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VITAMIN D PROVISION OF GIRLS WITH MENSTRUAL DISORDERS

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Abstract:
Despite the fact that the effect of vitamin D deficiency on the health of children and adolescents has been studied for a long time, information about the role of vitamin D in the formation of menstrual function in puberty girls is few and ambiguous. There is a close relationship between vitamin D deficiency and various other factors that determine a wide range of polymorphic clinical manifestations in which menstrual dysfunction is essential in puberty girls.
Vitamin D deficiency was detected in girls with menstrual disorders, correction of the level of which led to normalization of the menstrual cycle in 78.1% of girls. Thus, vitamin D supplementation corrects menstrual dysfunction, and therefore, vitamin D can be recommended for use in combination in the treatment and prevention of menstrual disorders.

Keywords: Menstrual dysfunction; girls; vitamin D deficiency; prevention of menstrual disorders.

INTRODUCTION

The problem of reproductive health of girls and women has become the focus of public health, since the quality of reproductive health determines the health of the nation, demographic problems, is of crucial importance for ensuring the stable development of society [1]. The reproductive function is provided by complex mechanisms of interrelations between the body systems and all its organs, respectively, both gynecological and extragenital diseases influence the formation and functioning of the reproductive system [2, 3, 4].

The formation of the pathology of the reproductive system is also influenced by specific, non-specific, constitutional factors and the environment. Disorders manifest themselves in the form of clinical, pathophysiological, immunological and biochemical changes that have similar results when exposed to a variety of environmental factors.

Emerging reproductive health disorders manifest themselves in the form of: an increase in the frequency of menstrual function disorders and nonspecific chronic inflammatory diseases of the genitals; a decrease in fertility, and, as a consequence, an increase in the number of infertile couples; an increase in the pathology of pregnancy and childbirth; deterioration of the fetus due to hypotrophy, hypoxia, malformations; a decrease in the quality of newborn health (up to fatal outcomes); an increase in the number of disabled children [5, 6].

Currently, it has been established that vitamin D deficiency is an etiopathogenetic factor in the development of a wide range of diseases. The level of vitamin D affects more than a hundred basic physiological indicators of human health associated with the risk of developing various diseases [5]. There are "classical" effects of D-hormone associated with its effect on calcium-phosphorus metabolism and bone mineral density, and "non-classical" biological effects. The "non-classical" effects of D-hormone include inhibition of cell proliferation and angiogenesis, stimulation of the production of insulin and cathelicidins (antimicrobial peptides), inhibition of renin production, anti-inflammatory, immunomodulatory, antibacterial, antitumor and a number of other properties.

Currently, under the term vitamin D, more than 6 molecules of a similar nature are combined, of which 2 molecules of steroid prohormones – D2 and D3 - have the greatest biological significance.

Vitamins D2 and D3 are biologically inert. To convert them into the active form of D-hormone (1,25((OH))2D), which binds to its receptors in tissues, requires two consecutive hydroxylations. The first occurs in the liver, and under the action of the mitochondrial enzyme vitamin-D-25-hydroxylase (CYP27A1) D3 is converted into 25-hydroxyvitamin D [25 ((OH))D], also known as calcidiol. The second hydroxylation occurs in the kidneys, as a result of which the biologically active 1,25-dihydroxyvitamin D [1,25(OH)2D], or calcitriol, is synthesized under the

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action of mitochondrial 1α-hydroxylase (CYP27B1).The enzyme 1α-hydroxylase is also found in many other tissues, which contributes to the local conversion of 25(OH)D in active 1.25(OH)2D [7, 12].

Since vitamin D and 1α-hydroxylase receptors are found in reproductive tissues, including the ovaries, uterus, placenta, testicles and pituitary gland, the association of vitamin D with the functioning of the reproductive system is obvious. D-hormone is able to affect the reproductive organs both directly, by binding to its receptor (VDR in women is detected in ovarian tissue, endometrium, fallopian tubes, as well as in the decidual membrane and placenta), and indirectly, through stimulation of the synthesis of steroid hormones (estrogens, progesterone, testosterone), which are necessary for the proper functioning of the reproductive system [7, 8].

