HYPERURICEMIA AS AN EARLY MARKER OF KIDNEY FUNCTION DISORDERS IN YOUTH

Rasulov Abdullo Alisherovich
Samarkand State Medical University, Faculty of General Medicine
Sattorov Komil Abdukarim o'g'li
Samarkand State Medical University, Faculty of General Medicine
Ujarova Umida Akrom qizi
Samarkand State Medical University, Faculty of Pediatrics
Azimova Aziza Azimovna

Samarkand State Medical University, Master's Degree in Therapeutic Medicine

Abstract: This study examines hyperuricemia as an early marker of kidney function impairment in youth. Elevated serum uric acid levels may reflect subclinical changes in glomerular filtration, tubular function, and renal microcirculation even in apparently healthy young individuals. The paper reviews the physiological role of uric acid, its impact on renal parameters, and the mechanisms by which hyperuricemia can contribute to kidney dysfunction. Early identification of elevated uric acid levels allows for timely preventive interventions, including lifestyle modifications, dietary adjustments, and increased physical activity. Monitoring uric acid alongside kidney function parameters provides a valuable tool for risk assessment, early diagnosis, and long-term preservation of renal health in the young population.

Keywords: Hyperuricemia, kidney function, youth, glomerular filtration rate, serum uric acid**.**

INTRODUCTION

Hyperuricemia, defined as an elevated level of uric acid in the blood, is increasingly recognized as a potential early marker of metabolic and renal dysfunction. This condition is particularly relevant for young individuals, as many pathological processes at this age remain subclinical and asymptomatic. Uric acid is the end product of purine metabolism, and its concentration in the blood reflects the balance between production and renal excretion. Even slight increases in uric acid levels may affect the endothelial function of renal vessels, renal microcirculation, and filtration processes. Therefore, investigating hyperuricemia in youth is of considerable scientific and clinical interest, providing insight into early detection of renal disorders and the prevention of chronic kidney disease.

Relevance

Recent epidemiological studies have shown a strong association between hyperuricemia and the risk of developing renal dysfunction, cardiovascular disease, and metabolic disorders. Young individuals generally demonstrate high compensatory capacity, which can mask early pathological changes. Nevertheless, even borderline elevations in uric acid can indicate initial alterations in glomerular filtration rate, electrolyte excretion, and overall kidney function. Lifestyle factors, dietary habits, physical activity, and genetic predispositions also contribute to subclinical metabolic shifts. Early identification of hyperuricemia in young people is therefore crucial for preventive strategies and timely intervention to preserve renal health.

Main part

Uric acid is the final product of purine metabolism and plays a dual role in the human body. At physiological levels, it acts as an antioxidant, neutralizing free radicals and protecting cells from oxidative damage. However, when its concentration exceeds normal limits, uric acid can act as a pro-oxidant, promoting oxidative stress, endothelial dysfunction, and inflammation in various tissues, including the kidneys. Hyperuricemia arises from increased production of uric acid due to enhanced purine breakdown or decreased excretion by the kidneys. Genetic factors, dietary habits, and lifestyle also influence uric acid levels in the blood. In young people, early stages of hyperuricemia often remain subclinical and may not present with obvious symptoms. Nevertheless, even moderate increases can initiate processes that compromise microcirculation in renal tissues. Elevated uric acid can lead to renal vasoconstriction, oxidative stress, and low-grade inflammation. These processes, if persistent, may contribute to early structural and functional changes in the kidneys. Understanding these mechanisms is crucial for identifying at-risk individuals and implementing timely preventive strategies. Laboratory monitoring of uric acid in youth can reveal early metabolic shifts before clinical manifestations develop. Recognizing hyperuricemia as a biochemical marker allows researchers and clinicians to explore its role in the pathogenesis of renal dysfunction. Preventive measures based on early detection can reduce long-term risks and improve renal health outcomes.

