Prevalence and pattern of hyperuricemia in a survey among inhabitants of Sokoto metropolis, north western Nigeria.

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Abstract

Pbjective. Hyperuricemia is increasingly being recognized as a risk factor for cardiovascular, metabolic and renal diseases. Studies have revealed links between urate, cardiovascular events and metabolic syndrome with considerable ethnic and geographical variation. Although clinical features may develop in persons with hyperuricemia, more than 60% remain symptomatic. There are no definite criteria for therapeutic intervention in patients with asymptomatic hyperuricemia. The study attempts to determine the prevalence and pattern of hyperuricemia among inhabitants of Sokoto in a bid to identify associated factors and threshold for rational therapy.

Methods. A cross sectional survey of 161 adults in which demographic indices including physical examination, anthropometric measurements were obtained with urine and blood samples taken for analysis. Statistical evaluation was done, using SPSS version 16 (SPSS Inc. Chicago, IL)

Results. Hyperuricemia was documented in 20.5%, with male to female ratio of 2:1 and higher mean urate level in males. Urate level increased with age; ranging from 5.0mmol/L±1.8 among 20-29 years to 6.5mmol/L±1.6 in those aged 50-59 years. Systemic hypertension, type2 DM, Obesity and kidney dysfunction were commoner among normouricemic than hyperuricemic subjects.

Conclusions. Hyperuricemia is common, especially among male gender and advancing age. The association between hyperuricemia and cardiovascular events remains a contentious issue as prevalence of type2DM, obesity and kidney dysfunction were similar in hyperuricemic and normouricemic subjects. We could not determine threshold to commence treatment for elevated uric acid level. A larger population and multicentre research is required to prove a link between hyperuricemia and some components of metabolic syndrome.

Keywords: Hyperuricemia, Prevalence, Pattern, Sokoto, Nigeria

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Prévalence et motif de l'hyperuricémie dans une enquête auprès des habitants de la métropole de Sokoto, au nord ouest du Nigeria.

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Resume

Objectif. L'hyperuricémie est de plus en plus reconnu comme un facteur de risque pour cardiovasculaires, métaboliques et les maladies rénales. Des études ont révélé des liens entre l'urate, les événements cardiovasculaires et le syndrome métabolique avec une variation ethnique et géographique considérable. Bien que les caractéristiques cliniques peuvent se développer chez les personnes présentant une hyperuricémie, plus de 60% demeurent symptomatiques. Il n'y a pas de critères précis pour l'intervention thérapeutique chez les patients présentant une hyperuricémie asymptomatique. L'étude tente de déterminer la prévalence et les tendances de l'hyperuricémie chez les habitants de Sokoto, dans le but d'identifier les facteurs et les seuils associés pour la thérapie rationnelle.

Méthodes. Une enquête transversale de 161 adultes dans lequel les indices démographiques, y compris l'examen physique, les mesures anthropométriques ont été obtenus avec l'urine et de sang prélevés pour analyse. L'évaluation statistique a été effectuée à l'aide du logiciel SPSS version 16 (SPSS Inc. Chicago, IL)

Résultats. Hyperuricémie a été documentée dans 20,5%, avec ratio hommes-femmes de 2: 1 et plus le niveau moyen de l'urate chez les mâles. niveau de l'urate augmente avec l'âge; allant de 5,0 mmol / L ± 1,8 entre 20-29 ans à 6,5 mmol / L ± 1,6 chez ceux âgés de 50-59 ans. L'hypertension systémique, type2 DM, l'obésité et la dysfonction rénale étaient plus fréquents chez les normouricemic que les sujets hyperuricémiques.

Conclusions. Hyperuricémie est fréquent, surtout chez le sexe masculin et l'âge avancé. L'association entre l'hyperuricémie et d'événements cardiovasculaires reste une question controversée que la prévalence des type2DM, l'obésité et la dysfonction rénale étaient similaires chez les sujets hyperuricémiques et normouricemic. Nous ne pouvions pas déterminer le seuil de commencer le traitement pour le niveau d'acide urique élevé. Une population plus importante et la recherche multicentrique est nécessaire de prouver un lien entre hyperuricémie et certains composants du syndrome métabolique.

