

Risk Factors for the Development of Chronic Kidney Disease in Adolescents

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Abstract Among adolescents, chronic kidney disease (CKD) is one of the leading causes of mortality and disability. Our research highlights key factors significantly associated with the progression of CKD. These include untreated chronic inflammatory foci (caries, tonsillitis, otitis media), harmful habits (smoking in boys, excessive consumption of energy drinks in both sexes), obesity, a history of allergic diathesis and rickets, low birth indicators (prematurity, low birth weight), anemia, and blood pressure irregularities. Identification of these risk factors allows for the early detection of nephropathy in adolescents.

Keywords Adolescence, Chronic kidney disease, Risk factors, Glomerular filtration rate (GFR)

1. Introduction

Chronic kidney disease (CKD) is a progressively widespread condition affecting all segments of the population. While extensive data exist for adult and pediatric populations, information on its prevalence and impact among adolescents remains limited.

Nephropathies in adolescence represent a critical challenge in nephrology. Early diagnosis and treatment are crucial in preventing progression to chronic renal failure, disability, or the need for renal replacement therapy at a young age. CKD in adolescents is increasingly recognized as a medical and social issue, often associated with early-onset nephropathies, congenital abnormalities, metabolic disorders, and environmental stressors [1,3].

Adolescence (11–16 years) is characterized by physiological growth, hormonal changes, and heightened susceptibility to modifiable risk factors. Therefore, identifying contributing factors to nephropathy during this period is vital for prevention and early intervention.

Globally, the prevalence of CKD in children and adolescents is estimated at 15–74 cases per million, though rising obesity and metabolic syndrome rates suggest an upward trend. Early-stage nephropathy is frequently asymptomatic, potentially leading to accelerated renal function decline in adulthood [4].

Risk Factors. Genetic and Congenital Factors: Congenital anomalies of the kidney and urinary tract (CAKUT) are among the most common causes of nephropathy in children. Genetic mutations such as APOL1 (especially in individuals of African descent), NPHS1, and NPHS2 are associated with

early glomerular injury and nephrotic syndromes.

Metabolic and Cardiovascular Factors: Obesity, metabolic syndrome, and type 2 diabetes are on the rise among adolescents, often linked to hyperfiltration and proteinuria. Hypertension, even pre-hypertensive states, particularly in obese individuals, is a risk for early renal damage [2,7].

Infections and Autoimmune Disorders: Post-streptococcal glomerulonephritis, lupus nephritis, and Henoch–Schönlein purpura are among the inflammatory causes of CKD. Recurrent urinary tract infections, especially in girls, can lead to reflux nephropathy and tissue damage.

Lifestyle and Environmental Factors: High-salt diets, sugary drinks, and sedentary lifestyles contribute to obesity-related nephropathy. Tobacco, NSAIDs, heavy metals, and substance abuse are nephrotoxic and increase CKD risk.

Socioeconomic and Psychosocial Factors: Limited access to healthcare, poor health literacy, and delayed diagnosis exacerbate CKD progression. Mental health disorders, poor nutrition, and substance dependency further increase risk [5,6].

Objective of the Study.

To assess the prevalence of CKD among adolescents and analyze the significance of associated risk factors contributing to nephropathy development.

2. Materials and Methods

A total of 791 adolescents from urban and rural areas of Bukhara region were surveyed. An initial questionnaire identified potential CKD risk factors and clinical symptoms. Based on the results, 380 adolescents were selected for further investigation.

Subsequent assessments included serum creatinine and cystatin C levels to calculate glomerular filtration rate (GFR), urinary microalbumin analysis, lipid spectrum, calcium and potassium levels, and complete blood count. GFR was calculated using the Schwartz formula.

Statistical analysis was conducted using Microsoft Excel with Student's t-test and Pearson correlation. The study adhered to evidence-based medicine principles.

3. Results and Discussion

Out of the 380 adolescents, 54.2% (n=206) were male and 45.8% (n=174) female. Risk factors for CKD were identified through questionnaires and analyzed by gender.

Using a questionnaire, the level of occurrence of risk factors that cause CKD in all adolescents was studied and their occurrence frequency was analyzed in terms of gender (Table 1).

