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Original Research Article

Urolithiasis in vegetarian population attending a tertiary care centre: a retrospective study

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ABSTRACT

Background: Urolithiasis is the one of the most common urological disease with kidney stone, being the most painful and prevalent urological disorders of the urinary system. Its prevalence has drastically increased during the present century with 3–20% of the overall population of the world having the tendency to form one urinary stone during the life time of 70 years. Diet is an integral part of renal accumulation and thus filtration, which in turn affects the absorption and bodily homeostasis of renal stone occurrence. The epidemiology differs in accordance with different geographical regions and social constructs. Within this context, food habits have been proposed as one of the major risk factors in renal stone formation, as a form of epidemiology for urine composition. With this background, this study is designed to study the incidence of urolithiasis in the vegetarian population of northeast India.
Methods: The study was designed as an observational study by including all the patients diagnosed with having urolithiasis on imaging who was managed according to different treatment modalities. Patients included in the study were enquired about their diet habits and were recorded.
Results: Out of the 151 cases of urolithiasis being studied, prevalence in male were 2.5 times more than female. Age group 31-40 years comprised of most number of patients with calculi (28.5%). Kamrup (metro and rural) had the most number of urolithiasis cases (33.8%). 5 cases of urolithiasis were found to be pure vegetarian (3.3%). 38.4% of the patient had a history of smoking.
Conclusions: Most of the patients had unilateral calculi. Majority of the urolithiasis patient hailed from Kamrup (rural and metro) district, followed by Darrang and Nalbari district. Vegetarian group of patient with urolithiasis had significant history of alcohol intake, smoking and tobacco chewing.

Keywords: Urolithiasis, Alcohol intake, Smoking

INTRODUCTION

Urolithiasis is the one of the most common urological disease with kidney stone, being the most painful and prevalent urological disorders of the urinary system.[1] Its prevalence has drastically increased during the present century with 3–20% of the overall population of the world having the tendency to form one urinary stone during the life time of 70 years.[2] Urolithiasis (urinary calculi) formation occurs in kidney, bladder and in the urinary tract.[3,4]

Urolithiasis constitutes a significant economic burden worldwide.[5,6] The primary physicians are being approached because of increase in the prevalence of urolithiasis. Therefore, utmost responsibility for diagnosis, management, referral to specialists, and further follow-up lies on the primary care physician.[7] Moreover, the prevalence is more in obese patients.[8] The epidemiology of urinary stone disease has increased dramatically though significant regional differences exists such as in North America (7–13%), Europe (5–9%), and Asia (1–5%).[9,10]

Diet is an integral part of renal accumulation and thus filtration, which in turn affects the absorption and bodily homeostasis of renal stone occurrence.[11,12] The epidemiology differs in accordance with different geographical regions and social constructs. Within this context, food habits have been proposed as one of the major risk factors in renal stone formation, as a form of epidemiology for urine composition.[13,14]

With this background, this study is designed to study the incidence of urolithiasis in the vegetarian population of northeast India.

METHODS

Study type

It was a descriptive study.

Study place

The study was conducted at the Department of Urology and Renal Transplant, Gauhati Medical College and Hospital, Guwahati, Assam.

Study period

The duration of the study was from July 2021 to December 2022.

Selection criteria of the patient

All patients diagnosed with urolithiasis, admitted in the urology ward, planned for management under different treatment modalities were taken as the inclusion criteria.

Procedure

A fact sheet was prepared containing information regarding relevant parameters. The content validity was verified. Patients with radiological imaging revealing urolithiasis, and planned for management under different modalities were included in the study. The patient was enquired about his/her diet habits and was recorded. The patient was also enquired about their habits of smoking, drinking and chewing tobacco. Patients' postal address was recorded and the distribution was represented district wise.

Ethical approval

Approval of the institutional ethics committee (IEC) was obtained before commencing the study (No.MC/190/2007/Pt II/Oct 2022/31).

Statistical analysis

The data collected was tabulated and analyzed in Microsoft excel 2021 with inbuilt statistical analysis tool. Frequency distribution was used in case of non-numerical variables (nominal and ordinal) variables.

Sample size

All the patients diagnosed with urolithiasis, satisfying the inclusion criteria, after taking consent were studied and constitute the sample size. It is a purposive sampling with a total of 151 cases.

RESULTS

Out of the 151 cases of urolithiasis being studied, 108 cases were male and 43 cases were female (Table 1).

Table 1: Gender wise distribution of the cases.

Gender	No. of cases (%)
Male	108 (71.52)
Female	43 (28.47)

The study showed maximum occurrence of calculus in the age group 31-40 i.e., 43 cases (28.5%) followed by 40 cases (26.5%) in the age group of 41-50 years. The occurrence of lithiasis in various age group has been depicted in the table (Table 2).

Table 2: Age wise distribution of the cases.

