**Justification of The Need to Determine the Level Of 25(OH) D 3 In the Blood Serum of Children to Assess the Quality of Rickitis Prevention**

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<table>
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<tr>
<th>Article History</th>
<th>Abstract</th>
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| Received: 06 June 2023  
Revised: 05 Sept 2023  
Accepted: 06 Dec 2023 | It has been established that the formation of rickets is promoted by a low level of the main metabolite of vitamin D, calcium and phosphorus in the blood serum. This was evidenced by the study of the biochemical parameters of the main indicators of calcium-phosphorus metabolism and the content of 25(OH) D 3 in the examined children before vitamin D prophylaxis when compared with the data of healthy children. Treatment with vitamin D 3, along with restorative therapy, has significantly increased the effectiveness of preventing rickets. At the same time, there was a decrease in alkaline phosphatase, an increase in the content of 25(OH) D 3 in the blood serum, as well as in the level of calcium and phosphorus. |

**Keywords:** rickets, vitamin D, calcium, phosphorus, alkaline phosphatase, 25(OH) D 3 content

1. Introduction

The Urgency of The Problem

Inadequate supply of vitamin D, calcium and phosphorus plays an important role in the formation of rickets, in this regard, it is of interest to study its level in blood serum in comparison with the level of calcium and phosphorus (Zakharova, I.N. 2016; Rasulova, N.A., Sharipov, R.Kh., 2019). Although until today there is no consensus on the optimal level of 25(OH) D, most experts define vitamin D deficiency at a level of less than 20 ng/ml (50 nmol/l). A 25(OH)D level of 21 to 29 ng/mL (52 to 72 nmol/L) is considered vitamin D deficiency, and normal vitamin D levels should be 30 ng/mL or higher (Vieth R., et al. 2007.). There are many reasons for the decrease in the level of Ca in the blood. These include vitamin D deficiency associated with insufficient intake from food, malabsorption in the intestine, suppression of the biosynthesis of active forms, as well as an unbalanced content of inorganic phosphates and magnesium in food, and other factors (Toroptsova N.V., Benevolenskaya L.I., 2005, Sharipov R.Kh., Rasulova N.A. 2018).

The high prevalence of rickets in young children, their polyetiology predetermine the need for a differentiated approach to the diagnosis, treatment and prevention of rickets in the pediatric area (Vasileva T.G. et al. 2006; Korovina, N.A., 2015). We have to admit that practical medicine cannot resist the rapid spread of this pathology among children, while the missed opportunities for the timely prevention of observed deviations determine the growth of the scale of the process at subsequent age stages. The active appeal of doctors to this topic, the identification of risk groups, the introduction of modern methods of diagnosis and treatment will qualitatively solve this problem (Vasilieva T.G., Kochetkova E.A., 2006).

In this regard, we consider the need to determine the level of 25(OH) D 3 in blood serum to determine the true causes of rickets in children of the first year of life. Only such an in-depth examination makes it possible to identify children at risk for rickets, determine the etiology, and most importantly, conduct differentiated prevention. That is why it is of interest to study its level in blood serum in comparison with the level of calcium and phosphorus.

The purpose of the work

To evaluate the effectiveness of rickets prevention carried out at the site by studying the levels of 25(OH) D 3, calcium, phosphorus, alkaline phosphatase and to substantiate methods of correction.
2. Materials and Methods
We observed 40 children aged from 1 to 12 months. Examination of children was carried out on the basis of a clinical examination, questioning and analysis of outpatient cards in the children's department of polyclinic No. 2 in Samarkand. Parents were explained the purpose of the study and received written consent. All children with a diagnosis of illness, given the impact of inadequate amounts of vitamin D, or who had received vitamin D supplements at least one month prior to the visit, were excluded.

All children were considered practically healthy, were examined physically to establish the clinical features of rickets (delayed closure of the large fontanelle, rickety rosary, wide wrist, muscle weakness, dystrophy, pale skin, excessive sweating, delayed teething, psychomotor development).

As a result, the children were divided into 2 groups: group 1 (healthy) - (20 children - 50%), group 2 - children with signs of rickets (20 infants - 50%) who did not undergo rickets prophylaxis. Children with rickets under the age of 6 months were 6 (30%), up to 12 months there were 10 (50%). The number of children under the age of 3 months was 4 (20%). There were 11 boys (55%), while the number of girls was 9 (45%).

To fulfill the tasks and clarify the diagnosis, we carried out biochemical studies: determination of the level of 25(OH) D 3, alkaline phosphatase, calcium and phosphorus in the blood serum. All children were consulted by a pediatrician, neuropathologist and doctors of other narrow specialties.

3. Results and Discussion
Studies have shown that the main factors in the development of rickets in young children, when questioning mothers about the course of pregnancy, were: lack of vitamin D intake during pregnancy (78%), iron deficiency anemia (82%), unbalanced nutrition (64.5%), young age of the mother during the 1st pregnancy (55%). In less than 50% of cases, low education of mothers and complicated childbirth were determined, and toxicosis of pregnant women accounted for only 43%. When assessing the risk factors for rickets in children, we found that the most important are the low content of 25(OH) D 3 in the blood serum and insufficient prevention of rickets in the 1st year of life. A significant role was played by such factors as: insufficient exposure to fresh air - less than 20 minutes a day (69.25%), acute respiratory viral infections (72.5%), time of birth of a child (autumn-winter period) (66.75%), perinatal factors (58.75%), IDA (67.5%).

It was established that, despite the recommendations of the local pediatrician on giving vitamin D 3 on the one hand, and on the obligatory implementation of the doctor's recommendations by the parents on the other hand, the children we observed had signs of rickets. Given this fact, we decided to conduct a follow-up examination of children to substantiate the reliability of our assumptions. In this regard, it became necessary to determine the level of 25(OH) D 3 in blood serum to determine the true causes of rickets in children of the first year of life. Only such an in-depth examination makes it possible to identify children at risk for rickets, to determine the etiology, and most importantly, to conduct differentiated prevention.

D 3, alkaline phosphatase, calcium and phosphorus in the blood serum of 40 children of the first year of life was studied. Children, as indicated above, were divided into 2 groups: group 1 (healthy children) - (20 children - 50%), group 2 - children with signs of rickets (20 infants - 50%) who did not undergo prophylaxis rickets.

### TABLE 1. Biochemical parameters

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicators</th>
<th>Healthy Children</th>
<th>Children Not Receiving Prophylaxis</th>
<th>P</th>
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<tr>
<td></td>
<td></td>
<td>M</td>
<td>m</td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>25 OH Vitamin D</td>
<td>34.16</td>
<td>1.31</td>
<td>19.89</td>
</tr>
<tr>
<td>2</td>
<td>Alkaline phosphatase</td>
<td>289.83</td>
<td>10.79</td>
<td>318.46</td>
</tr>
<tr>
<td>3</td>
<td>Calcium total</td>
<td>2.371</td>
<td>0.014</td>
<td>1.997</td>
</tr>
<tr>
<td>4</td>
<td>Phosphorus</td>
<td>1.205</td>
<td>0.016</td>
<td>0.922</td>
</tr>
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</table>
As can be seen from the table, the content of 25(OH) D 3 in the blood serum of healthy children was 34.16 ± 1.31 on average. Whereas in children who did not receive vitamin D prophylaxis 3 was equal to 19.89±1.97 mmol /l, which is significantly lower than in healthy children (<0.001). A significant difference was found in the examined groups in terms of calcium and phosphorus levels. Thus, the content of total calcium in healthy children was equal to 2.371 ± 0.014 mmol /l, and in children of the second group this indicator was 1.997 ± 0.019 mmol / l (<0.001). In children who did not receive rickets prophylaxis, the level of phosphorus was significantly reduced compared to healthy children - 0.922±0.011 mmol /l and 1.205 ± 0.016, respectively. Alkaline phosphatase in children who did not receive vitamin D prophylaxis tended to increase (318.46 ± 62.26 and 289.83 ± 10.79, respectively).

The obtained results show that despite the recommendations of the local doctor, parents do not always follow them. As a result, there is a risk of developing rickets in children, as evidenced by low levels of the main metabolite of vitamin D, calcium and phosphorus in the blood serum. All of the above dictates the need for preventive measures by direct instillation of vitamin D to the child by a nurse.

It is known that there are different forms of release of this vitamin. Currently, a modern affordable drug has appeared on the pharmaceutical market, which is an aqueous solution of cholecalciferol ("Aquadetrim " 1 drop contains 500 IU of an aqueous solution of vitamin D 3). Vitamin D preparation was administered to children in prophylactic doses of 500 to 1000 IU (one or two drops) per day. In children with an initial period of rickets with a normal level of 25(OH) D 3 in blood serum, treatment was started with a minimum dose of vitamin D - 500 IU, which, if necessary, was increased to 1000 IU after 7-10 days.

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicators</th>
<th>Before Prophylaxis</th>
<th>After Prophylaxis</th>
<th>P</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td>M</td>
<td>m</td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>25 OH Vitamin D</td>
<td>19.89</td>
<td>1.97</td>
<td>38.12</td>
</tr>
<tr>
<td>2</td>
<td>Alkaline phosphatase</td>
<td>318.46</td>
<td>62.26</td>
<td>267.65</td>
</tr>
<tr>
<td>3</td>
<td>Calcium total</td>
<td>1.997</td>
<td>0.019</td>
<td>2.53</td>
</tr>
<tr>
<td>4</td>
<td>Phosphorus</td>
<td>0.922</td>
<td>0.011</td>
<td>1.78</td>
</tr>
</tbody>
</table>

In the process of preventive measures, the level of 25(OH) D 3, calcium and phosphorus in the blood serum of children increased significantly to normal values. The level of alkaline phosphatase also changed. Thus, 25(OH) D 3 increased to 38.71±2.56 (at baseline - 19.89±1.97 mmol /l, P<0.001), alkaline phosphatase decreased to 267.65±18.50 (at initial - 318.46 ± 62.26), the calcium level increased to normal values - 2.53 ± 0.02 (at the initial - 1.997 ± 0.019, P < 0.001), the phosphorus level also normalized - 1.78 ± 0.03 (at baseline - 0.922±0.011, P<0.001). The results obtained indicate the high efficiency of the proposed scheme for the treatment of rickets.

4. Conclusion
In general, the presented material once again demonstrates that the formation of rickets is facilitated by a low level of the main metabolite of vitamin D, calcium and phosphorus in the blood serum. In addition, it should be noted that of the indicated risk factors on the part of the child, using statistical technologies, 2 more significant factors were identified: lack of vitamin D prophylaxis in the first year of life P <0.00001; iron deficiency anemia in a child P <0.09. The data obtained became the basis for carrying out preventive measures, consisting of the appointment of vitamin D preparations. The treatment with vitamin D 3, along with general strengthening therapy, made it possible to significantly increase the effectiveness of preventing rickets. At the same time, there was a decrease in alkaline phosphatase, an increase in the content of 25(OH) D 3 in the blood serum, as well as in the level of calcium and phosphorus.

References: