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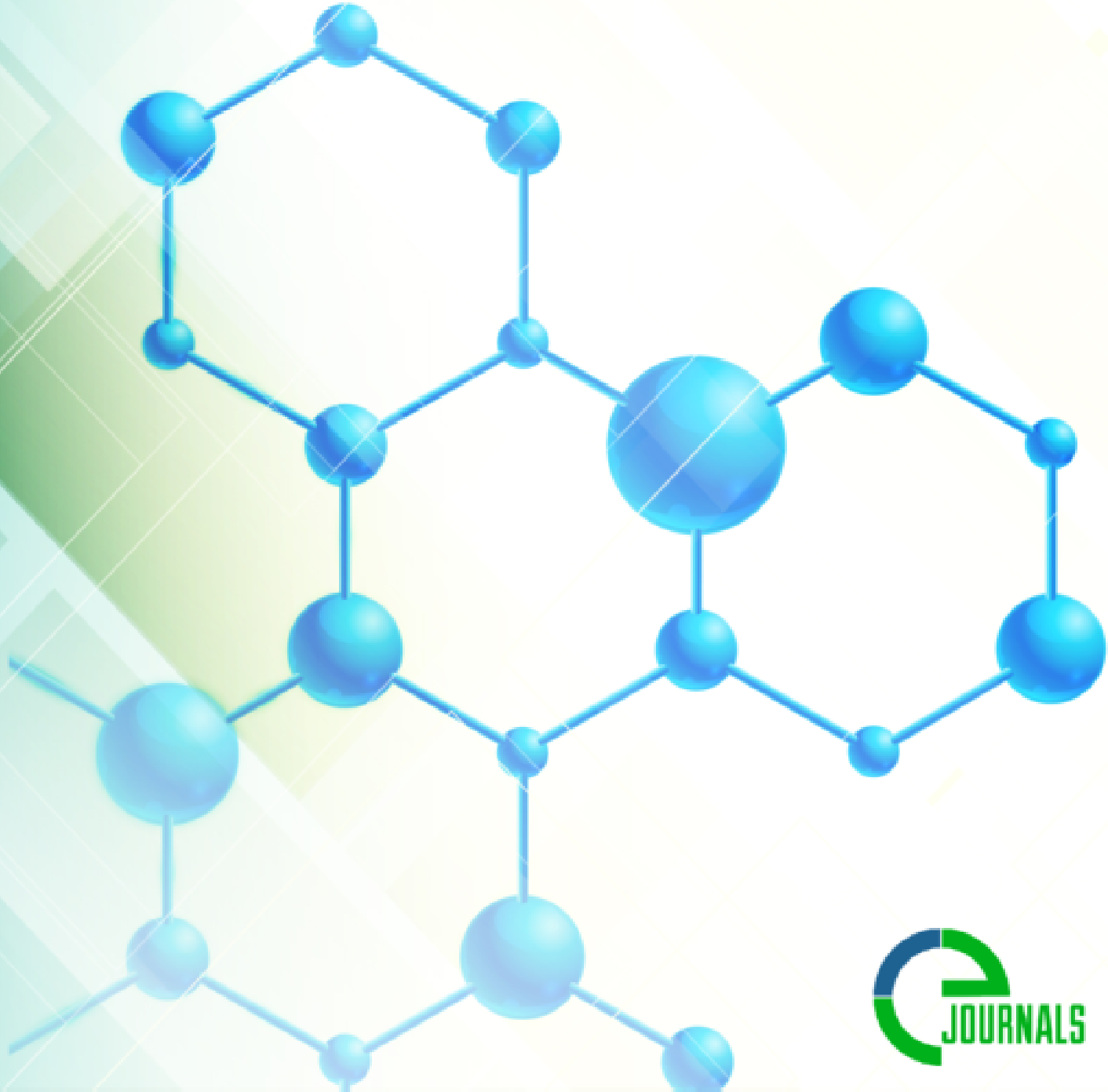

