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VIOLATION OF CALCIUM-PHOSPHORUS METABOLISM IN CHILDREN OF A PATIENT WITH CHRONIC PYELONEPHRITIS (LITERATURE REVIEW)

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ABSTRACT

The state of the organism is formed by various factors of the internal and external environment, among which the state of calcium-phosphorus metabolism occupies an important place.

Violation of the structure and function of the organs involved in the regulation of phosphorus-calcium metabolism is the cause of various diseases that develop during the life of the child.

The kidneys are the main organ in the regulation of phosphorus-calcium homeostasis in both physiological and pathological conditions.

Key words: prevention, in children, hygiene, oral cavity.

INTRODUCTION

The main physiological function of the kidneys is to maintain homeostatic parameters of the body [1, 20]. When primary urine is formed in the vascular glomerulus, it includes all trace elements of blood plasma. In proximal ducts, active reabsorption of minerals and water begins. In the initial part of the tubes, the absorption of single - valence cations is an active process, and in the last part of the tubules-an active and passive type [2, 17]. Absorption of bilavalent cations is an active process. Anions passively follow cations. In Distal ducts, 10-20% of filtered cations are absorbed. The process of reabsorption of microelements is under the

control of the nervous and endocrine systems. When the tubes are damaged, active and passive reabsorption of microelements from the primary urine is impaired, which leads to a decrease in their content in the body (Panchenko L.F., 2004). On the other hand, deformed mineral exchange contributes to the pathogenesis of kidney diseases and forms a kind of "Circle.

A number of authors conducted studies that found that a patient with chronic pyelonephritis violated the composition of such elements as magnesium, zinc, copper, iron in the body of children [3, 14].

So Makarov T.P. (2011) in his work, a patient with chronic pyelonephritis noted a significant increase in the clearance and excretion of zinc in children compared to healthy children, which indicates an increase in excretory insufficiency and a decrease in the intracellular capacity of neutrophils with the development of this pathology. cases such as killing microorganisms, a stable decrease in immunity were noted [4, 15].

A violation of magnesium metabolism in children with chronic pyelonephritis is characterized by a decrease in its level in the hair and blood serum. One of the causes of magnesium deficiency identified in children of a patient with localization of the pathological process in the tubulointersticial tissues of the kidneys is an increase in the excretion of the macronutrient through the kidneys [5, 11].

The ability of the kidney to perform homeostatic functions determines the main role of this organ in the processes of bone resorption and bone formation, as well as in the mineralization of teeth.The defeat of the tubulo-interstitial apparatus in pyelonephritis in children is accompanied by changes in the state of phosphorus-calcium metabolism. A.A.according to. Baranova A.A.according to (2005), with the diagnosis of "chronic pyelonephritis" in children aged 8 months to 14 years, serum calcium concentration decreases in 77.78% of children with primary pyelonephritis and 78.95% of children with secondary pyelonephritis. A decrease in phosphorus levels was found in 77.78% of children with primary pyelonephritis and 31.58% of children with secondary pyelonephritis. These disorders are characterized by a violation of reabsorption in sick children with microbial-inflammatory diseases of the kidneys.Svintsiskaya V.I. according to (2009) a densitometric (X-ray and ultrasound) study found that more than half (54.3%) of children with pyelonephritis had changes in bone mineral density, among which 25% of children had bone mineral density below chronological age. 29.3% - constitutes a risk group for the development of osteopenia [6, 19].

Based on the results of a study of bone mineral density, 37% of children with chronic pyelonephritis have an integral indicator - a decrease in the strength index

of bone tissue, while 9% of children have an indicator of bone tissue strength corresponding to osteoporotic changes in bone [7, 18].

In children with chronic kidney disease, secondary hyperparathyroidism develops in almost all cases [8, 19].

A patient with chronic kidney disease causes secondary hyperparathyroidism in children, which is one of the most frequent and severe complications, along with a violation of the synthesis of hormonally active vitamin D, Long-Term hypercalcemia and high phosphate levels (Dusso A. S., Thadhani R., Slatopolsky E., 2004). Characterized by compression hypersecretion of the parathyroid hormone, it leads to morphological changes in the thyroid gland, as well as the development of fibrous osteitis, bone loss, and concomitant cardiovascular diseases. As a rule, when the level of glomerular filtration drops below 60 ml / min / 1.73 m2, the level of parathyroid hormone in the blood begins to rise (Khoroshilov S.E., Nikitin A.V., Ochechenko T.Yu., 2010;). The parathyroid hormone produced by the parathyroid glands is directly involved in maintaining normal mineral metabolism and affects the growth and development of teeth, the physiological state of which is assessed. This hormone coordinates the processes of calcification and decalcification of bone and dental tissues. Many authors suggest that the parathyroid glands are an intrasecretory organ that regulates the exchange of calcium and phosphorus.

In the presence of parathyroid hormone, a constant amount of calcium (2.2 - 2.5 mmol / l) is maintained in the serum, which ensures a normal ratio between the processes of bone formation. When excess parathyroid hormone is produced, as a result of demineralization of bones and teeth, the amount of calcium in the blood rises, and its excretion in the urine increases.