Age group (in years)	No. of cases (%)
11-20	6 (3.9)
21-30	23 (15.2)
31-40	43 (28.5)
41-50	40 (26.5)
51-60	20 (13.2)
61-70	13 (8.6)
71-80	6 (3.9)
Total	151

Site of the stone was invariably related with its management. 101 cases had renal calculi, followed by 38 cases of ureteric calculi and 12 cases of bladder calculi (Table 3).

Table 3: Distribution of the cases according to the site of the calculus.

Site of the stone	No. of cases (%)
Renal	101 (66.88)
Ureteric	38 (25.16)
Vesical	12 (7.94)

Out of the 151 cases, 35 cases were having bilateral calculi (renal/ureteric) and 104 cases were unilateral. 146 cases were identified as being non vegetarian and only 5 cases were vegetarian (Tables 4 and 5).

Table 4: Distribution of cases according to laterality (uni/bi).

Laterality	No. of cases (%)
Unilateral	104 (68.87)
Bilateral	35 (23.17)

Table 5: Distribution of cases according to type of diet.

Diet	No. of cases (%)
Non vegetarian	146 (96.68)
Vegetarian	5 (3.31)

In the distribution of 151 patients having urolithiasis among various districts of Assam, Kamrup rural district had the most number of cases, 29 (19.2%) with Kamrup metro having 22 cases (14.6%), followed by Darrang district 21 cases (13.9%) and Nalbari district 17 cases (11.3%) (Table 6).

Pattern of food intake was studied among the vegetarian population having urolithiasis. Out of the 5 cases diagnosed with urolithiasis, all of them were regular intake of vegetables like tomato, cauliflower and brinjal. 2 of them takes intermittently fruits, coconut water whereas rest 3 takes occasionally. 4 of them takes green leafy vegetables intermittently. 2 of them are regular chocolate consumer whereas rest takes intermittently (Table 7).

Table 6: Distribution of cases of urolithiasis treated district wise.

Name of the districts	No. of cases (%)
Kamrup rural	29 (19.2)
Kamrup metro	22 (14.6)
Darrang	21 (13.9)
Nalbari	17 (11.3)
Udalguri	13 (8.6)
Lakhimpur	8 (5.3)
Sonitpur	4 (2.6)
Baksa	7 (4.6)
Nagaon	7 (4.6)
Goalpara	4 (2.6)
Dhubri	4 (2.6)
Morigaon	3 (1.9)
Barpeta	3 (1.9)
Jorhat	3 (1.9)
Charaideo	1 (0.6)
Dhemaji	1 (0.6)
Biswanath chariali	1 (0.6)
Dibrugarh	2 (1.3)
Karbi anglong	1 (0.6)
Total	151

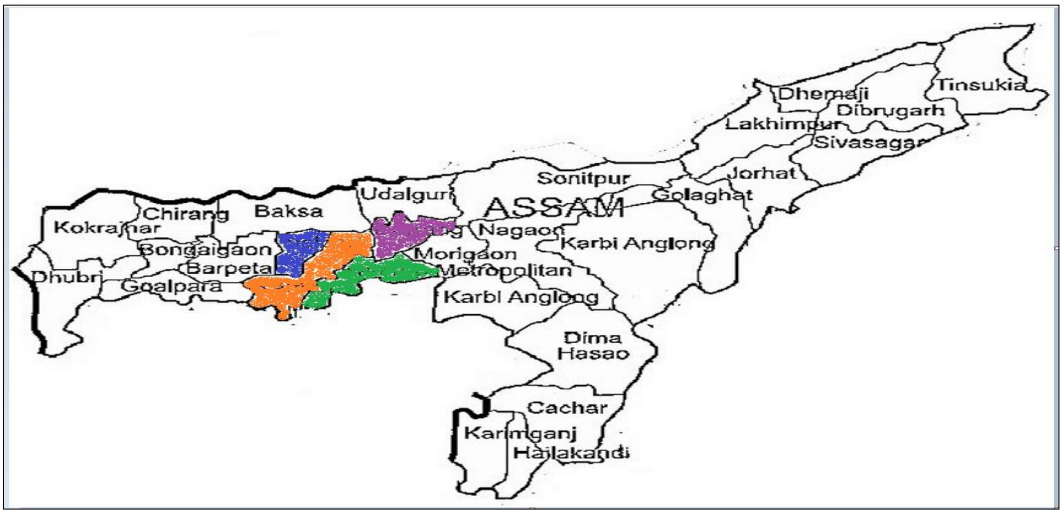

Figure 8: Apparent stone belt present in Assam from where the maximum patients suffering from urolithiasis are encountered.

Table 7: Distribution of cases according to the pattern of food habit.

