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# JOURNAL OF HEPATO-GASTROENTEROLOGY RESEARCH

## ЖУРНАЛ ГЕПАТО-ГАСТРОЭНТЕРОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ


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### ВЛИЯНИЕ МИКРОБИОЦЕНОЗА НА БИОХИМИЧЕСКИЕ ПОКАЗАТЕЛИ У ДЕТЕЙ С ПРИЗНАКАМИ РАХИТА

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#### АННОТАЦИЯ

Нарушения микробиоценоза у детей с рахитом проявляются различными заболеваниями и клиническими синдромами. Было обследовано 466 детей в возрасте до 1 года. Для выполнения поставленных задач и уточнения диагноза нами были проведены биохимические анализы (определение уровня 25(OH)D<sub>3</sub>, кальция и фосфора в сыворотке крови). Анализ уровня кальция и фосфора в сыворотке крови детей с рахитом показало низкое их содержание (1,99±0,019 и 0,92±0,011 ммоль/л, соответственно), и низкий уровень 25(OH)D в сыворотке крови 19,8±1,98 нмоль/л. В то же время у детей с ПППНС их содержание в сыворотке крови было 2,22±0,0524 и 1,21±0,044 ммоль/л, и содержание 25(OH)D – 36,7±5,04 нмоль/л.

**Ключевые слова:** рахит, кальций в крови, фосфор в крови, уровень 25(OH)D в сыворотке крови.

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### RAXIT BELGILARI BO'LGAN BOLALARDA MIKROBIOTSENOZNING BIOKIMYOVIY KO'RSATKICHLARGA TA'SIRI

#### ANNOTATSIYA

Raxit bilan og'rigan bolalarda mrobiotsenozning buzilishi turli kasalliklar va klinik sindromlar bilan namoyon bo'ladi. 1 yoshgacha bo'lgan 466 nafar bola tekshirildi. Qo'yilgan vazifalarni bajarish va tashxisni aniqlashtirish uchun biz biokimyoviy tahlillar o'tkazdik (qon zardobidagi 25 (ON) D<sub>3</sub>, kalsiy va fosfor darajasini aniqlash). Raxit bilan kasallangan bolalar qon zardobida kalsiy va fosfor miqdorini tahlil qilish ularning past miqdorini (mos ravishda 1,99±0,019 va 0,92±0,011 mmol/l) va qon zardobida 25 (ON) D ning past darajasini ko'rsatdi 19,8±1,98 nmol/l. Shu bilan birga, ATPZ bo'lgan bolalarda ularning qon zardobidagi miqdori 2,22±0,0524 va 1,21±0,044 mmol/l ni, 25 (ON) D miqdori esa 36,7±5,04 nmol/l ni tashkil etdi.

**Kalitso'zlar:** raxit, qon kaltsiyi, qon fosfori, sarum 25(OH)D darajasi.

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### THE EFFECT OF MICROBIOTSENOZIS ON BIOCHEMICAL PARAMETERS IN CHILDREN WITH SIGNS OF RICKETS

**ABSTRACT**

Disorders of microbiocenosis in children with rickets are manifested by various diseases and clinical syndromes. 466 children under the age of 1 year were examined. To fulfill the tasks and clarify the diagnosis, we carried out biochemical analyzes (determination of the level of 25(OH)D3, calcium and phosphorus in the blood serum). An analysis of the level of calcium and phosphorus in the blood serum of children with rickets showed their low content ( $1.99 \pm 0.019$  and  $0.92 \pm 0.011$  mmol/l, respectively), and a low level of 25(OH)D in the blood serum of  $19.8 \pm 1.98$  nmol/l. At the same time, in children with PPNS, their content in blood serum was  $2.22 \pm 0.0524$  and  $1.21 \pm 0.044$  mmol/l, and the content of 25(OH)D was  $36.7 \pm 5.04$  nmol/l.

