



## CLINICAL SPECTRUM OF PEDIATRIC UROLITHIASIS: A LITERATURE REVIEW

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**ABSTRACT**

Pediatric urolithiasis is an important kidney disorder encountered in clinical practice. There has been considerable regional variability in the reported incidences of urolithiasis. Also, there is a growing body of evidence demonstrating that the overall incidence of pediatric urolithiasis is increasing. The purpose of this review article is to highlight the various aspects of epidemiological data, clinical spectrum related to pediatric stones. A Medline search was used to identify manuscripts dealing with epidemiology and clinical features of pediatric urolithiasis such as flank pain, restlessness, hematuria, vomiting, sweating, irritability, features of uti, passage of stones in urine, penile edema, enuresis and anorexia in pediatric stone diseases. The results revealed varying descriptives of clinical spectrum in minor age groups. The body of available literature reveals the gravity of rarely encountered condition pediatric urolithiasis in various regions with debilitating clinical spectrum with idiopathic etiologies and known etiologies; which spearheads further research.

**KEYWORDS** : Pediatric urolithiasis; Clinical presentation; Epidemiology**Introduction**

Urolithiasis is a term originated from three Greek words, 'ouron' for urine, 'oros' for flow, and 'lithos' for stone. It is considered to be one of the most common urological disorders and has afflicted humans since good old generations of human kind.

Pediatric urolithiasis is an important kidney disorder encountered in clinical practice. There has been considerable regional variability in the reported incidences of urolithiasis. Also, there is a growing body of evidence demonstrating that the overall incidence of pediatric urolithiasis is increasing. A better understanding of different risk factors can help with risk stratification in an individual subject and can guide specific measures to prevent stone recurrence. The risk factors for urolithiasis include an individual's susceptibility to form stones, such as genetic predisposition and metabolic abnormalities, and environmental factors that facilitate stone disease, such as dietary practices as well as local climate characteristics.

Nephrolithiasis occurs following a complex interaction of environment and heredity. Urinary crystals coalesce and precipitate when physical and biochemical conditions disturb a delicate balance of stone-promoting and -inhibiting factors. Small urinary calculi may pass unnoticed or appear as sandlike sediment in urine. Larger calculi may cause pain or obstruct urinary flow. The prevalence of urinary stones varies by region, being more common in the southeastern United States. Nephrolithiasis prevalence is found to be similar among both sex; say around ratio of 1:1 and is identified in 1 in 1,000 to 1 in 7,600 hospital admissions.

Urinary stone formation is rare before the age of 18 years and in the <18-year age group, it does not exceed about 2.5% of all stone formers. The incidence of urinary stone disease increases with age. In Western countries, an increase in the incidence of upper urinary tract stones is associated with a low occurrence of bladder stones. Endemic bladderstone disease, once common in Europe, is now confined to Asia, Africa, and the Middle East. There is a geographical variation in the urolithiasis problem. India is a well-documented endemic stone region as are also countries such as Turkey and Thailand.

Urinary lithiasis affects between 5-10% of the humans during their lifetime, 2-3% of them are children. Pediatric urolithiasis has wide epidemiologic variation in developed and the developing nations, with a prevalence of 1-5% to 5-15% respectively. The literature on incidence, etiology and natural history of pediatric urolithiasis varies due to geographic, dietary and socioeconomic differences. Pediatric urolithiasis is known to be associated with urinary

infection, anatomic and metabolic abnormalities.

**Materials and Methods**

The purpose of this review article is to highlight the various aspects of epidemiological data, clinical spectrum related to pediatric stones. A Medline search was used to identify manuscripts dealing with epidemiology and clinical features of pediatric urolithiasis such as flank pain, restlessness, hematuria, vomiting, sweating, irritability, features of uti, passage of stones in urine, penile edema, enuresis and anorexia in pediatric stone diseases. Various search strategies has adopted to dig out the possible available literature in-order inculcate. I also share my experience on the subject.

