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Content of Gonadotropic Hormones and Testosterone in Blood Serum in Patients with Chronic Lung Diseases

Sharipova O.A*, MamatkulovaD.Kh, AbdurakhmonovZh.N

Samarkand Medical Institute. Uzbekistan.

***Corresponding Author:** Sharipova O.A, Samarkand Medical Institute. Uzbekistan.*

Abstract

The assessment of sexual development and the study of the hormonal status in the blood serum in patients with chronic lung diseases (CLD). The study included 140 children with CLD. The results of the study showed a significant difference in the time of the onset of pubertal changes, the intensity of the development of secondary sexual characteristics (VPP), as well as functional disorders in the pituitary gland system, which was characterized by an increase in FSH concentration, a decrease in LH and a decrease in testosterone in boys with CLD. In girls with CLD, there was no significant predominance of FSH levels at the beginning of puberty, the LH content throughout puberty was significantly lower, and the level of estradiol was significantly low in older age groups.

Thus, CLD negatively affects the sexual development of children, which dictates the need to develop certain practical measures in this direction.

Keywords: *chronic chronic lung diseases, sexual development, blood hormones.*

Introduction

In the last decade, there has been an increase in the incidence of chronic lung diseases (CLD) with a sluggish course, prolonged exacerbations and low effectiveness of antibiotic therapy [3,4]. In many countries of the world, CLD ranks third in terms of morbidity and mortality [1].

Long-term and serious illnesses, causing a whole complex of metabolic and morphological changes in the body, can significantly inhibit physical and sexual development and cause disturbances in morphogenesis [1,5,8,9].

In addition, physical as well as sexual development is influenced by any disorders in the reproductive system, and they begin to manifest themselves in one of the critical and most vulnerable stages of the formation of this system - during puberty [9,10,11].

At the same time, the physical and sexual development of children is one of the most important criteria for assessing the health status of the population [2,6,9]. Children with physical and sexual underdevelopment cannot cope with the educational load due to rapid physical or mental fatigue. An equally important factor is that the delay in physical and sexual development often leads to difficulties in psychological and social adaptation, the consequences of which may persist in the future, when they achieve normal physical development [3,4,6,7].

The literature provides information that children with CLD lag behind in physical development. Issues related to sexual development in CLD can be considered virtually unexplored.

Based on the above aspects, this problem seems to be quite urgent.

Characteristics of Children and Research Methods

140 patients with CLD at the age from 12 to 16 years were examined. Of these, 55 patients with chronic bronchitis (CB), 45 children with chronic pneumonia (with deformation of the bronchi without their expansion - 25, with bronchiectasis - 20) and 40 patients with bronchial asthma (BA). The sex distribution of the surveyed children showed the predominance of 88 boys (62.8%) over 52 girls

(37.2%). The age composition of the patients was as follows: 11 years old -18 (12.9%), 12 years old - 19 (13.5%), 13 years old - 23 (16.4%), 14 years old -29 (20.7%), 15 years old - 24 (17.1%), 16 years old - 27 (19.4%) patients.

The degree of sexual development of patients was assessed in accordance with the stages of sexual development according to Tanner. When assessing the sexual development (PD) of boys, the severity of pubic (P) and axillary hair (Ax), the size of the penis and testicles were determined. When assessing the PR of girls, the severity of pubic and axillary hair growth, the growth of the mammary glands (Ma) were determined. When studying the menstrual function (Me), ttention was paid to the period of menarche and the further formation of the cycle.

In children with CLD, the basal level of hormones was determined in blood serum: STH, TSH, T3, T4, FSH, LH, estradiol and testosterone. Determination of hormones was carried out using standard kits from "Human" by ELISA.

