

## Clinico-anatomical Pattern Of Presentation Of Upper Urinary Tract Stone Disease In Nnewi, South-East Nigeria.

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### ABSTRACT

A total of eighty-nine (89) Nigerians presented with symptomatic stone disease over a five year period. Made up of fifty-four (54) males and thirty-five (35) females (M:F, 1.5:1). The peak age incidence of stone disease was seen between 30-50 years. Seventy-eight (91%) of the stones occurred in the upper urinary tract. Of this number 41 (52.6%) occurred in the left upper tract and thirty-seven (47.4%) occurred in the right upper tract. This observed difference although not statistically significant ( $p > 0.05$ ) may be attributed to known anatomical differences between the left and right kidneys. Large multicenter study is needed to confirm this finding.

**Key Words:** urinary tract stones, supersaturation.

Urinary tract calculi occur when the saturation of substances found in urine exceeds their solubility product (Menon et al, 1998). Stones in the urinary tract are commonly made up of calcium, oxalate, phosphate, uric acid, and cystine (Olapade- Olaopa et al, 2004). Many factors interplay either singly or together to bring about the supersaturation of these solutes in urine. These factors may be internal (hereditary, age, sex) and/or external (geography, climate, diet, infection, dehydration).

It is still an established fact that urinary tract stone disease is uncommon in Nigerians (Esho, 1976; Mbonu et al, 1984; Ekwerre, 1995; Orakwe, 1988). It is however very common in Asia, North America, and Europe (Menon et al, 1998). Even in the same country, geographical spread of the disease is not uniform. Upper urinary tract stone is undoubtedly the most common form of presentation in Nigeria (Esho, 1976; Mbonu et al, 1984; Ekwerre, 1995; Orakwe, 1988), and also in the developed world (Menon et al, 1998).

The relative incidence of the disease vary between 6.3-19.1 per 100,000 in Nigeria (Monu, 1989; Esho, 1976; Mbonu et al, 1984; Ekwerre, 1995; Orakwe, 1988), compared to 2 per 1000 in Europe (Mbonu et al, 1984; Ekwerre, 1995; Laerum, 1996). In Nigeria the disease is common in the 4<sup>th</sup> and 5<sup>th</sup> decades of life, with a M:F ratio of 2-4:1 (Monu, 1989;

Mbonu et al, 1984; Ekwerre, 1995).

We reviewed cases of upper urinary tract stone as seen in the urology clinic of a teaching hospital at Nnewi, South-east Nigeria, to determine the site of the upper urinary tract that is most commonly affected, an aspect which most studies have failed to highlight.

### Patients And Methods

A 5-year retrospective review of all patients that presented to the urologic clinic of the teaching hospital at Nnewi with symptomatic stone disease over the period (January 1, 1999 to December 31, 2004) was done.

Information regarding the age, sex, presenting symptoms and the duration, as well as radiological findings were extracted from the patients' case notes and analyzed. Results were analyzed using the Chi square test for level of significance. P values less than 0.05 were taken as been statistically significant.

### RESULTS

A total of 89 patients met the criteria during the period under review (Figure 1). During this period a total of 228,723 Nigerians patients were seen in the hospital, putting the hospital incidence of stone disease at about 39 per 100,000. A total of fifty four males and thirty five females were seen, with a male to female

ratio of 1.5:1. The peak age incidence is in the 4<sup>th</sup> decade of life (29.2%). The mean age of the patients was  $45.0 \pm 16.0$  years for males and  $38.6 \pm 10.9$  years for the females.

The average duration of symptoms prior to presentation was 6 months, with 40.0% presenting within 1 month, 10.1% in 1-6 months, 37.1% in 6-12 months, 10.1% between 1-2 years. The remaining 8.0% presented more than two years from initial symptoms.

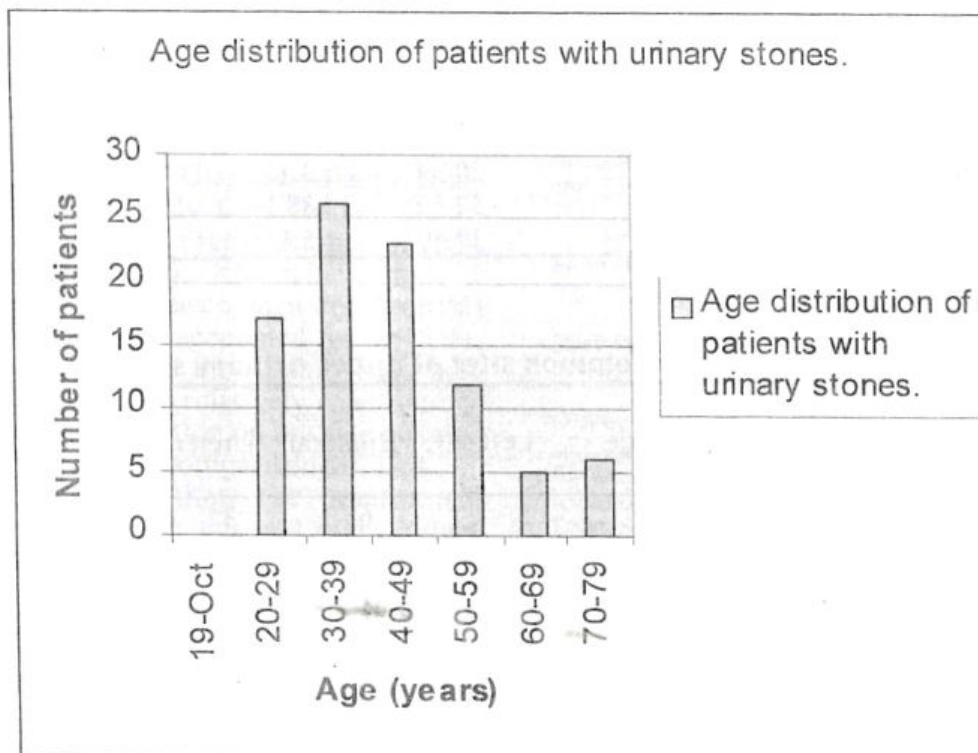
The commonest presenting symptom was flank pain in 79(88.8%), followed by nausea/vomiting in 48(53.9%), hematuria occurred in 35(39.3%) of patients, while lower urinary tract symptoms consisting mainly of frequency, nocturia and dysuria occurred in 26(29.2%) of cases (Table 1).

The presence of stone was confirmed with plain X-rays (KUB) and ultrasonography of the urinary tract in all patients. Seventy-eight out of 89 (91.0%) and 11 (9.0%) of the stones occurred in the upper and lower urinary tracts respectively (table 2). commonly in the left kidney and pelvis in 32(40.0%) of cases. The right kidney and pelvis was involved in 26(29.2%) of cases. Both kidneys and pelvis

were involved in only 8(9.0%) of cases. In the ureter, the right ureter was involved in 11(12.4%) of cases and the left in 9(10.1%) of cases. Eleven (12.4%) of stones occurred in the bladder while none was observed in the urethra. Using the Chi square test, the difference between the occurrence of stones in the left and right upper tracts (kidney and ureter on one side) was not statistically significantly ( $p < 0.05$ ).

An upper urinary tract stone, 91.0% of cases was commoner in patients less than 50 years old, while lower urinary tract stone, 9.0% of cases was commoner in men above 50 years. Of those with lower urinary tract stone 3 (27.3%) occurred in patients less than 50 years old. These were associated with stone in the upper urinary tract (one in the right kidney and two in the left kidney). Seventy-two percent of patients with bladder stone were above 50 years.

Anatomical anomaly was present in 21.7% of patients with upper tract stones. Of these ureteropelvic junctions obstruction was present in 15.4% and bifid pelvis and duplex ureters in 6.3% of cases. Of those with bladder stones, 72.7% (8) had prostatic enlargement, while 27.3% had bladder neck stenosis.



