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EVALUATION OF THE EFFECTIVENESS OF MAGNESIUM IN THE COMPLEX THERAPY OF PATIENTS WITH JUVENILE DYSMENORRHEA

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Abstract
Dysmenorrhea is a painful menstruation, widespread among gynecological diseases, today it is considered one of the economic and social problems not only of medicine. Dysmenorrhea is a signal of disorders that have developed in the systems that provide and control the process of endometrial rejection neuromuscular transmission.

Keywords: Dysmenorrhea, magnesium, hemodynamic parameters, Wong-Baker scale.

Introduction

Dysmenorrhea is a common pathological condition characterized by painful menstruation. From modern neurophysiological positions, it is called menstrual pain syndrome, which is more legitimate, since it can designate the entire wide range of neurovegetative, metabolic-endocrine and psycho-emotional deviations of the menstrual process, accompanied by pain in the lower abdomen [1, 3, 2].

Primary dysmenorrhea occupies a leading position in the structure of adolescent gynecological pathology: in puberty, the incidence of the disease ranges from 0.2 to 20% [4, 5]. According to modern publications, the incidence of juvenile dysmenorrhea ranges from 5 to 90%, which most likely reflects the subjective approach of doctors to the assessment of pain [2, 6, 7].

Abd.EL-Mawgod M.M. et al. (2016), studying the epidemiology of dysmenorrhea in Saudi Arabia, conducted a survey of 344 students, among whom the prevalence of dysmenorrhea was 74.4% [26]. Fernandez-Martmez E et al. (2018), through a cross-sectional study of 258 female university students in Spain, found the incidence of primary dysmenorrhea in 74.8%, among Palestinian female students, this figure was 85.1%, a group of researchers from Italy led by De Sanctis V (2016), studying dysmenorrhea in adolescents, found 50 studies that met the requested inclusion criteria and concluded that the prevalence of dysmenorrhea is between 34% and 94%, This indicates a variety of diagnostic criteria and the subjective nature of symptoms [23].

The monthly expectation of pain affects the general well-being, emotional and mental activity of girls. Menstrual pain syndrome is the cause of a huge number of absenteeism in schools, lyceums, colleges, institutes and at work [5, 8]. For example, Dawood cites data from a social epidemiological study in the United States, which confirmed that 600 million hours, i.e. 2 billion dollars, are lost annually as a result of the disability of working and studying adolescents with dysmenorrhea [23].

In some contingents (college students, lyceum students, university students) this figure reaches 17-22%. According to Jobava E.M. (2014), dysmenorrhea occurs in 43-90% of adolescents, while the frequency of occurrence increases with gynecological age and reaches a peak by the 5th year of menarche [7, 9]. In about 10% of these patients, the pain is so intense that during menstruation they lose their ability to work, cannot engage in daily activities, and feel very unwell [10, 3, 11].

It is noteworthy that it is in adolescence that 84% of girls experience a pain attack with vomiting, 79.5% with diarrhea, 22.7% with dizziness, 13.6% with headache, and 15.9% with fainting [28].

According to ICD 10 revisions, dysmenorrhea is usually divided into primary, secondary and unspecified. Primary dysmenorrhea is recommended to designate dysmenorrhea, which appeared in girls after 1-3 years with menarche, regardless of pathological changes in the genital organs pelvis. Dysmenorrhea, which first appears during puberty without clear causes, more than 3 years after menarche [12, 13, 14, 15], is unspecified [12, 13, 14, 15].

