

UROLITHIASIS: PREVALENCE AND RELATED FACTORS IN A RURAL AREA OF MANIPUR

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ABSTRACT

Background: Urolithiasis is the third most common urological disease. The prevalence is on the rise due to various changes in the socio-demographic and other etiological factors in the north-eastern states of India in general and Manipur in particular.

Aims & Objective: The study was conducted to determine the prevalence of urinary stones and to assess the association between urolithiasis and selected variables of interest.

Material and Methods: The study was conducted during September 2008 to August 2010 among wetland dwellers of Loktak Lake in Thanga, a rural area of Manipur. A representative sample of subjects, which included men and women 15 years of age and above were included in the study. Sample size was calculated based on a prevalence rate of 5.41% with an allowable error of 1.5 at 95% confidence level. Calculated sample size was 875. A pre-tested interview schedule was used for data collection.

Results: A total of 875 individuals were studied. The prevalence rate of urolithiasis was 196(22.40%) and was more commonly present in the age group of 25-44 years. Urolithiasis was observed to be significantly more common among those individuals who are more educated, engaged in heavy work, with history of urinary tract infection (UTI), with history of stressful events in recent years, among those who consumed only 2-4 glasses of water per day and with family history of stones.

Conclusion: Prevalence of urolithiasis was observed to be 196(22.4%). Information regarding the risk factors which have been identified in the present study can be utilized in formulating future health plans for preventive services.

Key-Words: Urolithiasis; Prevalence, Urinary Tract Infection (UTI)

Introduction

Urolithiasis is the third most common urological disease affecting both males and females but predominant among males in a proportion of approximately 2:1.^[1] The epidemiology of urolithiasis differs according to geographical area as well as by changing socio-economic conditions in terms of incidence and prevalence, age and sex distribution, type of lithiasis and stone location. Such differences have been explained in terms of race, diet and climate factors.^[2] Epidemiological surveys have been previously reviewed showing that in economically developed countries the prevalence rate ranges between 4% and 20%.^[3] In developing countries the male-to-female ratio ranges from 1.15 to 1 in Iran^[4], 2.5 to 1 in Iraq^[5] and 5 to 1 in Saudi Arabia^[6]. However a change in the prevalence by gender has been reported in the United States during the last decade. Scales et al obtained a dramatic increase from 1997 to 2002

in the prevalence of stone disease among females and a change from a 1.7:1 to 1.3:1 male-to-female ratio. The increasing incidence of nephrolithiasis in women might be due to lifestyle associated risk factors, such as obesity.^[7] Persons affected with kidney stones have a lifetime risk of passing it in about 8-10% of cases. Once a kidney stone forms, the probability of recurrence within 5-7 years is approximately 50%.^[8] Highest incidence of kidney stone is in 30-45 years age group and decreases after the age of 50 years. In India, the "stone belt" occupies some parts of Maharashtra, Gujarat, Punjab, Haryana, Delhi and Rajasthan.^[9] As recurrence is common, this condition impacts on the economically active population representing a significant healthcare cost burden, as it is associated with restricted activity and/or hospitalization. Although new and effective therapeutic methods to treat urolithiasis have been introduced recently, urinary stones continue

to occupy an important place in everyday urological practice. In Manipur, the situation is not an exception as the incidence of urolithiasis is high. From hospital records for a period of seven years and three months, urolithiasis cases was observed to be 11.6% of all general surgery cases in the General Hospital attached to a Medical College in Imphal.^[10]

The prevalence of urolithiasis is on the rise due to various changes in the socio-demographic and other etiological factors in the north-eastern states of India in general and Manipur in particular. However there is a lack of proper scientific study on this condition in this tiny part of the country and hence this present study is initiated to determine the prevalence of urinary stones in a rural area of Manipur.

