

RESULTS OF A STUDY OF THE LEVEL OF SERUM CORTISOL AS A HORMONE THAT AFFECTS CONNECTIVE TISSUE METABOLISM IN ADOLESCENTS WITH HIGH MYOPIA

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Abstract. Cortisol is a hormone that is produced in the adrenal cortex. It protects the body from stress, regulates blood pressure, and is involved in the metabolism of proteins, fats and carbohydrates. The release of cortisol is regulated by adrenocorticotrophic hormone (ACTH), produced in the pituitary gland, a small gland located on the lower part of the brain. The concentrations of ACTH and cortisol in the blood are regulated by feedback. A decrease in cortisol concentration increases the production of ACTH, resulting in stimulation of the production of this hormone until it returns to normal. An increase in the concentration of cortisol in the blood, on the contrary, leads to a decrease in the production of ACTH.

Keywords: cortisol, ACTH, ST, PVHRD.

Cortisol is a hormone that is produced in the adrenal cortex. It protects the body from stress, regulates blood pressure, and is involved in the metabolism of proteins, fats and carbohydrates. The release of cortisol is regulated by adrenocorticotrophic hormone (ACTH), produced in the pituitary gland, a small gland located on the lower part of the brain. The concentrations of ACTH and cortisol in the blood are regulated by feedback. A decrease in cortisol concentration increases the production of ACTH, resulting in stimulation of the production of this hormone until it returns to normal. An increase in the concentration of cortisol in the blood, on the contrary, leads to a decrease in the production of ACTH. Therefore, the concentration of cortisol in the blood can change with an increase or decrease in the secretion of both cortisol itself in the adrenal glands and ACTH in the pituitary gland, for example, with a pituitary tumor that secretes ACTH. A decrease in cortisol production can accompanied by nonspecific symptoms: weight loss, weakness, fatigue, decreased blood pressure, abdominal pain. When a combination of decreased cortisol production and severe stress occurs, an adrenal crisis sometimes develops, which requires emergency medical attention.

Results were analyzed using cortisol levels obtained from community laboratories. As is known, metabolic processes of ST are under the direct and diverse influence of hormonal factors: glucocorticoids and steroid hormones (cortisol, testosterone, estradiol). Hormones regulate the synthesis and catabolism of collagen, having anabolic (androgens) and catabolic (cortisol and its derivatives) effects on metabolism. As noted above, studies of the pathogenesis of progressive myopia reveal metabolic disorders in the connective tissue system of the body.

Most likely, among the many causes of disturbances in the general metabolism of connective tissue and the metabolism of collagen structures of the sclera, one of the leading ones is hormonal changes. A few studies devoted to the study of hormonal status in adolescents with progressive myopia have revealed an imbalance of both sex (testosterone and estradiol) and

glucocorticoid (primarily cortisol) hormones. Obviously, for more complete information and a reliable assessment of the hormonal influence on the development of myopia and its complications, research in this direction should be continued.

The purpose of this fragment of work was a comparative study of the level of cortisol as an active regulator of connective tissue metabolism in the blood serum of children and adolescents with different clinical refractions. To solve this problem, 155 children and adolescents aged 9 to 17 years (13.4 ± 2.1 years) with different clinical refractions were examined: 20 with mild myopia, 32 with moderate myopia, 85 with myopia high degree, of which 36 with congenital and 49 with acquired (mainly at an early age) myopia. In 32 children (20.6%) various forms of peripheral vitreochorioretinal dystrophy (PVCRD) were detected in the fundus.

To assess the hormonal status, the level of cortisol in the blood plasma was determined in the morning on an empty stomach according to the generally accepted method. According to laboratory practice, normal cortisol levels for children and adolescents under 16 years of age are in the range of 83-580 nmol/l, but these data were obtained without taking into account refraction. In this regard, in our study, a control group was formed, which consisted of 18 children with weak and moderate emmetropia or hypermetropia. We used the range of serum cortisol values obtained in this group as a reference interval for comparison with values obtained in children and adolescents with myopia.

The results of the study are presented in Table 7 and Fig. 17. 76 Table 7. Cortisol level (nmol/l) in the blood serum of children and adolescents with different clinical refractions ($M \pm m$).

Table 1. Cortisol level (nmol/l) in the blood serum of children and adolescents with different clinical refraction ($M \pm m$).

Contr ol	Acquired myopia					Button high myopia		
	Soot level	Interme diate level	High level			compl ete	uncompli cated	compli cated
			Full	uncomplic ated	complica ted			
335,8 $\pm 40,9$	290.7 ± 58.6	250.9 ± 26.4 *	243.9 ± 20.5 *	247.6 $\pm 30,1$ *	236.3 ± 29.3 *	339.4 ± 33.2 **	413.7 ± 48.8 **	287.4 ± 38.6 * **

- the difference with the control is significant, $p < 0.05$.

** - the difference with the corresponding indicator of acquired myopia is significant, $p < 0.05$.

***- the difference with the corresponding indicator for uncomplicated myopia is significant, $p < 0.05$

As a result of our studies, it was established that in children and adolescents, as refraction increases, there is a relative decrease in the level of cortisol in the blood serum.

If, with acquired mild myopia, the cortisol level was 290.7 ± 58.6 nmol/l, and was slightly lower than the control (335.8 ± 40.0 nmol/l), then with moderate myopia it was reduced to 250.9 ± 26.4 nmol/l, and the differences with the control values became statistically significant ($p < 0.05$). The data obtained suggest that hormonal an imbalance, namely, a violation of cortisol metabolism, may be both one of the causes of general biomechanical disorders in the connective tissue system of children and adolescents with progressive myopia, and a sign indicating the presence of such disorders.

Conclusion

From what has been discussed and analyzed above it can be inferred that it is possible that, under certain prerequisites, during the period of active growth of the child, the characteristics of the hormonal status, which initially do not go beyond the norm, under the influence of a certain lifestyle, unbalanced nutrition, unfavorable physical and psychological factors can lead to a shift in hormonal balance, which in turn can negatively affect the metabolism as a whole and, as a result, cause disruption of the functioning of organs and systems, including ST, i.e. become a factor involved in the disruption of the supporting properties of the sclera.

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