

Descriptive evaluation of ureteric urolithiasis between genders

AUB Pethiyagoda*, K Pethiyagoda**

*Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka

**Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

Abstract- Urolithiasis is a common clinical disorder. A descriptive cross sectional study was done to compare the presentation of ureteric urolithiasis with respect to gender. According to the literature the first episode of urinary tract stone occurs commonly in young people (20-40 years) and peak incidence is reported in second or third decades of life. There was a higher prevalence of male patients in the 6th and 7th decades of life which is similar to the findings reported in other studies. X-ray Kidney, Ureter, Bladder (KUB) and ultra sound KUB data and ureteric stone site and size were collected and analyzed. The stone size was significantly different between two groups ($p=0.303$). Both groups had similar distribution of ureteric stones within ureter, more in the lower ureter followed by upper ureter and mid ureter. The side of the stone was significantly different between males and females ($p<0.05$).

Index Terms- X-ray Kidney, Ureter, Bladder (KUB), site of the stone, size of the stone, side of the stone

I. INTRODUCTION

Urolithiasis is a common clinical disorder. Its frequency has risen with human civilization and varies with in the country. It poses health problems in most countries. Urinary tract stones affect up to 2-5% of the Asian population⁽¹⁾ and up to 15 % of the population in the western countries.⁽²⁾ Although such data is not available for Sri Lanka, the fact that nearly 3000 patients are treated with extra-corporeal shock wave lithotripsy (ESWL) at the National Hospital of Sri Lanka alone every year is an indirect indicator of the size of the problem.⁽³⁾

Urolithiasis has some potential risk factors such as intrinsic and extrinsic epidemiological, metabolic, physical-chemistry of the urine, mechanics and urinary infection⁽⁴⁾. It was highly associated with diabetes mellitus, urinary tract infections and arterial hypertension. High calcium, protein, purine, carbohydrates and oxalic acid intake together with low fluid intake were closely associated with this disorder.⁽⁴⁾

The epidemiology of urolithiasis differs according to the geographical area in terms of prevalence, incidence, age and sex distribution, stone composition and stone location.⁽⁵⁾

According to one of the local literature, it identifies the relationship between the disease prevalence and the drinking water geochemistry. The prevalence of the kidney stone disease in the selected Padiyapelella-Hanguranketa area in Central Highlands of Sri Lanka is significantly higher compared with neighboring regions. Hydro geochemical data obtained from the two groups were compared using the Wilcoxon rank-sum test. It

showed that pH, total hardness, Na⁺, Ca²⁺ and Fe²⁺ had significant difference ($p < 0.005$) between water sources used by patients and non-patients. This study reveals a kind of association between stone formation and drinking water geochemistry as evident by the high hardness/calcium contents in spring water used by patients.⁽⁵⁾

The relative increased frequency of stones in the region indicates that nutritional, environmental and genetic factors play a role in the occurrence of stones.(such as age, gender, climate, Body Mass Index (BMI), weight, water intake, co-morbidities, occupation and diet).⁽⁶⁾ Research shows that formation of stones can be prevented by special diets. (Low in salt, spinach, fatty foods, animal proteins and high in vegetables, water, and fresh fruits).⁽⁶⁾

Usually the first episode of renal stone occurs commonly in young people (20-40 years)⁽⁸⁾ and peak incidence is reported in second or third decades of life. As it mostly affects working age group, it is a major socioeconomic burden for the society.⁽⁹⁾ Ureteric stones contribute 20% of all urinary tract stones and 70% of which are located in the distal ureter.⁽⁷⁾

Kidney stone disease is a common disorder with a lifetime prevalence of 10-12% in men and 5-6% in women⁽⁴⁾. It has a high recurrence rate: 14.0% after one year, 25.0%-31.5% after five years, 49.0%-52.0% after ten years and 72.0% after twenty years^(5, 6). The prevalence of the KSD and the type of stones varies in different countries. In Iceland the prevalence of nephrolithiasis is lower than reported elsewhere; 4.3% in men and 3.0% in women.⁽⁷⁾ In the United States of America (US) the distribution of KSD is 12.0% among men and 5.0% among women.⁽¹⁾ Adult men are more commonly affected by kidney stones than women; while among children the proportion of the disease is approximately the same in both genders (1%-3%)⁽⁸⁾

Different studies suggest that men are affected two to three times more frequently than women⁽¹⁾ There was a higher prevalence of males patients in the 6th and 7th decades of life, which is similar to the findings reported in other studies. Our objective was to compare the presentation of ureteric urolithiasis with respect to genders.