Materials and Methods

A cross sectional study was conducted during September 2008 to August 2010 in Thanga, in Bishenpur district of Manipur state. The study area, Thanga has wetland dwellers in and around the Loktak Lake, the biggest freshwater lake in the country. It consists of 1010 households scattered in 8 villages. A sample of 875 individuals of 15 years of age and above, excluding those who refused to give consent and not available on two successive visits was selected for the purpose. The sample size was based on a prevalence rate of 5.41% with an allowable error of 1.5 at 95% confidence level.

A two-stage sampling was used to obtain the required number of study subjects. In the first stage, entire Thanga was divided into eight villages and then three villages are selected by lottery method. In the second stage, from each selected village, three localities were selected by random number technique and then total enumeration was conducted in all selected localities. A pre-designed and pre-tested interview schedule which consisted of socio-demographic characteristics, lifestyle variables including their dietary habits, water consumption, stressful events, history of their urinary stone status, any family history of urolithiasis, history of UTI etc. was used as tool for data collection. After taking informed consent from each eligible member in

the household, a detailed face-to-face interview was taken. Those participants who reported having urinary stones was confirmed from the reports of various investigations like ultrasonography, KUB X-ray and records of operations done. Stressful life events were defined as those life events that the subjects perceived as highly stressful and inflicted upon them intense emotional impact with apprehension and distress for at least one week.

Ethical approval from institutional ethical committee, RIMS, Imphal was obtained before conducting the study. Statistical analysis was done by using descriptive statistics like mean, standard deviation and percentages. Chi-square test was employed as test of significance and p-value of <0.05 was taken as significant.

Results

744 (85.0%) while only 36 (4.1%) were heavy workers. History of urinary tract infection (UTI) was present in 326 (37.3%) of the study population.

Regarding the dietary pattern of the study participants, majority 820 (93.7%) consumed fish daily and the type of fish consumed was mainly small fish 791 (90.4%). Majority 853 (97.5%) consumed small fish with head. Meat and fruit consumption was observed to be very less in the study area with majority taking both items only occasionally. Nearly two-third of the study population consumed only 2-4 glasses of water per day. Table 2 showed the distribution of urolithiasis by selected variables. Urolithiasis was observed to be significantly more common 109 (56.7%) in the age group of 25 to 44 years. Even though males suffer more 109 (22.9%), the finding was not statistically significant. Urolithiasis was also significantly more prevalent among those individuals with history of UTI 165 (50.6%), who are engaged in heavy work 15 (41.7%) and among those who consumed only 2 to 4 glasses of water per day 159 (29.1%). The condition was also observed to be more common among those who had a family history of urolithiasis 73 (67%) and who had experienced stressful events in the recent years 192 (24.9%). Prevalence of urolithiasis was higher among those

who consumed fish daily 187 (22%) and significantly more so among those 65 (33%) who consumed both big and small fish. The condition was also more among those who consumed fruits on a daily basis. However the finding was not statistically significant (Not shown in table).

Table-1: Background Characteristics of Study Population

Characteristics		No.	%
Age (years)	15-24	41	4.7
	25-34	157	17.9
	35-44	222	25.4
	45-54	229	26.2
	55-64	114	13.0
	≥65	112	12.8
Sex	Male	463	52.9
	Female	412	47.1
Marital Status	Married	730	83.3
	Unmarried	132	15.2
	Widower	13	1.5
Educational Status	Illiterate	441	50.5
	Undermatric	184	21.0
	Matric	115	13.1
	Higher secondary	69	7.9
	Graduate and above	66	7.5
Employment Status	Employed	107	12.2
	Unemployed	768	87.8
Type of Work	Heavy	36	4.1
	Moderate	744	85.0
	Sedentary	95	10.9
History of UTI	Yes	326	37.3
	No	549	62.7

