

Prevention of Rickets: The Right Way to Eliminate the Disease

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Abstract: There were 466 children under observation, aged from 1 to 12 months, the children were considered practically healthy and did not receive vitamin D within a month before blood sampling. The level of vitamin 25(OH)D3 less than 30 mmol/l was considered an existing biochemical deficiency. Despite the traditional prevention of rickets, 27.8% had mild and moderate severity, while 72.1% had no clinical signs of rickets. In 86.1% of children with rickets, a low level of 25(OH)D3 in the blood serum was detected. Thus, after the modified prevention of rickets, only in 9.2% of the examined children with signs of rickets, did the level of 25(OH)D3 remain low, while in 90.7% it returned to normal. At the same time, in children without signs of rickets, 14.3% had a low content of 25(OH)D3 in the blood serum, and in 85.7% of children, the level returned to normal. As a result, the correct administration of vitamin D makes it possible to reduce severe forms of rickets and improve the psychomotor development of the child.

Keywords: rickets, 25(OH) D3 in blood serum, prevention, children, vitamin D.

Introduction. Rachitis falls under the group of unprofitable diseases caused by deficiency of vitamin D and formation of different spots on a child's skin [1, 2, 10, 14]. Scientists have been already investigating this problem within the scores of years, though the frequency of rachitis has no tendency to decrease and comes to 30% average [4, 7, 11]. Despite the fact that there is an abundance of sun in our country, rachitis is widely spread. There are 27% of one year old children with rachitis in Uzbekistan [5, 6, 13]. It demands the necessity of working out an improving methods on preventive treatment of rachitis taking into account ecological and ethnical peculiarities [9, 15, 17]. However, the deficiency has been always indirectly defined by the substance of Calcium and Phosphorus in blood [13, 16]. At the same time, the content of Ca and P does not always show the degree of risk of rickets, and, according to various authors [3, 8, 12], rickets manifests itself with normal levels of Ca and P in the blood. There were no investigations in Uzbekistan on defining the active metabolism of vitamin D which is considered to be the direct indicator of deficiency.

Purpose of the study: to study the deficiency of children's 25(OH)D3 level in blood serum depending on the forms of preventive treatment of rachitis.

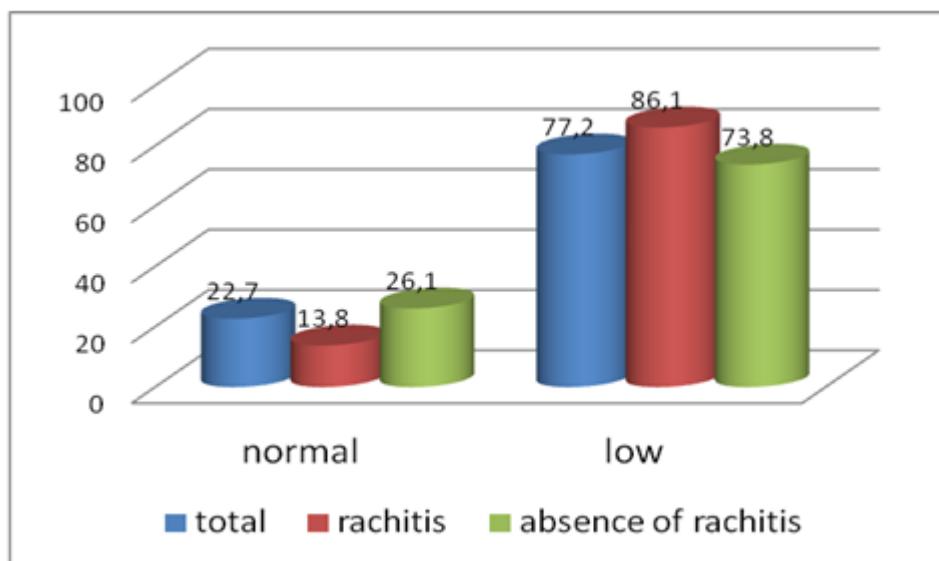
Material and methods of research: 466 children (aging from 1 till 12 month old) were examined, their parents considered them to be healthy, so these children did not get vitamin D within a month when their blood was taken. There were 35.6% of 6 month old children, 43.7% of children to 12 month old, and 20.6% of children to 3 month old. The prevail of boys was

