ISSN 2231-2218

ASIAN JOURNAL OF PHARMACEUTICAL AND BIOLOGICAL RESEARCH

AJPBR

Indexed by:

ROAD Crossref Universal Impact Factor IMPACT FACTOR SEARCH

Asian journal of Pharmaceutical and biological research 2231-2218
http://www.ajpbr.org/
Universal IMPACT factor 7
SJIF 2022: 4.465
Volume 12 Issue 2
MAY-AUG. 2023

Asian journal of Pharmaceutical and biological research 2231-2218
http://www.ajpbr.org/
Universal IMPACT factor 7
SJIF 2022: 4.465
Volume 12 Issue 2
MAY-AUG. 2023

Determining early risk factors of chronic kidney disease in adolescents

Olimova Gulkhayo Shamsher qizi
Bukhara State Medical Institute, Republic of Uzbekistan, Bukhara

Abstract. Analysis of the literature shows that the number of adolescents with chronic kidney diseases (CKD) increases every year. To date known more than twenty renal diseases, the end of clinical manifestation of which is CKD. Studies of recent years show that in CKD genesis and progression leading roleplays congenital anomalies of the kidney and urinary tract, low birth weight, small for gestational age, arterial hypertension, male sex, metabolic disorders of calcium and phosphorus, the use of nephrotoxic drugs, etc. At the present stage, for diagnosis of violations of the glomerular filtration rate, microalbuminuria rate, ordered ten most important of them - Cystatin C method.

Keywords: chronic kidney disease, adolescents, microalbuminuria, risk factors, proteinuria, low birth weight, small for gestational age.

Chronic kidney disease (CKD) is one of the common noncommunicable diseases (NCD) associated with highmorbidity and mortality worldwide. CKD is defined as progressive and usually irreversible functional and structural abnormalities of the kidney, lasting 3 months or more irrespective of the glomerular filtration rate (GFR), or reduction in estimated GFR (eGFR) <60 ml/min/1.73 m2 for 3 months or more[1].

Chronic kidney disease (CKD) is a growing public health problem worldwide with increasing incidence and prevalence. The prevalence of CKD in adolescents is much lower than that in adults, ranging from 15 to 75 cases per 1 million adolescents. CKD in children and adolescents, as well as in adolescents and adults, is associated with serious consequences, including increased risk of mortality, kidney failure, cardiovascular disease, mineral bone disorder, and poor nutrition. Moreover, children and adolescents have a longer life expectancy with a longer time to manifest complications related with CKD. Comorbidities of CKD may also lead to complications that include impairments in physical and psychosocial development in adolescents. Therefore, pediatric CKD requires a higher cost of care per individual than that in adult CKD. CKD is estimated to affect between 8% and 16% of the world population, while >2 million individuals are leaving with end‐stage kidney disease (ESKD)[2].

According to the World Healt Organization, the age of adolescents is 13–18 years. To determine the risk factors of causing CKD in adolescents, attention is paid to brith anamnesis, sociodemographic characteristics, lifestyle, dietary habits, meal pattern, physical activity, medical and surgical history, and family history of kidney

disease, as well as anthropometric measurements (weight, height, and mid‑upper arm circumference [MUAC]), blood pressure, and pulse rate. According to this datas, risk factors divided into two large group: non-modifiable risk factors and modifiable risk factors[3].

Non-modifiable risk factors

1.Primary kidney disease

Primary kidney disease is an important predictor of CKD progression in adolescents. Congenital anomalies of the kidney and urinary tract (CAKUT) are the most common cause of pediatric CKD. Children and adolescents with CAKUT experience a slower progression of CKD than those with other causes, resulting in a lower proportion of CAKUT in the population of children and adolescents with kidney failure. The kidney survival analysis based on data from the European Renal Association-European Dialysis and Transplant Association (ERA-EDTA) Registry showed that patients with CAKUT progressed to kidney failure at adolescents age[4]. CAKUT includes congenital and hereditary diseases in adolescents, which include:urinary tract obstractions, renal polycystosis, renal hypoplasia, Alport syndrome, reflux kidney diseases [5].

