

RESEARCH ARTICLE

Prevalence of Hyperuricemia at Birat Medical College and Teaching Hospital, Biratnagar, Nepal

Amar Kumar Sinha*, Chandra Prakash Gaire

Department of Biochemistry, Birat Medical College and Teaching Hospital, Biratnagar, Nepal

Received: 15 March 2019; Revised: 26 April 2019; Accepted: 07 June 2019

ABSTRACT

Serum uric acid (SUA) and the prevalence of hyperuricemia have been increasing both in developing and developed countries over the past decades. Recent studies suggest that hyperuricemia is an independent risk factor for metabolic syndrome, type-2 diabetes, and cardiovascular disease. Although the incidence of gout in Nepalese adults is increasing, epidemiologic studies on hyperuricemia in the general Nepalese population are limited. The aims of this study were to evaluate the prevalence of hyperuricemia at Birat Medical College and Teaching Hospital, Biratnagar, Nepal. A hospital-based retrospective study was conducted from December 2015 to November 2016. A total of 1513 (507 males and 625 females) outpatient department from Birat Medical College Teaching Hospital, Biratnagar, Nepal, were participated in this survey. Total subject was investigated for SUA by uricase/phenol-aminophenazone (PAP) method. SUA concentration of >7 mg/dl in men and >6 mg/dl in women was considered as hyperuricemia. Overall prevalence of hyperuricemia among the total population (1513) was 25.18%. Among hyperuricemia population, the prevalence of men and women was 25.33% and 25.05%, respectively. The prevalence of hyperuricemia was high in young Nepalese adults of age <20 years (39.53% in men and 35.06% in female). Similarly, >60 years age group, hyperuricemia in men and women was 32.85% and 28.88%, respectively. The prevalence of hyperuricemia among <20 years age group was relatively high followed by >60 years age group. There was high prevalence of hyperuricemia among the men compare to women of these populations of Biratnagar, Nepal.

Keywords: Prevalence, Serum uric acid, Gout

INTRODUCTION

Serum uric acid (SUA) is the final product of both endogenous and exogenous purine metabolism in humans.^[1,2] Uric acid is excreted majorly by the kidneys ($>70\%$) with a smaller portion by intestinal and biliary secretion.^[3] Abnormalities in SUA metabolism and its impairment in renal function usually yield urate retention and are one of the leading causes of hyperuricemia.^[3]

The prevalence of hyperuricemia and gout had shown an increasing trend all over the world

including in developing countries and dietary habits. The prevalence of hyperuricemia in Nepal and in the developing world has low studies than in the developed world^[1]. Gout is an inflammatory arthritis caused by the long-term deposition of monosodium urate crystals in the joint tissues^[3]. This condition typically occurs after years of sustained hyperuricemia. It is estimated to affect 5.1 million people in the United States according to the most recent National Health and Nutrition Examination Survey (NHANES).^[3]

Hyperuricemia may include many complications such as chronic gout and renal failure.^[4] A few study has reported that hyperuricemia in adults was associated with metabolic syndrome, type 2 diabetes, chronic kidney diseases, and coronary

***Corresponding Author:**

Dr. Amar Kumar Sinha,
E-mail: sinhaamar96@gmail.com

artery disease.^[26-28] Therefore, it is important to study the prevalence of hyperuricemia in Biratnagar, Nepal. The present study was carried out to determine the prevalence of hyperuricemia among men and women of Biratnagar, Nepal, who had come to the Birat Medical College and Teaching Hospital, Biratnagar, Nepal. This study will help us to know about the demographic pattern of hyperuricemia and also about the age group that will have more chance to develop gout and other related complications.

MATERIALS AND METHODS

We conducted retrospective study of 1513 outpatients for investigation of SUA level in the Biochemistry Department, Brat Medical College and Teaching Hospital, Biratnagar, Nepal, from December 2015 to November 2016. Blood sample of selected patients was withdrawn under supervision of biochemistry departments. Sample was collected in clean vacutainers and SUA was estimated by kit method (Uricase/PAP method) Beacon Diagnostics Pvt. Ltd. using Erba fully automated analyzer. We defined subjects as hyperuricemia if their SUA concentration was >7 mg/dl in men and >6 mg/dl in women.^[5] Obtained data were analyzed using Excel.

RESULTS

Table 1 shows that 1513 patients were investigated (679 men and 834 women). SUA level found elevated in 381 patients and 1132 found within normal range. In 381 patients elevated cases, 172/679 were male and 209/834 were female. Overall prevalence of hyperuricemia was 25.18% and among hyperuricemia population, the prevalence in men and women was 25.33% and 25.05%, respectively.

Table 2 shows the prevalence of hyperuricemia in different age groups, i.e., <20 years->60 years in men. The highest prevalence of hyperuricemia in male found in the age group of >20 years (39.53%) and the second highest was found in >60 years (35.06%) of age groups.