Results and discussion

The results obtained when assessing the PR in boys showed that there is a significant difference in the time of the onset of pubertal changes, the intensity of development and the severity of secondary sexual characteristics (SSP) in CLD patients, compared with their practically healthy peers. Genetic studies have shown that in patients with CP at 12, 13, 14 years old, the size of the genitals was significantly ($P < 0.05$) lagging behind. In contrast to CP, in the group of patients with chronic bronchitis and asthma, the size of the genitals significantly ($P < 0.001$) lagged behind at the age of 14, 15 and 16 years.

Analysis of the formation of secondary sexual characteristics in boys with CP showed that at the age of 15-16 years, P2 Ax2 was noted in 18 (69.2%) of 26 patients, while in boys of this age it was normal according to J. Tanner's method - P3-4 ... In the group of patients with chronic bronchitis at the age of 15-16 years, P1 Ax1 was noted in 10 (71.4%) of 14 patients and only 4 (28.5%) had P2 Ax2. It was found that all 100% of boys with CP were lagging behind in the formation of secondary sexual characteristics in relation to healthy ones. In boys with BA at the age of 15-16, P1 Ax1 was detected in 6 (27.2%) of 22 patients, while P2Ax2 was found in 13 (59%).

In general, delayed sexual development was detected in 85.7% of the examined boys with CLD. The analysis of CR depending on the duration and severity of the disease showed that the degree of CRD correlates with the duration and severity of CLD ($r = 0.50$; $r = 0.39$ ($P < 0.05$)). So, signs of CRD in the group of patients with a disease duration of 5-6 years were detected in 66.7%, with a prescription of 7 years - in 88.9%, 8 and more years - in 100% of boys with CLD

During a clinical examination of sick girls, it was found that by the age of 16, sexual hair growth in the P_2Ax_2 stage was in 54.4%, and in the P_3Ax_3 stage it was only in 33.3% of patients, while in the group of healthy peers this formula looks like $P_{3-4}Ax_3$. In addition, in all age groups, there was a tendency to lengthen the timing of certain stages of mammary gland development in comparison with the group of healthy girls. By the age of 16, the mammary glands in 24.4% of patients were in the Ma_3 stage, and in the rest of the patients they did not exceed II degree according to Tanner. It is known that the most objective indicator of the puberty of girls is the time of the appearance of the first menstruation. In our republic, according to F.M. Ayupova (1998), the average age of menarche is 12 years 10 months. The analysis of our data showed that at the age of 13, among girls with CLD, no persons with the onset of menstruation were identified. Violation of the formation of menstrual function was more often detected in female patients with bronchial asthma, in whom systemic glucocorticoids were used for treatment. The incidence of delayed puberty among girls with CLD was often detected in older age groups and amounted to 82.7%.

Functional disorders in the pituitary-gonadal system were confirmed by the results of studies of the content of gonadotropins and sex hormones in the blood serum (Fig. 1).

