conakry: Study of Clinical Characteristics and Associated Factors

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Abstract

Introduction: The Modification of Diet in Renal Disease (MDRD) equation is used to estimate glomerular filtration rate (GFR) from creatinine levels.

Gout is caused by excess uric acid in the blood. If renal failure is a known factor in hyperuricemia. The objective was to describe the clinical characteristics of gout patients with chronic renal failure admitted to the Rheumatology Department of the Ignace Deen National Hospital and to identify associated factors.

Material and Method: This was a 26-month case-control study of patients admitted or hospitalized for gout (cases), compared with patients managed in the department for other causes (controls) during the same period. The two groups were matched for age and gender.

Results: Mean age was 55.5 ± 11.7 years for cases and 55.4 ± 11.6 years for controls; male gender predominated in both groups. Civil servants were the most commonly affected socio-professional category; joint pain was the main reason for consultation (100%); the character was inflammatory (62.26% for cases and 35.85% for controls); the knee was the most frequent location (49.06%). Chronic polyarticular gout was the most common clinical form, followed by gout attacks. Chronic renal failure was found in most patients: Stage I: 18.7%; Stage II: 47.17%; Stage III: 30.19%; Stage IV: 1.89%; Stage V: 1.89%. Hypertension was associated with gout.

Conclusion: Calculation of renal function by MDRD revealed cases of renal failure at all stages, with no significant association between gout and renal failure.

Keywords: CKD; Gout; Rheumatology

Abbreviations

ATCD: Antecedents; Clcr: Creatinine Clearance; eGFR: Effective Glomerular Filtration Rate; F : Female; HTA: Hypertension; M : Male; BMI: Body Mass Index; CI: Confidence Interval; ARF: Acute Renal Failure; CKD: Chronic Renal Failure; KDIGO: Kidney Disease Improving Global Outcomes; CKD: Chronic Kidney Disease; MDRD: Modification of Diet in Renal Disease; mg/l: Milligram Per Liter; ml/min: Milliliter Per Minute; µmol/l: Micromole Per Liter; OR: Odds Ratio

Introduction

Chronic kidney disease (CKD) is a major public health problem, yet it is frequently under-diagnosed. Estimation of glomerular filtration rate and measurement of the albuminuria/creatinuria ratio should be offered regularly in patients with comorbidities, particularly those with diabetes, hypertension and/or cardiovascular disease [1].

Gout is an inflammatory metabolic or microcrystalline arthropathy associated with prolonged uric acid overload [2].

Hyperuricemia and its clinical manifestations are frequently encountered in patients with chronic renal failure, Chronic renal failure (CRF) is a cause of hyperuricemia and one of the major risk factors for gout. The prevalence of CKD in gout has been estimated at 39% [3], and some studies suspect an effect of hyperuricemia on the progression of CKD [4].

Hyperuricemia appears early in cases of reduced glomerular filtration rate and chronic kidney disease. It is associated with a more rapid decline in renal function [5].

Gout is an arteriopathy characterized by the deposition of sodium urate in joints and extra-articular tissues as a result of chronic hyperuricemia - 70mg/l in men and 60mg/l in women [6].

Nearly 10% of the population suffers from some degree of CKD, and hyperuricemia is one of the first biological complications of CKD [5].

Recent studies have demonstrated a correlation between blood urate levels, the development of hypertension and the progression of CKD [7].

In CKD with reduced glomerular filtration rate, hyperuricemia develops, even though intestinal excretion increases in compensation. Several studies have demonstrated a link between reduced glomerular filtration rate and uricemia. In the case of CKD, a progressive increase in uricemia is observed as the eGFR falls. This same inverse correlation has been observed in very early stages of renal failure [5].

Material and Methods

The Rheumatology Department of the Ignace Deen National Hospital in Conakry, located in the commune of Kaloum, served as the setting for this study.

It was a case-control, descriptive and analytical study lasting 26 months, from October 1 2021 to November 30, 2022.

