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The Relationship of Metabolic and Hormonal Disorders and their Role in the Formation of the Reproductive Health of Girls (Overview)

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ABSTRACT

Thus, the human body is a complex biological system consisting of organs and tissues. In order for the body to work as a whole, various organ and tissue systems must have a good direct correlation, including with the endocrine system. The endocrine system coordinates and regulates the activity of all organs and systems and has a significant role in relation to sexual development, which is the main lever for maintaining reproductive health and the formation of its reproductive function.

The problem of maintaining the reproductive health of girls became acute in Uzbekistan at the beginning of the 21st century, which is associated with the deterioration of the health indicators of the country's population [1,3,7]. Despite the large number of studies in the field of reproductive health, numerous sources of modern literature covering the age aspect of this problem are mainly devoted to the study of reproductive health and the analysis of reproductive losses in young mothers - up to 18 years of age.

Of course, in the development and growth of girls, the metabolic process occurring in the human body is of great importance. In children, in the process of growth and development, significant changes occur in the morphological characteristics of tissues, their chemical composition and metabolism, so the child's body cannot be considered as a small copy of an adult[6,8].

There are many distinguishing features of the body of a child from an adult, and this is manifested in the aspect of metabolism. The state of metabolism in each age period provides optimal conditions for growth and the ratio of plastic and bioenergetic processes. In children, the process of anabolism exceeds the intensity of catabolism, and in adults, the rates of these processes are comparable. The systems and mechanisms of regulation of all systems are in the process of development in adolescence, which leads to metabolic lability, imperfection of

biochemical adaptation, ease of occurrence of pathological processes in metabolism and, accordingly, an imbalance in hormone production [10,12].

Metabolic disorders mean a large number of diseases and syndromes that can be caused by internal or external factors. Endocrine diseases predominate among internal causes. Metabolism can always be disturbed with a lack or excess of certain hormones and has a direct correlation with the production of all hormones of the internal environment.

Temporary metabolic disorders and hormone production are possible against the background of a deficiency of trace elements, vitamins, proteins, carbohydrates and metabolic disorders, as a rule, indicate more serious problems in the body ().Vitamin D is an important prohormone involved in many metabolic processes. It is now established that vitamin D deficiency affects a wide range of acute and chronic diseases. WHO experts (2010) emphasized that the status of vitamin D is very important in the prevention of a large number of abnormalities in the functioning of the human body. A relationship between vitamin D deficiency and the long-term course of many diseases has been revealed. Because VDRs and 1a-hydroxylases are found in reproductive tissues, including the ovaries, uterus, placenta, and pituitary gland, vitamin D deficiency is highly likely to be associated with many reproductive health problems [4,11].

Vitamin D induces over 3,000 genes, many of which play a role in fetal development, 26 of which have a wide range of proven biological actions, including inhibition of cell proliferation and induction of terminal differentiation, inhibition of angiogenesis and renin production. Involved in stimulation of insulin production, macrophage production and induction of apoptosis[13].

Experimental studies have shown that with the development of vitamin D deficiency in female rats, mating behavior changes and a decrease in the birth rate is observed. Since the level of 1,25 (OH) 2D3 determines the modulation of ovarian activity, hypergonadotropic hypogonadism, uterine hypoplasia, impaired folliculogenesis, abnormal development of follicles, and infertility were observed when it was imbalanced [2,14].

Obesity is also often combined with hormonal ovarian insufficiency. It has been shown that 45% of women with severe obesity develop reproductive dysfunction. Obese women are 2–5 times more likely to experience various forms of menstrual irregularities, increase the frequency of uterine bleeding and endometrial pathology [7].

According to N.V. Gorbatenko 2017 The causal role of obesity in the pathogenesis of reproductive system dysfunction is confirmed by the restoration of the ovulatory menstrual cycle after a decrease or normalization of body weight ( ). Adipose tissue itself plays an important role in the pathogenesis of hormonal ovarian insufficiency. For various species of animals and humans, there is a "critical" body weight necessary for the onset of sexual development. In girls, the age of menarche coincides with an increase in body weight, on average, up to 47 kg. Of greatest importance for the onset of puberty is not so much body weight as the amount of subcutaneous adipose tissue and its ratio with body weight. In girls in the early puberty, there is a significant increase in adipose tissue, on average by 10 kg (120%), while the entire body weight increases by only 44%. A minimum level of easily mobilized energy is required for the formation of the menstrual cycle. An increase in the mass of adipose tissue leads to an increase in the peripheral conversion of androgens to estrogens, which occurs with the participation of the aromatase enzyme. In obese women, aromatase activity is several times higher than in non-obese women [5,13].

