European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 07, Issue 05, 2020

Criteria for studying the risk factors for rickets and its effect on the level of 25 (OH) D in blood serum in children

Rasulova N.A., Rasulov A.S., Sharipov R.X., Axmedova M.M., Irbutaeva L.T.

Rasulova Nadira Alisherovna
Candidate of medical sciences, assistant
Department of Pediatrics Faculty of Postgraduate Education
Samarkand state medical institute
Rasulov Alisher Sobirovich
Docent Department of Pediatrics Faculty of Postgraduate Education
Samarkand state medical institute
Sharipov Rustam Xaitovich
Doctor of medical sciences, docent Department of Pediatrics Faculty of Postgraduate Education
Samarkand state medical institute
Axmedova Maxbuba Maxmudovna
Docent Department of Pediatrics Faculty of Postgraduate Education
Samarkand state medical institute
Irbutaeva Lola Tashbekovna
Assistant Department of Pediatrics Faculty of Postgraduate Education
Samarkand state medical institute

Annotation. 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.

Key words: rickets, risk factors, 25 (OH) D3 in serum.

Introduction. For the first time in the scientific literature, rickets is mentioned in the writings of Soranus of Ephesus (98-138 AD), who noted in this disease the deformity of the lower extremities and the spine in children. A detailed clinical description of rickets was presented in 1650 by the English anatomist and orthopedist Glisson, in connection with which the disease was called “English disease”, “slum disease” (2). Recently, it has been suggested that vitamin D deficiency can lead to the subsequent development of oncological diseases, some types of cancer, neurological disorders, type 2 diabetes mellitus, hypertension, and decreased immunity (8).

M.S. Maslov (year) (18) quite rightly points out that "for a correct understanding of the etiology and pathogenesis of rickets, it is necessary to clearly distinguish between factors that predispose to it and directly cause it."

In the conditions of Uzbekistan, this issue still remains poorly understood, however, the climatic, geographical and ethnic characteristics characteristic of it can have a certain impact on the incidence and course of rickets in children of the first year of life.

So, according to B. Mamatkulov's research (...), the highest prevalence of rickets was noted among premature babies (77.4%) and those weighing up to 3000g (71.4%), as well as those on mixed (64.9%) and artificial feeding (70.8%). The study of social and hygienic living conditions revealed that rickets is more common in families with the least favorable living conditions (68.4%), in the parents of students (81.8%), with incomplete secondary education (62.6%), with low family budget (60.4%).

According to Ryvkin (1985) (11), with a timely course of rickets, the most frequent reasons for its development in the first year of life are the absence of elements of physical education in the family (81.2%), insufficient stay in the fresh air (72.2%), various intercurrent diseases (70.1%), extragenital (24.5%) and obstetric pathology in the mother,

birth weight less than 2500 g or more than 3500 g (44.3%), high (53.9%) or low (36 , 2%) rate of mass growth increments, calendar date of birth, improperly organized, early mixed or artificial feeding (60.1%).
According to the author, natural protection factors were used only in 18.8% of children, 81.2% did not receive massage and gymnastics, 68.7% - specific prophylaxis, 72.2% - were in the fresh air for at least 3 hours. Therefore, it is necessary to strengthen the responsibility of parents for the health of their children, as well as to develop fundamentally new approaches to promoting a healthy lifestyle.
At the same time, according to Gesner (…) (24), exclusive breastfeeding leads to rickets. Perhaps this is due to the fact that in the 70s, artificial and mixed feeding was carried out with unadapted formulas, and the content of vitamin D in breast milk is insufficient. With a daily requirement for vitamin D of 400-500 IU, a child receives 40-70 IU of vitamin from 1 liter of human milk, and 5-40 IU from 1 liter of cow's milk. High levels of phosphates in cow's milk, due to the widespread use of phosphate fertilizers, are responsible for the disturbance of calcium in the intestine and inhibition of the formation of parathyroid hormone (5).
Children with allergic diseases are especially problematic, when the strictest elimination diet is often prescribed with a depletion of the diet not only in vitamin D, but also in calcium (…). At the same time, it should be noted that convulsive syndrome (metabolic convulsions caused by hypocalcemia) occur not only in the first or second year of a child's life and can be an indication for assessing the functional state of the parathyroid glands (9,25).
Thus, today the incidence of rickets is still high, despite the switch to breastfeeding. The etiological factors leading to its formation are rather diverse and varied, and it is rather difficult to identify a clear etiological factor. For each climatic-geographical region, they are unique, which dictates the need for a more thorough study of them, taking into account the characteristics of our region.