In Table 3, the highest prevalence of hyperuricemia was found in females in <20 years (32.85%) of

Table 1: Prevalence of hyperuricemia in different genders

Gender	Normal	Elevated	Total	Prevalence %
Men	507	172	679	25.33
Women	625	209	834	25.05
Total	1132	381	1513	25.18

P = 0.90

Table 2: Prevalence of hyperuricemia in different age groups in male

Age/years	Normal	Elevated	Total	Prevalence %
<20	26	17	43	39.53
21–40	248	64	312	20.51
41–60	183	64	247	25.91
>60	50	27	77	35.06
Total	507	172	679	

Chi-square = 12.31, P = 0.006

Table 3: Prevalence of hyperuricemia in different age groups in female

Age/years	Normal	Elevated	Total	Prevalence %
<20	47	23	70	32.85
21–40	290	102	392	26.02
41–60	256	71	327	21.71
>60	32	13	45	28.88
Total	625	209	834	

Chi-square = 4.76, P = 0.190

age groups and the second highest was found in >60 years (28.88%) of age groups. In our study, it was found that the prevalence rate of hyperuricemia increases as the age rises.

DISCUSSION

Hyperuricemia has become a major public health issue worldwide due to its high and increasing prevalence in the global context.^[6-8] A national survey reported that approximately 21.4% of adults in the US suffered from hyperuricemia.^[9] Meanwhile, the prevalence of hyperuricemia is ranged from 13% to 25.8% in some Asian countries.^[10-13] Hyperuricemia is diagnosed in 5–30% of general population^[14] in the past several decades; the prevalence of hyperuricemia varied greatly and appeared to be increasing.^[15] In Nepal, the prevalence of hyperuricemia was 21.42%.^[16] In Thailand, 10.6%^[17] in accordance with the previous

studies, it is found that SUA levels are higher in men than in women, although uric acid levels in women tend to increase above the age of 50 years. Studies have shown that high concentration of SUA has been associated with an early onset of hypertension and predicts rise in blood pressure, an increase in body and triglyceride levels.^[5,18-19] In contrast, many studies^[20-25] have found that an elevated SUA level is associated not only with purine intake from seafood, meat, and beer but also the presence of endogenous metabolic disorders. The concentration of uric acid reflects the balance of purine metabolism by xanthine oxidase (XO) in the liver and its elimination by the kidney.^[29] Therefore, levels of SUA are closely related to the enzymatic activity of XO, which is directly responsible for tissue oxidative stress.^[30] However, hyperuricemia is not as great of a concern as other metabolic disorders among people living in Mongolian regions, where the lifestyle is much different from that of other populations living in Asian regions. This study was conducted in the eastern region of Nepal and found that, among the study population, the SUA level differed according to gender and age.

This is hospital-based retrospective study, therefore, does not stimulate the occurrence in community. Sometimes, we cannot get complete record of patients, which could have been useful to give important information to the patients with rapid industrial development and due to that hike in financial status possibility of improved nutrition and promotion of successful health and medical care programs in Nepal life expectancy has been prolonged and the elderly population has been increased: Thus, preventing and control of chronic diseases have become more important than before.

CONCLUSIONS

The present study was conducted to explore the age group of hyperuricemia among the peoples of Biratnagar. The prevalence of hyperuricemia was high in young Nepalese adults of age <20 years of age group.

ACKNOWLEDGMENT

We thank all subjects who participated in the study and the staff at BMCTH for their assistance with the study.

REFERENCES

- Pokharel K, Yadav BK, Jha B, Parajuli K, Pokharel RK. Estimation of serum uric acid in cases of hyperuricaemia and gout. *JNMA J Nepal Med Assoc* 2011;51:15-20.
- Wortmann RL, Kelley WN. Kelley's, Textbook of Rheumatology. 6th ed. Philadelphia, PA: W.B. Saunders Company; 2001. p. 1339-76.
- Kramer HM, Curhan G. The association between gout and nephrolithiasis: The national health and nutrition examination survey III, 1988-1994. *Am J Kidney Dis* 2002;40:37-42.
- Neupane Y, Padmavathi P, Dubey RK, Gautam N, Jayan A, Sinha, AK. A hospital based retrospective study on prevalence of hyperuricemia in Lumbini zone, Nepal. *Ann Biol Res* 2014;5:8-11.
- Conen D, Wietlisbach V, Bovet P, Shamlaye C, Riesen W, Paccaud F, et al. Prevalence of hyperuricemia and relation of serum uric acid with cardiovascular risk factors in a developing country. *BMC Public Health* 2004;4:9.
- Liu H, Zhang XM, Wang YL, Liu BC. Prevalence of hyperuricemia among Chinese adults: A national cross-sectional survey using multistage, stratified sampling. *J Nephrol* 2014;27:653-8.
- Trifirò G, Morabito P, Cavagna L, Ferrajolo C, Pecchioli S, Simonetti M, et al. Epidemiology of gout and hyperuricaemia in Italy during the years 2005-2009: A nationwide population-based study. *Ann Rheum Dis* 2013;72:694-700.
- Wallace KL, Riedel AA, Joseph-Ridge N, Wortmann R. Increasing prevalence of gout and hyperuricemia over 10 years among older adults in a managed care population. *J Rheumatol* 2004;31:1582-7.
- Zhu Y, Pandya BJ, Choi HK. Prevalence of gout and hyperuricemia in the US general population: The national health and nutrition examination survey 2007-2008. *Arthritis Rheum* 2011;63:3136-41.
- Uaratanawong S, Suraamornkul S, Angkeaw S, Uaratanawong R. Prevalence of hyperuricemia in Bangkok population. *Clin Rheumatol* 2011;30:887-93.
- Roddy E, Doherty M. Epidemiology of gout. *Arthritis Res Ther* 2010;12:223.
- Miao Z, Li C, Chen Y, Zhao S, Wang Y, Wang Z, et al. Dietary and lifestyle changes associated with high prevalence of hyperuricemia and gout in the Shandong coastal cities of eastern China. *J Rheumatol* 2008;35:1859-64.
- Nagahama K, Iseki K, Inoue T, Touma T, Ikemiya Y, Takishita S, et al. Hyperuricemia and cardiovascular risk