Pattern of food habit	Frequency of intake (%)		
	Regular (almost daily)	**Intermittently (3 days in a week)**	**Occasional**
Intake of vegetables (like tomato, cauliflower, brinjal)	5 (100)		
Intake of fruits, coconut water		2 (40)	3 (60)
Intake of green leafy vegetables		4 (80)	1 (20)
Intake of chocolate	2 (40)	3 (60)	

Out of all the 151 cases, 47 (31.16%) of them were regular or occasional consumer of alcohol, 58 (38.41%) of them were smoker while 51 (33.77%) of them were tobacco chewer (Table 8).

Table 8: Distribution of cases according to intake of tobacco, alcohol and smoking.

Parameters	No. of cases (%)
Alcohol intake	47 (31.16)
Smoking	58 (38.41)
Chewing tobacco	51 (33.77)

DISCUSSION

Our study comprising of 151 cases had a male: female ratio of 2.5. Age group 31-40 years comprised of most number of patients with calculi. Faridi et al in their study found that the male to female ratio was 1.01:1 in the urolithiasis population. Imphal west district comprised of 30.8% patients. Single stone population group comprised of 63.1% of studied population, commonly seen in the 31–40 years of age, whereas multiple stones (n=59) were predominant in the 41–50 years of age group, difference of number of stones between the age groups was statistically significant (p=0.000). Kidneys (67.4%) was the most common location of stones and urethra were the least common site. They also concluded that there is a shift in gender distribution of urolithiasis. Increased prevalence of urolithiasis were associated with obesity, aging demographics and number of stones.[15]

Sandilya et al in their study found that out of 307 patients studied, 228 were males and 79 were females. Male to female ratio was 2.9:1. The maximum number of patients in the age group was between 30-39 years. Majority of the patients were found to be from the Dibrugarh district of upper Assam. Most of the positive urolithiasis cases was found in patients consuming a non-vegetarian diet. They concluded that urolithiasis is a disease with preponderance in adult males. Geographical distribution, age and diet are factors that affect the occurrence of the disease.[16]

Prakash et al in their study found that among the 150 people being studied in age group of 20–80, majority (46%) were more than 60 years of age. It observed that the kidney stone patients were higher in the age group of 21-60 (46%) and lower <20 (1%) and >60 (7%) which was statistically significant (15.33±8.74; p=0.01). They concluded that kidney stone formation may be due to the food habits (diet), age, sex, obesity, genetics and environmental factors, geographical location, climate and lifestyle.[17]

Our study had a significant history of alcohol intake, smoking and tobacco intake in the urolithiasis patient. Also in vegetarian population with urolithiasis, details about intake of vegetables (like tomato, cauliflower, and brinjal), fruits, coconut water, green leafy vegetables and chocolate were taken into account. Guha et al did a study on food habits among the urolithic populations. They concluded that dietary therapy can be one of the promising solutions for minimizing the cases of recurring kidney stone formation and hence a better quality of life. Stone formation is mostly attributed to two mechanisms: renal calcium leak, excessive absorption, bone resorption/formation imbalance; and mineralization. Dietary factors have been widely recognized as one of the primary risk factors of kidney stone formation.[18,19]

The increased consumption of animal products leads to higher calcium, oxalate, and phosphorous in the urinary tract.[20-22] These are the reasons for stone formation, initially in the form of insoluble calcium oxalate or calcium phosphate crystals. Proteins also increase uric acid generation, which may end up in stone formation.[21,22] High carbohydrate and lipid consumption has been shown to have similar changes.[23] The presence of a high amount of salt in fast food, especially in industrialized countries, causes higher calcium in the kidneys.[24] Conversely, a low calcium diet is considered to be a risk factor, as it increases the intestinal absorption of oxalate.[25] Citric acid, potassium, and magnesium act as negative regulators of stone synthesis.[21] For this reason, the inadequate intake of fruits and vegetables are considered as risk factors for stone synthesis, although some oxalate-rich fruits, such as berries, chikoos, and vegetables, such as tomatoes, spinach, and beets, are still of some risk.[26,27]

Limitations

It was a single centre study.

CONCLUSION

Out of the 151 cases of urolithiasis being studied, prevalence in male were 2.5 times more than female. Age group 31-40 years comprised of most number of patients with calculi. Most of the patients had unilateral calculi (68%). Majority of the urolithiasis patient hailed from Kamrup (rural and metro) district, followed by Darrang and Nalbari district. Vegetarian group of patient with urolithiasis had significant history of alcohol intake, smoking and tobacco chewing.

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REFERENCES

1. Machoy P. Analytical evaluation of urinary calculi mineral composition. Ann Acad Med Stetin. 1995;41:259-71.
2. Chauhan CK, Joshi MJ, Vaidya ADB. Growth inhibition of struvite crystals in the presence of herbal extract Boerhaavia diffusa Linn. Am J Infect Dis. 2009;5(3):177-86.