Studies to determine the active metabolite of vitamin D, which is a direct indicator of vitamin D deficiency, have not been conducted in Uzbekistan.

Objective: to study the risk factors for the development of rickets while controlling the level of 25 (OH) D3 in blood serum.

Material and methods: there were 466 children under observation, aged from 1 to 12 months. All children were considered practically healthy, were examined physically to establish the clinical features of rickets (delayed closure of the large fontanelle, rickets rosary, wide wrist, muscle weakness, dystrophy, pale skin, excessive sweating, delayed teething, psychomotor development) and these children did not receive vitamin D within a month before blood sampling. There were 166 (35.6%) children under 6 months, 204 (43.7%) under 12 months, 96 (20.6%) under 3 months. The predominance of boys was noted - 258 children (55.3 ± 2.3%), while the number of girls was 208 (44.6 ± 2.3). Mothers were questioned, and the questionnaire covered topics such as ethnic background, medical history, sunlight exposure, child development and pregnancy. The content of 25 (OH) D3 in blood serum was determined by radioimmunoassay in the laboratory of the Rijmond-Zuid Medical Center in Rotterdam (Netherlands). 2 ml of venous blood was taken from each child. The serum was separated by centrifugation at 3000 rpm for 10 min. and stored at a temperature of -200C. The 25 (OH) D3 deficiency was defined as below 30 mmol / L (12 mg / ml).

Results and 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 a normal level of 25 (OH) D3 in the blood serum; Group 2 - children with low serum 25 (OH) D3 levels. 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 were diagnosed in 28.9% of children, the consequences of perinatal damage to the nervous system - 16.2%, malnutrition - 4.8%, paratrophy - 0.6%, ARVI - 51.2%, clinically mild iron deficiency anemia was detected in 25, 8% of the examined children.
It was of interest to elucidate the relationship between the content of the main metabolite of vitamin D and risk factors for the development of rickets on the part of the child (Table 1).

The incidence of risk factors in children depending on the level of 25 (OH) D3 in blood serum

Risk factors	with normal level 25 (OH) D3, n = 84		low level 25 (OH) D3, n = 365		
	abc.	%	abc.	%	P<
Mixed feeding	20	23,8±9,5	34	9,3±5,0	
Perinatal factors	28	33,3±8,9	122	33,4±4,3	
Lack of prophylaxis of rickets with vitamin D in the 1st year of life	32	38,1±8,6	283	77,5±2,5	0,001
SARS in a child	50	59,5±6,9	180	49,3±3,7	0,05
Time of birth of a child (autumn-winter period)	35	41,7±8,3	116	31,8±4,3	
Insufficient stay in the fresh air (no more than 20 minutes)	40	47,6±7,9	137	37,5±4,1	
Body weight at birth over 3500 g	23	27,4±9,3	85	23,3±4,6	
Prematurity	13	15,5±10,0	30	8,2±5,0	
Iron deficiency anemia in a child	83	98,8±1,2	333	91,2±1,5	
Low blood calcium levels	19	22,6±9,6	93	25,5±4,5	
Low levels of phosphorus in the blood	70	83,3±4,5	100	27,4±4,5	0,001

The table shows that in children from group 2, the reasons for the development of rickets come first: lack of vitamin D intake in the first year of life - 77.5%, insufficient stay in the fresh air (less than 20 minutes a day) - 37.5%, frequent colds. Other factors were detected with the same frequency in children with normal and low serum 25 (OH) D3 levels. A decrease in the level of Ca and P can occur both at normal and at a reduced level of 25 (OH) D3 in the blood serum.