Mots-clés: Hyperuricémie, Prévalence, Motif, Sokoto, Nigeria

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INTRODUCTION

Elevated serum uric acid level is fast gaining prominence as a risk factor for cardiovascular, metabolic and kidney diseases (1,2). Hitherto, it was largely thought to be a consequence of these conditions or having indirect association with these diseases rather than playing an etiologic role (3). Hyperuricemia is currently not considered to be an important risk factor for metabolic syndrome, cardiovascular events and renal disorders by the American Heart Association (AHA), National Kidney Foundation (NKF) and Joint National Committee (NJC) on prevention, detection, evaluation and treatment of hypertension (4,5,6). The link between elevated urate and cardiovascular events has been studied in general populations and in patients with type 2 diabetes, congestive cardiac failure, coronary heart disease and systemic hypertension (9,10). Multiple studies provide evidence that hyperuricemia is an independent risk factor for cardiovascular mortality (11-14).

Studies from different parts of world have also revealed considerable ethnic and geographic variations in mean serum uric acid levels (15-17). The differences have been ascribed to genetic, physiologic and environmental factors which include age, sex, race, socioeconomic status, diet, systemic hypertension and alcohol intake (7,18). Global prevalence rate of hyperuricemia has been reported to be between 5% to 62% (7,18,19). In Nigeria, prevalence among diabetics from studies by Isezuo et al and Ogbera et al were 32.3% and 25% respectively (20,21). Hyperuricemia is frequently seen in hypertensive patients and is often related to defect in renal urate clearance (18,22,23). Patients with hypertension and increased urate level have about 5 fold increased risk of coronary artery disease and cerebrovascular disease as compared with patients with normal urate levels (24,25). Recent studies have documented association between urate level and hypertension, type 2 diabetes mellitus(DM),chronic kidney disease(CKD), heart failure, metabolic syndrome, obesity and cardiovascular events (11,17,21,25,26). Despite increasing incidence of gout and other uric acid related diseases (19), it has been found that persons with asymptomatic hyperuricemia are very common. Although clinical manifestations may develop in individuals with hyperuricemia at any point, more than 60% of such persons remain asymptomatic and without physical signs (18,22,24). Asymptomatic hyperuricemia has also been associated with some disorders which appear to be largely unrelated to crystal deposition (1,3,9,11,17). These disorders include hypertension, chronic kidney disease, cardiovascular disease and insulin resistance syndrome. A universally acceptable definition of hyperuricemia is not available because of the discrepancies observed in clinical features at varied levels of uric acid (18,22,25,27). However, physicochemical definition based upon the solubility limit of urate in body fluids corresponds to urate concentration greater than 7mg/dL(416 μmol/L) as measured by automated enzymatic methods or 8mg/dL obtained with colorimetric methods (27,28).There is paucity of definite criteria on which to decide commencement of medical treatment in individuals with asymptomatic hyperuricemia. This study is an attempt to determine the prevalence of hyperuricemia among inhabitants of Sokoto metropolis in a bid to identify threshold for rational therapy.

MATERIALS AND METHODS

This is a cross sectional survey carried out during the world kidney day 2013 celebration amongst the populace of Sokoto metropolis, North western Nigeria. Ethical approval was obtained from Usmanu Danfodiyo University Teaching Hospital, Sokoto while consent was obtained the participants.

At the end of the survey, 161 participants were screened for cardiovascular and renal risk factors. Indices such as age, gender, occupation, educational level, diet and drug history were obtained through face to face interview. Similarly, history of smoking, alcohol consumption and chronic medical conditions such as for hypertension and diabetes were documented. All subjects had measurements of weight, standing height and BMI with readings taken to the nearest 0.1 kg and nearest 0.1 cm for weight and height respectively. Waist and hip circumference were measured and waist hip ratio determined. Blood pressure was measured in the sitting position after 5 minutes rest and average of two readings taken, using a mercury sphygmomanometer.

Five milliliters of venous blood and spot urine sample was collected from each participant. A dip stick method, using an Ames-Multistix (Combi-10) urinary reagent strip was utilized to analyze the urine samples. Both low and high power objective lens of light microscope were used to examine for casts, white blood cells, red

blood cells, epithelial cells and crystals. The blood specimens were allowed to clot at room temperature for 30 minutes and sera were obtained after centrifugation at 1000 x g for 10minutes. The sera were used for the evaluation of uric acid using Chiron express plus chemistry autoanalyser by Chiron diagnostics, USA. Subjects were considered to have hyperuricemia if the serum uric acid level was 416 µmol/L (7.0 mg/dL) in males and 386 µmol/L (6.5 mg/dL) in females. These cutoff values are used to define hyperuricemia in our clinical laboratory.

