

Preliminary study of prevalence of urolithiasis in North-Eastern city of India

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ABSTRACT

Introduction: Urinary tract stone is one of the major urological problems globally and has changed significantly in the last few decades. The epidemiology differs according to geography, socioeconomic status, and diet. The primary care physicians are initially consulted rather than urologists because of increase in the prevalence of urolithiasis and saturation of health facilities. **Objectives:** To study the prevalence of urolithiasis in the urology department of a tertiary care centre, Manipur, India. **Methods:** A total 621 patients of urolithiasis were studied. After history and physical examination of each patient, urolithiasis was confirmed by X-ray Kidney Ureter Bladder (KUB) or Ultrasound (USG) KUB. **Results:** The male to female ratio was 1.01:1. 30.8% patients came from Imphal West district. 63.1% of studied population had single stone and commonly seen in the 31–40 years of age, whereas multiple stones ($n = 59$) were found most commonly in the 41–50 years of age group. The difference of number of stones according to age group was statistically significant ($P = 0.000$). The most common location of stones was in kidneys (67.4%) and stones in urethra were the least common ($P = 0.000$). **Conclusion:** In this preliminary study, we report the prevalence of urolithiasis in Manipur, India. The better understanding of the epidemiology of urolithiasis is important to plan the effective treatment and prevention strategies in general practice. There is a shift in gender distribution of urolithiasis. Aging demographics, number of stones, obesity; all were associated with increased prevalence of urolithiasis.

Keywords: Demography, epidemiology, urinary calculi, urinary tract stone

Introduction

Urolithiasis is one of the oldest disease affecting humans. The epidemiology of urinary stone disease has increased dramatically but with regional differences^[1] such as the prevalence in North America (7–13%), Europe (5–9%), and Asia (1–5%).^[2] In India, the lifetime prevalence of urolithiasis was 7.9% (5.7–10.8%).^[3] However, prevalence of urolithiasis in rural population of Manipur was 22.4%.^[4]

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Urolithiasis constitutes a significant economic burden with cost between £ 190 million and £ 324 million for 2010 in England^[5] and an expected additional expenditure of \$1.24 billion/year by 2030 in the United States.^[6]

The primary care physicians are initially consulted rather than urologists and nephrologists because of increase in the prevalence of urolithiasis and saturation of health facilities. Therefore, primary care physicians have utmost responsibility for diagnosis, management, referral to specialists, and further follow-up.^[7] Moreover, the urolithiasis is more prevalent in obese patients^[8] whose treatment is provided mainly by primary care physicians.^[9] There is no study available on the epidemiology of urolithiasis from North-Eastern part of India.

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Objectives

This study was conducted to determine the prevalence of urolithiasis in patients attending urology department at Regional Institute of Medical Sciences, Imphal, Manipur, India.

Methods

Study design & ethics

This was a prospective hospital based descriptive study conducted in the Department of Urology, Regional Institute of Medical Sciences, Imphal, Manipur, India from February 2016 to January 2018 after obtaining approval from the Research Ethics board of the Institute [A/206/REB-Comm (SP)/RIMS/2015]. The approval from ethics committee was obtained and the date of approval was 5.11.2015.

After taking written informed consent, patients with age 10 years or more with clinical features of urolithiasis and radiological confirmation of calculus disease were included. Patients who were unwilling to participate in the study or to undergo the necessary investigations were excluded. Children of age less than 10 years were also excluded. Total 664 patients were enrolled for the study, of which 621 were studied as rest left the study in between.

A detailed history and physical examination of each patient was recorded and confirmed for urolithiasis by X-ray KUB (Kidney, Ureter and Urinary Bladder) or Ultrasound KUB. To avoid repetition of the patients, an ID no. was issued to every patient on enrolling in the study. All data was recorded in a proforma specially designed for the study. The proforma includes history of pain, fever, hematuria, any past history of stone passage, family history of urolithiasis, any habit of alcohol, smoking, and tobacco chewing. On examination, height and weight with per abdominal findings were recorded. X-ray KUB or Ultrasound KUB findings which include site, side, size, number of stones were recorded.

Statistical analysis

In the study, statistical analysis was done by using IBM SPSS Version 21 for windows. Descriptive statistics such as mean, proportion, percentage were used to calculate the results. Chi square test were used as a test of significance of the study for comparing the outcome variables. $P = <0.05$ was taken as significant.

Results

Out of 621 patients, 313 (50.4%) were males and the male-to-female ratio was 1.01:1. The mean age of the patients was 42.88 ± 14.78 years and majority of the patients (25.12%) were between age group 31 and 40 years. Housewife as occupation was the most common (37.2%) among all studied patients [Table 1].

Majority of studied patients (50.9%) had no history of consumption of alcohol, smoking, tobacco chewing and 68.4%

Table 1: Socio-demographic parameters of the study population

Parameters	Number of patients (n=621)	Percentage
Age group (Years)		
10-20	22	3.5
21-30	127	20.4
31-40	156	25.1
41-50	137	22
51-60	105	16.9
61-70	49	7.9
71-80	18	2.9
81-90	7	1.1
Gender		
Male	313	50.5
Female	308	49.5
Occupation		
Student	82	13.2
Housewife	231	37.2
Office Workers	133	21.4
Retired	24	3.9
Business	107	17.2
Farmer	44	7.1
Habits		
Alcohol	142	22.9
Tobacco	10	1.6
Smoking	3	0.5
No	316	50.9
Alcohol+Tobacco	87	14
Alcohol + Tobacco + Smoking	63	10.1
BMI (Kg/m ²)		
<18.5	15	2.4
18.5-24.9	153	24.6
25-29.9	425	68.4
≥30	28	4.5

patients were tagged as overweight with body mass index (BMI) between 25 and 29.9 Kg/m² [Table 1].

As per district wise distribution, maximum patients 191 (30.8%) belonged to Imphal West [Figure 1].

Most of the patients (57.8%) were asymptomatic with flank pain present in 35.6% patients [Table 2]. 42.8% of patients had family history of urolithiasis.

63.1% of studied population had single stone and commonly seen in 31–40 years of age whereas multiple stones were found most commonly in 41–50 years of age group. There was statistically significant difference in the number of stones according to age group ($P = 0.000$) [Table 3].

The renal stones were the most common finding (67.47%) in either of the gender. Vesical stones and urethral stones were present only in males. The difference of location of stone according to gender is statistically significant ($P = 0.000$) [Figure 2].

In 259 (41.72%) patients, stones were present on right side, whereas in 163 (26.24%) patients had bilateral stones. Majority

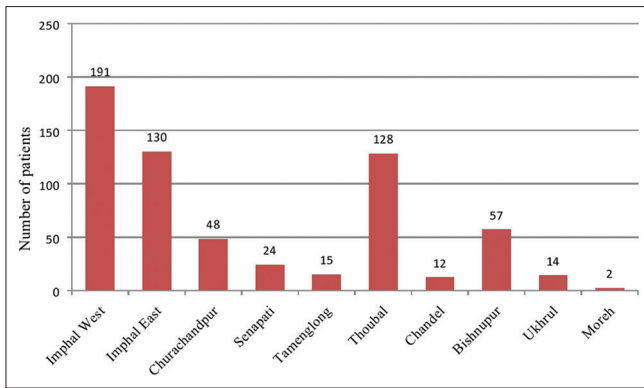


Figure 1: District wise distribution of study population

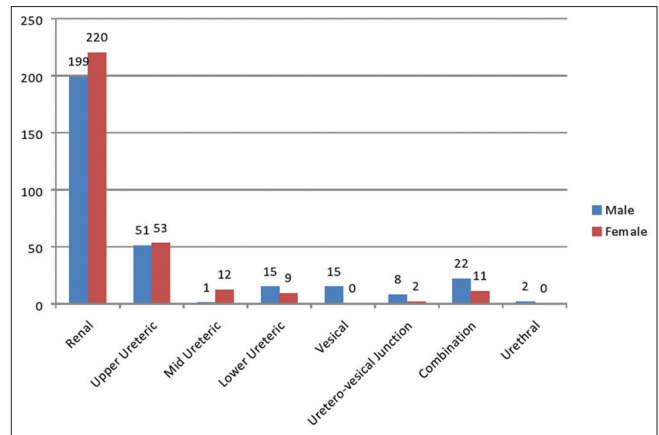


Figure 2: Site of stones according to gender

Complaints	Number of patients	Percentage
Pain	221	35.6
Fever	9	1.4
Hematuria	2	0.3
Burning Micturition	6	1
Asymptomatic	359	57.8
Pain + Fever	11	1.8
Pain + Hematuria	7	1.1
Pain + Burning Micturition	4	0.6
Pain + Fever + Hematuria	2	0.3

Age Group (years)	Single	Multiple
10-20	17	5
21-30	91	36
31-40	98	58
41-50	78	59
51-60	50	54
61-70	44	5
71-80	8	10
81-90	5	2

of the patients (56.8%) had stone size of 11–20 mm and only 14.5% patients had stone size of more than 20 mm.

Single stone was found in 228 patients whereas 123 patients had multiple stones of size 11–20 mm. Similarly, 118 patients had single stone and 58 patients had multiple stones of size upto 10 mm. More than 20 mm size stone was found as solitary calculus in 42 patients and multiple calculi in 47 patients. The difference of number of stones according to size of stones was statistically significant ($P = 0.003$).

