BANGLADESH JOURNAL OF
UROLOGY
Bangladesh J. Urol. 2023; 26(2): 104-109
www.banglajol.info/index.php/BJU
DOI: https://doi.org/10.3329/bju.v26i2.71223

Original Article

ISSN : 2304 - 8514 (Print)
ISSN : 2304 - 8522 (Online)

Pattern of Urinary Stone Disease among Armed Forces Personnel - A Cross Sectional Study of 223 cases

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Received: 01 - 07 - 2023
Accepted: 10 - 07 - 2023
Conflicts of interest: None

Keywords: Urinary stone disease, Armed Forces Personel.

Abstract

Introduction: *Urinary stone disease is one of the common disease entities with higher male preponderance seen in urological practice. Though etiology of urinary stone disease is not well understood but some precipitating factors like urinary infection, less fluid intake, dietary habit and metabolic factors has been observed common among the members of Armed forces personnel. They are having common supplied food items with prolonged exposure to precipitating factors of stone formation. This observation leads to inference this study to see the distribution of urinary stones among the members of Armed forces personnel.*

Materials and Methods: *This is a Cross-sectional study. A total of 223 patients diagnosed with urinary stone diseases and managed in Urology Center of Combined Military Hospital (CMH) Dhaka from 01 June 2022 to 30 June 2023 were included. The data was collected in a data collection sheet from hospital records. The data was entered into the Microsoft Excel software and analyzed using statistical package for social studies (SPSS) software 23.0 version.*

Results: *Among 223 patients 182 patients were male and 41 were female and male female ratio was 4:1. Age range found from 8 years to 81 years, with a mean of 40.99 years. According to location of stone the most common site was ureter, followed by Kidney. The highest incidence of stone disease was found in the summer months (May - July).*

Conclusion: *Urinary stones are predominantly found in male. Upper tract stone is more common than lower tract. During summer (May - July) more urinary stone disease found among armed forces personnel.*

Introduction

Urinary stone disease is a term used to describe calculi or stones that form in the urinary system. It is the third most common urological disease after UTI and prostatic pathology.[4] Data from five European countries, Japan, and the United States showed that the incidence and prevalence of urinary stone disease has been increasing over the time around the world.[5] Stone occurrence is relatively uncommon before the age of 20 but peak incidence is observed in the fourth to sixth decades of life.[6,7] The peak incidence from ages 60 to 69 years in men, but relatively little change in incidence between ages 20 and 70 years for women, with a slightly higher incidence in women 30 to 39 years and 60 to 69 years.[8] It has been observed that women show a bimodal distribution of stone disease, demonstrating a second peak in incidence in the sixth decade of life corresponding to the onset of menopause and a fall in estrogen levels.[6,7] Seasonal variation in stone disease is likely related to temperature by way

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of fluid losses from perspiration and perhaps by sunlight induced increases in vitamin D. The highest incidence of stone disease is seen in the summer months,[13] July through September, with the peak occurring within 1 to 2 months of maximal mean temperatures.[14] The study of military personnel translocated to desert locations has provided a unique opportunity to study the effect of climate on a defined population. American soldiers in an undisclosed desert location had an increase in symptomatic episodes of renal colic during the summer season.[15] Military personnel who developed symptomatic stones after arrival in Kuwait and Iraq revealed a mean time interval to stone formation of 93 days.[16] Heat exposure and dehydration constitute occupational risk factors for stone disease as well. Cooks and engineering room personnel, both of whom are exposed to high temperatures, were found to have the highest rates of stone formation among personnel of the Royal Navy.[17] Likewise, a significantly higher incidence of stones were found among steelworkers exposed to high temperatures (8%) compared to those working in normal temperatures (0.9%).[18]

Worldwide, the prevalence of urinary stone diseases varies from 2 to 20%.[19] And it is also projected that the prevalence will escalate.[20] As there is a paucity of data in this regard, to see the pattern of urinary stone diseases among Armed forces personnel is a time demanding topic to study. The general objective of this study is to explore the pattern of urinary stone disease managed at Combined Military Hospital (CMH) Dhaka. The specific objectives are to see the disease distribution, the professional risk factors, any secondary cause, stone types, recurrence of stones.

Materials and Methods

This Cross-sectional study was done on total 223 patients diagnosed with urinary stone diseases treated in OPD or IPD of Urology Centre at Combined Military Hospital (CMH) Dhaka from 01 June 2022 to 30 June 2023(12 months). Sample technique was Convenient sampling. Exclusion criteria are Stone disease with CKD and pregnancy.