Table-2: Distribution of Urolithiasis Cases by Selected Variables

Characteristics		Urolithiasis		P-value
		Yes	No	
Age (years)	15-24	7 (17.1)	34 (82.9)	0.015*
	25-34	41 (26.1)	116 (73.9)	
	35-44	68 (30.6)	154 (69.4)	
	45-54	36 (15.7)	193 (84.3)	
	55-64	26 (22.8)	88 (77.2)	
	≥65	18 (16.1)	94 (83.9)	
Sex	Male	109 (22.9)	366 (77.1)	0.685
	Female	87 (21.8)	313 (78.2)	
Educational Status	Illiterate	80 (18.1)	361 (81.9)	0.000*
	Undermatric	39 (21.2)	145 (78.8)	
	Matric	27 (23.5)	88 (76.5)	
	Higher secondary	30 (43.5)	39 (56.5)	
	Graduate & above	20 (30.3)	46 (69.7)	
Type of Work	Heavy	15 (41.7)	21 (58.3)	0.000*
	Moderate	157 (21.1)	587 (78.9)	
	Sedentary	24 (25.3)	71 (74.7)	
History of UTI	Yes	165 (50.6)	161 (49.4)	0.000*
	No	31 (5.6)	518 (94.4)	
Stressful Events in Recent Years	Yes	192 (24.9)	580 (75.1)	0.000*
	No	2 (1.9)	101 (98.1)	
Water Consumed/Day	2-4 glasses	159 (29.1)	388 (70.9)	0.000*
	5-7 glasses	35 (11.6)	267 (88.4)	
	≥ 7 glasses	2 (7.7)	24 (92.3)	
Family H/O of Stones	Yes	73 (67.0)	36 (33.0)	0.000*
	No	123 (16.1)	643 (83.9)	

* P<0.05: Significant

Discussion

The prevalence of urolithiasis in the study area is higher 196 (22.4%) than that observed in past findings by other researchers.^[9,14] It may be due to the variation of risk factors over the places as well as times. For instance, the prevalence of the condition varies between 2% and 20% worldwide due to the variation in climatic conditions, eating and drinking habits as well as genetic factors.^[2,12,13]

A previous study have demonstrated that urolithiasis usually occurs between the third and fourth decades of an individual's life, and that the prevalence rate varies considerably according to age, while peak incidence of urinary calculi is from twenties to the forties.^[10] Similarly our study also reported maximum prevalence 109 (56.9%) in the age group of 25 to 44 years and more so among males. In contrast, another study reported that the prevalence of urolithiasis increased with age in both men and women, seeming to be more prevalent in elderly people, while rare in adolescents.^[17] According to literature, urolithiasis is more common in men than in women^[10,15], while other investigators found no statistically significant differences in the prevalence of lithiasis between sexes in all age groups.^[16,17] UTI plays an important role in the synthesis of renal stones.^[18]

In this study the prevalence of urolithiasis was higher 165 (50.6%) among those with history of UTI. The prevalence of urolithiasis was higher 192 (24.9%) among those who experienced stressful events in recent years. This finding was in accordance with another study which reported an association between stressful events and urolithiasis.^[19] An increased urine volume achieved by a high fluid intake had some preventive effect on the onset and recurrence of urinary stones. A sufficient intake of fluid is one of the most important preventive measures in recurrence of stones.^[20] It was also observed in the present study that the prevalence of urolithiasis was more among those who consumed only 2 to 4 glasses of water per day. The concurrence of a genetic predisposition seems to be crucial for calcium stone formation. In fact, the importance of family history for idiopathic

calcium stone disease is clearly demonstrated in a study conducted by Curham GC et al.^[24] This study has also clearly demonstrated that a family history of kidney stones was reported by 17.2% of men who had a kidney stone compared with 6.4% of men who had never had a stone. The condition was also observed to be more among those individuals engaged in heavy work. This might be because of more fluid loss associated with such types of work.

Conclusion

This study has thus highlighted better knowledge of the distribution of this condition in this section of the population. The study has identified significant preventable risk factors like UTI, less consumption of water, stressful events in recent years. It will thus allow for better planning of preventive services.