The study population consisted of all patients having consulted and/or hospitalized for gout constituted part of our study population (Group A = Cases), compared with patients without gout and without IR managed in the department during the same study period (Controls = Group B).

Cases were patients with gout diagnosed according to the Rome (1963) and/or New York (1966) criteria, whose renal function had been assessed by the MDRD method, and who agreed to take part in the study.

Controls were recruited from other patients in the Rheumatology Department. They were matched to cases according to age and sex.

The 1963 Rome Criterion was defined as

- Uricemia greater than 70mg/l (420.5µmol/l)
- Tophus
- Urate crystals in synovial fluid
- History of brief joint fluxions

New York criteria

- At least two attacks of monoarthritis of one limb
- Same as first criterion, but involving the big toe.
- Tophus
- Colchicino-sensitivity.

Two Rome or New York criteria are required for a diagnosis of gout. Study variables were epidemiological, clinical and prognostic.

Epidemiological data

- Patients were divided into age groups with an amplitude of 10, and mean age was determined.

Clinical data

Triggering factors were sought; these included any situation that led to the onset of pain or the discovery of gout, purine-rich dietary excess and any other factors.

BMI (Body Mass Index): calculated as the ratio of mass in kg to height in $m^{(2)}$ (Weight/height^{2}or $kg/m^{2)}$.

- **Overweight:** BMI between 25-29.9 $kg/m^{(2)}$
- **Obese:** BMI ≥ 30$kg/m^{(2)}$
- **Pain:** unpleasant sensation (suffering, discomfort or discomfort) localized in a joint.

Periarticular pain: pain localized to periarticular structures (tendons, ligaments, capsule, muscle).

Mechanical pain: pain increased by movement, with a brief (<30 min.) rousing in the morning, relieved by rest.

Inflammatory pain: nocturnal pain, not relieved by rest and increased by exertion and a prolonged morning shake-off (>30 min.).

- **Mixed pain:** Combination of inflammatory and mechanical features.
- **Arthritis:** Inflammatory pain in a joint.
- **Monoarthritis:** Inflammatory involvement of a single joint.
- **Oligoarthritis:** Inflammatory disease affecting 2 to 3 joints.
- **Polyarthritis:** Inflammatory disease affecting 4 or more joints.
- **Tophus:** A hard, whitish, painless subcutaneous protrusion of variable size.

The chronic nature of renal insufficiency is determined by the following criteria Elevation of creatinine above 130µmol/l;

Normochromic Normocytic Aregenerative Anemia, hypocalcemia, decreased kidney size and/or associated with abnormal cortico-medullary differentiation on abdominal ultrasound.

Creatinine clearance was calculated by MDRD (an application installed in an android phone) and patients were divided into 5 stages of chronic kidney disease according to KDIGO.

Frequencies (percentages) or means (standard deviations) were used to describe qualitative and continuous variables at baseline. Univariate logistic regression was used to identify prognostic factors associated with gout, then candidates with a p-value less than 0.10 were entered into multivariate logistic regression. Independent predictors of gout from multivariate regression were selected using a backward procedure, based on the lowest Akaiké information criterion. Odds ratios (OR) and 95% confidence intervals (CI) were used as measures of association. Analysis was performed in Epi-info 7.2.0.2.

Information was collected anonymously with patient consent and treated confidentially with strict adherence to ethical rules.

The lack of a large number of cases made statistical analysis difficult.

Results

During the period, the study collected 53 patients in whom the diagnosis of gout was retained, and among patients admitted for other pathologies, 53 were selected, matched to gout patients according to age, gender.

Older people were most affected, with a mean age of 55.5 ± 11.7 years in the case group and 55.4 ± 11.6 years in the control group (Table 1).

Males predominated in both groups, with a sex ratio equal to 1.5 in the case group and 1.3 in the control group (Table 2).

Married people were the most affected, with a frequency of 96.23% in the case group and 98.11% in the control group (Table 2).

Civil servants were the most affected socio-professional group, with a frequency of 47%, followed by merchants 28% (Table 2).

