Preterm Birth with Vitamin D Deficiency

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A B S T R A C T

Currently, there is more and more data on the pleiotropic effect of vitamin D, including those related to its effect on the body of a pregnant woman and the fetus. At the same time, it was found that a sufficient level of vitamin D is necessary throughout pregnancy, starting from the moment of implantation and the formation of the placenta. Vitamin D plays an important role in the adequate functioning of the mother-placenta-fetus system, and also has a positive effect on embryogenesis, the course of intra- and postnatal periods.

A RTICLEINFO

Article history:
Received 22 March 2022
Received in revised form
26 April 2022
Accepted 28 May2022

Keywords: Pregnancy, vitamin D deficiency, fetus, placenta.

Rationale

It is known that vitamin D plays an important role in pregnancy, its deficiency may be associated with the risk of developing gestational diabetes mellitus, preeclampsia, placental insufficiency, low birth weight, and may be a risk factor for preterm birth and bacterial infections.

Purpose To conduct an epidemiological analysis of vitamin D availability in women at different stages of pregnancy living in Uzbekistan.

Methods

The observational multicenter cross-sectional study included 1198 healthy pregnant women living in three regions of Uzbekistan. In all pregnant women, the level of 25(OH)D blood serum was determined, and a questionnaire was conducted (date of birth and gestational age). The collection of biomaterial was carried out from August 2018 to December 2019. The end point of the study was the assessment of vitamin D availability of pregnant women by trimester. Statistical analyzes included scoring and categorization by vitamin D levels, as well as calculating the median level of vitamin D in each region.

Correction of hypovitaminosis D

Doses of vitamin D recommended during pregnancy are 800–1200 IU/day. However, in most pregnant women, this dose does not provide sufficient levels of 25(OH)D_3. Increasing the dose to 2000 IU/day provides optimal levels of vitamin D in the blood for most women. With some complications of pregnancy (preeclampsia, placental insufficiency, gestational diabetes mellitus), the optimal and safe dose is 4000 IU / day throughout pregnancy.

Practical recommendations for the correction of hypovitaminosis D in the postnatal period currently take into account not only the effect of vitamin D on the musculoskeletal system, but also a wide range of biological effects on other organs and systems of the child's body. In this regard, various options for the

prophylactic intake of vitamin D in children are discussed. Thus, it has been established that with a daily intake of vitamin D at a dose of 400 IU / day, the level of 25 $(OH)D_3$ in the blood serum reaches 20 ng / ml (50 nmol / l), and this is enough to prevent rickets and osteomalacia in children. To ensure a pleiotropic effect, a serum concentration of $25(OH)D_3$ is required in the range of 30-50 ng / ml (75-125 nmol / l), which is achieved only with a daily intake of a higher dose of vitamin D - up to 2000 IU / day.

According to European recommendations, the daily vitamin D supplementation after birth should be 400 IU, regardless of the type of feeding. In the second half of the year, the dose increases to 600 IU / day, taking into account the intake of vitamin D from food. At the same time, it is considered that the dose up to 1000 IU / day is safe. Premature infants are given 400–800 IU/day until 40 weeks postconceptual age and then switched to doses recommended for term infants. ESPGHAN recommends 800–1000 IU/day of vitamin D in preterm infants. It has been shown that a daily dose of 800 IU in preterm infants increases vitamin D levels significantly faster over 4 weeks than a dose of 400 IU.

In the southern regions of Europe, regardless of the type of feeding, vitamin D is prescribed from birth at a dose of 400 IU / day throughout the first year of life. At the same time, in certain groups of children (dark-skinned, with pathology of internal organs, with malabsorption), the dose is increased to 1000 IU / day. The same authors recommend prescribing 200–400 IU/day of vitamin D to preterm infants from the first days of life (taking into account intake with parenteral nutrition, fortifiers, formula for preterm infants). Upon reaching the volume of enteral nutrition of 100 ml / kg and body weight of 1500 g, the dose of vitamin D is increased to 400–800 IU / day.

In turn, in the United States, newborns with very low birth weight are recommended to start prophylactic vitamin D intake with a dose of 200-400 IU / day. With a body weight of more than 1500 g and complete enteral nutrition, the dose is increased to 400 IU / day (maximum up to 1000 IU / day). At the same time, in premature babies, the recommended doses do not always allow reaching a sufficient level of calcidiol in the blood. With an initial low level of $25(OH)D_3$, even after 1 month. taking vitamin D at a dose of 800 IU/day, only in 1/4 of cases did the content of calcidiol exceed 30 ng/ml. A multicentre, six-year European study showed the low efficacy of standard doses of vitamin D in older children.

In accordance with the foregoing, the appearance on the Russian pharmaceutical market of a new form of vitamin D release in the form of dietary supplement Detrimax® Baby is of particular interest. Detrimax® Baby is a pure oily solution containing 200 IU of cholecalciferol per drop and can be used in children from birth. The bottle is provided with a special pump dispenser, which allows you to very accurately titrate the required dose, which is especially important for meeting the daily requirement for vitamin D in small and premature babies. It should be especially noted that the appearance of cholecalciferol with a dose of 200 IU in 1 drop in the arsenal of neonatologists makes it possible to adequately select an individual dose of vitamin D for small, premature and full-term newborns.

Results

In all three regions studied, the presence of vitamin D deficiency in pregnant women was confirmed. Its optimal level was found in less than 7% of women. Deficiency of this vitamin is present in 20.62% of the examined. The largest proportion of the surveyed is in vitamin D deficiency - 46.66%. The lowest rates were found in Smolensk, where the median level of vitamin D was 12.75 ng/ml. ¬It was also found that in the surveyed regions, the incidence of vitamin D deficiency increases in dynamics over trimesters.

Conclusion

In our study, we confirmed the presence of 25(OH)D deficiency in the majority of the examined pregnant women, which is consistent with international epidemiological data. This must be taken into account both at the stage of pre-gravid preparation, and to achieve the optimal level of vitamin D for each trimester of pregnancy.

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