References

1. Lancina MJA, Rodriguez-Rivera GJ, Novas CS, Rodriguez GI, Fernandez RE, Alvarez CL et al. Metabolic risk factors in calcium urolithiasis according to gender and age of the patients. *Actas Urologicas Espanolas*. 2002;26:111-20.
2. Alberto N. Epidemiology of urolithiasis: an update. *Clin Cases Miner Bone Metab*. 2008;5(2):101-6
3. Trinchieri A. Epidemiology of urolithiasis. *Arch Ital Urol Androl*. 1996;68:203-50
4. Safarinejad MR. Adult urolithiasis in a population based study in Iran: prevalence, incidence and associated risk factors. *Urol Res*. 2007;35:73-82
5. Qaader DS, Yousif SY, Mahdi LK. Prevalence and etiology of urinary stones in hospitalized patients in Baghdad. *East Mediterr Health J*. 2006;12:853-61
6. Khan AS, Rai ME, Gandapur G, Pervaiz A, Shah AK, Hussain AA et al. Epidemiological risk factors and composition of urinary stones in Riyadh, Saudi Arabia. *J Ayub Med Coll Abbottabad*. 2004;16:56-8
7. Scales CD Jr, Curtis CH, Norris RD, Springhart WP, Sur RL, Schulman KA et al. Changing gender prevalence of stone disease. *J Urol*. 2007;177:979-82
8. Najem GR, Seebode JJ, Samady A, Feuerman M, Friedman L. Stressful life events and risk of symptomatic kidney stones. *Int J Epidemiol*. 1997;26:1017-23.
9. Stones bladder, kidney stones, renal calculus, lithotripsy, urinary stones. Dr. Raja's Urology & Andrology Centre. Available from URL: <http://www.dilipraja.com/stone.htm>. (Accessed 1st August 2010)
10. Singh PP, Singh LKB, Prasad SN, Singh MG. Urolithiasis in Manipur (north eastern region of India) Incidence and chemical composition of stones. *Am J Clin Nutr*. 1978; 31:1519-25.
11. Definition of Renal calculi. MedicineNet.com. Available from URL: <http://www.MedicineNet.com/urolithiasis>. (Accessed on 23rd April, 2010)
12. UNDP. Profile of human poverty in human development. Oxford 1997. Oxford University press. 1997;137-228.
13. Kidney stone. Wikipedia. Available from URL: http://en.wikipedia.org/wiki/kidneystone_sufferers. (Accessed on 3rd Feb, 2010)
14. Zahrani HA, Norman RW, Thompson C, Weerasingha S. The dietary habits of idiopathic calcium stone formers and normal control subjects. *BJU Int*. 2000;85(6):616-20.
15. Yanagawa M, Kawamura J, Onishi T, Soga N, Kamada K, Sriboonlue P et al. Incidence of urolithiasis in Northeast Thailand. *Int J Urol*. 2007;4(16):537-40.
16. Curham CG, Willett CW, Rimm BE, Stampfer JM. A prospective study on dietary calcium and other nutrients and risk of symptomatic stones. *NEJM*. 1993; 25;328(12):833-38.
17. Stamatiou KN, Karanasiou VI, Lacroix RE, Kavouras NG, Papadimitriou VT, Chlopsios C et al. Prevalence of urolithiasis in rural Thebes, Greece. *Rural Remote Health*. 2006;6(4):610.
18. Daudom M, Dore JC, Jungers P, Lacour P. Changes in stone composition according to age and gender of patients: a multivariate epidemiological approach. *Urol Res*. 2004;32(3):241-7.
19. Najem GR, Seebode JJ, Samady A, Feuerman M, Friedman L. Stressful life events and risk of symptomatic kidney stones. *Int J Epidemiol*. 1997;26:1017-23.
20. Siener R, Hesse A. Fluid intake and epidemiology of urolithiasis. *Eur J Clin Nutr*. 2003;57(2):547-51.
21. Curham GC, Willett WC, Rimm EB, Stampfer MJ. Family history and risk of kidney stones *J Am Soc Nephrol*. 1997;8(10):1568-73.

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