Higher education was most affected in the case group (36%) and primary education (54.72%) in the control group (Table 2).

Civil servants and merchants were the most affected, at 47% and 28% respectively (Table 3).

A protein-rich diet was more likely to be the cause of the pain attacks that prompted consultation (92.45%) (Figure 1).

Obesity and hypertension were the most common medical conditions, at 54.72% and 28.30% respectively (Table 4).

Joint pain was the main reason for consultation, accounting for 100% (Cases); it predominated in the knee and elbow (49.06% each), followed by the big toe (32.07%) (Table 5).

Pain was inflammatory in the case group (62.62%) and mechanical in the control group (62.26%) (Table 5).

Chronic poly-articular gout was the most common clinical form (56.60%); chronic tophaceous gout was found in 13.21% (Figure 2).

There was no significant difference in renal involvement between the two groups; stages II and III were the most common: 47.17% and 30.19% in the case group and 45.28% and 32.08% in the control group (Table 6).

There was no statistically significant association between gout and the onset of renal failure on uni and multivariate analysis (Table 7 and 8).

During the period, the study collected 53 patients in whom the diagnosis of gout was retained, and among patients admitted for other pathologist, 53 were selected, matched to gout patients according to age, gender. The patients were divided into age groups with a range of 10 years and we are looking for the predominant age group; the 50-59 age group was the most dominant with a frequency of 37,74% for gout patients and 35,85% for non-gout patients.

Older people were most affected, with a mean age of 55.5 ± 11.7 years in the case group and 55.4 ± 11.6 years in the control group (Table 1).

Age (years)	Cases n (%) N = 53	Controls n (%) N = 53
20-29	02 (3,77)	02 (3,77)
30-39	02 (3,77)	02 (3,77)
40-49	10 (18,87)	10 (18,87)
50-59	20 (37,74)	19 (35,85)
60-69	13 (24,53)	14 (26,42)
70-79	06 (11,32)	06 (11,32)
Total	53 (100)	53 (100)

Table 1: Age distribution of patients (Cases and Controls).

Cases: Mean age 55.5 ± 11.7 years Controls: Mean age 55.4 ± 11.6 years

According to socio-demographic categories: Males predominated in both groups, with a sex ratio equal to 1.5 in the case group and 1.3 in the control group Married people were the most affected, with a frequency of 96.23% in the case group and 98.11% in the control group . Civil servants were the most affected socio-professional group, with a frequency of 47%, followed by merchants 28% . Higher education was most affected in the case group (36%) and primary education (54.72%) in the control group (Table 2).

Socio-demographic data	Cases (N = 53)	Controls (N = 53)
Sex		
Sex Male	32 (60,38%)	30 (56,60%)
Female	21 (39,62%)	23 (43,40%)
Sex ratio	1,5	1,3
Marital status		
Married	51 (96,23%)	52 (98,11%)
Single	-	-
Divorced	1 (1,89%)	-
Widowed	1 (1,89%)	1 (1,89%)
Level of education		
Higher	18 (36,00%)	8 (15,09%)
Secondary	10 (20,00%)	9 (16,98%)
Primary	3 (6,00%)	29 (54,72%)
Koranic school	13 (26,00)	4 (2,55%)
No schooling	6 (12,00%)	3 (5,66%)

Table 2: Distribution of patients (cases and controls) by demographic data.

Dans la catégorie socioprofessionnelle, nous avons recherché la prédominance dans le groupe des patients gouteux et les fonctionnaires Civil servants and merchants were the most affected, at 47% and 28% respectively (Table 3).

Occupation	Numbers (n)	Percentages (%)
Civil servants	25	47
Merchants	15	28
Household	9	17
Workers	2	4
Drivers	2	4
Total	53	100

Table 3: Distribution of gout patients by profession.

In the search for factors triggering painful crises requiring patient consultation, we found two factors in the interview of patients with gout: excess dietary pyrines and trauma**;** protein-rich diet was more likely to be the cause of the pain attacks that prompted consultation (92.45%) (Figure 1).