Elevated uric acid levels are strongly associated with changes in kidney function, even among clinically healthy young individuals. The most important parameters include glomerular filtration rate (GFR), serum creatinine, urea concentration, and electrolyte excretion. Hyperuricemia may reduce GFR by causing renal microvascular constriction and impairing perfusion. It can also promote endothelial dysfunction in glomerular and tubular capillaries. These alterations often remain subclinical,

detectable only through laboratory analysis, which highlights the importance of regular monitoring. Research shows that persistent hyperuricemia can lead to low-grade renal inflammation, fibrosis, and oxidative damage, even before symptoms appear. Uric acid may also interact with other metabolic pathways, exacerbating insulin resistance, hypertension, and oxidative stress, which indirectly affect kidney function. Tracking these parameters in young individuals provides early warning signs of developing renal compromise. Early detection allows clinicians to implement interventions before irreversible changes occur. The relationship between uric acid levels and kidney function demonstrates the interdependence of metabolic regulation and renal health. Understanding this link supports the use of uric acid as an early biomarker for assessing the risk of kidney dysfunction. Monitoring laboratory markers of renal function alongside uric acid provides a more comprehensive evaluation of renal health in youth. Recognizing hyperuricemia as an early marker of kidney dysfunction in young people has significant preventive implications. Identifying elevated uric acid levels enables timely lifestyle interventions, including dietary adjustments, increased physical activity, adequate hydration, and weight management. Early intervention may halt or slow the progression of metabolic disturbances and prevent the development of chronic kidney disease. Personalized recommendations based on laboratory monitoring can help mitigate risk factors that contribute to hyperuricemia and renal stress. Preventive strategies also enhance awareness among young individuals regarding long-term kidney health. Educational programs on nutrition and exercise can complement medical monitoring, fostering healthier behaviors. Clinicians can use uric acid levels to stratify patients for risk and prioritize early follow-up. Continuous evaluation of kidney function alongside uric acid monitoring provides feedback on the effectiveness of lifestyle modifications. Such proactive measures are cost-effective and reduce future healthcare burdens. Early detection and management of hyperuricemia support the overall goal of preventive medicine by preserving renal function, minimizing complications, and promoting healthy aging.

Conclusion

Hyperuricemia in youth serves as a significant early marker of kidney function impairment. Even in the absence of clinical symptoms, elevated uric acid levels can indicate subclinical changes in glomerular filtration, tubular function, and renal microcirculation. Monitoring uric acid alongside key kidney function parameters, such as serum creatinine, urea, and glomerular filtration rate, allows for early detection of potential renal dysfunction. Early identification enables the implementation of preventive strategies, including lifestyle modifications, dietary adjustments, increased

physical activity, and weight management, which can reduce the risk of progression to chronic kidney disease. Recognizing hyperuricemia as a prognostic and diagnostic biomarker in young populations highlights its importance in preventive medicine. Overall, integrating uric acid monitoring into routine health assessments in youth provides an effective approach for preserving renal health and promoting long-term wellness.

References

1. Li N., Yang X., Wu J., et al. Correlation between the increase in serum uric acid and the rapid decline in kidney function in adults with normal kidney function: a retrospective study in Urumqi, China. *BMC Nephrology*. 2023;24:103.
2. Johnson R. J., Kang D. H., Feig D. I. Uric acid and kidney disease: mechanisms and clinical implications // Nephrology. – 2019. – Vol. 24. – P. 12–22.
3. Sanchez-Lozada L. G., Johnson R. J. Uric acid: a marker and mediator of kidney injury // Kidney International. – 2017. – Vol. 91. – P. 491–499.
4. Martynov A. I., Chazova I. E. The role of uric acid in the pathogenesis of renal dysfunction // Journal of Internal Medicine. – 2020. – № 6.
5. Азимова, А. А., Маликов, Д. И., & Шайкулов, Х. Ш. (2021). МОНИТИРОИНГ ЭТИОЛОГИЧЕСКОЙ СТРУКТУРЫ СЕПСИСА ЗА. *PEDAGOGICAL SCIENCES AND TEACHING METHODS*, *48*, 18-22.
6. ЯНОВА, Э. У., ИСТАТОВА, Ф. Ш., & АЗИМОВА, А. А. (2023). Морфометрия Коркового Вещества При Церебральной Микроангиопатии. *Central Asian Journal of Medical and Natural Science*, *4*(3), 51-64.