II. METHODOLOGY

This was a descriptive cross sectional design with an analytical component. A total of 154 patients were selected as study sample. The study population consisted of the patients referred to the genitourinary clinic, Teaching Hospital, Peradeniya. This study was conducted over one year period from 1st May 2013 to 31st April 2014.

Patients' demographic data, blood and urine investigations, X-ray Kidney, Ureter, Bladder (KUB) and ultra sound KUB data were recorded. Patients with metabolic etiologies such as hypocalcaemia, hyperparathyroidism and etc. were excluded. Ureteric stone site and size were collected and analyzed with independent sample t-test and chi-square test. Data were analyzed with descriptive statistics using statistical package for social sciences (SPSS) version 20.0

III. RESULTS

A total of 154 participants (aged 20-75 years) were included in this analysis. Mean age of men was 39.07 ± 11.82 and out of the sample 76% (n=117) were male. Mean age of women was 43.49 ± 14.97 and 24% (n=37) were female. (p=0.075).

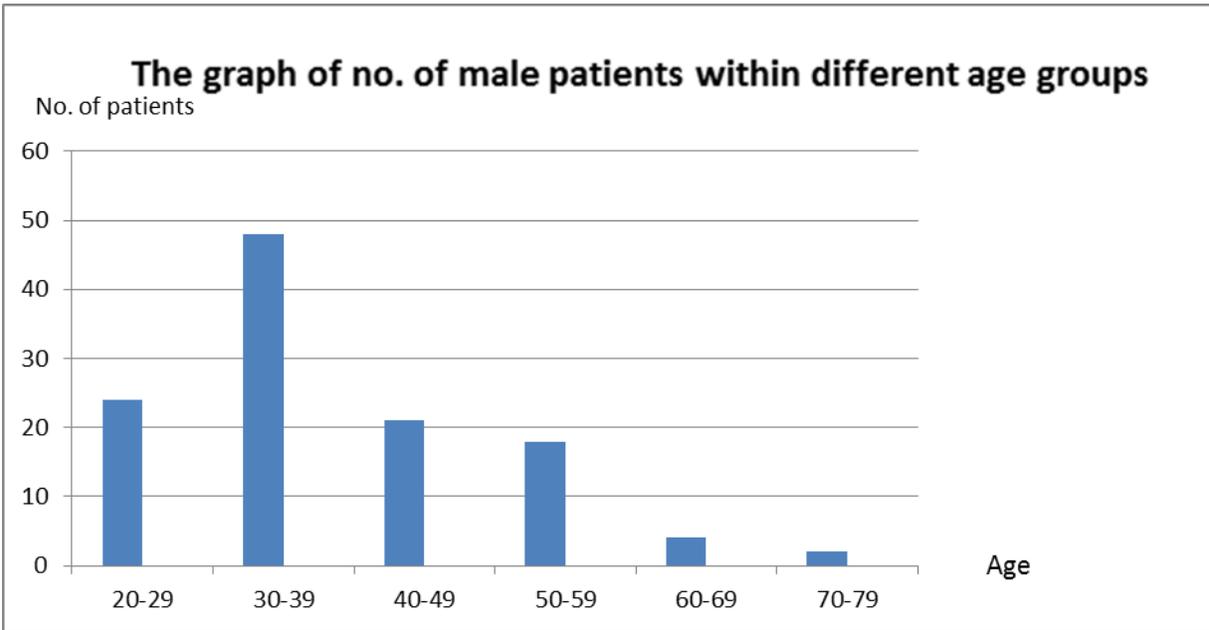


Figure 01- The description of the population by age and gender
The most affected age group of men is 30-39 years.

