

Comparison of Biochemical Parameters in the Treatment of Rickets

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Abstract: The correct tactics for the treatment of rickets is an indispensable component of the correction of disorders of phosphorus-calcium metabolism in a growing child in modern conditions. 203 children under the age of 1 year were examined. In all children, the level of 25(OH)D in the blood serum, the level of calcium and phosphorus were determined. The proposed scheme of individual prescription of vitamin D preparations for children with rickets in combination with calcium preparations and general strengthening therapy made it possible to significantly increase the effectiveness of treatment. At the same time, there is a decrease in the clinical manifestations of rickets, its residual effects, symptoms of spasmophilia and an increase in the content of 25(OH)D₃ in the blood serum.

Keywords: rickets, treatment, blood serum 25(OH)D level, calcium and phosphorus levels, vitamin D.

Relevance: An important place in the formation of rickets in the conditions of Uzbekistan is occupied by parents, especially those who do not pay enough attention to children in the village, a low level of maternal health, especially the peculiarities of raising children [1,5]. Therefore, according to literature, with a tendency to the development of rickets and hyperarousality in the Republic, a high frequency was noted due to the imbalance of calcium and phosphorus metabolism in the body of children [2,8]. This is especially important in infants, since low levels of this metabolite are a predisposing factor for the development of spasmophilia, hyperarousality of the Central and peripheral nervous system, muscle atony, which worsens the quality of life of babies [4,7].

It must be said that the guideline for determining the dose of vitamin D for the prevention and treatment of rickets in developed countries is to determine the level of D₃ – liver metabolite 25(OH). Many believe that the regulatory values of 25(OH)D₃ and, to a lesser extent, 1,25(OH)2D₃; 24,25 (OH)2D₃ vary depending on race, age, season and diet. In addition, they depend on the characteristics of the methods to be determined [3,6].

For many decades, vitamin D preparations for the Prevention of rickets have been successfully used in the form of fatty solutions or fish oil. However, the dosage forms of these drugs, their specific taste and smell caused a number of difficulties in prescribing it to young children, which, unfortunately, often led to non-compliance with the recommendations of doctors by parents [1,3].

It should be noted that currently in Pediatrics there are several conflicting opinions about the need to prevent rickets and the methods of its conduct. Obviously, the decrease in the incidence of rickets in children, as well as new data on vitamin D, are misinterpreted by a number of doctors who consider prevention to be voluntary [5,7].

Proper prevention and treatment of rickets is an obligatory component of correcting a violation of phosphorus-calcium metabolism in a growing child in modern conditions [4,9]. Therefore, the prevention and treatment of rickets should only be carried out in conditions of adequate protein nutrition. Children with moderate to severe rickets should be under dispensary supervision for 3 years. They are checked every quarter.

Purpose of work: To study the biochemical indicators of blood for rickets for the correct appointment and dosage of vitamin D.

Materials and methods: There were 203 children under 1 year of age under supervision. All children were considered almost healthy and underwent a physical examination to determine the clinical characteristics of rickets (delay in the closure of a large Fontanel, rachitic rosary, broad forearm, muscle weakness, dystrophy, pale skin, excessive sweating, delayed teeth, psychomotor development). In all children, serum levels of 25(OH)D, calcium and phosphorus levels were determined.

Discussion of the results obtained: A total of 130 children were diagnosed with rickets, 73 children were diagnosed with the consequences of perinatal damage to the nervous system. Mild rickets were recorded in 84 (64.6±4.19%) children, an acute course at 53 (40.7±4.30%), and a subacute course at 31 (23.8±3.73%). In children, fear, anxiety, irritability were often noted, sleep was disturbed, appetite decreased. At the same time, vasomotor excitability of the skin was noted in children, which was manifested by Red dermographism and sweating, especially the scalp. In children with an acute course, mild symptoms of osteomalacia were detected, which was manifested by the elasticity of the bones of the skull, the edges of the Fontanel.

On average, rickets was detected in 46 (35.3±4.19%) of the children examined, in a 25 (19.2±3.45%) acute, y – 21 (16.1±3.22%) subacute course. In children, along with the above symptoms, craniotabes, head flattening, head asymmetry and brachycephaly have been reported. In some children with a subacute course, symptoms of osteoid hyperplasia were noted, which manifested themselves in the form of a rachitic "rosary", chicken breast, musclehypotonia.

In 26 (20%) children with rickets, symptoms of spasmophilia due to acidosis in combination with hypocalcemia have been reported. Of these, 19 (73%) children had low serum levels of 25 (OH)D3.