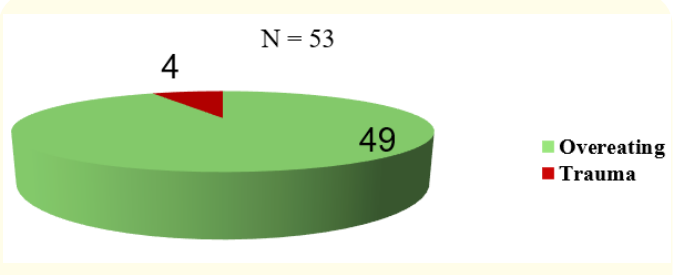

Figure 1: Distribution of cases according to triggers.

The comorbidities of the patients were sought and those that could be a risk factor for renal damage in the two groups of patients were retained; gouty and non-gouty; it appears from this table that obesity and HTA were the most found in these two groups (Table 4).

According to clinical data; the main reason for patient consultation in this rheumatology department was pain, the study revealed the characteristics of this pain in the two groups of patients (gout patients and non-gout patients) according to the type of pain, location, nature, mode of onset, presence or absence of tophus (Table 5).

Comorbidities	CASE n (%) N = 53	BACKGROUND n (%) N = 53
Obesity	29 (54,72)	20 (37,74)
HTA	15 (28,30)	5 (9,43)
Diabetes mellitus	5 (9,43)	2 (3,77)
Renal insufficiency	5 (9,43)	-
Family history of gout	2 (3,77)	-
Heart disease	1 (1,92)	-

Table 4: Distribution of patients according to Comorbidities.

Clinical signs		Cases n (%)	Controls n (%)
Pain	Joint	53 (100%)	45 (84,91%)
	Periarticular	-	2 (3,77%)
Joint site of pain	Knees	26 (49,06%)	
	Big Toes	17 (32,07%)	
	Ankle	7 (13,20%)	
	Shoulder	3 (5,66%)	
	Elbow	26 (49,06%)	
	Heel	01 (1,89%)	
Nature Of Pain	Inflammatory	33 (62,26)	19 (35,85%)
	Mechanical	03 (5,66)	33 (62,26%)
	Mixed	17 (32,08	1 (1,89%)
Start-up mode	Progressive	29 (54,72%)	52 (98,11%)
	Brutal	24 (45,28%)	1 (1,89%)
Arthritis type	Oligoarthritis	30 (56,60%)	
	Monoarthritis	15 (28,30%)	
	Polyarthritis	8 (15,10%)	
Tophus		7 (13,21%)	

Table 5: Distribution of patients according to clinical signs/characteristics of pain.

According to the clinical forms of gout, gout patients were classified into three categories: acute gout, chronic poly-articular gout, and chronic tophaceous gout. Patients with chronic poly-articular gout were the most numerous according to figure 2.

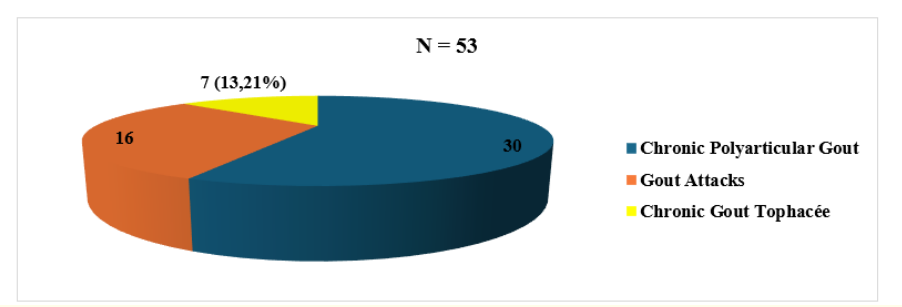

Figure 2: Distribution of gout patients by clinical form of gout.

Renal function was assessed in both groups of patients by the modified MDRD method, after searching for chronicity criteria, patients were classified into five classes according to KDIGO. There was no significant difference in renal involvement between the two groups; stages II and III were the most found, i.e. 47.17% and 30.19% in the case group and 45.28% and 32.08% in the control group (Table 6).

CKD stage Clcr (mn/1.73m^2)	Cases n(%) N = 53	Controls n(%) N = 53
I (Clcr≥90)	10 (18,70)	11 (20,75)
IIq (Clcr 60-89)	25 (47,17)	24 (45,28)
III (Clcr 59-30)	16 (30,19)	17 (32,08)
IV (Clcr 29-15)	1 (1,89)	1 (1,89)
V (Clcr< 15)	1 (1,89)	-

Table 6: Distribution of patients according to CKD stage and KDIGO.

Univariate and multivariate analysis was performed to investigate factors associated with the occurrence of renal failure in both groups of patients; this study showed that there was no statistically significant association between gout and the occurrence of renal failure in univariate and multivariate analysis (Tables 7 and 8).

Risk factors associated with gout	OR (65%)	p-value
Sex (M vs F)	1,168 (0,539-2,531)	0,6936
Residence (Urban vs Rural)	0,448 (0,142-1,414)	0,1710
Marital status (married vs. single)	0,394 (0,096-0,616)	0,1961
Type of pain	0,005 (<0,001-0,055)	0,001
Joint swelling	1,930 (0,759 -4,908)	0,4763
Overweight-Obesity	1,994 (0,918-4,329)	0,0811
Diabetes mellitus	2,656 (0,492-14,346)	0,2562
HTA	3,789 (1,264-11,361)	0,0174
Creatinine clearance (<60 vs >60 ml/mn)	1,000 (0,448-2,234)	1,0000
Age	1,000 (0,968-1,034)	0,9933
Diagnostic delay	1,002 (0,995-1,009)	0,5636
BMI	1,085 (0,993-1,185)	0,0696
Creatinine	1,003 (0,996-1,009)	0,3954

Table 7: Distribution of patients according to risk factors associated with gout (univariate analysis).

Risk factors associated with gout	OR (95% CI)	p-value
Pain character (Inflammatory Vs mechanical)	0,053 (0,014-0,207)	<0,0001
Mixed Vs Inflammatory)	11,47 (1,390-94643)	
HTA (Yes Vs No)	4,543 (1,120-18,445)	0,0341

Table 8: Risk factors associated with gout (multivariate analysis).

Discussion

During the period, the study collected 53 patients in whom the diagnosis of gout was retained, for patients admitted for other pathologies, 53 were selected, they were matched to gout patients according to age and gender.

Older people were the most affected, with a predominance of the 50-59 age group, i.e. 37.74% in the case group and 35.5% in the control group, followed by the 60-69 age group, i.e. 24.53% in the case group and 26.42% in the control group, with an average age of 55.5 ± 11.7 years in the case group and 55.4 ± 11.6 years in the control group.

Males predominated in both groups, 60.38% in the case group and 56.60% in the control group, with a sex ratio of 1.5 in the case group and 1.3 in the control group.

In 2024, Angalla et al in the Congo conducted a study of 75 gouty patients, giving a prevalence of 71.43%, with males predominating (80%); the mean age of patients was 60± 11.47 years [8].

Amri et al in 2016 found a male predominance of 61.5%, with a sex ratio of 4; and an average age of 61 years [9].

The literature reports that the prevalence of gout is estimated at 1-5% in men and 2% in women > 40 years of age. It increases with age and with the degree of hyperuricemia [10].

Epidemiological studies have consistently shown that the risk of gout is 3-6 times higher in men than in women; this is explained by the fact that uricemia levels are lower in adult women than in men, until the menopause, due to the urecosuric effect of estrogen [8].

Married people were the most affected, with a frequency of 96.23% in the case group and 98.11% in the control group.

Civil servants were the most affected socio-professional group, with a frequency of 47%, followed by merchants 28%. The difficult socio-economic situation obliges most people to self-medicate in the face of pain by taking analgesics, or to turn to traditional medicine; the group of civil servants and shopkeepers is an exception, not only because of the means at their disposal, but also because of their level of information.