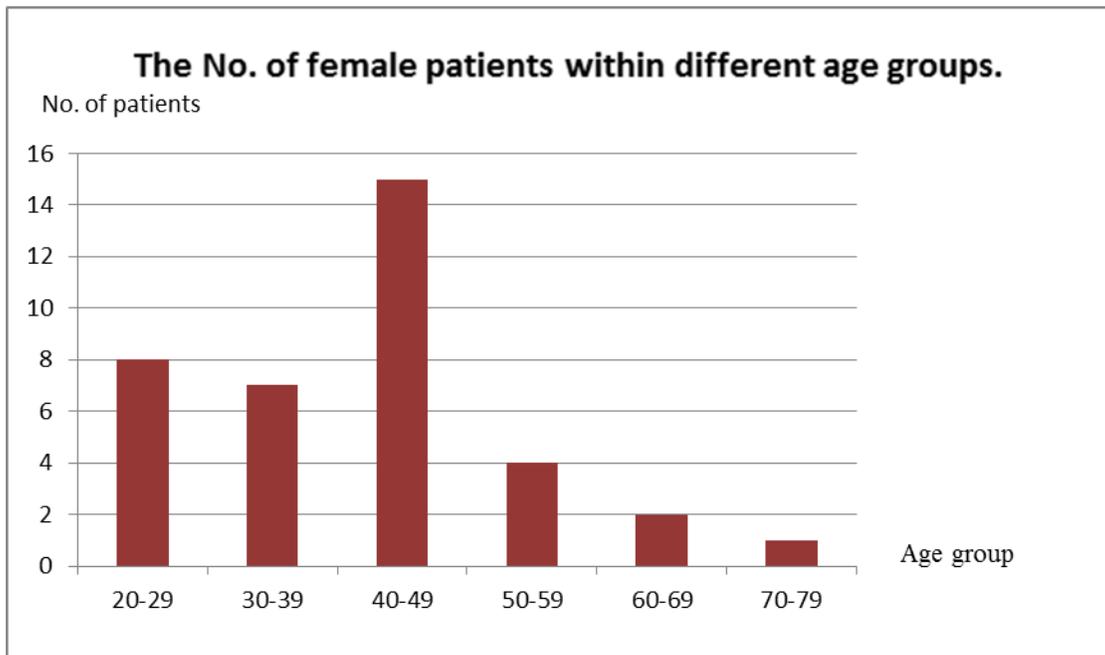


Figure 02- The description of the population by age and gender
The most affected age group of women is 40-49 years.

Mean stone size in males and females were 7.19 (± 3.05) mm and 8.04(± 4.86) mm respectively. The stone size was significantly different between two groups ($p=0.303$). Both groups had similar distribution of ureteric stones within the ureter. More in the lower ureter followed by upper ureter and mid ureter. Location of the calculi in Males and females was lower as follows. Upper ureter 83, 24 and mid ureters 10, 28 and lower ureter 7 and 2 respectively.

Out of 117 males 75 had left sided stones while remaining 42 had right sided. Out of 37 females 17 had left sided stones while the other 20 had right sided. The side of the stone was significantly different between males and females ($p<0.05$).

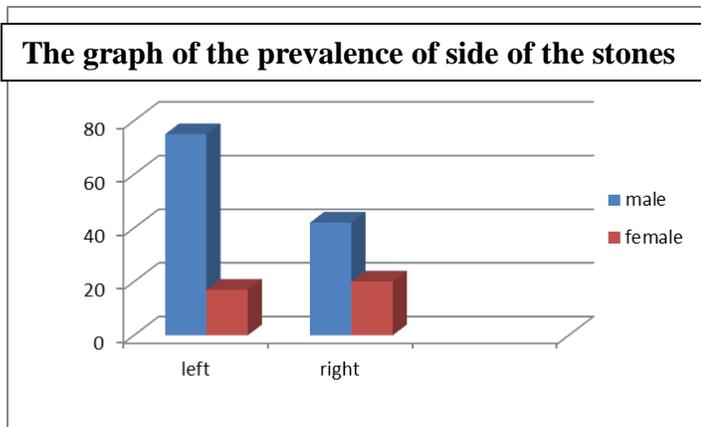


Figure 03 – Description of the population by side of stone occurrence.

According to the obtained data, the prevalence of urinary stones in males was 76% and 24 % was in females. Other investigators have noted the higher proportion of males: Twinem (1937), 5: 3; Grossman (1938), 4: 1; Winsbury-White (1946), 3: 2; while Sutherland (1954) found the sexes to be almost equally represented with a ratio of 6: 5.⁽¹¹⁾

The reason may be due to the differences of genetic factors, age, weight, water intake, occupation and diet between genders. Most of the male patients of this study were carpenters, farmers, drivers, labors and soldiers. All of these occupations are non-sedentary types. Hence they are hard workers and work outdoors. Due to less water consumption and sweating, urine gets concentrated in kidneys and urinary calculi can be formed.

As this study, the size of the stones was larger in females than males. Smaller the size, it is capable of passing spontaneously or entering and getting impacted in the ureter. Hence it is symptomatic. Most of the male patients admit into hospitals due to this reason. Therefore the proportion between male to female will increase.

According to the literature, males produced small calculi which were passed or at least were small enough to enter the ureter. Therefore higher incidence of ureterolithotomy can be seen in men.⁽¹¹⁾ While in women calculi were larger, it is difficult to pass and remain in kidneys Therefore high incidence of pyelolithotomy and can be identified among women.⁽¹¹⁾

This study reveals that the commonest age groups of stone disease of males were 20 to 29, 30 to 39 and 40-49 which included two-thirds of all patients. The average ages of stone disease of males were 30-39. For females stone disease was evenly spread from 20 to 49 years of age. The average age of onset was 40-49 and that was slightly later for women than men.

