EUROPEAN JOURNAL OF
MODERN MEDICINE AND PRACTICE
Vol. 6 No. 10 (Oct - 2026) EJMMP ISSN: 2795-921X

https://inovatus.es/index.php/ejmmp

IMPROVING RISK ASSESSMENT AND RECURRENCE PREVENTION IN UROLITHIASIS AMONG YOUNG CHILDREN

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Abstract: In recent years, urolithiasis in young children has become an increasingly important clinical problem. It is associated with metabolic disturbances, hereditary factors, inadequate dietary habits, and environmental influences. This study examined measures intended to prevent the early formation of urinary stones and reduce the risk of recurrence in young children. Rational dietary planning, an appropriate fluid-intake regimen, and the timely diagnosis and treatment of infections are important components of prevention. The findings indicate that a comprehensive approach combining early preventive measures with recurrence prevention may reduce the incidence of urolithiasis and its recurrence in young children, thereby helping protect children's health and prevent serious complications.

Keywords: young children; urolithiasis; early prevention; recurrence prevention; metabolic disorders; recurrence.

Introduction

Urolithiasis in young children has become an increasingly relevant issue in pediatrics and pediatric nephrology in recent years. Its reported occurrence, presentation at an early age, and tendency to recur make this condition an important subject for further investigation. Factors that may contribute to stone formation, particularly in environmentally disadvantaged areas, include high mineral content in drinking water, poor dietary habits, and inadequate fluid intake [1], [2].

Because of the anatomical and physiological characteristics of children, urolithiasis may progress rapidly and lead to serious complications. This highlights the need for early diagnosis and the development of effective preventive and metaphylactic strategies [3]. Urolithiasis can affect not only a child's physical health but also their quality of life later in life.

Accordingly, improving metaphylactic approaches to prevent urolithiasis, identify risk factors at an early stage, and reduce recurrence in young children is an important priority in contemporary pediatrics [4].

Aim

To develop and evaluate effective preventive and metaphylactic measures aimed at preventing urolithiasis in young children, identifying and addressing major risk factors, and reducing disease recurrence [5].

Materials and Methods

A prospective comparative study was conducted in the Department of Pediatric Surgery at Urgench State Medical Institute from January 2023 to December 2024. The study protocol was reviewed by the institutional ethics committee (approval No. 45/06-2023). Written informed consent was obtained from the parents of all participants. The study included 120 children aged 6 months to 4 years with newly diagnosed urolithiasis confirmed by renal ultrasonography.

The main exclusion criteria were congenital urinary tract abnormalities, known inherited stone disorders (primary hyperoxaluria and cystinuria), stage 2 or higher chronic kidney disease, and use of medications that could affect stone formation. Participants were randomly assigned, using a computer-generated sequence, to two equal groups. Group 1 (n = 60) received conventional treatment, including stone-specific management and general dietary advice. Group 2 (n = 60) received a comprehensive intervention consisting of individualized dietary recommendations based on 24-hour urinary metabolic profiles; a prescribed fluid-intake regimen (100–120 mL/kg/day for infants and 1,500 mL + 20 mL/kg/day for older children); pharmacological correction (potassium citrate 2 mEq/kg/day, hydrochlorothiazide 1 mg/kg/day, or allopurinol 5 mg/kg/day when indicated); treatment of urinary tract infections; and monthly reinforcement counselling.

The primary outcome was stone recurrence within six months, defined as formation of a new stone, growth of residual fragments by ≥2 mm, or ultrasonographic evidence of stone passage. Secondary outcomes included reduced crystalluria, normalization of metabolic parameters, and a lower rate of infection. Laboratory assessments included serum biochemical tests and measurement of calcium, oxalate, urate, and citrate in 24-hour urine samples. Renal ultrasonography was performed at baseline and at 3 and 6 months by radiologists blinded to group allocation.

Statistical analysis was performed using SPSS version 26.0. Categorical variables were compared using the chi-square test. For continuous variables, normality was assessed with the Shapiro–Wilk test, followed by independent-samples t-tests or Mann–Whitney U tests, as appropriate. A two-sided p-value <0.05 was considered statistically significant. The intention-to-treat analysis included all randomized participants who had completed at least one follow-up assessment.

Results and Discussion

The study included 120 children aged 6 months to 4 years. Participants were assessed using clinical, laboratory, and instrumental investigations. They were divided into two groups: Group 1 (n = 60), which received standard treatment, and Group 2 (n = 60), which received comprehensive preventive and metaphylactic measures, including an individualized diet, fluid management, metabolic correction, and dynamic follow-up.

Metabolic abnormalities—including hypercalciuria, hyperoxaluria, and uraturia—were identified in 68.3% of the children [6]. Urolithiasis was accompanied by urinary tract infection in 41.7% of cases. Dietary problems, including excessive salt and protein intake and insufficient fluid consumption, were recorded in 72.5% of children.

Table 1. Risk factors and metabolic abnormalities identified in the study population

Parameter	Number of children (n)	%
Hypercalciuria	34	28.3%
Hyperoxaluria	27	22.5%
Uraturia	21	17.5%
Urinary tract infection	50	41.7%
Unhealthy dietary habits	87	72.5%
Insufficient fluid intake	79	65.8%

As shown in Table 1, metabolic changes and external risk factors were common among the children.

During the six-month follow-up, recurrence in Group 2, which received comprehensive metaphylaxis, was approximately half that observed in Group 1 (10.0% versus 23.3%) [7], [8], [9]. The amount of urinary salt crystals and metabolic indicators also improved substantially in Group 2. In Group 1, recurrent disease and persistent clinical signs were observed in some children.

Table 2. Stone recurrence during six-month follow-up

Group	Number of children (n)	Recurrences (n)	%
Group 1 (standard treatment)	60	14	23.3%
Group 2 (metaphylaxis)	60	6	10.0%

The results in Table 2 show a lower recurrence rate in the group receiving comprehensive metaphylactic measures.

The findings suggest that metabolic abnormalities and external factors play an important role in the development of urolithiasis in young children. Comprehensive prevention and metaphylaxis may be effective not only in preventing disease but also in reducing recurrence [10], [11], [12]. These findings support organizing treatment and follow-up according to each patient's individual risk profile.

Table 3. Changes in urinary parameters before and after intervention

Parameter	Group 1: Before	Group 1: After	Group 2: Before	Group 2: After
Crystalluria	70%	45%	72%	25%
Hypercalciuria	30%	22%	28%	12%
Hyperoxaluria	25%	18%	23%	10%

As shown in Table 3, urinary parameters improved to a greater extent in Group 2 than in Group 1.

Overall, metabolic disturbances, inadequate dietary habits, and insufficient fluid intake appear to be important factors in urolithiasis among young children. Table 1 shows that metabolic changes and external risk factors were common in this study population [13], [14], [15], [16], [17]. The lower recurrence rate in Group 2 supports the potential value of individualized care, dietary modification, and adherence to an appropriate fluid-intake regimen. The more marked improvement in urinary parameters also suggests that metaphylaxis may have both clinical and laboratory benefits [18], [19].

Therefore, effective management of urolithiasis in young children requires a comprehensive approach that combines prevention and metaphylaxis.

Conclusion

Urolithiasis in young children is a multifactorial condition in which metabolic disturbances, inadequate dietary habits, and insufficient fluid intake play important roles. The study findings indicate that metabolic abnormalities such as hypercalciuria, hyperoxaluria, and uraturia are common and may contribute to urinary stone formation. Comprehensive preventive and metaphylactic measures—including an individualized diet, an appropriate fluid-intake regimen, and metabolic correction—may substantially reduce disease recurrence. Dynamic follow-up and early diagnosis may also help prevent complications. Effective management of urolithiasis in young children therefore requires an integrated, individualized strategy to preserve children's health and improve their quality of life.