marked— they were 258 (55,3±2,3%), whereas girls were 208 (44,6±2,3). The defining of 25(OH)D₃ level in blood serum was held by means of radioimmunal method in the laboratory of Santa Clara Hospital, Rotterdam city, The Netherlands. 2 ml of venous blood was taken from each child. The serum was separated by centrifuge on 3000 rev/min within 10 minutes and kept under the temperature of -20°C. Children with 25(OH)D₃ level less than 30 mmol/l were considered to have biochemical deficiency.

Results: It was proved that the deficiency of vitamin D have 77,2% of children including 27,8% of one year old children suffering from an acute form of rachitis, so it tells about the insufficiency of traditional preventive treatment of rachitis. It is known that the effectiveness of rachitis treatment vitally depends on using of vitamin D₃ timely taking into account the extent of unfavourable risk factors influencing on child's organism. Moreover, it was found that children who were under our observation had symptoms of rachitis despite the fact that pediatrician gave recommendations on taking of vitamin D₃ along with parents obligatory execution of doctor's recommendations.

According to biographical particulars we ascertained that during the realization of standard preventive treatment of rachitis from the total amount of children only 128 children (27,4%) got vitamin D. It is worth mentioning that doctor prescribed vitamin D, but mother forgot to give it to her child daily.

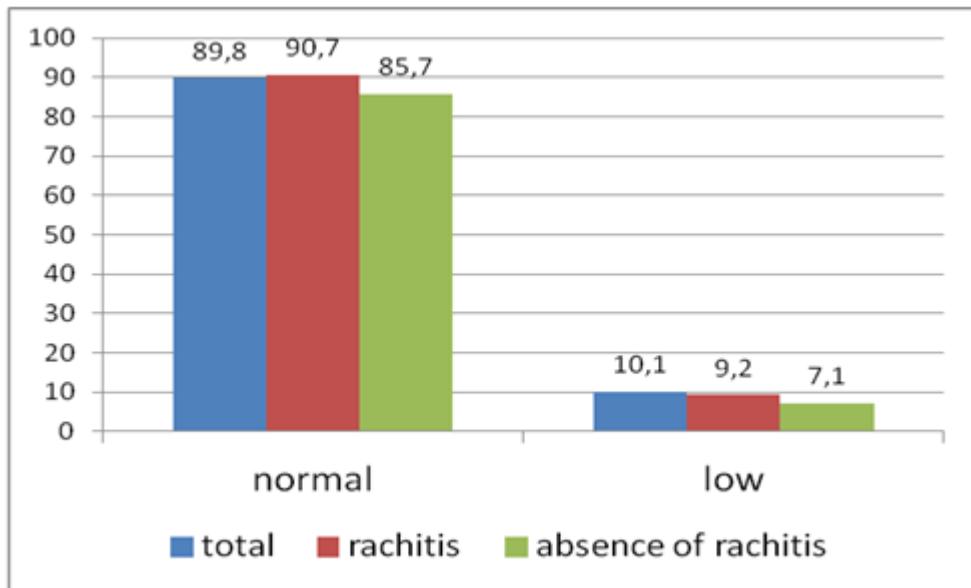
It was set, in spite of the realization of traditional preventive treatment of rachitis from 466 children the slight form of rachitis was found in 27,8% of children, but an acute form of rachitis was lacking in 72,1% of children. 86,1% of children suffering from rachitis had low 25(OH)D₃ level in blood serum, whereas all other children had this level within the norm. It sounds paradoxically, but 73,8% of children having no rachitis symptoms had low level of vitamin D (pic. 1). Apparently it was connected not only with the absence of holding the preventive treatment, but with the peculiarities of life mode and nourishment of children and their mothers. 22,7% of children had 25(OH)D₃ level in blood serum within the norm, 26,1% of children had no rachitis symptoms and 13,8% of children had rachitis symptoms.