Side of the ureteric stone is significantly different between genders with males on left and females on right. However, according to the literature females have more stones on the left side than men. It is suggested that this was due to the proximity of the left urinary tract to the perivenous lymphatic draining genital tract infections. Female have more chance for infections. Infections may also a risk factor for genesis of stones.⁽¹¹⁾ However further research is needed to evaluate this statement and to understand the underling pathophysiology.

Comparison of the single and recurrent stone-forming patients showed that recurrent stone formation occurred more frequently in males, and that usually small calculi were formed, capable of passing spontaneously or entering and getting impacted in the ureter.⁽¹¹⁾

And also the literature says that the group of patients with a single stone had an equal sex ratio with males and female.⁽¹⁰⁾ Single and recurrent stone-forming patients differed in sex ratio, in the incidence of spontaneous passage and operation, and in their relationship to chronic infection. These factors suggest that different etiological factors may be involved in these groups.⁽¹⁰⁾

In this investigation the high proportion of males with recurrent calculi was related to the occupational liability of the male to severe stress. It is known that women have a higher incidence of hyperparathyroidism than men: this applied in the present survey but the numbers were too small for significance. The marked difference in sex ratio between the idiopathic patients with a single stone and those with recurrent stones has been discussed, the single stone-forming patients being equally distributed between the sexes while patients with recurrent stone had a male/female ratio of 2.8:1.⁽¹¹⁾

The sex distribution, the various operations might be expected to follow the overall sex ratio of two males to one female. However, this ratio applied only to partial nephrectomy. Nephrolithotomy had a higher incidence among women than was expected and Pyelolithotomy even more so. Ureterolithotomy was predominantly an operation of males especially among idiopathic recurrent stone-forming patients.⁽¹¹⁾

IV. CONCLUSION

Higher proportion of males have urinary tract stones than females. The size of the stones were larger in females than males. Both groups had similar distribution of ureteric stones within the ureter. With regard to location, there was more in the lower ureter followed by upper ureter and mid ureter. Side of the ureteric stone is significantly different between genders with males on left and females on right. Further research is needed to evaluate this statement and to understand the underling pathophysiology.

REFERENCES

- [1] Ramello A, Vitale C, Marangella M. Epidemiology of nephrolithiasis. *J Nephrol.*2000; 13 (3):545–50.
- [2] Miller NL, Lingeman JE. Management of kidney stones.*BMJ.*2007; 334:468-72.
- [3] Goonawardena SAS. Nephrolithiasis: metabolic evaluation of stone formers and preventive medical therapy. *Sri Lanka Journal of Urology.*2002; 3: 1–5.
- [4] Reyes L1, Almaguer M, Castro T, Valdivia. Clinico-epidemiologic study of urolithiasis in a Caribbean urban area. 2002;22(3):239-44.
- [5] Abewickrama B, Ralapanawa U, Chandrajith R. Geoenvironmental factors related to high Incidence of human urinary calculi (kidney stones) in Central Highlands of Sri Lanka, *Environmental Geochemistry and Health*; 2015; pp1-12
- [6] Bakunts V. Knowledge, Attitude and Practice of Kidney Stone Formers in Armenia Regarding Prevention of Kidney Stone Disease. [Internet]. [place unknown], [publisher unknown], [date unknown] 2011.
- [7] Shokouhi B, Gasemi K, Norizadeh E. Chemical composition and epidemiological risk factors of urolithiasis in Ardabil Iran. *Research Journal of Biological Sciences.* 2008; 3(6): 620-626.
- [8] Abeygunasekera AM. Urinary stone disease in Sri Lanka. *Ceylon Med J.* 2004 June; 49(2):42-43.
- [9] Khan AS, Rai ME, Parvaiz AG, Shah AH, Hussain AA, et al. Epidemiological risk factors and composition of urinary stones in Riyadh Saudi Arabia. *J Ayub Medical Coll Abbotabad.* 2004 Jul-Sep; 16(3):56-8.
- [10] Menon M, Parulkar BG, Drach GW. Urinary lithiasis: etiology, diagnosis and medical management, In Walsh PC, Retik AB, Vaughan ED jr, et al, editors. *Campbell's Urology*, 7th ed. Philadelphia: W B Saunders; 1998, 2261- 2733.
- [11] William S.F, Long-term survey of 538 patients with upper urinary tract stone. *British journal*, 1963,35;416-437

AUTHORS

First Author – AUB Pethiyagoda, Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka
Second Author – K Pethiyagoda, Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka