

MONITORING OF CHILDREN WITH URATE NEPHROPATHY IN THE PRIMARY SYSTEM

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Abstract: Urate nephropathy in children represents a metabolic–renal disorder characterized by impaired uric acid metabolism, crystalluria, and progressive renal dysfunction if not identified early. Effective monitoring within the primary healthcare system plays a critical role in preventing complications, optimizing treatment, and improving long-term outcomes. This study highlights the significance of standardized screening protocols, early clinical and laboratory assessment, and risk-stratified follow-up strategies for children with hyperuricemia and urate nephropathy. Special emphasis is placed on integrating biochemical markers, renal ultrasound findings, and lifestyle-nutritional factors into a comprehensive monitoring framework suitable for primary care settings. The analysis demonstrates that timely detection and continuous observation enable early therapeutic interventions, reduce the risk of chronic kidney disease, and enhance the overall quality of pediatric nephrological care.

Keywords: Urate nephropathy; hyperuricemia; children; primary healthcare; monitoring; metabolic disorders; renal dysfunction; pediatric nephrology; early detection; follow-up system.

Urinary nephropathy is a disease characterized by the accumulation of urate crystals in the kidneys and impaired renal function as a result of excessive accumulation of uric acid in the body [1]. In pediatric practice, this pathology occurs in children and often develops against the background of metabolic syndromes and neuro-arthritic diathesis [2]. In order to prevent the onset of the disease and the development of complications, it is important to keep patients under constant dispensary supervision [3,4]. Especially in the hot months of the year, a decrease in diuresis and the formation of sediment in the urine are observed. Therefore, dietary therapy, medications and lifestyle recommendations are the main directions of disease control [5,6,7].

Research objective. To study the fluid regimen and increase diuresis, diet, medications, urate excretion facilitating agents, vitamins and supportive therapy in children with urate nephropathy based on the latest world standards.

Research material and methods. The study was conducted in 2024–2025 in pediatric departments, the Center for Pediatric Nephrology and outpatient observation points under the Ministry of Health of the Republic of Uzbekistan. The study was cross-sectional and observational-analytical in nature and was aimed at assessing metabolic and clinical indicators in children with urate nephropathy. The object of the study was 120 children aged 5–15 years diagnosed with urate nephropathy. The disease was confirmed based on the criteria of WHO (WHO, 2023) and KDIGO (Kidney Disease: Improving Global Outcomes, 2024).

Results. In hot seasons, as a result of increased fluid loss in the body, urine concentration increases and crystalluria increases. Therefore, patients with urate nephropathy are recommended to drink 1.5–2 times more fluid than in normal conditions. The daily norm is calculated as 2 liters per 1.73 m² of body surface area. Mineral waters with an alkaline

environment (Yessentuki No. 20, Zheleznovodsk, Pyatigorsk, Berezovsk springs) are preferred as liquids. Local grape juices also help alkalize the urinary environment. In order to increase diuresis, it is recommended to consume melons such as watermelon, melon, fruit juices and vegetables. Diet: It is necessary to limit purine-rich products from the children's diet. These include: brain, liver, meat broths, nuts, chocolate and peas. The main part of the diet should be dairy products, vegetables and fruits. It is advisable to give meat boiled, since during the boiling process up to 50% of purines pass into the broth. Limiting animal fats from the diet is important for the prevention of atherosclerosis. The solubility of urates is increased by consuming lemons (0.5–2 pieces per day). The use of enterosorbents is recommended to facilitate the excretion of uric acid salts. Medications: the main drug that reduces the endogenous synthesis of uric acid is allopurinol (milurite), which reduces the activity of the enzyme xanthine oxidase. This reduces the formation of uric acid and prevents the deposition of urates in the kidney tissues. Daily dose: 5–10 mg/kg (up to 6 years old – 0.15 g; in children over 6 years old – 0.2 g). Duration of treatment: 3–4 weeks. Later, the dose is reduced to 50–75 mg/day. In addition, orotic acid also reduces the synthesis of phosphoribosylamine, stopping the formation of uric acid.

Uricolytic agents include urate oxidase, which converts uric acid to allantoin and accelerates its excretion. Also, herbal preparations such as Kanefron kids, Syston, Solegon are effective against inflammation of the urinary tract. Urate-facilitating agents: Drugs that reduce uric acid reabsorption in the renal tubules (anturan, benemid, etamide) can reduce uricemia. However, they are used only in combination with plenty of fluids due to the possibility of crystallization and increased pain syndrome. In addition, citrate preparations (Urolit "U", Blemaren, Magurlit, Solemok) are effective in alkalizing urine. Vitamins and supportive therapy: Vitamins A, B, D are prescribed during the course of the disease. Vitamins B1, B6 and citrate mixtures are used to prevent oxalate crystallization in acidic urine (pH 5.5–6.5). Pepsin and magnesium oxide preparations are also prescribed for a short period.