2. Perinatal factors

There is convincing epidemiologic evidence that persons with low birth weight (LBW) have an increased risk for developing CKD or ESRD by adulthood. The Kidney Disease Outcomes Quality Initiative (K/DOQI) clinical practice guideline for CKD recognizes LBW (<2500 g), and very low birth weight (VLBW; < 1500 g), as a potential risk factor for CKD susceptibility and initiation, and further recommends that all individuals at increased risk of developing CKD undergo testing to estimate glomerular filtration rate (eGFR) and assess markers of kidney damage.

Nephrogenesis commences at 5 weeks of gestation and reaches its peak velocity between 20 and 28 weeks of gestation. Therefore, in preterm infants born with immature kidneys during the period between 20 and 28 weeks, postnatal renal maturation accelerated after birth, with abnormal morphology of nephrons. The CKiD study reported that an abnormal birth history, including low birth weight, small for gestational age (SGA), and prematurity, is more common in children and adolescents with CKD than those in the general population[6].

A nationwide cohort study in Sweden revealed that preterm and early-term birth are strong risk factors for the development of CKD from childhood to mid-adulthood. In the Norway Birth Registry, low birth weight subjects had an adjusted hazard ratio for kidney failure of 1.61 (95% confidence interval, 1.4–1.98) compared with those without low birth weight [7]. In the last two decades the low birth pa-rameters attracted the attention of many rese-archers since there is evidence that the adverse events in utero lead to impaired nephrogenesis and increase the risk of CKD later in life. There is a higher prevalence of children and adolescents born with low birth parameters in cohorts of CKD patients compared with the subjects without

Asian journal of Pharmaceutical and biological research 2231-2218
http://www.ajpbr.org/
Universal IMPACT factor 7
SJIF 2022: 4.465
Volume 12 Issue 2
MAY-AUG. 2023
CKD. The abnormal birth history [prematurity, low birth weight (LBW), or small for gestatio-nal age (SGA)] is also associated with hyper-tension, cardiovascular morbidity, obesity and diabetes mellitus in adulthood.

Modifiable risk factors

1. Proteinuria

The presence of proteinuria constitutes a sign of kidney damage, and heavy proteinuria predicts a rapid kidney function decline. Experimental evidence supports the crucial role of proteinuria in accelerating the progression of kidney disease to kidney failure through multiple pathways. Urinary proteins themselves can elicit pro-inflammatory and profibrotic effects that directly contribute to chronic tubulointerstitial damage. This tubulointerstitial injury is one of the mediators that lead to CKD progression.

Association of proteinuria with race, cause of chronic kidney disease, and glomerular filtration rate in the chronic kidney disease in children and adolescents study [8]. Warady et al. revealed that times to either a 50% decline in GFR or the initiation of kidney replacement therapy were significantly shorter with nephrotic-range proteinuria among children and adolescents with glomerular and non-glomerular CKD. Fuhrman et al. showed that children and adolescents with proteinuria of ≥0.2 mg/mg and albuminuria of ≥30 mg/g had a mean eGFR that was 16 mL/min/1.73m2 lower than those without proteinuria and albuminuria. The ESCAPE trial demonstrated that higher levels of proteinuria were associated with a more rapid decline in GFR.

2. Hypertension

The high prevalence of risk factors for CKD among the in‐school adolescents may have a correlation with early onset of ESKD. Hypertension, excess weight, abnormal MUAC, and family history of kidney disease were factors independently associated with the development of CKD among the in‐school adolescents. These factors except for the family history of kidney disease were modifiable, and lifestyle modifications such as lowsalt diets, avoidance of high‐calorie foods, and regular exercise both at home and in school should be part of the preventive strategies, to reduce the burden of kidney disease in this group. Regular in‐school screening for kidney disease and risk factors and health education to the students, teachers, and parents will be potentially rewarding measures geared towards preventing the development of CKD and its risk factors. Finally, the departments/ministries of health and education at the local, state, and federal levels should work together to setup policy framework for the reintroduction of effective school health services, as this will go a long way in early detection and prompt treatment of CKD and its risk factors. This study is not without limitations and these include the fact that dipstick proteinuria, hematuria, and eGFR were only measured once, therefore, increasing the likelihood of overdiagnosis of kidney disease and its features. Second, only 80 of the