Picture. 1 25(OH)D₃ level in blood serum children had during the realization of traditional preventive treatment of rachitis

It was established, in spite of the holding of traditional preventive treatment of rachitis its effectiveness remains on the low level because of the high frequency of rachitis development and low 25(OH)D₃ level in blood serum of children. In our opinion it is of big importance for all mothers to take care of their children and take preventive treatment in time.

In this connection we decided to modify vitamin D dosage and make visiting nurses responsible for holding modified preventive treatment of rachitis. Such decision proceeded from supposition that daily vitamin D dosage is considered to be inconvenient, so parents themselves forget to give it to their child in time. Thus it was decided to change not only the scheme, but also a methodology of giving this vitamin. Analysis of the state of children's health proved the truth of our supposition. On the strength of it, within 3 months a visiting nurse gave vitamin D to children according to the following scheme: vitamin D (aquadetrim, devaron) on 4000 MU once in a week giving to children aging from month old till one year old under the home-nursing observance (one course dosage is 160000-180000 MU). It should be noticed that the realization of modified preventive treatment allowed to normalize 25(OH)D₃ level in blood serum of 89,8% of children. 82,2% of children had slight forms of rachitis and 17,7% of children had no clinical symptoms of rachitis (pic. 2).



Picture. 2. 25(OH)D₃ level in blood serum children had during the realization of modified preventive treatment of rachitis

Investigations showed that after the realization of modified preventive treatment of rachitis only 9,2% of examined children had low 25(OH)D₃ level, whereas 90,7% of children had normal level. It was set, in fact, that 14,3% of children had low 25(OH)D₃ level in blood serum without rachitis symptoms and 85,7% of children had normal amount of level.

The improvement of health of a child, normalization of an appetite and sleep of a child, the ending of abundant sweat during suckling, the increase in weight were noticed. On the whole, children's state of health during the course of preventive treatment of rachitis became satisfactory. Side effects and overdosage from applied vitamin were not revealed.

It should be marked that the realization of traditional and modified preventive treatments of rachitis in Samarkand city and Akdarya region showed its results. Earlier, in Akdarya region it was found out 56,7% of children being struck with rachitis and 28,5% of children – in Samarkand city. During the research we defined 25(OH)D₃ level in children's blood serum according to their place of residence. According to received data, in Akdarya region 80,2% of children had low 25(OH)D₃ level in blood serum and normal 25(OH)D₃ level had 19,7% of children. In Samarkand city low 25(OH)D₃ level in blood serum with rachitis symptoms had 82,9% of children, and normal 25(OH)D₃ level had 17% of children.

During the realization of traditional preventive treatment of rachitis in Akdarya Region, 96,4% of children had low 25(OH)D₃ level in blood serum and 3,4% of children had normal amount of level. The same was in Samarkand city. Low 25(OH)D₃ level in blood serum with rachitis symptoms had 80% of children, and 20% of children had normal level.

After the realization of modified preventive treatment of rachitis the proposed scheme of research proved to be correct. Thus, in Akdarya Region, only 9.5% of children had low 25(OH)D₃ level, whereas 90.5% of children had normal level. In Samarkand city, the low 25(OH)D₃ level had 16.6% of children with rachitis symptoms and normal 25(OH)D₃ level had 83.4% of children.

Conclusion: Thus, we offer the vitamin D correction which allows to normalize the 25(OH)D₃ level, to decrease painful forms of rachitis, to improve psychomotor development on the 1st year of a child's life and recommend it for using in Uzbekistan.

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