Results

Among 223 patients 182 (81.6%) patients were male and 41 (18.4%) were female (Figure 1).

Table 3.1: *Age and sex distribution pattern (n=223)*

Age (years)	Total no. of cases	No. of male cases	No. of female cases	Percentage (%)
8-19	5	4	1	2.24
20-39	44	33	11	19.73
40-49	77	69	8	34.53
50-59	73	55	18	32.74
>60	24	21	3	10.76
Total	223	182	41	100

In our study the maximum prevalence 77 (34.53%) of urinary stone disease in the age group of 40 to 49 years.Age ranges were 8 years to 81 years. With a mean of 40.99 yrs. The mean age of the patients of our study was 40.99 years.

Table 3.2: *Recurrence of stone (n=223)*

Traits	Number of patients	Percentage
Recurrent	8	3.59
Not recurrent	215	96.41

Among 223 patients 8 patients observed with recurrent stone.

Table 3.3: *Comorbidities associated with urinary stone disease (n=223)*

Traits	Number of patients	Percentage
Diabetes	11	4.93
Hypertension	9	4.04
Hypothyroidism	1	0.45
UTI	16	7.17

Among 223 patients 16 patients reported with UTI, 11 patients with diabetes mellitus, 9 patients with hypertension, 1 patient with hypothyroidism.

Table 3.4: *Organism involved in UTI (n=16)*

Traits	Number of patients	Percentage
E. coli	15	93.75
Klebsiella	1	6.25

Among 223 patients 16 patients reported with UTI. Among these 16 patients most commonly found organism is E. coli (93.75%). Other organism is Klebsiella (6.25%).

Table 3.5: *UN mission status of patients (n=223)*

Traits	Number of patients	Percentage
Completed	101	45.29
Not completed	122	54.71

Among 223 patients 101 patients completed UN mission and 122 did not complete.

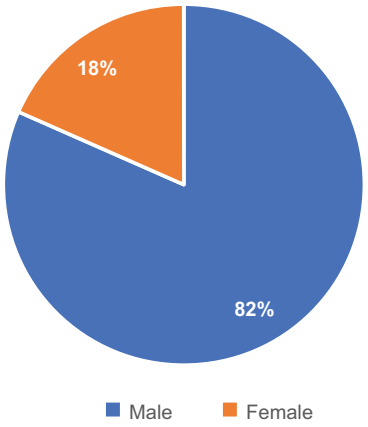

Figure 3.1: *Sex distribution (n=223)*

Among 223 patients 182 (81.6%) patients were male and 41 (18.4%) were female.

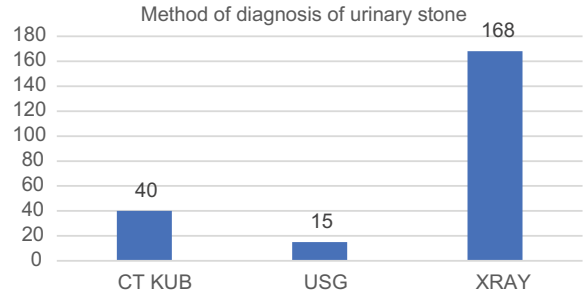

Figure 3.2: *Method of diagnosis of urinary stone (n=223)*

Among 223 patients 168 (75.33%) patients were diagnosed by an X-ray KUB, 40 (17.94%) were diagnosed by Non contrast CT scan of KUB, 15 (6.73%) patients were diagnosed by USG of KUB region.

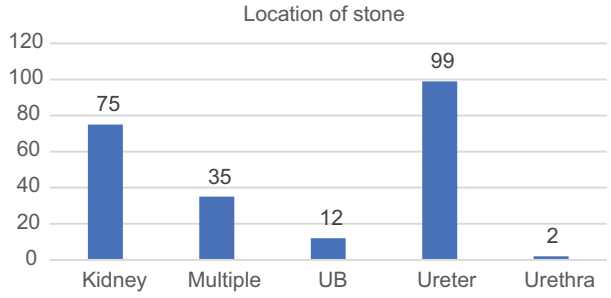

Figure 3.3: *Location of stone (n=223)*

According to location of stone the most common site is Ureter- 99 (52.66%), followed by Kidney- 75 (39.89%), 12 (6.38%) found in the urinary bladder and 2 (1.06%) found in the urethra. Stone found in multiple sites in 35 (15.69%) cases.