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STUDY OF THE ACTIVE METABOLITE OF VITAMIN D TO DETERMINE THE CAUSES OF RICKETS

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Abstract: Based on questionnaires and level of 25(OH)D in 466 children under 1 year factors for rickets was identified. Reliable factors were iron deficiency anemia during pregnancy, toxemia of pregnancy of the mother and the lack of vitamin D during first year of life of a child, lack of outdoor stay (less then 20 minutes per day), frequent colds, not effective traditional prevention of rickets vitamin D

Keywords: rickets, risk factors, 25(OH)D in serum of children

Introduction. Rickets has been known since ancient times and was eliminated almost in the 2nd half of the 20th century in developed countries, but in the last decade [1,7,10], there has been a revival of this disease in developed countries, while the disease remains an endemic problem in many developing countries. It is assumed that vitamin D deficiency can subsequently lead to the development of oncological diseases, certain types of cancer, neurological disorders, type 2 diabetes mellitus, hypertension and reduced immunity [4,8,11]. M.S. Maslov quite rightly pointed out that "for a correct understanding of the etiology and pathogenesis of rickets, it is necessary to clearly distinguish between the factors that predispose to it and directly cause it." The highest prevalence of rickets was noted among premature babies (77.4%) and those weighing up to 3000 g (71.4%), as well as those on a mixed (64.9%) and artificial breastfeeding (70.8%) [3,9]. The immediate factor causing rickets is a lack of vitamin D [2,4]. However, its deficiency has always been determined indirectly by the content of Ca and P [13]. At the same time, the content of Ca and P does not always accurately reflect the severity and clinical manifestations of rickets, and according to [5,6,12], manifestations of rickets can also occur with a normal content of Ca and P in the blood. Studies to determine the active metabolite of vitamin D, which is a direct indicator of vitamin D deficiency, have not been conducted in Uzbekistan.

The aim of the work is to study the influence of risk factors for the development of rickets in children of the 1st year of life with the control of the level of 25(OH)D3 in the blood serum.

Material and research methods

There were 466 children under observation, aged from 1 to 12 months, whose parents considered them to be practically healthy and did not receive vitamin D during the month before blood sampling. There were 166 (35.6%) children under the age of 6 months, 204 (43.7%) under 12 months, 96 (20.6%) under 3 months. The predominance of boys was noted - 258 children (55.3ë2.3%), while the number of girls was 208 (44.6ë2.3). Mothers were interviewed and the questionnaire included topics such as ethnic background, medical history, exposure to sunlight, child development and pregnancy. The determination of 25(OH)D3 in blood serum was carried out in the laboratory of the Santa Clara Hospital in Rotterdam, Holland, using the radioimmunoassay

method. Each child took 2 ml of venous blood. Serum was separated by centrifugation at 3000 rpm for 10 minutes. and stored at -200C. Children with 25(OH)D3 less than 30 mmol/l were considered to be biochemically deficient. To calculate the risk factors, the x2 criterion was used for contingency tables with Yates' correction for continuity (the degree of freedom in each case is v=1).

Results of the study and their discussion

Depending on the level of 25(OH)D3 in the blood serum, all examined children were divided into 2 groups: group 1 - children with normal levels of 25(OH)D3 in the blood serum; Group 2 - children with low levels of 25(OH)D3 in blood serum. Group 1 included 84 (18.7%) children, group 2 - 365 (81.2%). The pathological course of pregnancy was detected in 73.4% of the examined mothers. Toxicosis of the 1st half of pregnancy was noted in 11.4%, the threat of termination - in 1.1%, nephropathy - in 1.5% of women. In 47.9%, the course of labor was pathological. This was mainly manifested by early discharge of water (4.7%), surgical interventions (3.2%). Rickets was detected in 28.9% of children, the consequences of perinatal damage to the nervous system - 16.2%, malnutrition - 4.8%, paratrophy - 0.6%, SARS - 51.2%, mild iron deficiency anemia was clinically detected in 25, 8% of the examined children.