The determination of the level of 25(OH)D3 in the blood serum of children with rickets showed a low level of 112 (86.1%) of those examined, a normal content of 18 (13.8%). And children with CDPNS had a low level of 25(OH)D at 50 (68.4%), a normal content of 23 (31.5%).

The average values of serum 25 (OH)D3 in children were 15.23±1.32 nmol/l with mild rickets, 18.75±2.76 nmol/l with moderate weight. with mild rickets, calcium and phosphorus levels were 2.13±0.03 and 0.96±0.02 mmol/l respectively, with an average rickets level of 1.73±0.02 and 0.77±,02 mmol/l, respectively. In children with rickets and CDPNS serum levels of D3, calcium and phosphorus 25(OH)D were 17.4±4.24 nmol/l, 1.96±0.05 and 0.88±0.03 mmol/l. Normal Ca and P levels in the blood (2.48±0.07 and 1.11±0.40 mmol/l, respectively) were detected in children and they received only vitamin D without additional administration of calcium preparations.

The data obtained indicate the need to revise the tactics of treating rickets with the obligatory consideration of laboratory indicators for the selection of an individual therapeutic dose of vitamin D.

In children with mild rickets with a reduced level of 25 (OH)D3 in the blood serum (15.23 ± 1.32 nmol / L), with normal levels of calcium and phosphorus (2.48 ± 0.07 and 1.11± 0.40 mmol / L, respectively), vitamin D was prescribed at a dose of 2000 IU / day for 1- 1.5 months before normalization of 25 (OH)D. Then the children were transferred to a preventive dose of vitamin D – 4000 IU/week.

In children observed, the treatment dose was 4,000 IU per day in children with a decrease in serum (18.75±2.76 nmol/l), calcium and phosphorus (1.73±0.02 and 0.77±, 02 mmol/l) 25(OH)D3 with moderate severity of rickets, respectively. The course of treatment is 30-45 days before the normalization of 25(OH)D, then transferring children to a prophylactic dose of vitamin D – 4000 IU/week. In calciopenic forms, children received additional calcium preparations during treatment.

The dose of vitamin D in combination with rickets and CDPNS in a reduced blood serum of 25(OH)D (17.4±4.24 nmol/l, respectively), calcium and phosphorus (1.96±0.05 and 0.88±0.03 mmol/l, respectively) increased to 8,000 IU per day. manifestations (sweating, restlessness, sleep and appetite disorders) and normalization of biochemical indicators.

In the complex of therapeutic measures for rickets, general massage and therapeutic exercises were used.

Complex treatment of rickets made it possible to have a good therapeutic effect in all observed children. As a result of treatment, well-being improved in 10-12 days, appetite increased, the elasticity of large fontanel edges decreased, and the functions of the autonomic nervous system were restored. The restoration of muscle tone and motor functions continued more slowly, positive dynamics was observed only at the end of 2 weeks.

In the course of treatment, serum levels of 25(OH)D3, calcium and phosphorus in children with rickets increased by 6.46; 1.5 and 1.7 times, respectively. In light rickets, the 25 (OH)D level is 105.49±8.98 nmol/l (p<0.001), the average weight is 124.39±14.36 nmol/l and the calcium and phosphorus level is 2.97±0.02 mmol/l (P<0.05) and 1.52±0.17 mmol/l (p<0.001), respectively.

In combination with CDPNS in vitamin D treatment in children 25(OH)D3, serum calcium and phosphorus levels also statistically increased to 131.54±21.14 mmol/l, 2.01±0.21 and 1.83±0.13 mmol/l, respectively. The results obtained indicate the high effectiveness of the recommended treatment regimen for rickets.

Thus, the scheme of individual prescribing of vitamin D preparations to children with rickets in combination with calcium preparations and restorative therapy made it possible to significantly increase the effectiveness of treatment. At the same time, a decrease in the clinical manifestations of rickets, its residual phenomena, symptoms of spasmophilia and an increase in the amount of 25(OH)D3 in the blood serum were noted. This makes it possible to widely introduce modified rickets therapy in different regions of the Republic.

Conclusion: insufficient supply of vitamin D plays an important role in the formation of rickets, biochemical indicators were analyzed to clarify the role of calcium and phosphorus supply, and the relationship between vitamin D deficiency and indicators of Ca and P in the blood was determined. At the same time, the active form of the vitamin is its hydroxylated derivative, which ensures the normal absorption of calcium from the intestine.

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