**Key words:** rickets, blood calcium, blood phosphorus, serum 25(OH)D level.

**Relevance of the problem:** Rickets is a metabolic disease of young children. The exchange at this age proceeds very sharply, and due to age-related maturity, the child's body turns out to be functionally imperfect [1,3]. Violation of calcium-phosphorus metabolism is manifested by various diseases and clinical syndromes [4,9]. In particular, spasmophilia—a predisposition to spasms or seizures – is directly related to rickets: both of these conditions are associated with a violation of the metabolism of the main mineral-calcium. Spasmophilia (also known as tetany) is manifested by increased muscle excitability that lacks calcium. This often leads to the development of persistent seizures, especially in infants, who receive a "rachitogenic diet" with great weight in the first six months of life [2.5].

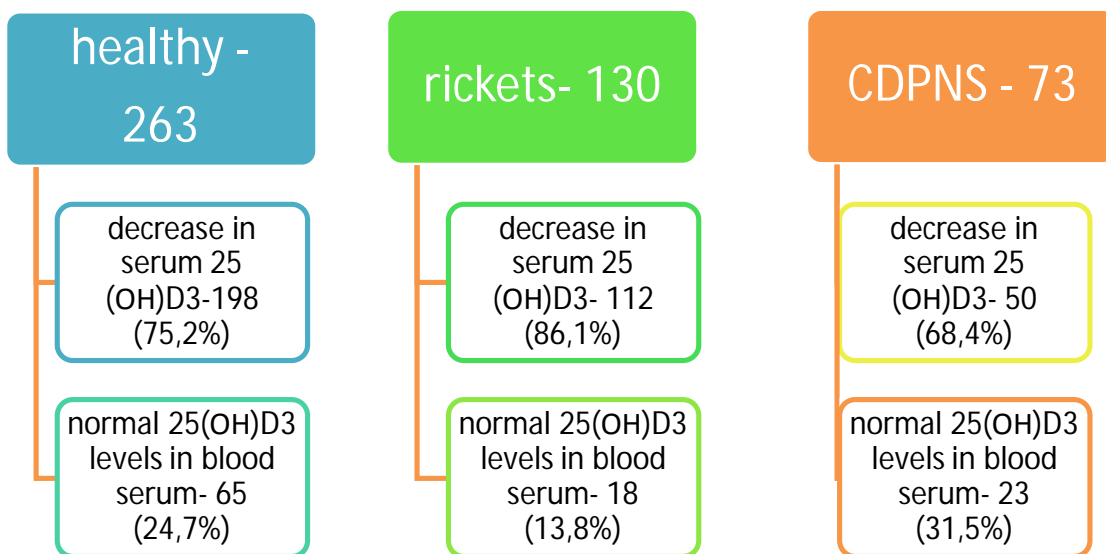
Thus, the basic biochemical mechanisms for regulating calcium-phosphorus metabolism have been very well studied [6,8]. The leading role in regulation belongs to the active form of parathyroid hormone and calcitonin, as well as vitamin D. These mechanisms work in interconnection, and therefore insufficient production of one of them to the formation of pathological conditions [7]. Considering that the active form of vitamin D plays an important role in regulating phosphorus-calcium metabolism, the criteria for the diagnosis and treatment of

rickets and spasmophilia are the determination of the content of this metabolite.

**Purpose of the study:** study of biochemical indicators in children with rickets symptoms, depending on the level of the main metabolite of vitamin D in the blood serum.

**Materials and research methods:** 466 children under the age of 1 were examined. All children are divided into 3 large groups: Group 1 (healthy) – (263 children – 56.4%), Group 2 – children with signs of rickets (130 babies – 27.8%), Group 3 – children with consequences of damage to the perinatal nervous system (73 children – 15.6%). To complete the tasks and clarify the diagnosis, we performed biochemical tests 25(OH)D3, determination of serum calcium and phosphorus levels.