All statistical analysis was performed using the SPSS program, version 16.0 (SPSS Inc, Chicago, IL). The data were presented as means ± SD or proportions. Categorical data were compared by means of Chi-square test and continuous variables by means of t-test. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 161 subjects were studied with overall mean age of 28.48 (6.8). Males constituted 59%(n=95) of study subjects while females constituted 41%(n=66) with mean age of 27.6(4.3) and 29.7(9.2) respectively. The clinical and biochemical characteristics in both genders are presented in table 1. Means of waist circumference, waist hip ratio, systolic blood pressure diastolic blood pressure, fasting blood sugar and serum urea were similar between males and females. However, the mean BMI was higher in the females than in the males (p=0.04). A higher percentage of males (29.3%) had significant proteinuria than females but the difference did not reach statistical significance. Nine females (5.6%) had hematuria which was not seen in any of the male participants. Hyperuricemia was found in 33 subjects (20.5%) with male to female ratio of 2:1. Males had a higher mean uric acid of 5.19 ± 1.76 than females 4.89 ± 1.58, but the difference did not reach statistical significance, p-value>0.05.

The distribution of serum uric acid by age group is shown in table 2. The serum uric acid appears to be increasing with age ranging from 5.0 ±1.8mmol/L in those aged 20-29years to 6.5 ±1.6 mmol/L among participants in age group 50-59 years. Comparison of subjects with hyperuricemia against those with normouricaemia is presented in table 3. The anthropometric parameters, blood pressure indices and biochemical parameters were similar between those with and without hyperuricemia. However, the former had more history of hypertension than the latter respectively, p=0.01. Spearman' rho correlation analysis of serum uric acid with other parameters done for the study subjects did not show any significant association with serum uric acid level (Table 4).

DISCUSSION

The prevalence of hyperuricemia from this study is comparable with that of Isezuo et al and Ogbera et al even though they worked on high risk groups (20, 21). This study was conducted among the urban populace and life styles associated with urbanization is a known risk factor for hyperuricemia. A significant number of the participants also had historical evidence of long standing systemic hypertension. Elevated serum uric acid level has been found to be commoner among males (9,24,29) in line with the findings in the present study.

The result of this study showed that uric acid levels increase with advancing age which is consistent with findings of previous studies (7,18,30). Renal excretion and clearance of uric acid decreases with age and the additional risk of arteriolosclerosis in old age especially in hypertensive individuals is contributory. Hyperuricemia revealed a gender bias as fewer females had elevated uric acid level than males. The uricosuric effect of estrogen is said to account for lower incidence of hyperuricemia in females with increasing age prior to menopause (29).

Hyperuricemia results as a consequence of increased production or decreased excretion of uric acid (10). Elevated serum uric acid level induces vascular inflammation and arterial endothelial wall damage with increased risk of atherosclerosis (11,15). The consequent endothelial dysfunction and reduction in the concentration of endothelial nitric oxide are the proposed mechanisms by which uric acid is associated with cardiovascular risk or clustering of risk factors designated “metabolic syndrome”. However, the contribution of hyperuricemia to atherosclerotic vascular disease still remains controversial (12,15). Some studies argue that observed association between hyperuricemia and components of metabolic syndrome were indirect and coincidental (12,13), while others documented overwhelming evidence of strong correlation between them (11,14,16,21). Consequently, the assumption that hyperuricemia is a risk factor of some component of metabolic syndrome and renal dysfunction is no longer in dispute (10,25,26,28).

The present study interestingly showed that normouricemic and hyperuricemic subjects had similar prevalence of diabetes mellitus, obesity and impaired renal function but the latter had more history of hypertension than the former. This may be as a result of the fact that this survey was not among high risk group of patients, although the association between hyperuricemia and early phases of some components of metabolic syndrome has been shown to be inconsistent (17). There was no statistical significance in correlation analysis for uric acid with Age, BMI, SBP,
DBP, and urea and serum creatinine in this study. In a related study by Alikor et al, similar correlation analysis had statistical significance with waist circumference, total cholesterol, low density lipoprotein and gender (24). The foregoing observations and taking cognizance of the fact that more subjects with historical evidence of hypertension had hyperuricemia underscore the need for more comprehensive study of uric acid level in hypertensive patients.