**Clinical Spectrum of pediatric urolithiasis**

A retrospective review was performed of the records of 85 children with urinary-tract calculi evaluated and treated during a 12-year period. There were 68 boys and 17 girls, a ratio of 4:1. Patient age ranged from 10 months to 16 years (average 8.2 years). Flank pain was the most common manifestation. Seventy patients had calculi in the upper urinary tract and 31 in the lower urinary tract; 16 had stones in more than one site and 15 had bilateral stones.

Acar B et al conducted a retrospective study to evaluate the clinical outcome in children with urinary calculi and to detect risk factors for nephrolithiasis in childhood. The results obtained were the mean age of the patients affecting urolithiasis was 8.8 +/- 4.5 years (1-16 years). hypercalciuria was found in 25 (40%) patients. The mean urinary calcium excretion for hypercalciuric patients was 5.7 +/- 1.2 mg/kg (4.8 mg/kg per day). In hypercalciuric patients 15 (60%) children had abdominal or flank pain, seven (28%) patients macroscopic hematuria and three (12%) dysuria.

Various studies reported classic presentation for a patient with acute renal colic is the sudden onset of severe pain originating in the flank and radiating inferiorly and anteriorly; at least 50% of patients will also have nausea and vomiting. Patients with urinary calculi may report pain, infection, or hematuria. Patients with small, nonobstructing stones or those with staghorn calculi may be asymptomatic or experience moderate and easily controlled symptoms. The location and characteristics of pain in nephrolithiasis include the following: Stones obstructing uretero pelvic junction, Mild to severe deep flank pain without radiation to the groin; irritative voiding symptoms (eg, frequency, dysuria); supra pubic pain, urinary frequency/urgency, dysuria, stranguria, bowel symptoms, Stones within ureter, Abrupt, severe, colicky pain in the flank and ipsilateral lower abdomen, radiation to testicles or vulvar area; intense nausea with or without vomiting, Upper ureteral

stones, Radiate to flank or lumbar areas, Mid ureteral calculi, Radiate anteriorly and caudally, Distal ureteral stones: Radiate into groin or testicle (men) or labia majora (women), Stones passed into bladder: Mostly asymptomatic; rarely, positional urinary retention.

The classic presentation for a patient with acute renal colic is the sudden onset of severe pain originating in the flank and radiating inferiorly and anteriorly. The pain is usually, but not always, associated with microscopic hematuria, nausea, and vomiting. Dramatic costovertebral angle tenderness is common; this pain can move to the upper or lower abdominal quadrant as a ureteral stone migrates distally. However, the rest of the examination findings are often unremarkable. Approximately 85% of all patients with renal colic demonstrate at least microscopic hematuria, which means that 15% of all patients with kidney stones do not have hematuria. Lack of hematuria alone does not exclude the diagnosis of acute renal colic. Tachycardia and hypertension are relatively common in these cases, even in patients with no prior personal history of abnormal cardiac or blood pressure problems. Fever is not part of the presentation of uncomplicated nephrolithiasis. The presence of pyuria, fever, leukocytosis, or bacteriuria suggests the possibility of a urinary infection and the potential for an infected obstructed renal unit or pyonephrosis. Such a condition is potentially life threatening and should be treated as a surgical emergency.

Sadeghi S et al conducted a study to investigate clinical presentation, metabolic risk factors and urinary tract abnormalities in paediatric urolithiasis. They found that between 2011 and 2012, 100 children (53 boys and 47 girls) were treated for urolithiasis. Clinical presentation, calculus localisation, urinary tract infection status, presence of anatomic abnormalities and urinary metabolic risk factors were retrospectively evaluated. The result obtained was; the most common clinical features on admission were restlessness/irritability (62%), flank pain (33%) and gross hematuria (4%).

## Conclusion

The incidence of urolithiasis in children has increased globally over the last few decades with varying but specific clinical features. The pattern of occurrence of stone disease has also changed, with an increase in kidney stones secondary to multiple known or idiopathic etiologies are at unleashing path. The body of available literature reveals the gravity of rarely encountered condition pediatric urolithiasis in various regions with debilitating clinical spectrum with idiopathic etiologies and known etiologies; which spearheads further research.

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