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ФОСФОРНО-КАЛЬЦИЕВЫЙ ОБМЕН И КЛИНИЧЕСКАЯ КАРТИНА У ДЕТЕЙ С ТУБУЛОИНТЕРСТИЦИАЛЬНЫМИ ЗАБОЛЕВАНИЯМИ ПОЧЕК

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АННОТАЦИЯ

Исследовано 44 детей с вторичным пиелонефритом и оксалатной нефропатией. У детей с тубулоинтерстициальными заболеваниями почек наблюдается нарушение кальциевого и фосфорного обмена. Степень выраженности остеопении при тубулоинтерстициальных заболеваниях почек зависит от наличия факторов риска, среди которых наибольшее значение имеют патологическое течение беременности у матери, перенесенный рахит, дефицит алиментарного кальция, гиподинамия. Наиболее выраженное снижение показателей минеральной плотности костной ткани при заболеваниях почек выявлено у детей с нарушениями физического развития и дефицитом массы тела.

Ключевые слова: вторичный пиелонефрит, оксалатная нефропатия, кальций, фосфор, факторы риска.

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PHOSPHORUS-CALCIUM METABOLISM AND CLINICAL PICTURE IN CHILDREN WITH TUBULOINTERSTITIAL KIDNEY DISEASES.

ANNOTATION

The study involved 44 children with secondary pyelonephritis and oxalate nephropathy. Children with tubulointerstitial kidney diseases have impaired calcium and phosphorus metabolism. The severity of osteopenia in tubulointerstitial kidney diseases depends on the presence of risk factors, among which the most important are the pathological course of pregnancy in the mother, rickets, deficiency of alimentary calcium, and physical inactivity. The most pronounced decrease in bone mineral density in kidney diseases was found in children with physical development disorders and body weight deficit.

Keywords: secondary pyelonephritis, oxalate nephropathy, calcium, phosphorus, risk factors.

Relevance of the problem. Medical and social problems of osteopenia and osteoporosis in pediatric practice remain poorly studied in many respects. Particularly relevant are studies of disorders of bone tissue formation processes in children with various chronic pathologies leading to changes in phosphorus-calcium homeostasis, including kidney diseases [1,2,4]. The state of phosphorus-calcium metabolism in chronic renal failure and nephrotic form of glomerulonephritis, in which the influence of glucocorticosteroid therapy on the formation of steroid osteoporosis is high, has been studied most thoroughly. At the same time, the state of bone metabolism in tubulointerstitial kidney diseases has been practically not studied. In this regard, it is relevant to study the indices of phosphorus-calcium metabolism and bone metabolism in children with the most common tubulointerstitial kidney diseases (secondary pyelonephritis, oxalate nephropathy) [1,2,3,4]. The aim of the work: to establish the frequency of phosphorus-calcium metabolism disorders and to determine the role of risk factors in the development of osteopenic conditions in tubulointerstitial kidney diseases in children

Materials and methods of the study. Clinical, laboratory and instrumental examination of sick children was carried out at the nephrology department of the Samarkand Regional Children's Specialized Center.

The study included 44 children aged 5 to 13 years, including 20 children with secondary pyelonephritis against the background of developmental anomalies of the urinary system (doubling of the renal pelvis, VUR, nephroptosis, renal dystopia, polycystic kidney disease, neurogenic bladder), and 24 children with oxalate nephropathy. The diagnosis was determined based on anamnestic, clinical and laboratory data, instrumental research methods (ultrasound, X-ray examination of the urinary system, including micturition cystography, intravenous urography, and cystoscopy). Kidney function was assessed by the concentration of creatinine, urea, and electrolytes in the blood serum, glomerular filtration, and the osmotic concentration function in the Zimnitsky test. Physical development was determined for all children, the indicators of which were assessed by absolute values of height and body weight using percentile tables and the principle of sigma assessment of anthropometric indicators. Alimentary calcium intake and the level of physical activity were assessed. No patient showed signs of decreased glomerular filtration or impaired tubular function of the kidneys during the examination. The study of phosphorus-calcium metabolism indicators included determination of the serum level of calcium, phosphorus, and alkaline phosphatase activity, and the excretion of calcium and phosphorus in the urine.

Results of the study. When studying the state of phosphorus-calcium metabolism, we found reliable changes in the level of calcium and phosphorus in the blood of patients with tubuloinertial kidney diseases. Thus, in 55% of children with secondary pyelonephritis and 54.1% of children with oxalate nephropathy, the level of calcium in the blood was reduced and amounted to an average of 1.97 ± 0.08 mmol / l, while in the general sample the calcium level was 2.31 ± 0.03 mmol / l and 2.18 ± 0.08 mmol / l, respectively, in children with secondary pyelonephritis and oxalate nephropathy. Hypophosphatemia was found with almost the same frequency in 60% of children with secondary pyelonephritis and 58.3% of children with oxalate nephropathy. Thus, the average phosphorus content in hypophosphatemia was 0.85±0.02 mmol/l, while the total phosphorus level in children in the group with secondary pyelonephritis was 1.33±0.03 mmol/l and 1.35±0.02 mmol/l in the group with oxalate nephropathy.