Magnesium is a unique basic intracellular cation of the human body, relieves the manifestations of autonomic dysfunction at various levels and participates in the processes of neuromuscular transmission. It is believed that this macroelement indirectly affects collagen synthesis through its effect on the higher vegetative center, the hypothalamus [16, 17, 18]. The body contains 24-28 g, 53-60% of which is found in the bones, bound to calcium and phosphorus, 22-27% in muscles, 15-19% in soft tissues, 1% in blood, lymph, interstitial fluids, and 0.3% in plasma [17, 19]. Magnesium ions are involved in all regulatory processes, starting with cells, tissues, organs and systems. Analysis of annotated human genes showed the existence of at least 500 magnesium-dependent proteins. It participates in energy metabolism, activates more than 300 enzymes, catalyzes and activates reactions occurring with adenosine triphosphate (ATP), regulates the synthesis of amino acids, and therefore cell growth, cell division, is responsible for the structure and permeability of membranes, the interaction of hormones with receptors.

The effect of magnesium on the parameters of the oxygen transport function of erythrocytes has been established. Under the influence of magnesium, the

stabilization of erythrocyte membranes, the preservation of structural and functional layering due to the normalization of lipid peroxidation processes (LPO) and the intensity of antioxidant defense processes (AOP) are observed [23]. Normal levels of magnesium in the body, which controls human health, are recognized as a fundamental constant. To date, magnesium deficiency occupies a leading position among the pathology of elemental status [20,10]. According to ICD-10, the diagnosis of magnesium deficiency is coded as E61.2.

Normally, magnesium is absorbed throughout the intestine and is absorbed both by active transport and by passive diffusion. On average, 30-50% of magnesium ingested with food is absorbed. The half-life of magnesium is about 1000 hours (42 days). The entry of magnesium into the cell is inhibited by prostaglandin E. Magnesium metabolism depends on age, height, physical activity, fluid intake, medications, and stress. It is known that 10 minutes of stress "burn" the daily norm of magnesium. Magnesium content decreases during pregnancy, breastfeeding, and the development of various diseases, both extragenital and gynecological [17].

Magnesium is not synthesized in the body, the daily dose of magnesium consumption is 5-6 mg/kg of body weight per day, i.e. about 300-400 mg. The norm for magnesium content in the blood serum in adults is in the range of 0.7-26 mmol/l, in pregnant women - 0.8-1.05 mmol/l, in children - 0.74-1.15 mmol/l. If we take into account that only 1% of the total amount of magnesium available in the body is in the blood plasma, then fluctuations in the level of magnesium in the blood plasma do not reflect the saturation of this element. Magnesium in the blood serum, even with a decrease in the total amount of magnesium by 80%, can be retained within normal limits [21].

Thus, according to J. Ronald et J. Elin, 32% of the population with normal blood magnesium levels have a latent magnesium deficiency, and 90% are people with a blood magnesium level of 0.70 mmol/L, 50% - 0.75 mmol/L, 10% - 0.80 mmol/L, and 1% - 0.90 mmol/L [25]. A decrease in the level of magnesium in the blood serum below the reference values is a sign of a pronounced magnesium deficiency in the body.

A large number of studies are devoted to the problem of magnesium deficiency, according to researchers from Italy, it may play an important role in several clinical conditions related to women's health, where dysmenorrhea is indicated [22].

For example, in the studies of E. V. Uvarova and I. G. Gaynova (2004), at the time of presentation of patients with primary dysmenorrhea, in 69.2% of cases, the content of magnesium in the blood serum fluctuated below the standard values, amounting to an average of 0.73±0.8 mmol/l, and within the standard values in only 30.7% of

patients. There were usually no obvious symptoms of magnesium deficiency, but increased sensitivity to stress was noted in individuals with magnesium deficiency [23].

Symptoms of anxiety and irritability are associated with magnesium deficiency, which is attributed to a selective lack of dopamine in the brain. In magnesium deficiency, impaired connective tissue formation in the form of undifferentiated connective tissue dysplasia was often noted [10]. In patients with hypomagnesemia, manifestations of DST syndrome were found in the form of frequent colds (88.9%), mitral valve prolapse (72.3%), scoliotic changes in the spine and chest (55.6%). It should be noted that magnesium plays a role in the pathogenesis of DST and its individual manifestations. For example, it is known that magnesium ions are involved in the processes of collagen synthesis by fibroblasts [24], so magnesium deficiency can be attributed to the factors that cause the development of DST. The most severe manifestations of DST were found only among patients with severe hypomagnesaemia [23]. A state of chronic stress in adolescents leads to significant losses of magnesium in the urine, while absorption in the gastrointestinal tract is significantly reduced, which ultimately leads to impaired collagen production in the connective tissue.