We analyzed the relationship between the level of 25 (OH) D3 in blood serum and the main risk factors on the part of mothers (Table 2).

Table

The frequency of occurrence of risk factors from mothers depending on the level of 25 (OH) D3 in blood serum

Risk factors	with normal level 25 (OH) D3 n = 84		low 25 (OH) D3 n = 365		
	abc	%	abc.	%	P<
Iron deficiency anemia during pregnancy	66	78,6±5,1	316	86,6±1,9	0,01
Not taking vitamin D during pregnancy	70	83,3±4,5	312	85,5±2,0	
Complicated labor	35	41,7±8,3	188	51,5±3,6	
Place of work of mothers (housewives)	35	41,7±8,3	184	50,4±3,7	
Nutritional Defects During Pregnancy	48	57,1±7,1	213	58,4±3,4	
Mother's age at 1 pregnancy (up to 20 years)	48	57,1±7,1	198	54,2±3,5	
Toxicosis of pregnant women	18	21,4±9,7	44	12,0±4,9	0,05

Among the risk factors on the part of the mother, the absence of vitamin D intake during pregnancy can be brought to the fore - 85.4%; iron deficiency anemia during pregnancy - 59.1%.

When comparing tables with normal and reduced levels of 25 (OH) D3 in serum, we used the criterion for assessing the proportions. The reliability was determined using a table of critical values, Student's test. From 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 labor Z = 1.46 P <0.2; housewife Z = 1.2 P <0.5; toxicosis in the mother 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: the absence of vitamin D prophylaxis in the first year of life P <0.00001; iron deficiency anemia in a child P <0.01.

Conclusions: At present, recommendations for the prophylactic and therapeutic use of vitamin D3 preparations should be substantiated on the basis of the 25 (OH) D3 level in the blood serum of children. Moreover, the assessment of the supply 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 the metabolites of vitamin D in the blood. A reliable method for assessing the exogenous supply of vitamin D at present is the determination of the content of 25-hydroxycholecalciferol (25-OH -D).

Literature:

1. Zakharova I.N., Korovina A.N., Dmitrieva Yu.A. The role of vitamin D metabolites in rickets in children. // Pediatrics. -2010.-t. 89.-№3.-C. 68-73
2. Korovina A.N., Zakharova I.N., Dmitrieva Yu.A. Modern ideas about the physiological role of vitamin D in healthy and sick children.// Pediatrics. -2008.-T.87. No. 4. Pp. 124-130
3. Maidannik V.G. Rickets in children: Modern aspects.-K. - 2006. –S. 114
4. Novikov P.V. Rickets and hereditary rickets-like diseases in children. M., 2006: 336
5. Ozegov A.M., Koroleva D.N., Petrova I.N. Questions of practical pediatrics. // 2009. No. 4. Pp.23-27
6. Rasulova N.A. Multifactorial assessment of disorders of phosphorus-calcium metabolism in predicting and preventing the consequences of rickets. Abstract dissertation… .kand med. sciences. Tashkent. - 2010.- P. 19
7. Schwartz G.Ya. Vitamin D deficiency and its pharmacological correction. // Russian medical journal. 2009. - T.17. No. 7. P.477-486
8. Deniz Gungor, Ilke Biger, Rob Rodrigues Pereira, Alisher S. Rasulov e.a. Prevalence of vitamin D deficiency in Samarkand, Uzbekistan // J of Nutritional 2008; 000 (000): 1-9
9. Pettifor J.M. Ind. J Med Pts 127: 2008: 245-249