**Table 1. Clinical presentation in patients with urinary stone disease**

Presentation	Frequency	Percentage (%)
Flank pain	79	88.8
Nausea/vomiting	48	53.9
Hematuria	35	39.3
Lower urinary tract symptoms	26	29.2
Asymptomatic	0	0.0
	Total	100

**Table 2. Distribution of stones in the urinary tract of patients with urinary stone disease.**

Location	Number of patients	Percentage (%)
Lt kidney/pelvis	32	40.0
Rt kidney/pelvis	26	29.2
Both kidney/pelvis	8	9.0
Rt ureter	11	12.4
Lt ureter	9	10.1
Both ureters	0	0.0
Bladder	11	12.4
Urethra	0	0.0
Total	89	100.0

**Table 3. Comparison of studies on epidemiology of urinary tract stone disease.**

	Length of Study (years)	No. of patients	Percentage of upper urinary Tract (%)	Peak age incidence	M:F ratio
Esho (1976)	NR	85	60	21-50 61-70	NR
Mbonu (1984)	5	81	57	20-49	5:1
Ekwerre (1995)	5	96	79	21-50	2.7:1
Olapade (2004)	2	20	77	20-29	1.5:1
Orakwe (1988)	2	38 147*	73	20-39 50-59*	5.3:1 4.88:1
This study	5	89	91	30-50	1.5:1

NR. Not recorded.

\*Study in Edinburgh.

**Table 4. Comparison of studies on common sites of upper urinary stones.**

	No. of cases of Upper urinary Stone	Right side	Left side	Bilateral	Ureter
Olapade (2004)	20	6	5	6	3*
This study	78	37**	41**	8	

\*Side note stated.

\*\* Includes sites in the ureter.

## DISCUSSION

Stones in the urinary tract have afflicted man since the earliest records of civilization, with the earliest examples recorded in the kidneys and bladders of Egyptian mummies dated 4800B.C (Menon et al, 1998). Both kidneys and their outflow tracts have equal chances of stone occurring in them. Most stones however present in a unilateral pattern (Stoller et al, 2000). The reason for this unilateral mode of presentation is largely unknown because urinary constituents are known to be similar for both kidneys.

Urinary stone disease is a disease of young adults afflicting those in the 4th and 5th decades of life (Menon et al, 1998). Our study shows a high incidence among patients aged 30-50 years, similar to previous studies in this environment (Esho, 1976; Mbonu et al, 1984; Ekwerre, 1995). Studies from Ibadan, south-west Nigeria, indicate a much lower age incidence of 20-29 years (table 3). A male preponderance of stone disease was also noted from this study with a M:F ratio of 1.5: 1. This reflects a downward trend in the male disease as compared to previous studies in this area which indicates a much higher male preponderance of 2.7-5.3:1 male to female ratio (Ekwerre, 1995; Mbonu et al, 1984; Orakwe, 1988).

This study undoubtedly confirms the higher incidence of upper urinary tract stones as noted from other studies (table 3). Significant finding from this study is that upper urinary tract stones were more common in the left kidney/pelvis and ureter accounting for 41(52.6%) of cases while those in the right accounted for only 37(47.4%) (table 4). This difference was however not statistically significant ( $p > 0.05$ ). Olapade-Olaopa et al, (2004) in their own study from Ibadan, south-west Nigeria, showed a preponderance of right kidney stones 6 (30%), left kidney stone 5 (25%). Bilateral cases accounted for 6 (30%) and stones in the ureter accounted for 3 (15%), although the side for the ureter was not indicated. However, the relatively small sample size and lack of information on the side affected within the ureter makes comparison difficult.

We propose that the anatomical differences between the left and right kidney may account for this observed differences in stone occurrence. Each kidney measures about 11cm in length, 6cm in breadth, and 3cm anterior-posteriorly. The left kidney is however slightly longer and narrower than the right, and lies nearer the median plane. The left kidney also lies at a higher level in the retroperitoneum than the

right. This is attributed to the presence of the liver on the right. The kidneys are supplied by a single renal artery in 70% of subjects, supernumerary renal arteries occur more commonly in the left than on the right. The right renal artery arises at a higher level in the aorta than that of the left and the right renal artery is also longer than the left (Mary Dyson, 1999). More research is needed to confirm this postulation. Clinical presentations in this study were similar to other reported series.

## CONCLUSION

Urinary stone disease still remains a rare disease among Nigerians, occurring mostly in the 4th decade of life. A downward trend in the incidence among males than in females is noted in this study. Upper urinary tract stone is still more common than lower urinary tract stones. The left upper tract is more commonly affected than the right upper tract. From this study, this observed difference was not statistically significant ( $p > 0.05$ ). Anatomical differences between the left and right upper tract may account for these observed differences. We recommend a large scale, multicenter study to confirm these differences.

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