AMERICAN JOURNAL OF MULTIDISCIPLINARY BULLETIN
ISSN: 2996-511X (online) | ResearchBib (IF) = 9.512 IMPACT FACTOR
Volume-4| Issue-3| 2026 Published: |30-03-2026|

LABORATORY CHANGES IN KIDNEY DISEASES IN CHILDREN

https://doi.org/10.5281/zenodo.18900574

Erkin A. Khudoykulov
Tashkent State Medical University, Tashkent, Uzbekistan

Abstract

Kidney diseases in children represent a significant group of disorders affecting renal structure and function. Early diagnosis is essential to prevent long-term complications such as chronic kidney disease and growth impairment. Laboratory investigations, including urinalysis, biochemical tests, and hematological parameters, play a crucial role in identifying renal abnormalities and monitoring disease progression. This article reviews the most common laboratory changes observed in pediatric kidney diseases and highlights their diagnostic significance.

Keywords

pediatric nephrology, kidney diseases, laboratory findings, urinalysis, creatinine, nephrotic syndrome

Introduction

Kidney diseases in children are an important medical problem worldwide. Pediatric renal disorders include congenital anomalies, glomerular diseases, infections, and metabolic disorders affecting kidney function. The kidneys play a critical role in maintaining homeostasis by regulating fluid balance, electrolyte concentrations, acid–base balance, and excretion of metabolic waste products.

Laboratory examinations are fundamental tools for diagnosing kidney diseases in children because clinical symptoms are often nonspecific. Tests such as urinalysis, serum creatinine, blood urea nitrogen, and electrolyte levels help evaluate renal function and identify underlying pathology. Early detection of abnormal laboratory parameters allows timely treatment and prevention of disease progression.

Urinalysis in Pediatric Kidney Diseases.Urinalysis is one of the most important diagnostic methods in pediatric nephrology. It provides valuable information about the functional state of the kidneys and urinary tract.

Proteinuria. Proteinuria is defined as an abnormal amount of protein in the urine and is one of the most common laboratory findings in children with kidney disease. It may indicate glomerular damage, especially in conditions such as

AMERICAN JOURNAL OF MULTIDISCIPLINARY BULLETIN
ISSN: 2996-511X (online) | ResearchBib (IF) = 9.512 IMPACT FACTOR
Volume-4| Issue-3| 2026 Published: |30-03-2026|

nephrotic syndrome or glomerulonephritis. Persistent proteinuria requires further evaluation because it may reflect chronic kidney disease or systemic disorders.

Hematuria. Hematuria refers to the presence of red blood cells in urine. It may be microscopic or macroscopic. Hematuria is frequently observed in inflammatory diseases of the kidneys, including glomerulonephritis and IgA nephropathy. In children, hematuria may also occur due to urinary tract infections, trauma, or congenital abnormalities.

Leukocyturia

Leukocyturia indicates the presence of white blood cells in urine and often suggests infection or inflammation of the urinary tract or kidneys. It is commonly detected in pyelonephritis and urinary tract infections.

Urinary Casts. Microscopic examination of urine may reveal different types of casts formed in the renal tubules. These include:

Red blood cell casts

White blood cell casts

Granular casts

Hyaline casts

The presence of cellular casts strongly suggests renal parenchymal involvement, particularly glomerular or tubular injury.

Urine Specific Gravity and Osmolality

Changes in urine concentration ability are also important indicators of kidney dysfunction. Reduced urine specific gravity may reflect impaired tubular function and reduced concentrating ability of the kidneys.

Blood Biochemical Changes. Blood biochemical analysis is essential for evaluating renal function in children with kidney disease.

Serum Creatinine. Serum creatinine is one of the most widely used markers for assessing kidney function. Creatinine is produced from muscle metabolism and excreted by the kidneys. Elevated serum creatinine levels indicate decreased glomerular filtration rate (GFR) and impaired renal function.

Blood Urea Nitrogen (BUN). Blood urea nitrogen reflects the level of urea in the bloodstream. Urea is a waste product formed during protein metabolism. Increased BUN levels may occur when kidney filtration is impaired.

Electrolyte Disturbances. Kidney diseases in children often lead to electrolyte imbalances, including:

Hyperkalemia – elevated potassium levels

Hyponatremia – decreased sodium levels

Metabolic acidosis – disturbance of acid–base balance

AMERICAN JOURNAL OF MULTIDISCIPLINARY BULLETIN
ISSN: 2996-511X (online) | ResearchBib (IF) = 9.512 IMPACT FACTOR
Volume-4| Issue-3| 2026 Published: |30-03-2026|

These abnormalities occur due to reduced renal excretion and impaired tubular reabsorption.

Hypoalbuminemia. Hypoalbuminemia is frequently observed in nephrotic syndrome due to excessive protein loss in urine. Studies show that children with nephrotic syndrome often have significantly reduced serum albumin levels and increased serum cholesterol levels.

Hematological Changes. Kidney diseases may also affect hematological parameters in children.

Anemia. Chronic kidney disease leads to decreased production of erythropoietin, a hormone responsible for red blood cell production. As a result, children may develop anemia characterized by reduced hemoglobin levels.

Inflammatory Markers

Inflammatory kidney diseases may be associated with elevated inflammatory markers such as:

C-reactive protein (CRP)

Erythrocyte sedimentation rate (ESR)

These markers help identify underlying inflammatory processes affecting the kidneys.Emerging Biomarkers in Pediatric Nephrology. Recent research has focused on identifying novel biomarkers for early detection of kidney diseases in children. Advances in urine proteomics have shown that specific urinary proteins may help differentiate between types of glomerular diseases such as minimal change disease and focal segmental glomerulosclerosis.

These biomarkers may improve diagnostic accuracy and help predict treatment response in pediatric nephrology. Diagnostic Importance of Laboratory Findings

Laboratory findings are essential for diagnosing kidney diseases and determining disease severity. Abnormal results may indicate:

Glomerular damage

Tubular dysfunction

Reduced filtration capacity

Systemic complications

In clinical practice, laboratory tests are often combined with imaging methods and clinical evaluation to establish a definitive diagnosis.

Conclusion

Laboratory investigations play a crucial role in diagnosing and managing kidney diseases in children. Urinalysis, biochemical tests, and hematological parameters provide valuable information about kidney function and disease progression. Early detection of abnormal laboratory findings allows prompt

treatment and helps prevent complications such as chronic kidney disease. Continuous research on novel biomarkers may further improve diagnostic accuracy and patient outcomes in pediatric nephrology.

REFERENCES:

1. Lane JC, et al. Pediatric nephrology and laboratory evaluation of kidney disease. Clinical Kidney Journal.

2. American Academy of Family Physicians. Proteinuria in Children: Evaluation and Diagnosis.

3. Çetinkaya S, et al. Evaluation of Children with Nephrotic Syndrome. Journal of Pediatric Research.

4.CureGN Consortium. Urine proteomics in pediatric nephrotic syndrome. Scientific Reports.

5. N Maxamatjanova, S Djalilova. The significance of neurovisualization psycho-emotional disorders in cerebral stroke. CEREBROVASCULAR DISEASES, 2017

6. NM Makhamatjanova. FEATURES OF ANXIETY AND DEPRESSION IN WOMEN. JOURNAL OF EDUCATION AND SCIENTIFIC …, 2025

7. Djalilova, S; Makhamatjanova, N; Ibodullayev, Z; Sadikova, S; Abdullayeva, D. FLUVOXAMINE INFLUENCE ON DISTURBING - DEPRESSIVE DISORDER AT PATIENTS WITH ESSENTIAL HYPERTENSION HYPERTENSIVE, COMPLICATED BY CHRONIC HEART FAILURE. JOURNAL OF HYPERTENSION volume 34, 2016

8. Djalilova, S; Makhamatjanova, N; Ibodullayev, Z; Sadikova, S; Abdullayeva, D. DETECTION OF ANXIETY AND DEPRESSION DISORDERS AT PATIENTS WITH ESSENTIAL HYPERTENSION COMPLICATED BY CHRONIC HEART FAILURE, TAKING INTO ACCOUNT SYMPATHOADRENAL SPECTRUM. JOURNAL OF HYPERTENSION volume 34, 2016

9. Ishanhodjayeva Gulchexra Talipovna. A study of sleep quality in patients with type 2 diabetes mellitus complicated by diabetic polyneuropathy //AMERICAN JOURNAL OF EDUCATION AND LEARNINGISSN: 2996-5128 (online) |ResearchBib (IF) = 10.91 IMPACT FACTORVolume-3| Issue-10| 2025 Published: |30-11-2025. https://doi.org/10.5281/zenodo.17756982

10. NM Maxamatjanova, GT Ishanxodjayeva. Neuropsychological studies in children with tic hyperkinesis. Parkinsonism & Related Disorders, 2025/5/1.

11. NM Maxamatjanova. CLINICAL, PSYCHOLOGICAL ANALYSIS OF NEUROSIS AND DEPRESSION. Central Asian Journal of Education and Innovation, 2025

12. ZR Ibodullayev, NM Maxamatjanova, S Gafurova, SA Dursunov. THE IMPORTANCE OF INFORMATION TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN DEPRESSION. The Bioscan 19(2): S.I (1), 475-477, 2024

13. N Maxamatjanova. Cognitive disorders and their rehabilitation in parkinson's diseases. Journal of the Neurological Sciences, 2019