- factor clustering in a screened cohort in Okinawa, Japan. *Hypertens Res* 2004;27:227-33.
14. Fang J, Alderman MH. Serum uric acid and cardiovascular mortality the NHANES I epidemiologic follow-up study, 1971-1992. National health and nutrition examination survey. *JAMA* 2000;283:2404-10.
 15. Alderman MH, Cohen H, Madhavan S, Kivlighn S. Serum uric acid and cardiovascular events in successfully treated hypertensive patients. *Hypertension* 1999;34:144-50.
 16. Sanjana RK, Shah R, Chaudhary N, Singh YI. Prevalence and antimicrobial susceptibility pattern of methicillin-resistant *Staphylococcus aureus* (MRSA) in CMS-teaching hospital: A preliminary report. *J Coll Med Sci Nepal* 2010;6:1-6.
 17. Vitoon J, Rungroj K, Thananya B, Kamol U, Suthipo U. Prevalence of hyperuricemia in Thai patients with acute coronary syndrome. *Thai Heart J* 2008;21:86-92.
 18. Feig DI, Madero M, Jalal DI, Sanchez-Lozada LG, Johnson RJ. Uric acid and the origins of hypertension. *J Pediatr* 2013;162:896-902.
 19. Keenan T, Blaha MJ, Nasir K, Silverman MG, Tota-Maharaj R, Carvalho JA, et al. Relation of uric acid to serum levels of high-sensitivity C-reactive protein, triglycerides, and high-density lipoprotein cholesterol and to hepatic steatosis. *Am J Cardiol* 2012;110:1787-92.
 20. Hara S, Tsuji H, Ohmoto Y, Amakawa K, Hsieh SD, Arase Y, et al. High serum uric acid level and low urine pH as predictors of metabolic syndrome: A retrospective cohort study in a Japanese urban population. *Metabolism* 2012;61:281-8.
 21. Zhang Z, Bian L, Choi Y. Serum uric acid: A marker of metabolic syndrome and subclinical atherosclerosis in Korean men. *Angiology* 2012;63:420-8.
 22. Tomiyama H, Higashi Y, Takase B, Node K, Sata M, Inoue T, et al. Relationships among hyperuricemia, metabolic syndrome, and endothelial function. *Am J Hypertens* 2011;24:770-4.
 23. Li Q, Yang Z, Lu B, Wen J, Ye Z, Chen L, et al. Serum uric acid level and its association with metabolic syndrome and carotid atherosclerosis in patients with Type 2 diabetes. *Cardiovasc Diabetol* 2011;10:72.
 24. Pacifico L, Cantisani V, Anania C, Bonaiuto E, Martino F, Pascone R, et al. Serum uric acid and its association with metabolic syndrome and carotid atherosclerosis in obese children. *Eur J Endocrinol* 2009;160:45-52.
 25. Lu Z, Dong B, Wu H, Chen T, Zhang Y, Wu J, et al., Serum uric acid level in primary hypertension among Chinese nonagenarians/centenarians. *J Hum Hypertens* 2009;23:113-21.
 26. de Oliveira EP, Burini RC. High plasma uric acid concentration: Causes and consequences. *Diabetol Metab Syndr* 2012;4:12.
 27. Puddu P, Puddu GM, Cravero E, Vizioli L, Muscari A. Relationships among hyperuricemia, endothelial dysfunction and cardiovascular disease: Molecular mechanisms and clinical implications. *J Cardiol* 2012;59:235-42.
 28. Chuang SY, Lee SC, Hsieh YT, Pan WH. Trends in hyperuricemia and gout prevalence: Nutrition and health survey in Taiwan from 1993-1996 to 2005-2008. *Asia Pac J Clin Nutr* 2011;20:301-8.
 29. Puddu P, Puddu GM, Cravero E, Vizioli L, Muscari A. Relationships among hyperuricemia, endothelial dysfunction and cardiovascular disease: Molecular mechanisms and clinical implications. *J Cardiol* 2012;59:235-42.
 30. Stocker R, Keaney JF Jr. New insights on oxidative stress in the artery wall. *J Thromb Haemost* 2005;3:1825-34.