**Research results and their discussion:** To clarify the role of calcium and phosphorus supply, we analyzed biochemical indicators and tried to establish the relationship between vitamin D deficiency and indicators of Ca and P in the blood. Studies conducted showed that the average in the group of children with rickets found a low serum level of 25(OH)D3 of 112 (86.1%) of those examined, only 18 (13.8%) – its normal composition. In children with CDPNS, the content of this metabolite is 23 (31.5%) normal, while 50 (68.4%) of those examined are lower (figure 1).



**Picture.1** Frequency of occurrence of normal and low levels of 25(OH)D3 in the blood serum of the examined children.

As you can see from Figure 1, in a group of healthy children, the low level of 25(OH)D3 in blood serum is 75.2%, and the normal level is 24.7% of children. Analysis of the content of this metabolite in the group of children with rickets showed that the normal content is  $25(OH)D3 - 62.72 \pm 9.17$  nmol/l, the low content is  $13.77 \pm 0.35$  nmol/l.

Thus, serum levels of calcium and phosphorus were 44.4% lower at normal 25(OH)D3, and normal calcium and phosphorus were 16.6% lower. Thus, we can say that a child with normal 25(OH)D3, but with low levels of calcium and phosphorus, has vitamin D-resistant rickets. But we did not take into account such children. At a low level of 25(OH)D3, normal calcium and phosphorus were recorded at 15.1%.

Analysis of serum calcium and phosphorus levels in children with rickets showed their low levels ( $1.99 \pm 0.019$  and  $0.92 \pm 0.011$  mmol/l, respectively) and low serum levels of 25(OH)D at  $19.8 \pm 1.98$  nmol/L.

However, in children with CDPNS, their serum levels were  $2.22 \pm 0.0524$  and  $1.21 \pm 0.044$  mmol/l and 25(OH)D –  $36.7 \pm 5.04$  nmol/L.

In the group of children with rickets and CDPNS serum calcium and phosphorus levels were  $1.95 \pm 0.047$  and  $0.88 \pm 0.028$  mmol/l, slightly lower than in the group of infants with rickets and a level of 25(OH)D was  $31.7 \pm 14.8$  nmol/L.

In the examined children, a correlation analysis of the content of the above indicators was also of interest. To determine the relationship between the concentration of Ca and P in the blood serum and the concentration of 25(OH)D3, we used the Pearson correlation coefficient (r).

Studies have shown that in a group of children with rickets, a positive relationship between the amount of 25(OH)D3 and the level of serum calcium ( $r = -0.82$ ), the amount of 25(OH)D3 and the level of serum phosphorus ( $r = -0.87$ ) is lost. At the same time, a positive correlation is maintained between the level of phosphorus and calcium in the blood serum ( $r = 0.71$ ).

In the group of children with CDPNS, a positive relationship between the amount of 25(OH)D3 and the level of serum calcium ( $r = -$

0,146), the amount of 25(OH)D3 and the level of serum phosphorus ( $r = -0,204$ ) is lost. At the same time, a positive correlation is maintained between the level of phosphorus and calcium in the blood serum ( $r = 0,736$ ).

In the group of children with rickets, the correlation between the amount of 25(OH)D3 and calcium levels in combination with CDPNS was  $R = 0,041$ , the amount of 25(OH) D3 and the level of phosphorus was  $r = 0,146$ , and the level of phosphorus and calcium in whey was  $r = 0,505$ .

**Conclusion:** The formation of rickets is facilitated by a low level of the main metabolite of vitamin D, calcium and phosphorus in the blood

serum, while the value of these indicators for the manifestation of CDPNS is less pronounced. Low serum levels of 25(OH)D3 do not contribute to the synthesis of metallothionins in the intestinal epithelium and, as a result, slow down the absorption of calcium from the intestine. This necessitates the need to take preventive measures on an outpatient basis to prevent the development of rickets. On the other hand, the results obtained also indicate an increase in food intake with a high content of calcium and phosphorus in young children, choosing the right diet.

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