Discussion

Urolithiasis is more common in males; however, the exact rate differs between studies.^[10] Male to female ratio in our study was 1.01:1. The worldwide literature showed the male: female ratio ranges from 3:1 to 1.8:1.^[11,12] Our data showed the change in the distribution of urolithiasis as per gender.

According to available literature, this is the first study which demonstrates district wise distribution of urolithiasis. The maximum number of patients were from Imphal West 191 (30.8%) and patients from Moreh were least (0.3%) [Figure 1]. Our institute is located in Imphal West, this could be the reason of maximum number of patients from this district, whereas Moreh is far away from our institute and moreover it is a hill district with communication and transport difficulties.

In our study, majority of the patients were housewives (37.2%) followed by office workers (21.4%). Only 7.1% were farmers. Sedentary life style professional had higher incidence of urinary calculi.^[13] It may be related to differences in the diet but also may be because of physical activity. Physical activity may agitate the urine and dislodge the crystal aggregation.

The general practitioner is often the first clinician involved in dealing directly during a renal colic or radiographic investigation performed on account of the presence or suspicion of other diseases.^[14] In the present study, 57.8% patients were asymptomatic at the time of presentation, so high index of intuition is required by the primary care physician. In a study on urolithiasis patients, most common symptom was loin pain (73% to 94%).^[15] But study done by Lohiya^[3] showed that majority of patients were asymptomatic at the time of presentation and diagnosed by ultrasound. We also had similar results and patients were diagnosed incidentally by radiographic or ultrasonographic techniques.

We observed that 42.8% of our patients had family history for urolithiasis while literature varies according to studies.^[16,17] This may be because of different genetic basis.

Studies showed that alcohol (> 3 times/week) reduces the incidence of urinary stones $P = 0.001$, OR (odds ratio) = 0.824,^[18] but smoking significantly increases the risk of urolithiasis, $P = 0.002$, OR = 8.474.^[19] In our study only 22.9% patients had history of regular alcohol consumption with 1.6% was tobacco chewer and 0.5% had history of smoking. Our results were

different from the worldwide literature which may be due to genetic makeup of Indian subgroup of patients.

68.4% of studied patients had BMI between 25 and 29.9 kg/m² in our study. Patients with a body mass index (BMI) of ≥ 25 kg/m² were associated with a greater risk of kidney stone formation.^[20] Our study also showed the same results.

In the present study, kidney was the most common site of calculus affecting in 419 (67.4%) cases. Upper 1/3 ureter 103 (16.6%), middle 1/3 ureter 13 (2.1%), lower 1/3 ureter 34 (5.5%), and vesical 16 (2.6%) followed in frequency. Stones present at two or more sites were in 34 (5.5%) patients. The incidence of urolithiasis differs according to location. A study reported 75.08% renal stones, 13.62% stones were ureteric stones, 9.56% had stones at vesico-ureteric junction (VUJ), and 1.74% stones had bladder stones.^[21] The observations in this study matched the worldwide trends.

In the present study, 41.72% the calculus was on right side. Hallawee S studied that calculi were found with equal frequency on either side with presence of stones on both the side in 26.24%.^[22]

In the present study, 63.1% patients had solitary urinary tract stone. Most of the single stones (n = 98) were present in 31–40 years group while majority of the multiple stones (n = 59) were found in 41–50 years group. The difference was statistically significant ($P = 0.000$). Literature also had the similar result with solitary stone present in 59.8% patients.^[22]

Limitations of the study

Our study has some limitations. The NCCT (Non-contrast CT scan) KUB which is the investigation of choice was not done because of financial constraints of the patient. Moreover, it is the single centre data, so further multicentric studies are required. Still more epidemiologic studies are crucial to further elucidate the risk factors associated with urolithiasis.

Key Points

- This is the first study revealing the district-wise distribution of urolithiasis in Manipur, India.
- There is a shift in gender distribution of urolithiasis.
- A very high index of suspicion for urolithiasis is required by family physician as majority were asymptomatic and the risk factors for urolithiasis (obesity, sedentary life style, smoking, alcohol) overlap with other diseases also.

Conclusions

In this preliminary epidemiological data, we report the prevalence of urolithiasis in Imphal, Manipur, India. The better understanding of the epidemiology of urolithiasis is important to plan the effective treatment guidelines and prevention strategies in general practice. The family physician

must have a high index of suspicion of urolithiasis as most of the patients in the study were asymptomatic and furthermore, the risk factors for urolithiasis identified in this study like obesity, sedentary life style, smoking, alcohol are common for other diseases also.

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Conflicts of interest

There are no conflicts of interest.

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