participants agreed to blood collection, and analysis of CKD prevalence was based on this subgroup. salt diets, avoidance of high‑calorie foods, and regular exercise both at home and in school should be part of the preventive strategies, to reduce the burden of kidney disease in this group. Regular in‑school screening for kidney disease and risk factors and health education to the students, teachers, and parents will be potentially rewarding measures geared towards preventing the development of CKD and its risk factors. Finally, the departments/ministries of health and education at the local, state, and federal levels should work together to setup policy framework for the reintroduction of effective school health services, as this will go a long way in early detection and prompt treatment of CKD and its risk factors. This study is not without limitations and these include the fact that dipstick proteinuria,hematuria, and eGFR were only measured once,t herefore, increasing the likelihood of overdiagnosis of kidney disease and its features. Second, only 80 of the participants agreed to blood collection, and analysis of CKD prevalence was based on this subgroup [9].

The kidney is a major site for target organ damage of hypertension. Systemic hypertension and glomerular hyperfiltration lead to progressive nephron damage. The ESCAPE trial showed that intensified blood pressure control conferred a substantial benefit regarding kidney function among children and adolescents with CKD stages 2–4. The trial was designed to compare intensified blood pressure control (target <50th percentile) with conventional control (50th– 90th percentile) using an angiotensin-converting enzyme inhibitor. Based on the results of this trial, the KDIGO guideline recommends that the blood pressure treatment target for children and adolescents with CKD is systolic and diastolic blood pressure of less than the 50th percentile for gender, age, and height.

3. Anemia

Anemia is a common complication of CKD and is associated with several clinical consequences, including mortality, cardiovascular morbidity, and growth failure. Two prospective cohort studies for children and adolescents with CKD showed that 40%–45% of patients had anemia and the hemoglobin level decreases as GFR declines. Anemia and resulting tissue hypoxia could increase endothelial injury and stimulate the release of profibrotic cytokines. GFR declined more rapidly in adolescent patients with CKD with significant anemia. In the CKiD study, anemia was associated with an accelerated decline of 7.8 mL/min/1.73m2 in adolescents with CKD aged 13–18 years compared with the decline rate in those without anemia. Warady et al. reported that time to the composite renal event was significantly shorter with anemia by 45% among children and adolescents with non-glomerular CKD.

In the KNOW-Ped CKD study, only 21.6% and 36.6% of children and adolescents with anemia were treated with erythropoietin-stimulating agent (ESA) and iron supplementation treatment, respectively. This finding suggests the importance of identifying anemia and iron deficiency and actively correcting these in pediatric patients with CKD. In a randomized controlled study in adults with

predialysis CKD, early treatment of ESA targeting at a higher hemoglobinlevel significantly slowed the progression of CKD and delayed the initiation of kidney replacement therapy. However, high serum erythropoietin level is associated with the risk of cardiovascular events in adults [10]. Although the question of appropriate target hemoglobin levels in adolescents remains under debate, the KDIGO guideline recommends that Hb targets with ESA treatment should be kept within the range of 11.0–12.0 g/dL.

4. Obesity

In the last two decades there is a global, worldwide epidemic of obesity affecting not only adults but particularly children and adolescents . The new style of life, lack of proper education and aggressive marketing of the junk food industry contributed to the magnitude of this epidemic. In the year 2008, 1.4 billion peo-ple worldwide were overweight, and 500 mil-lion were obese. The situation is alarming since in 2010, 40 million children under the age of 5 years were overweight or obese.

In parallel with these data there is an increasing prevalence of CKD in adults and children and adolescents. Obesity is comorbidity associated with CKD, but vice versa, it can be a strong risk factor for CKD and its progression. It is well known that low birth parameters may be asso-ciated with the low nephron numbers and obesity and risk of CKD later in the life. Leptin and adiponectin are elevated in obese subjects and may be involved in pathogenesis and progression of CKD. Additional factors such as hypertension, increased cardiovascular morbidity, insulin resistance, dyslipidemia, and lipotoxicity, may play important roles in the patho-genesis of CKD in obesity [11-19]. It was shown that obesity is independent risk factor for progression of CKD as in the case of IgA nephropathy clinically and pathologically.

References

1. Hogg RJ, Furth S, Lemley KV, Portman R, Schwartz GJ, Coresh J, et al. National kidney foundation’s kidney disease outcomes quality initiative clinical practice guidelines for chronic kidney disease in children and adolescents: Evaluation, classification, and stratification.