The ratio of estrogen / androstenedione, reflecting aromatase activity, in healthy women is 33 and increases with obesity to 50. The average level of estrone in the blood of women with obesity is 2 times higher than in women with normal weight. Estradiol stimulates the replication of progenitor adipocytes and thereby increases estrogen synthesis. The increased content of estrone in the blood of patients with obesity and ovarian hormonal insufficiency confirms the assumption that hyperestrogenemia is one of the leading causes of anovulation in overweight women [9].

Hyperestrogenemia sensitizes the pituitary gonadotrophs to the endogenous gonadotropin-releasing hormone of the hypothalamus. The threshold level of estradiol decreases, which is necessary to start the ovulatory rise in LH, which under physiological conditions occurs when the follicle reaches a certain degree of maturity. Hyperstimulation of immature follicles probably underlies their cystic degeneration. An elevated level of insulin in the blood increases the sensitivity of the ovaries to gonadotropic stimulation and at the same time inhibits the aromatization of androgens into estrogens [11].

Obesity affects ovulation, oocyte maturation, endometrial remodeling, endometrial receptivity, implantation process, and miscarriage rates. Authors Chavarro .,Rich- Edwards J.W. (2009) found that obesity is associated with lower concentrations of anti-Müllerian hormone.

In obese women, there is an increase in the concentration of C-reactive protein in the follicular fluid, which indicates that the metabolic environment of the body has a direct effect on the processes of folliculogenesis. Foreign researchers Crujeiras A.B., Casanueva F.F. 2014 it has been proven that an increase in this marker of inflammation and oxidative stress in the follicular fluid is statistically significantly associated with a decrease in the development potential of oocytes. Accordingly, metabolic disorders in girls and a decrease in the quality of oocytes can lead to abnormal development of the embryo.

It should be noted that in any form of obesity, there is a pathology of the hypothalamic-pituitary system, which leads to ovarian insufficiency.In the etiology of menstrual dysfunction in the body of girls and girls, the role of hypovitaminosis is multifaceted.

A significant deficiency of essential micronutrients, especially B vitamins, can lead to menstrual irregularities up to amenorrhea. The lack of vitamins A, C and group B contributes to the violation of the processes of estrogen inactivation in the liver, which in turn changes the state of steroid fractions [9,13].

Scientists Rebrov V.G. And Gromovoi O.F. 2008 experimentally proved the estrogen-like action of vitamins B2 and B6, which synergistically with estradiol increase the mass of the uterus (with its deficiency). They also indicated that with vitamin E deficiency in the body of girls, there is a violation of the processes of biosynthesis of prostaglandins and due to this there are signs of dysmenorrhea.Dysmenorrhea is not only a medical, but also a socio-economic problem, since up to 30-35% of girls suffering from this pathology lose their ability to work from 1 to 5 days every month. For example, M.Dawood 2006 in his scientific papers cites data from a social epidemiological study in the United States, which confirmed that 600 million hours are lost as a result of the disability of working adolescents with dysmenorrhea, i.e. 2 billion dollars annually. Pain during each menstrual cycle affects the emotional and mental sphere and disrupts human relationships in connection with which dysmenorrhea creates a social problem [12].

Rigon F., Harel Z., based on the results of their research, indicate that a central role in the pathogenesis of primary dysmenorrhea is played by arachidonic acid metabolism disorders with their pathological accumulation in the endometrium on the eve or during menarche of

eicosanoids - prostaglandins, leukotrienes and thromboxanes.

In the process of puberty, endocrinological studies have established that separate stages are distinguished by different hormonal situations and they determine the specifics of the functioning of physiological systems. The role of hormones in metabolic processes that ensure tissue metabolism determines the specifics of the functioning of physiological systems at different stages of puberty [3,5].

Thus, the human body is a complex biological system consisting of organs and tissues. In order for the body to work as a whole, various organ and tissue systems must have a good direct correlation, including with the endocrine system. The endocrine system coordinates and regulates the activity of all organs and systems and has a significant role in relation to sexual development, which is the main lever for maintaining reproductive health and the formation of its reproductive function.

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