CONCLUSION

Hyperuricemia is common among the study subjects especially among male gender and advancing age. The causal relationship of hyperuricemia and cardiovascular events still remains a contentious issue as the prevalence of type2DM, obesity and kidney dysfunction were similar between hyperuricemic and normouricemic subjects. It was not feasible to determine threshold to commence treatment for elevated uric acid level from this study. A larger population size and multicentre research is required to prove a link between hyperuricemia and some components of metabolic syndrome.

Conflict of interest: No conflict of interest declared.

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Table 1: Baseline characteristics of study population

Variable	population (N=161) Mean (SD)	Gender based differences		
		Male (N=95) Mean (SD)	Female (N=66) Mean (SD)	p-value
Age (years)	28.5 (6.8)	27.6 (4.3)	29.7 (9.2)	0.06
BMI (Kg/m2)	24.04 (4.5)	23.4 (3.7)	24.40 (5.4)	0.03*
WC (cm)	83.5 (9.0)	83.6 (8.4)	83.4 (10.4)	0.90
WHR	1.06 (0.4)	1.07 (0.4)	1.04 (0.4)	0.70
SBP(mmHg)	117.8 (14.0)	118.9 (13.6)	116.3 (14.4)	0.26
DBP(mmHg)	77.1 (10.2)	77.9 (9.6)	75.9 (11.0)	0.21
RBS(mmol/l)	6.3 (2.8)	5.9 (1.8)	6.9 (3.7)	0.07
Urea (mmol/l)	5.1 (2.1)	4.9 (2.1)	5.2 (2.1)	0.43
Creatinine(umol/l)	1.0 (0.3)	1.1 (0.3)	1.0 (0.3)	0.04*
Uric acid (mmol/l)	5.1 (1.7)	5.2 (1.8)	4.9 (1.6)	0.25
Hyperuricaemia (N%)	33 (20.5%)	22 (23.2%)	11 (16.7)	0.049
Proteinuria (N%)	45 (28%)	28 (29.5%)	17 (25.8%)	0.6
Haematuria	9 (5.6%)	0 (0%)	9 (5.6%)	

KEY: BMI=Body mass index, WC=waist circumference, WHR= waist hip ratio, SBP=systolic blood pressure, DBP= Diastolic blood pressure, RBS=Random blood sugar.

Table 2: Distribution of serum uric acid by age group of participants

Age group (years)	Frequency	Serum uric acid (Mean SD)
10-19	1	5.1 (-)
20-29	130	5.0 (1.8)
30-39	16	5.1 (1.9)
40-49	6	6.0 (1.8)
50-59	6	6.5 (1.2)
60-69	2	6.3 (1.6)
Total	161	5.2 (1.7)

Table 3: Comparison of participants with hyperuricaemia and normouricaemia

Variable	Hyperuricaemia (N= 35) Mean (SD)	Normouricaemia (N=126) Mean (SD)	p-value
Age (years)	28.0 (5.9)	28.6 (7.1)	0.62
Weight (kg)	67.0 (11.0)	68.1 (12.1)	0.64
BMI (kg/m2)	23.3 (3.0)	24.1 (4.8)	0.24
WC (cm)	83.3 (8.5)	83.6 (9.2)	0.89
WHR	1.09 (0.43)	1.05 (0.39)	0.67
SBP (mmHg)	115.3 (9.5)	118.5 (14.9)	0.14
DBP mmHg)	75.5 (7.5)	77.6 (10.8)	0.20
RBS (mmol/l)	6.0 (1.5)	6.4 (3.0)	0.37
Urea (mmol/l)	4.7 (1.6)	5.1 (2.1)	0.30
Creatinine (µmol/l)	1.1 (0.2)	1.0 (0.3)	0.37
Hypertension history (N%)	6 (17.9%)	8 (6.3%)	0.01

KEY: BMI=Body mass index, WC=waist circumference, WHR= waist hip ratio, SBP=systolic blood pressure, DBP= Diastolic blood pressure, RBS=Random blood sugar.

Table 4: Spearman' rho correlation of serum uric acid with other variables

Variables	Correlation coefficient	P value
Age	0.143	.070
BMI	0.006	.941
SBP	- 0.022	.782
DBP	0.081	.313
RBS	-0.006	.943
Urea	0.043	.616
Creatinine	0.084	.288

KEY: BMI=Body mass index, SBP=systolic blood pressure, DBP= Diastolic blood pressure, RBS=Random blood sugar.