Table 1. Analysis of risk factors leading to the development of nephropathy among adolescents involved in the study (%)

Risk Factors	Total n=380		Boys n=206		Girls n=174	
	absolute	%	absolute	%	Absolute	%
Overweight	189	49,7	102	53,9	87	46,1
History of Prematurity	72	18,9	34	47,2	38	52,8
Allergic Diathesis (Childhood)	109	28,7	47	43,1	62	56,9
History of Rickets	71	18,7	43	60,5	28	39,5
Family History of Renal Disease	68	17,9	37	54,4	31	45,6
Maternal Nephropathy During Pregnancy	86	22,6	40	46,5	46	53,5
Chronic Inflammatory Foci	178	46,8	94	52,8	84	47,2
History of Allergic Reactions	58	15,3	28	48,3	30	51,7
Smoking	42	100	42	100		
Energy Drink Consumption	116	30,5	64	55,2	51	44,8
Fast Food Consumption	94	24,7	49	52,1	45	47,9
Inadequate Water Intake	49	12,9	27	55,1	22	44,9
Hypodinamia	59	15,5	31	52,5	28	47,5
Parasitic Diseases (Current/History)	66	17,4	31	46,9	35	53,1

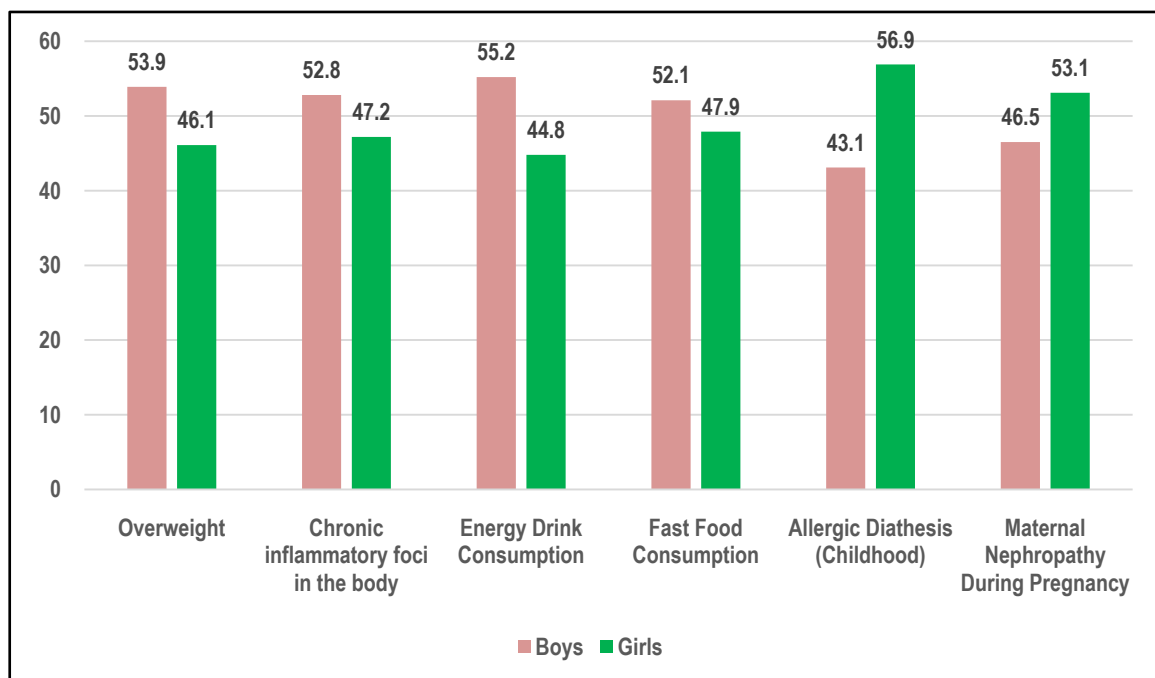


Figure 1. Gender Distribution of Risk Factors Contributing to Nephropathy in Adolescents