2. Pediatrics 2003;111:1416‑21.Becherucci F, Roperto RM, Materassi M, Romagnani P. Chronic kidney disease in children and adolescents. Clin Kidney J 2016;9:583-91.

3. EARLY DETERMINATION OF THE PREVALENCE OF CHRONIC KIDNEY DISEASE RISK FACTORS IN ADOLESCENTS LIVING IN BUKHARA REGIONAH Olimova G.SH, Istamova A.H. Asian journal of pharmaceutical and biological research 11 (3), 2022.

4. Wuhl E, van Stralen KJ, Verrina E, Bjerre A, Wanner C, Heaf JG, et al. Timing and outcome of renal replacement therapy in patients with congenital malformations of the kidney and urinary tract. Clin J Am Soc Nephrol 2013;8:67-74.

5. ASPECTS OF PREDICTION OF CHRONIC KIDNEY DISEASE IN

OUTPATIENT CONDITIONS. AKHMEDOVA NILUFAR SHARIPOVNA, RAVSHANOV SARDOR SHARIPOVNA Elektronniy nauchniy jurnal “Biologiya i integrativnaya meditsina” №2 (55) 2022
6. Crump C, Sundquist J, Winkleby MA, Sundquist K. Preterm birth and risk of chronic kidney disease from childhood into midadulthood: national cohort study. BMJ 2019;365:l1346.
7. Gjerde A, Lillas BS, Marti HP, Reisaeter AV, Vikse BE. Intrauterine growth restriction, preterm birth and risk of end-stage renal disease during the first 50 years of life. Nephrol Dial Transplant 2020;35:1157-63.
8. Fuhrman DY, Schneider MF, Dell KM, Blydt-Hansen TD, Mak R, Saland JM, et al. Albuminuria, proteinuria, and renal disease progression in children and adolescents with CKD. Clin J Am Soc Nephrol 2017;12: 912-20.
9. Chronic kidney diseases in children. Karimjanov I.A., Israilova H.A. *Zdorov’ye Rebenka. 2017;12(7):832-840.*
10. PREVALENCE, RISK FACTORS AND ORGANIZATION OF CARE
FOR CHRONIC KIDNEY DISEASES AKHMEDOVA NILUFAR SHARIPOVNA Elektronniy nauchniy jurnal “Biologiya i integrativnaya meditsina” №5 (45) 2020
11. Ding W, Cheung WW, Mak RH. Impact of obesity on kidney function and blood pressure in adolescents. World J Nephrol. 2015; 4: 223–9.
12. Abdullayev R. B., Makhmudova L.I. Features of Chemical Elements in Various Forms of Irritable Bowel Syndrome // Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 2, 2021, Pages. 2993 – 3000.
13. Abdullayev R.B., Makhmudova L.I. Micro elemental imbalance in irritable bowel syndrome and IBS correction. Academicia. Vol. 11, Issue 5, May 2021:655-662.
14. Abdullayev R.B., Makhmudova L.I., (2021). Assessment Of Clinical And Psychological Status And Quality Of Life Of Patients In Different Forms Of Irritable Bowel Syndrome. The American Journal of Medical Sciences and Pharmaceutical Research, 3(02), 127-134.
15. Makhmudova L.I, Akhmedova N.Sh. Irritable bowel syndrome: a new look at the problem // Academicia. 10.5958/2249-7137.2020.00983.0. 433-38.
16. Makhmudova L.I., Akhmedova N.Sh., Ergashov B.B. Clinical manifestation of irritable bowel syndrome. Art of medicine. International medical scientific journal. Vol. 1, Issue 2. 2021:24-33.
17. Makhmudova L.I., Ismatova M.N., Mukhamedjanova M.H., Sulaymonova G.A. Evaluation of microelement status and IBS correction with irritable bowel syndrome. New day in medicine. 2(34) 2021:325-331.

18. Makhmudova L.I., Shazhanova N.S., Akhmedova N.Sh., (2021). Clinical Features Of Irritable Intestinal Syndrome. The American Journal of Medical Sciences and Pharmaceutical Research, 3(04), 154-159.
19. Makhmudova L.I., Sharipov J.N. State of intestinal microflora in irritable bowel syndrome. Tematics journal microbiology. Vol.6, Issue 1. 2022:104-109.