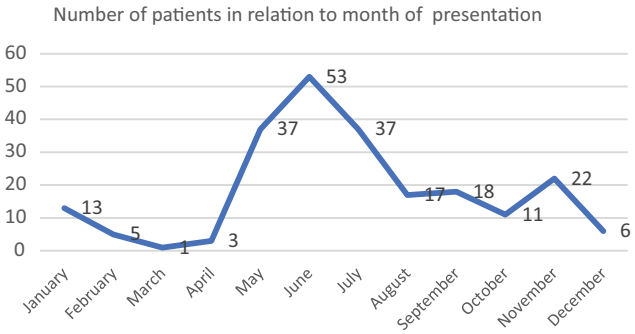

Figure 3.4: *Number of patients in relation to month of presentation (n=223)*

The highest incidence of stone disease is found in the summer months (June-23.77%, May-16.59%, July-16.59%).

Discussion

Regarding age-specific distribution a previous study has demonstrated that urolithiasis usually occurs between the fourth and fifth decades of an individual's life, and that the prevalence rate varies considerably according to age, while peak incidence of urinary calculi is from forties to fifties.[28] The peak age for onset of stone formation is in the fourth decade, and prevalence increases with age until 70.[29] According to Ahmad et al, the maximum incidence of renal stones were in the age group 40-49 years.[30] In our study also reported maximum prevalence 77 (34.53%) in the age group of 40 to 49 years. The mean age of the patients of our study was 40.99 years which is close to the study done by Ahmad et al and Sreedharan et al who found out the mean age to be 41.5 years.[30,31] According to literature, urinary stone disease is more common in men than in women. Urinary stone disease is the third most common urological disease affecting both males and females but predominant among males in a proportion of approximately 3:1.[32] In our study 81.6% were males and the male to female ratio was 4:1. In some other studies the ratio is as high as 6:1.[33] The male predominance can be described by the role of androgens in enhancing the oxalate excretion and deposition of calcium in the urinary system both being the main risk factors of urolithiasis whereas in female, estrogen decrease oxalate excretion. Therefore, there

is more burden of stones among males than in females. Seasonal variation in stone disease is likely related to temperature by way of fluid losses from perspiration and perhaps by sunlight induced increases in vitamin D. The highest incidence of stone disease is seen in the summer months,[13] July through September, with the peak occurring within 1 to 2 months of maximal mean temperatures.[14] In our study the highest incidence of stone disease is found in the summer months during our study period (June-23.77%, May-16.59%, July-16.59%).

The study of military personnel translocated to desert locations has provided a unique opportunity to study the effect of climate on a defined population. American soldiers in an undisclosed desert location had an increase in symptomatic episodes of renal colic during the summer season.[15] Military personnel who developed symptomatic stones after arrival in Kuwait and Iraq revealed a mean time interval to stone formation of 93 days.[16] In our study we found that among 135 military persons 101(74.81%) were deployed under UN and 02 were deployed in OKP.

Bacteria may be involved in stone formation by damaging the mucosal layer of the urinary tract, resulting in increased bacterial colonization and crystal adherence.[34] A recent multicentre review of 121 struvite and/or carbonate apatite stones obtained from patients undergoing surgical intervention for stones at four participating centers revealed preoperative urine cultures that grew Proteus species in 11.3% and E. coli in 15.2% of cases.[35] In our study 16 patients reported with UTI. Among these 16 patients most commonly found organism is E. coli (93.75%).

According to Yu et al research most of the patients reported due to ureteric calculi which was same as our study.[36] Stone occurrence in the urethra was relatively less (1%).[37,38] According to our study the most common site of stone is Ureter- 99 (52.66%), followed by Kidney-75 (39.89%), 12 (6.38%) found in the urinary bladder and 2 (1.06%) found in the urethra. Stone found in multiple sites in 35 (15.69%) cases. Among 223 patients 168 (75.33%) patients were diagnosed by an X-ray KUB, 40 (17.94%) were diagnosed by Non contrast CT scan of KUB, 15 (6.73%) patients were diagnosed by USG of KUB region.

Conclusion

At this moment of time, urinary stone disease is becoming a common disease in part of our world and yet our nationwide information on the prevalence of urolithiasis is lacking. However, we could make out the socio-demographic and clinical profile of patients of this disease from this research to improve management and prevention. Although a definite conclusion remains to be made as other factors affecting this disease is yet to be studied. Prospective research that includes a more diverse population is warranted to validate our findings and to provide more accurate findings.

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