

metabolic disorder with bilateral and multiple stones was confirmed by 2 authors<sup>(4,31)</sup>. These findings led us to think that metabolic disorders dominate cases with multiple and bilateral stone. A correlation between staghorn calculi and infective stones was noted in this study, also found by many authors<sup>(17,29,30)</sup>. In consistent with results of many studies<sup>(3,4,14,15,18,19,24,25,28)</sup>, majority of stones were located in the upper urinary tract among our patients.

**Table 3. Associated renal anomalies in 16 patients with urolithiasis**

Associated anomalies/causes	No.	%
Neurogenic bladder	6	6.2
Single kidney	3	3.1
Polycystic kidney	3	3.1
PUJ obstruction	2	2.08
Duplex system	2	2.08

In agreement with several studies, calcium oxalate was the most frequent chemical compound in UL<sup>(4,14,18,19,22,24,25,26,28)</sup>. Calcium oxalate stones are linked to dietary habits, although this effect is more prominent among adults more than children. However, Calcium oxalate stone caused by genetic diseases is proportionately more frequent in children<sup>(18)</sup>.

Similar to us, most literature reviews from various regions of the world revealed an underlying predisposing factor for stone formation in a large proportion of their studied series. (3, 4, 14, 15, 19, 23, 24, 26, 27).

Like our results, metabolic disorders ranked first etiology for UL in most studies<sup>(3,4,14,15,19,23,24,26,27)</sup>. Over the past decades, the etiology of UL in children has shifted from predominantly infectious to metabolic causes<sup>(14,32)</sup>. Early presentation, family history of stone disease, high recurrence rate of UL, bilateral and multiple stones are all indicators for metabolic disorders, which were observed in this study, and this observation was also confirmed by a recent study from Turkey<sup>(4)</sup>. Most of the studies that addressed etiologic classification reported a

ratio of 10.7–26% for Infectious stones<sup>(4,18,24,26,28)</sup> which is near to our results.

Previous studies reported similar renal anomalies with various rates<sup>(4,18,19,26,28)</sup>. Urinary tract anomalies with stasis, but no infection, leading to CaOx stones, while the growth of calcium phosphate stones is facilitated by infection and a high urinary pH<sup>(18,26)</sup>. The profile of predisposing risk factors for UL of the present study was in accordance with previous Iraqi study held on 2005<sup>(15)</sup>.

In conclusion, UL among a group of Iraqi children had male predominance, early onset of presentation, high rate of positive family history and recurrence of stone disease. UTI was the commonest clinical presentation with *E. coli* as predominant pathogen isolated by urine culture. Hypercalciuria was the commonest metabolic abnormality as single or multiple and Calcium oxalate was the commonest type of stones. Predisposing factor of UL was established in majority of cases.

Early presentation, family history of stone disease, high recurrence rate of UL, bilateral and multiple stones are all indicators for metabolic disorders, which mandate complete metabolic evaluation in pediatric stone formers to determine the possible metabolic disorder with early treatment.

Future studies are needed including patients of UL from other Iraqi governorates. Pediatrician should have higher concern of possible UL with mentioned clinical presentation, with early referral to pediatric nephrology / Urology clinic.

## References

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