At the same time, in some children with reduced phosphorus and calcium levels, the alkaline phosphatase level also increased, which in oxalate nephropathy was large at 579.8±18.2 U/l, while in children with secondary pyelonephritis, the activity of this enzyme was 479.3±19.2 U/l. In 45% of children with secondary pyelonephritis and 50% of children with oxalate nephropathy, significant hyperphosphaturia (42.0 ± 1.7 mmol / day) was observed, which may be associated with impaired phosphorus reabsorption in the tubules.

Individual analysis of phosphorus-calcium metabolism indicators depending on age showed that children with pyelonephritis in pre- and pubertal age also had hyperphosphaturia 59.6 ± 1.0 mmol / day, which may be associated with hormonal dysfunction, requiring further study.

To identify the causes of osteopenic conditions, we first analyzed the frequency of generally accepted risk factors for osteopenia in kidney disease in children. The data obtained showed that almost all mothers of patients with hypocalcemia and hypophosphaturia had a pathological course of pregnancy. Thus, the most complicated obstetric and gynecological anamnesis was observed in the group of mothers of children with secondary pyelonephritis (65%). In the group of these mothers, fetoplacental insufficiency, threatened miscarriage, breech presentation of the fetus were more common, while in the group of mothers of children with oxalate nephropathy, the frequency of complicated pregnancy and childbirth was less common (55%). When analyzing morbidity and background pathology, it was found that children with osteopenia were often ill children, so the number of acute respiratory viral infections, bronchitis and pneumonia 8 or more times a year was 40% and 37.5% of cases, respectively, in the group with secondary pyelonephritis and oxalate nephropathy. It should also be noted that a significant number of children with rickets of 1-2 degrees were observed in the examined contingent of children with hypocalcemia and hypophosphatemia (40% and 37.5%), while in 35% and 33.3% of children did not take vitamin D and calcium preparations.

At present, it has been shown that in the prevention of osteopenia in older children, the leading role belongs to proper nutrition and calcium supply to the body.

The data we obtained showed that in patients of the studied groups, the frequency of insufficient calcium intake with food was high. At the same time, it was found that in patients with oxalate nephropathy, calcium deficiency with food was observed most often (100%). Often, calcium deficiency was associated not only with inadequate provision of the body with alimentary calcium, but, apparently, also with its ineffective absorption from food in the gastrointestinal tract.

There is no doubt about the connection between age-appropriate physical activity and higher levels of phosphorus and calcium in adolescence. According to our data, in all kidney diseases studied, reduced levels of phosphorus and calcium were more often observed in children with a sedentary lifestyle: 55% in pyelonephritis and 41.6% in oxalate nephropathy. The studies conducted allowed us to establish the role of various risk factors for the development of osteopenia in tubulointerstitial kidney diseases, the highest frequency of which was observed in patients with a significant decrease in phosphorus and calcium. According to literary data, a decrease in bone mineral density in children is not always characterized by specific clinical symptoms (Endocrine Practice, 2003). The analysis of the frequency and nature of disorders of the skeletal system in the examined children showed that the majority of patients with tubulointerstitial kidney diseases had: multiple dental caries (30% and 29.1%), nail lamination (20% and 25%), joint hypermobility (35% and), scoliosis (45%), flat feet (25% and 25%), fractures of long tubular bones (10% and 12.5%), indicating a combination of osteopenia with various diseases of the skeletal system.

When assessing the physical development of patients with tubulointerstitial kidney diseases, it was found that among all the examined patients, a decrease in physical development below average was noted only in 25% and 25% of children, 60% and 58.3% had average and above average physical development indicators. All children with low physical development had hypocalcemia and hypophosphaturia. At the same time, no significant changes in calcium and phosphorus were found in children with normal and high physical development.

In the majority of children, the body mass index corresponded to the norm; 10% and 4.1% of the examined children were overweight.

Conclusions. Children with tubulointerstitial kidney diseases have impaired calcium and phosphorus metabolism. The severity of osteopenia in tubulointerstitial kidney diseases depends on the presence of risk factors, among which the most important are the pathological course of pregnancy in the mother, rickets, deficiency of alimentary calcium, and physical inactivity. The most pronounced decrease in bone mineral density in kidney diseases was found in children with impaired physical development and body weight deficiency.

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