To determine the significance of each factor, we analyzed x2 values. Mothers, children with clinical signs of rickets had the following: lack of vitamin D intake during pregnancy - 40.059 (P<0.0001), unbalanced nutrition during pregnancy - 10.064 (P<0.002), iron deficiency anemia in the mother during pregnancy - 4.096 (P<0.043) and mother's age at 1 pregnancy (up to 20 years) - 0.418 (P<0.518). On the part of the child: low level of 25(OH)D3 in the blood serum - 13.217 (P<0.0001), low level of phosphorus in the blood - 13.150 (P<0.0001), insufficient exposure to fresh air (less than 20 minutes) - 9.395 (P<0.002), perinatal factors - 8.516 (P<0.004), iron deficiency anemia in a child - 7.083 (P<0.008), time of birth of the child (autumn-winter period) - 5.14 (P<0.025), low level calcium in the blood - 4.960 (P<0.026) and the lack of prevention of rickets with vitamin D at the 1st year of life - 4.334 (P<0.037).

For an in-depth analysis of the role, various risk factors for the development of latent vitamin D deficiency, children were divided into 2 groups depending on the level of 25(OH)D3 in blood serum: group 1 - children with a normal level of 22.7% (n=106); Group 2 - children with a low level of 77.2% (n=360). The main reasons for the development of rickets on the part of the child in the first place with a low level of 25 (OH) D3 in the blood serum are the lack of vitamin D intake in the first year of life - 73.6% (at a normal level - 52.8%), the child had SARS - 45.5% (at a normal level - 62.2%), insufficient exposure to fresh air (up to 20 minutes) - 36.3% (at a normal level - 46.2%). Of the risk factors on the part of the mother, the lack of vitamin D intake during pregnancy at a low level - 84.1% (with normal - 88.6%), iron deficiency anemia during pregnancy - 56.1% (with normal - 82%), unbalanced nutrition during pregnancy - 53.3% (with normal - 78.3%).

Thus, it has been established that of the large number of risk factors, such factors as the lack of specific prevention, insufficient exposure to fresh air, the autumn-winter period of childbirth, prematurity, and iron deficiency anemia are of the greatest importance. A low level of 25(OH)D3 in the blood serum is a major risk factor for the development of rickets, which may be a prognostic criterion.

When comparing the parameters with normal and reduced levels of 25(OH)D3 in blood serum, we used the criterion for evaluating the shares. Reliability was determined using the table of critical values Student's criterion. Of the indicated risk factors on the part of the mother, 4 significant factors were identified: iron deficiency anemia during pregnancy Z=3.12 P<0.002; complicated childbirth Z=1.46 P<0.2; housewife Z=1.2

P<0.5; maternal toxicosis during pregnancy Z=1.8 P<0.1.

On the part of the child, 6 significant risk factors were identified: lack of vitamin D prophylaxis in the first year of life Z=6.9 P<0.00001; SARS in a child Z=1.5 P<0.02; time of birth (autumn-winter period) Z=1.6 P<0.2; insufficient exposure to fresh air (less than 20 minutes a day) Z=1.5 P<0.2; iron deficiency anemia in a child Z=16 P<0.01. Of the indicated risk factors on the part of the child, using statistical technologies, the most significant factors were determined: lack of vitamin D prophylaxis in the first year of life P<0.00001; iron deficiency anemia in a child P<0.01.

Findings:

1.It has been established that of the large number of risk factors, such factors as the lack of specific prevention, insufficient exposure to fresh air, the autumn-winter period of childbirth, prematurity, and iron deficiency anemia are of the greatest importance.

2.A low level of 25(OH)D3 in the blood serum is the main risk factor for the development of rickets, which can be a prognostic criterion.

3.Assessment of sufficiency should be carried out not indirectly - by determining the content of Ca and P in the blood, but by the method of direct determination of vitamin D metabolites in the blood.

4.A reliable method for assessing the exogenous supply of vitamin D is currently the determination of the content of 25-oxycholecalciferol (25-OH-D) in the blood.

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