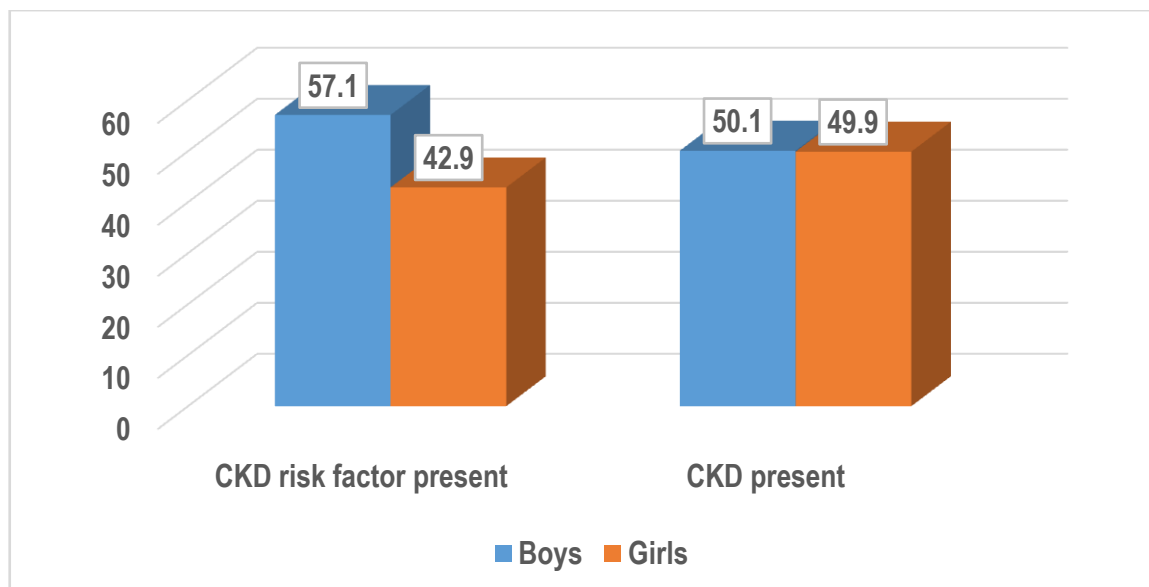


Figure 2. Analysis of study groups by gender

Based on the statistical analysis of the data presented in the table, the risk factors that are more significant in boys and girls were identified and their intergroup comparative analysis was carried out (Fig. 1).

Based on the data presented in the figure, an assessment of gender-specific aspects of risk factors influencing the development of nephropathy in adolescents revealed that the most significant risk factors include excess body weight, untreated chronic inflammatory foci in the body, harmful habits, and predisposing factors in the medical history.

Excess body weight emerged as the most critical factor, observed in 53.9% of boys and 46.1% of girls. Obesity is associated not only with metabolic syndrome but also with an increased filtration load on the kidneys, which contributes to a higher risk of nephropathy development, particularly in boys.

The second most significant factor was the presence of undiagnosed and untreated chronic inflammatory foci in the adolescent body, identified in 52.8% of boys and 47.2% of girls.

Another group of high-risk factors included harmful habits. Among adolescents, the consumption of energy drinks was recorded in 55.2% of boys and 44.8% of girls. Similarly, the prevalence of fast food in the diet was reported in 52.1% of boys and 47.9% of girls.

Moreover, among the factors contributing to the development of nephropathy in adolescence, a notable one was the presence of allergic diathesis during childhood, which was significantly more common in girls (56.9%) than in boys (43.1%).

Subsequent creatinine testing and GFR evaluation showed that 164 adolescents had varying degrees of CKD. Based on this, two groups were defined:

Group 1 – Adolescents at risk of nephropathy (normal GFR) (n=216).

Group 2 – Adolescents with risk factors and identified

CKD (n=164) (Figure 2).

According to the figure, although the prevalence of nephropathy risk factors in adolescents with preserved renal function was nearly equal in both groups (57.1% in boys and 50.1% in girls), the incidence of early signs of renal involvement (SBC) was found to be higher among adolescent girls (49.9% in girls vs. 42.9% in boys).

4. Conclusions

Based on the analysis in the study, it can be concluded that the most significant risk factors for the development of SBC in adolescents include: undiagnosed and untreated chronic inflammatory foci (in our study: dental caries, tonsillitis, and otitis media), harmful habits (smoking among boys and the abuse of energy drinks in both genders), excess body weight, and a history of allergic diathesis. Nephropathy in adolescents is a multifactorial and complex clinical condition with various contributing risks. Comprehensive screening programs, lifestyle modification strategies, and targeted monitoring of at-risk groups are crucial in preventing CKD. Future research should focus on long-term cohort studies and early diagnostic markers based on biomarkers.

REFERENCES

- [1] Debra Braun-Courville, Sarah Holliday, Neerav Desai, Adolescent and Young Adult Development in Transplant Recipients, Pediatric Transplantation, 10.1111/ptr.14866, 28, 7, (2024).
- [2] Ikramov A. Sh, Akhmedova N. Sh, Sulaymonova G. T. Features of Chronic Kidney Disease and Risk Factors in Adolescents Best Journal of innovation in Sciences, research and development - 2024. - Vol. 3, P-176-180.

- [3] Nilufar Akhmedova, Ravshan Makhmudov The significance of genetic mutations in the pathogenesis of the development of nephropathy in chronic kidney diseases of different etiologies BIO Web of Conferences 121, 01006 (2024).
- [4] Solis-Herrera, Carolina et al. "Nephropathy in youth and young adults with type 2 diabetes." *Current diabetes reports* vol. 14,2 (2014): 456. doi:10.1007/s11892-013-0456-y.
- [5] Sun P, Ming X, Song T, Chen Y, Yang X, Sun Z, Zheng X, Tong L, Ma Z and Wan Z (2024) Global burden of chronic kidney disease in adolescents and young adults, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Front. Endocrinol.* 15: 1389342. doi: 10.3389/fendo.2024.1389342.
- [6] Nurmatov, I. A., & Sharipova, S. Sh. (2020). Skrining nefroticheskogo sindroma u detey v usloviyax ambulatornoy slujbi. *Tibbiyotda yangi kun*, (2), 72–75.
- [7] Petrosyan E.K., Kostereva Ye.A., Novikov S.Yu., Moreno I.G., Shumilov P.V. Funktsionalnoye sostoyaniye pochk u podrostkov s ojireniyem. *Nefrologiya*. 2017; 21(2): 48-55.