Currently, the effect of parathyroid hormone, including on dental tissues, is dominated by its three-way continuation:

- Enzymatic destruction of the bone matrix (increased activity of it), carried out by exposure to collagen and bone collagenase.
- The effect on enzymatic systems involved in the exchange of carbohydrates and the formation of organic acids (lemons, etc.).
- Activation of the calcium and phosphorus ion transport system (ion pump) from bone tissue to extracellular fluid.

However, not all of these phenomena occur separately in the body: the function of the parathyroid glands is influenced by various hormonal regulators, especially growth hormone, which is modified by the main biochemical factor - calcium levels . In addition, other hormones and mediators are involved in the regulation of calcium-phosphorus metabolism: thyroid hormones, tyrocalcitonin,

glucocorticoids, estrogens, growth hormone and anabolic steroids are included in these.

Calcium is known to have great physiological significance for the body. It plays a leading role in ossification and formation of tissue structures (Salusky IB, 2001). It is involved in the conduction of electrical impulses, reduces the permeability of cell membranes and, as a result, is a leading link in the electrogenesis of nerve, muscle and glandular tissues, synaptic processes, the molecular mechanism of muscle contraction, secretory and endocrine. processes of the digestive tract and the activity of the endocrine glands. The presence of calcium is necessary to carry out normal blood clotting, since it is involved in the synthesis of thrombin and affects the vascular component of coagulation; the synthesis of aldosterone without calcium is impossible . With an increase in calcium concentration, the effect of the antideuretic hormone on the renal ducts decreases, as a result of which water loss increases. Deviation of the amount of calcium in the blood and tissues from the norm leads to the development of not only functional, but also morphological changes in the functioning of many organs and systems of the body, including the development of pathology of mineralized tissues.

At the same time, another element is phosphorus - the most important plastic component of bone and other tissue structures. The body of an adult contains about 1120 grams of calcium, 95-99% of which is contained in bone tissue, which is mainly present in combination with phosphorus. The total concentration of calcium in the blood in the body is 2.5 mmol /l, of which 0.82 mmol /l, combined with proteins, is 1.53 mmol/l diffusion calcium. The composition of the latter includes 1.33 mmol /l of biologically active ionized calcium and 0.30 mmol /l compounds with bicarbonate, phosphate and citrate. The distribution of inorganic phosphate in the blood serum is not so complicated. Negligible amounts of phosphorus bind to proteins and basically all inorganic phosphates are ionized. Bone tissue and other mineralized tissues represent a depot where calcium can accumulate. Absorption of both elements occurs in the upper intestines in a slightly acidic environment in a ratio of 1.2:1, and excretion is carried out by the kidneys and colon. As mentioned above, the intensity of these processes is regulated by the physiological system, in which the parathyroid hormone plays a leading role among a number of hormones and physicochemical factors. The delicate mechanism of the regulatory and controlling action of hormones is manifested mainly through enzyme systems, as a result of which the concentration of calcium ions is maintained at a constant level reliably. Parathyroid hormone has been shown to destroy the chromoform group of the truncated triphosphopyridine nucleotide, thanks to which the reaction in the

Krebs cycle is possible only with the predominance of isositrate and glycolysis processes up to the formation stage, and pyruvate, lactate, citrate are formed, leading to acidosis (Domrongkitchaiporn S, 2001). lowering the RN environment increases the solubility of hydroxyapatite. The resulting sa and P ions enter the extracellular fluid into the blood, and if the first accumulates in the serum due to its restriction by the kidneys, the second increases.

The effect of the parathyroid hormone on phosphorus occurs quickly (after 15 minutes) and decreases rapidly.

Regulation of calcium metabolism at the cellular level is primarily done by the action of the parathyroid hormone on the mitochondria (Waller S, 2003). Enhances the processes of tissue respiration and oxidation of pyridine nucleotides in the mitochondria, and also increases the absorption of sodium, magnesium, phosphates by these structures. However, regulation of the concentration of SA ions in the fluid by the parathyroid glands also occurs using another hormone with the opposite effect, calcitonin.

The release of sa and P in mitochondria occurs in the presence of vitamin D. The latter affects the uptake of calcium from the intestine, stimulating its deposition in bone tissue, that is, its action is aimed at enhancing calcium absorption and phosphorus retention.

In the literature, parathormone can help adsorb SA and P in the intestine, stimulate the formation of osteoclasts and the destruction of osteoblasts in bone tissue, increase its resorption and inhibit bone synthesis, enhancing phosphaturia, that is, all these processes. Those directly related to the activity of the dental system.

In fact, the signs described accompany the biochemical and morphological characteristics of chronic pyelonephritis and The Associated hyperparathyroidism, which, in turn, affects the severity of dental pathology due to impaired mineral metabolism. It is known that the appearance of a carious process depends primarily on the structural features of the tooth. The high sensitivity of the teeth to caries is usually due to the structure of low enamel and dentin. This disadvantage largely depends on mineral exchange, primarily sa and P levels. On the other hand, the existing relationship between their composition in the oral fluid and caries may indicate that its mineral composition is also one of the triggers for caries. . This is evidenced by the known fact that the lack of sa and P in water and food is important for the development of caries.

Despite a number of publications dedicated to the study of the state of calcium-phosphorus metabolism in oral pathology study of the dental condition of children and adolescents with chronic pyelonephritis, as well as the main

properties of saliva, such as buffer capacity and acid-base balance, are not covered in the scientific literature.

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