The National Guidelines (2016) of the Russian Scientific Medical Society of Physicians for the Diagnosis, Treatment and Rehabilitation of Patients with DST take into account the fact that girls with primary dysmenorrhea are characterized by subclinical magnesium deficiency. Despite the fact that the average level of magnesium in the blood of girls with DST was within the normal range, nevertheless, every third girl with DST had hypomagnesemia compared to every fifthin the blood and the intensity of pain, as well as reactive anxiety[23].

Thus, based on the above, analyzing the clinical pathogenetic features of patients with dysmenorrhea, which are represented by a normal ratio of estrogens and progesterone, as well as changes in hormonal homeostasis in the form of not only hypoestrogenism, but also hypoprogesteronemia, it is important to assess the hormonal profile in juvenile dysmenorrhea, taking into account the content of magnesium in the blood serum, since the above changes in the ratio of hormones are detected against the background of insufficient the content of magnesium in the blood serum [23].

Despite the long history of studying this problem, the frequency of dysmenorrhea in adolescent girls has not been determined in Uzbekistan, the features of the clinical course against the background of low indicators of somatic health have not been specified. To date, some etiological moments in the development of pain syndrome

during menstruation have not yet been fully studied, there is no systematization of data on the pathogenesis of the development of pain in girls suffering from painful menstruation. in the absence of pathology from the pelvic organs. In the available literature, it was not possible to identify information on the interdependence of dysmenorrhea types, magnesium levels, and DST. There are practically no data on the study of the biological marker of connective tissue oxyproline, indicating the presence of connective tissue dysmorphism syndrome caused by hypomagnesemia, which may be the cause of dysmenorrhea in girls, which could make it possible to develop a certain algorithm for the diagnosis and treatment of juvenile dysmenorrhea. The above information confirms the importance of magnesium in the treatment of dysmenorrhea. This prompts us to conduct scientific research.

The aim of the study was to optimize the results of treatment through the use of magnesium in the complex treatment of patients with dysmenorrhea.

Material and Methods

In 2021-2022, girls suffering from juvenile dysmenorrhea participated in the perinatal center in Tashkent. Ultrasound examination of the pelvic organs in 40 girls aged 13 to 18 years with complaints of painful menstruation revealed various causes of secondary dysmenorrhea: the presence of fluid in the posterior opening in 10 (25%), adnexitis and salpingitis - 9 (22.5%), uterine malformation - 4 (10%), cervical adenomyosis - 6 (15%), ovarian endometriosis - 6 (15%). and signs of genital infantilism - 5 (10%).

The patients were divided into 2 groups, 20 patients of the 1st group received standard therapy + COCs. The remaining 20 patients of Group 2 were prescribed standard therapy + COCs + Magnesium. All patients received standard dysmenorrhea therapy received in our clinic.

Outcomes

Table No1. Dynamics of laboratory parameters of magnesium in plasma against the background of therapy

Group 1 (standard ter – I + COC) n=20		
Plasma magnesium mmol/l	Before treatment	After treatment
	0,80±1,03	0,95±0,3
Group 2 (standard ter – I + COC + Magnesium) n=20		
Plasma magnesium mmol/l	Before treatment	After treatment
	0,75±1,01	1,06±0,9*

Note: reliability is presented in relation to the initial data * – p <01.

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Analysis of patients in Group 1 (standard sweat + COCs) showed that Mg before treatment was 0.80±1.03, after treatment - 0.95±0.3. Plasma magnesium in this group has not changed much. In the 2nd group (standard sweat - Ya + COC + Magnesium) in patients before treatment Mg was 0.75±1.01, after treatment - 1.06±0.9. This indicates that in Group 2 there was an increase in plasma magnesium content from hypomagnesaemia to the upper limit of normal, which increased the effectiveness of dysmenorrhea treatment.