3. Moe OW. Kidney stones: Patho-physiology and medical management. Lancet. 2006;28;333-44.
4. Pearle MS, EA Calhoun, Curhan GC. Urologic Diseases in America, NIH Publication No. 07–5512. 2007;283-319.
5. Mikawlrawng K, Kumar S, Vandana R. Current scenario of urolithiasis and the use of medicinal plants as antiurolithiatic agents in Manipur (North East India): a review. Inter J Herbal Med. 2014;2(1):1-2.
6. Sunitha J, Thirunavukkarasu P, Asha S. A retrospective study on prevalence and risk factors associated with kidney stone in Vellore district, Tamil Nadu. Int J Pharm Sci Rev Res. 2018;48(1):54-7.
7. Han H, Segal AM, Seifter JL, Dwyer JT. Nutritional management of kidney stones (nephrolithiasis). Clin Nutrition Res. 2015;4(3):137-52.
8. Romero V, Akpinar H, Assimos DG. Kidney stones: a global picture of prevalence, incidence, and associated risk factors. Reviews Urol. 2010;12(2-3):e86.
9. Wathigo FK, Hayombe A, Maina D. Urolithiasis analysis in a multiethnic population at a tertiary hospital in Nairobi, Kenya. BMC Res Notes. 2017;10(1):158.
10. Marak A, Shantibala K, Singh TA, Singh RN, Singh LS. Urolithiasis: prevalence and related factors in a rural area of Manipur. Inter J Med Sci Pub Heal. 2013;2(4):956-60.
11. Borghi L, Schianchi T, Meschi T, Guerra A, Allegri F, Maggiore U, et al. Comparison of two diets for the prevention of recurrent stones in diopathic hypercalciuria. N Engl J Med. 2002;346:77-84.
12. Taylor EN, Fung TT, Curhan GC. DASH-style diet associates with reduced risk for kidney stones. JASN. 2009;20:2253-9.
13. Trinchieri, A. Epidemiology of urolithiasis. Arch Ital Urol Androl. 1996;68:203-49.
14. Robertson WG. Renal stones in the tropics. Semin Nephrol. 2003;23:77-87.
15. Faridi MS, Singh KS. Preliminary study of prevalence of urolithiasis in North-Eastern city of India. J Family Med Prim Care. 2020;9:5939-43.
16. Sandilya P. A demographic study of urolithiasis in patients attending tertiary urological hospital in Dibrugarh, Assam, India. Int J Res Med Sci. 2019;7(2):417-20.
17. Prakash R, Arunachalam, Narayanasamy. Prevalence and socio-demographic status on kidney stone patients in Thanjavur district, Tamil Nadu, India. Int J Comm Med Public Health. 2019;6(5):1943-7.
18. Guha M, Banerjee H, Mitra P, Das M. The Demographic Diversity of Food Intake and Prevalence of Kidney Stone Diseases in the Indian Continent. Foods. 2019;8(1):37.
19. Nouvenne A, Meschi T, Guerra A, Allegri F, Prati B, Borghi L. Dietary treatment of nephrolithiasis. Clin Cases Miner Bone Metab. 2008;5:135-41.
20. Robertson WG, Peacock M, Baker M, Marshall DH, Pearlman B, Speed R, et al. Studies on the prevalence and epidemiology of urinary stone disease in men in Leeds. BJU Int. 1983;55:595-8.
21. Breslau NA, Brinkley L, Hill KD, Pak CY. Relationship of animal protein-rich diet to kidney stone formation and calcium metabolism. J Clin Endocrinol Metab. 1988;66:140-6.
22. Lekcharoensuk C, Osborne CA, Lulich JP, Pusoonthornthum R, Kirk CA, Ulrich LK, et al. Association between dietary factors and calcium oxalate and magnesium ammonium phosphate urolithiasis in cats. J Am Vet Med Assoc. 2001;219(9):1228-37.
23. Meschi T, Nouvenne A, Ticinesi A, Prati B, Guerra A, Allegri F, et al. Dietary habits in women with recurrent idiopathic calcium nephrolithiasis. J Transl Med. 2012;10:63.
24. Goldfarb DS, Coe FL. Prevention of recurrent nephrolithiasis. Am Fam Physician. 1999;60:2269-76.
25. Finkielstein VA, Goldfarb DS. Strategies for preventing calcium oxalate stones. CMAJ. 2006;174:1407-9.
26. Traxer O, Huet B, Poindexter J, Pak CY, Pearle MS. Effect of ascorbic acid consumption on urinary stone risk factors. J Urol. 2003;170:397-401.
27. Meschi T, Maggiore U, Fiaccadori E, Schianchi T, Bosi S, Adorni G, et al. The effect of fruits and vegetables on urinary stone risk factors. Kidney Int. 2004;66:2402-10.

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