Vitamin D deficiency in girls may cause an increased risk of developing menstrual function disorders [9]. Data on the role of vitamin D in the formation of menstrual function are ambiguous. According to some studies, the role of vitamin D deficiency in the development of menstrual disorders in women was considered proven; therefore, high doses of vitamin D had to be prescribed for these disorders [10]. However, according to other authors, the level of vitamin D (in combination with calcium) had no clinical significance and no positive correlation with the function of reproductive organs was found [11]. A direct correlation has been shown between vitamin D levels and metabolic and hormonal disorders, such as insulin resistance, increased levels of total testosterone and dehydroepiandrosterone in blood serum [12]. In addition, the authors note that taking vitamin D supplements or its analogues has a positive effect on insulin secretion, lipid profile, lowering glucose and C-peptide levels, restoring the menstrual cycle and follicle development [12]. However, there is insufficient data on the role of vitamin D in the development of reproductive disorders in girls, and there are no clinical recommendations on the need to prescribe vitamin D supplements to girls with vitamin D deficiency and menstrual dysfunction.

THE PURPOSE OF THE STUDY

To determine the level of vitamin D in girls with menstrual disorders and the possibility of vitamin D in their correction.

MATERIAL AND METHODS OF RESEARCH

The reproductive health of 120 female students was assessed by means of a questionnaire survey. According to the results of the survey, female students with menstrual disorders (algodismenorrhea, dysfunctional uterine bleeding, amenorrhea) were selected. Girls with menstrual disorders (32 patients) (the main group) and 10 patients with a normal menstrual cycle, who represented the control group, were assessed for vitamin D content in the blood. Blood was taken from the ulnar vein into a 5.0 ml test tube. The vitamin D content was determined by the enzyme immunoassay (Biomedica gruppe (Germany)). The normal level of vitamin D in the blood is 20-35 ng/ml, the deficiency is 10-20 ng/ml.

Girls with vitamin D deficiency were prescribed 4000 IU of vitamin D preparation. After 6 months of taking the vitamin D preparation, the level of vitamin D in the blood was re-determined in the girls.

Statistical processing of the study results was carried out using the Statistica for Windows software packages (version 6.1). The differences between the groups were considered statistically acceptable with the probability of error ($p<0.05$).

RESULTS AND THEIR DISCUSSION

When studying the vitamin D content in the blood, it was noted that in girls with menstrual disorders, the vitamin D level was reduced and amounted to 17.7±1.6 ng/ml, and in girls with a physiological menstrual cycle (control group), the vitamin D level was within the normal exogenous supply and amounted to 27.5±1.3 ng/ml ($p\geq0.01$).

Girls with vitamin D deficiency were recommended to take vitamin D preparations at a dose of 4000 IU. When making recommendations on vitamin D supplements, it is certainly necessary to take into account its baseline levels, as well as the presence of a history of diseases of the gastrointestinal tract, liver and kidneys [5]. However, a number of authors have proven that daily intake of 10000 IU of vitamin D does not cause hypercalcemia and an increase in calcium excretion by the kidneys. In any case, the appointment of low and high doses of vitamin D should be considered individually, after determining the level of vitamin D in blood serum and regular urine tests.

After 6 months, the girls who took vitamin D at the prescribed dose were re-surveyed and the vitamin D level was determined. According to the results of the survey, it was found that in 25 (78.1%) girls of the main group, the menstrual cycle was normalized, whereas in 7 (21.9%) girls who initially had a violation of menstrual function in the form of amenorrhea, these violations were not completely eliminated, which required a more in-depth examination of somatic, macro- and microelement status for the full correction of these violations. The level of vitamin D in girls who had a normalization of the menstrual cycle was

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31.4±2.6 ng/ml. In girls with preserved menstrual dysfunction, the vitamin D level was 26.3±1.8 ng/ml.

CONCLUSION

Thus, it is possible that vitamin D availability has a beneficial effect on the functioning of the hypothalamic-pituitary-ovarian system, including the course of the normal menstrual cycle. According to the results of our study, in girls with menstrual disorders (algodismenorrhea, dysfunctional uterine bleeding), after saturation of the body with vitamin D, the menstrual cycle returned to normal, and in 21.9% of girls with amenorrhea, menstrual dysfunction persisted, which indicated the need for further replenishment of the vitamin D balance with a more in-depth correction of existing disorders. Thus, the use of vitamin D has a positive effect on the normalization of the menstrual cycle, and therefore, it can be used in combination in the treatment and prevention of menstrual disorders.

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