Direction	Recommendation	Objectives	Note / source
Fluid intake	Increase daily fluid intake by 1.5–2 times in the hot season; at least ≈ 2 L/1.73 m ² /day (individualized by age/weight)	Increase diuresis, dilute urine	Increased fluid intake reduces risk of stones; AUA recommends urine output ≥ 2.5 L/day (in adults).
Urine pH control	Aim for a pH of 6.0–6.5 with home pH tests	Increase urate solubility	Primary treatment for urate stones in children is alkalization; pH 6–6.5 is sufficient.
Alkalinization	Potassium citrate/citrate mixtures (e.g., blemaren, etc.); alkaline	Maintain pH 6–6.5 and help dissolve	EAU/AUA: potassium citrate is the first choice; continuous pH monitoring

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	mineral waters	existing stones	is necessary.
Diet (purine restriction)	Reduce purine-rich foods (offal, strong meat broths, some types of fish); increase dairy products, fruits and vegetables	Reduce uric acid production, increase urine alkalinity	Recommendations to reduce purine load and increase alkaline load; balanced diets (DASH/Med) are supported.
Juices and fruits	Include lemon/lime, grape juices, and melons (watermelon) in the diet in season	Raise pH, increase diuresis	Citrus lemonades help alkalinize, but fructose may increase urate formation - use in moderation.
Suppression of urate synthesis	Allopurinol — in hyperuricemia/hyperuricemia, relapses, or hematological conditions; in children ≈ 10 mg/kg/day as directed	Reduce serum and urine urate	Pediatric dosage EAU: 10 mg/kg (with supervision); first step in urate stones is alkalization, allopurinol - additional/selective.
Uricosurics	Probenecid/benemid and others — with caution	Reduce urate reabsorption	May increase urate crystallization; high fluid intake and pH monitoring are necessary. (according to clinical judgment)
Monitoring	Metabolic assessment, 24-hour urine (volume, pH, urate, citrate, Ca, Na, etc.), control USG	Prevent recurrence, adjust therapy	AUA: 24-hour urine collection within 6 months of onset, then at least once a year.

Conclusion

An effective treatment approach for children with urate nephropathy is a complex, multifaceted, continuous monitoring process. According to the results of the study, maintaining patients under constant dispensary supervision, regular assessment of metabolic status, and quarterly revision of the individual therapy plan are important factors in preventing the progression of the disease and the development of nephrolithiasis. Diet therapy plays a key role in urate nephropathy. Among the study participants, patients who strictly followed Pevzner's diet No. 6 showed an average decrease in uric acid levels by 25–30% within 2–3 months, and a decrease

in urate crystals in the urine. Limiting foods high in purines (red meat, liver, fish, legumes) and increasing the intake of vegetables and fruits, alkaline drinks, and dairy products helps restore the acid-base balance in the body. In the hot season, especially in the conditions of Uzbekistan, a physiological decrease in diuresis is observed. This leads to an increase in the concentration of urate in the urine, an increased risk of crystallization. Therefore, patients are recommended to drink 1.5–2.0 l/m² of fluid per day relative to body weight, especially in the evening and at night, as well as alternately drink alkaline mineral waters (“Borjomi”, “Essentuki-17”) or sodium bicarbonate solutions. These measures increase diuresis, alkalize the urinary environment and facilitate the dissolution of urate crystals. In pharmacotherapy, allopurinol is used as the main drug, which reduces the formation of uric acid by inhibiting the enzyme xanthine oxidase. In the study, after 3 months of treatment with allopurinol (5–10 mg/kg/day), serum uric acid decreased by an average of 35%, and the level of crystalluria in the urine decreased by up to 40%. The use of the drug in combination with metabolic activators (magnesium, calcium citrate) maintained the stability of renal function. The use of B vitamins, ascorbic acid and tocopherol as adjuvant therapy increased antioxidant protection, reduced oxidative stress and improved microcirculation of renal tissue. Phytotherapy drugs - Canephron N, Urolesan, Phytonefrol - due to their diuretic and spasmolytic effects, increased diuresis and improved the general condition of patients. In 70% of patients, after 6 months of complex treatment, the urine pH increased to 6.5–7.0, which reduced uric acid deposition. The number of patients whose crystalluria disappeared or was reduced to a minimum increased by 1.5 times. Serum uric acid decreased from 400 μmol/l to 280–320 μmol/l. Stabilization of metabolic processes in children with urate nephropathy not only protects renal tissue, but also has a positive effect on the overall growth and development of the child's body. No adverse changes in cardiovascular and liver function were noted, the patients' appetite, physical activity, and laboratory parameters improved. The results obtained showed that a comprehensive approach - dispensary control, diet therapy, properly selected drugs and supportive therapy - effectively prevents chronic complications of urate nephropathy. Such an approach reduces the likelihood of late development of kidney stones in children, significantly improves their quality of life and social adaptation.

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