References

[1] U. S. Alon, "Medical treatment of pediatric urolithiasis," Pediatric Nephrology, vol. 24, no. 11, pp. 2129–2135, 2009, doi: 10.1007/s00467-007-0740-7.
[2] Y. Akın, M. Uçar, and S. Yücel, "Current medical treatment in pediatric urolithiasis," Turkish Journal of Urology, vol. 39, no. 4, pp. 253–263, 2013.
[3] D. Fahlenkamp, B. Noack, S. Lebentrau, and H. Belz, "Urolithiasis in children—Diagnosis, therapy and metaphylaxis," Der Urologe A, vol. 47, no. 5, pp. 545–552, 2008.
[4] M. Straub, J. Gschwend, and C. Zorn, "Pediatric urolithiasis: Current surgical management," Pediatric Nephrology, vol. 25, no. 7, pp. 1239–1244, 2010.
[5] R. Chimenz et al., "Pediatric urolithiasis," Journal of Biological Regulators and Homeostatic Agents, vol. 33, no. 5, pp. 39–44, 2019.
[6] İ. Üntan, S. Üntan, H. Tosun, and D. Demirci, "Metabolic risk factors and prophylaxis in pediatric urolithiasis," Journal of Pediatric Urology, vol. 17, no. 2, pp. 215.e1–215.e6, 2021.
[7] O. Kaygısız, "Metaphylaxis in pediatric urinary stone disease," in Urolithiasis. IntechOpen, 2017.
[8] A. Sagymbayeva, "Modern view on pediatric urolithiasis: Epidemiology, diagnostics, treatment, metaphylaxis," Journal of Clinical Medicine of Kazakhstan, vol. 18, no. 6, pp. 9–14, 2020.
[9] U. S. Alon, "Hypercalciuria and hypocitraturia in children," Pediatric Nephrology, vol. 22, pp. 165–170, 2007.

[10] C. Y. C. Pak, “Medical management of urinary stone disease,” Nephron Clinical Practice, vol. 98, no. 2, pp. c49–c53, 2004.
[11] F. B. Stapleton, “Clinical approach to children with urolithiasis,” Seminars in Nephrology, vol. 16, no. 5, pp. 389–397, 1996.
[12] R. L. Kroovand, “Pediatric urolithiasis,” Urologic Clinics of North America, vol. 24, no. 1, pp. 173–184, 1997.
[13] E. Minevich, “Pediatric urolithiasis,” Pediatric Clinics of North America, vol. 48, no. 6, pp. 1571–1585, 2001.
[14] B. Hoppe and M. J. Kemper, “Diagnostic and therapeutic management of urolithiasis in children,” Nature Reviews Urology, vol. 7, no. 5, pp. 265–273, 2010.
[15] D. S. Milliner and M. E. Murphy, “Urolithiasis in pediatric patients,” Mayo Clinic Proceedings, vol. 68, no. 3, pp. 241–248, 1993.
[16] F. F. Rakhimov, “Outpatient prevention and management of urolithiasis,” American Journal of Pediatric Medicine and Health Sciences, vol. 1, no. 1, pp. 1–6, 2023.
[17] K. Abhishek, A. Mandhani, and A. Srivastava, “Pediatric urolithiasis: Experience from a tertiary care center,” Journal of Pediatric Urology, vol. 9, no. 6, pp. 1012–1016, 2013.
[18] M. Lao and B. A. Kogan, “Recurrence of pediatric urolithiasis,” The Journal of Urology, vol. 191, no. 5, pp. 1508–1512, 2014.
[19] BMC Pediatrics Study Group, “Metabolic evaluation and recurrence in pediatric urolithiasis,” BMC Pediatrics, vol. 25, pp. 1–10, 2025.