Higher education was most affected in the case group (36%), and primary education in the control group (54.72%).

Obesity, hypertension and diabetes mellitus were found respectively in 54.7%, 28.30% and 9.43% of cases and 37.74%, 9.43% and 3.77% of controls.

Angalla et Coll in 2024 found that The main comorbidities found were arterial hypertension in 61.33% of cases, obesity in 22.67%, renal failure in 21.33%, diabetes in 17.33%, coronary heart disease in 14.67%, stroke in 12%, dyslipidemia in 6.67% and heart failure in 2.67% [11].

Amri et al 2016 had found as cardiovascular risk factors: diabetes in 30.8%, hypertension in 53.8%, dyslipidemia in 57.7%, renal failure in 38.5% and obesity in 30%. Coronary insufficiency was found in 3.8% of cases, and heart failure in 5.8% [9].

A triggering factor was found in all cases: animal purine intake in 33.1%, drugs in 52.5%, alcohol in 9.6% and post-traumatic in 4.8% [9].

These data differ from those obtained in this study, where the triggering factors were dominated by overeating (98.11%).

According to the clinical data, joint pain was the main reason for consultation; the knee and elbow were the joints most affected (49.06% each), followed by the big toe (32.07%);

Pain was inflammatory in 62.26% of cases and 35.85% of controls.

Pain onset was progressive in 54.72% of cases and 98.11% of controls.

Oligoarthritis was most common (56.60%), followed by monoarthritis (28.30%) and polyarthritis (15.10%).

Amri et al found in their study that 28.6% of patients presented with monoarthritis, 38.1% with oligoarthritis and 33.3% with polyarthritis [9].

Angalla et al in Brazzaville in 2024 had found that joint involvement was in the majority of cases polyarticular in 52% of cases, followed by oligoarticular and monoarticular in 24% of cases. Monoarticular involvement was most common in the big toe (44.45%), followed by the knee (33.33%) and the elbow (22.22%) [8].

Amri et al found that 28.6% of patients presented with monoarthritis, 38.1% with oligoarthritis and 33.3% with polyarthritis. Gouty tophus and joint deformity were noted in 15.4% and 17.3% of cases respectively [9].

Early manifestations of acute gouty arthritis are typically monoarticular (90%). The metatarsophalangeal joint of the first ray is the first joint involved in over 50% of patients [10].

According to the clinical forms of gout in this study, chronic polyarticular gout represented 56.60%; gout attack 30.19% and chronic tophaceous gout 13.21%.

This result is comparable to that of Kemta Lekpa et al in Cameroon in 2017 [12].

Renal impairment in this study was marked by chronic renal failure, with stage II and III predominating, with frequencies of 47.10% and 30.19% respectively in the case group, and 45.28% and 08.19% in the control group.

Chronic renal failure is a silent disease with a progressive course, often discovered by chance in the presence of certain clinical events or late onset of complications. A number of studies have demonstrated a link between the decline in glomerular filtration rate and uricemia. In CKD, a progressive increase in uricemia is observed as the eGFR decreases [5].

There was no significant association between renal failure and gout; Krishan et al had reported in their studies that renal glomerular function was an important risk factor for gout [13].

Madala et al had found in their study that in univariate and multivariate analysis is positively associated with male sex and cardiovascular disease, while it was negatively associated with African ancestry, but neither of these factors remained significant [14].

Conclusion

Chronic renal failure is a factor in hyperuricemia; numerous studies have demonstrated a statistically significant association between renal failure and the development of gout. This study failed to establish this link because of the small sample size. Excessive consumption of purine-rich foods can increase plasma uric acid levels and may be a trigger for painful attacks. Chronic gout can lead to or aggravate kidney disease, which can progress to chronic renal failure. Studies on this subject need to be carried out with larger samples and taking into account several parameters for a better analysis.

Informant Consent Statement

All authors appearing in this article also share and agree to the publication of this article in your journal.

Conflict of Interest

The authors declare that there are no conflicts of interest in the preparation of this article.

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