Table No2 Monitoring of hemodynamic parameters

	Artillery pressure (mmHg)	Heart rate (bpm)	SBP (mmHg)
Group 1 (standard ter – I + COC) n=20			
Before Treatment	125,3±4,2/85,3±2,3	95,3±5,1	96±0,7
After Treatment	122,8±2,2/79,0±3,1*	85,5±4,8*	93,6±0,9
Group 2 (standard ter – I + COC + Magnesium) n=20			
Before Treatment	129,3±2,3/88,0±1,1	102,1±0,7	95,7±0,8
After Treatment	110,3±2,0/81,33±0,9*	71,93±0,8*	89,2±0,6

Note: reliability relative to baseline * –p < 0.05

BP in patients of groups 1 and 2 was 125.3±4.2/85.3±2.3 and 129.3±2.3/88.0±1.1. After treatment, it changed to 122.8±2.2/79.0±3.1 and 110.3±2.0/81.33±0.9. During the study, BP decreased in groups 1 and 2 by 4.39% and 11.83% compared to baseline before treatment. It is known that arterial pressure was significantly reduced due to its hypotensive and antispasmodic effect in patients who used magnesium. Heart rate decreased by 10.16 and 29.38% in both groups. Due to the relatively better elimination of pain with the antispasmodic and analgesic effect of magnesium, a change in heart rhythm from tachycardia to normocardia was established.

Table No2.Dynamics of pain syndrome according to the Wong-Baker scale.

Group 1 (standard ter – I + COC) n=20		
Wong-Baker Scale/ Points	Before treatment	After treatment
	9,1±0,7	4,6±0,7*
Group 2 (standard ter – I + COC + Magnesium) n=20		
Wong-Baker Scale/ Points	Before treatment	After treatment
	9,2±0,8	1,5±0,9**

Note : reliability relative to the initial data * – p < 0.05, ** – p < 0.01.

When studying the Wong-Baker scale, it was 9.1 ± 0.7 and 9.2 ± 0.8 points in the first and second groups. After treatment, it decreased by 4.6±0.7 and 1.5±0.9, which indicates an improvement in results by 47.52% in the 1st group and by 79.68% in the 2nd group. The results obtained mean that the pain syndrome in the 1st group was reduced to a mild and superficial level. In the 2nd group, complete disappearance of pain was observed with the Wong-Baker coding variant.

Discussion

Magnesium is involved in the synthesis of a number of neuropeptides in the brain, in particular, neurotransmitters: catecholamines, acetylcholine, which are the most important mediators of the body's physiological response to stress [25]. This explains the ability of magnesium preparations to reduce the excitability of the nervous system, to have a vasodilating and antispasmodic effect. leads to a change in the hemodynamics of the pelvis, which is caused by an increase in the concentration of prostaglandins in the body. This, in turn, contributes to cell hypoxia, the accumulation of algogenic substances with irritation of nerve endings, and the occurrence of pain in the lower abdomen [16]. Hypomagnesaemia can lead to dyshormonemia, in which the metabolism of estrogens and progesterone is disrupted with increased prostaglandin synthesis, as well as to insufficient production of endogenous opiates, which provide painless rejection of the functional layer of the endometrium [23].

From all the above information and our research, it is known that magnesium has an antispasmodic, sedative, analgesic and hypotensive effect on patients with juvenile dysmenorrhea and increases the effectiveness of treatment.

Conclusions:

1.With the use of magnesium against the background of standard therapy for juvenile dysmenorrhea, there was a complete elimination of pain, and patients quickly got rid of unpleasant sensations.

2.In juvenile dysmenorrhea, hemodynamic parameters are relatively better stabilized under the influence of magnesium.

3.Magnesium preparation eliminates hypomagnesemia by increasing the concentration of magnesium in the blood.

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