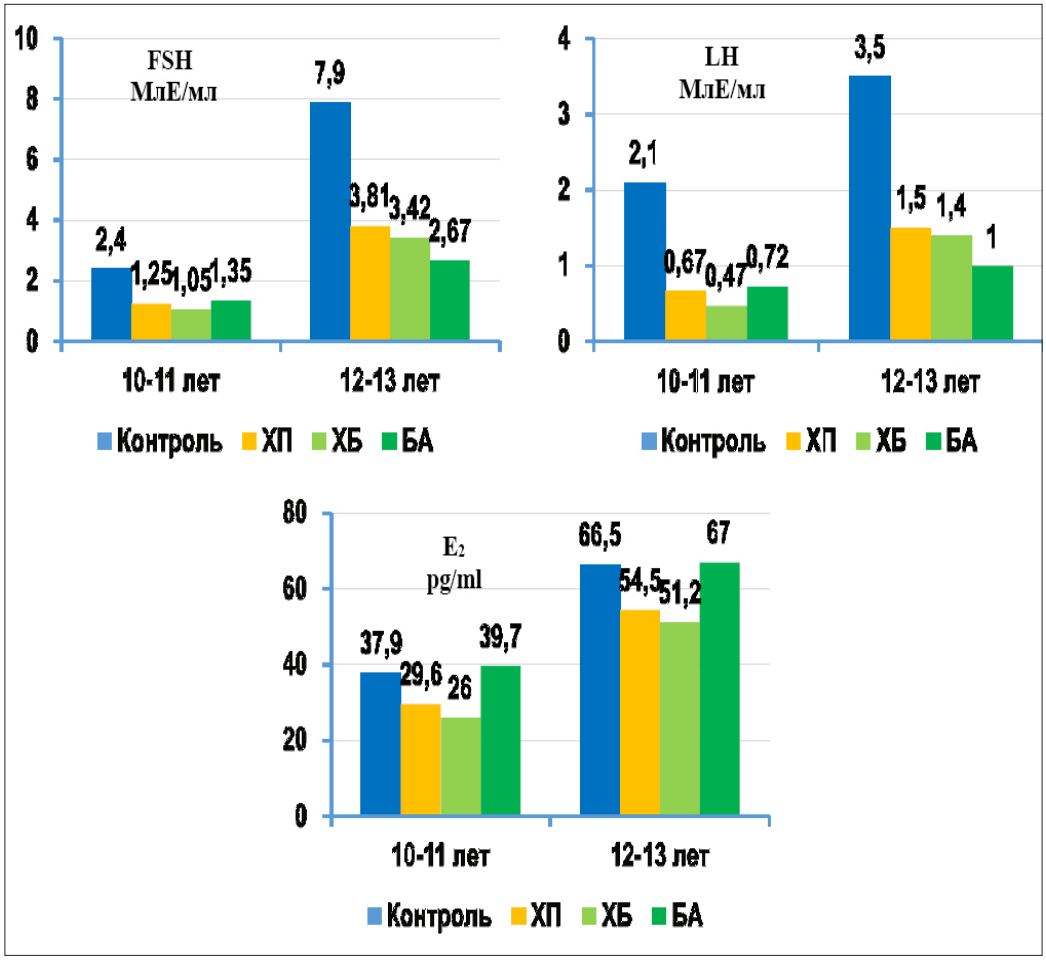

Fig1. *The content of gonadotropic hormones in the blood serum of boys with CLD*

The increase in the secretion of gonadotropic hormones of the pituitary gland during puberty in healthy boys is heterogeneous, in almost all age groups LH prevails over FSH. The results of our studies show that in patients with CP and CB at the age of 10-11 years, there was an increase in the level of FSH ($P < 0.05$), a significant decrease in LH in patients with CP and BA (1.18 ± 0.26; 0.73 ± 0.32 MlU/ml, respectively) and an insignificant increase in testosterone in all clinical forms of CLD (3.57 ± 0.67; 3.47 ± 0.55; 3.9 ± 0.67 nmol/L). This, apparently, is due to the fact that in children at the beginning of puberty in response to hypoxia, the FSH concentration increases compensatory, and LH remains low ($P < 0.001$). The synergism of the action of these hormones is disrupted from this age. In patients with CLD from the age of 14, the testosterone level begins to decrease significantly (7.8 ± 0.42; 7.9 ± 0.33; 7.6 ± 0.42 nmol/L) compared with the control group (9.49 ± 0.36 nmol/L $P < 0.01$). The decrease in testosterone indicates that in patients with CLD, the sensitivity of the gonads to LH is reduced.

The revealed low genetic indicators in boys with CLD are interrelated with low levels of FSH and LH $r = 0.33$; $r = 0.38$.

A comparative study of the state of the pituitary-gonadal system depending on the clinical forms of CLD showed that the most noticeable changes occur in patients with chronic bronchitis.

The results of the study of the pituitary-ovarian system in girls with CLD showed significant changes in the production of some sex hormones (Fig. 2). As can be seen from Fig. 2, the peak increase in pituitary FSH secretion in healthy girls occurs at the age of 12-13 years.

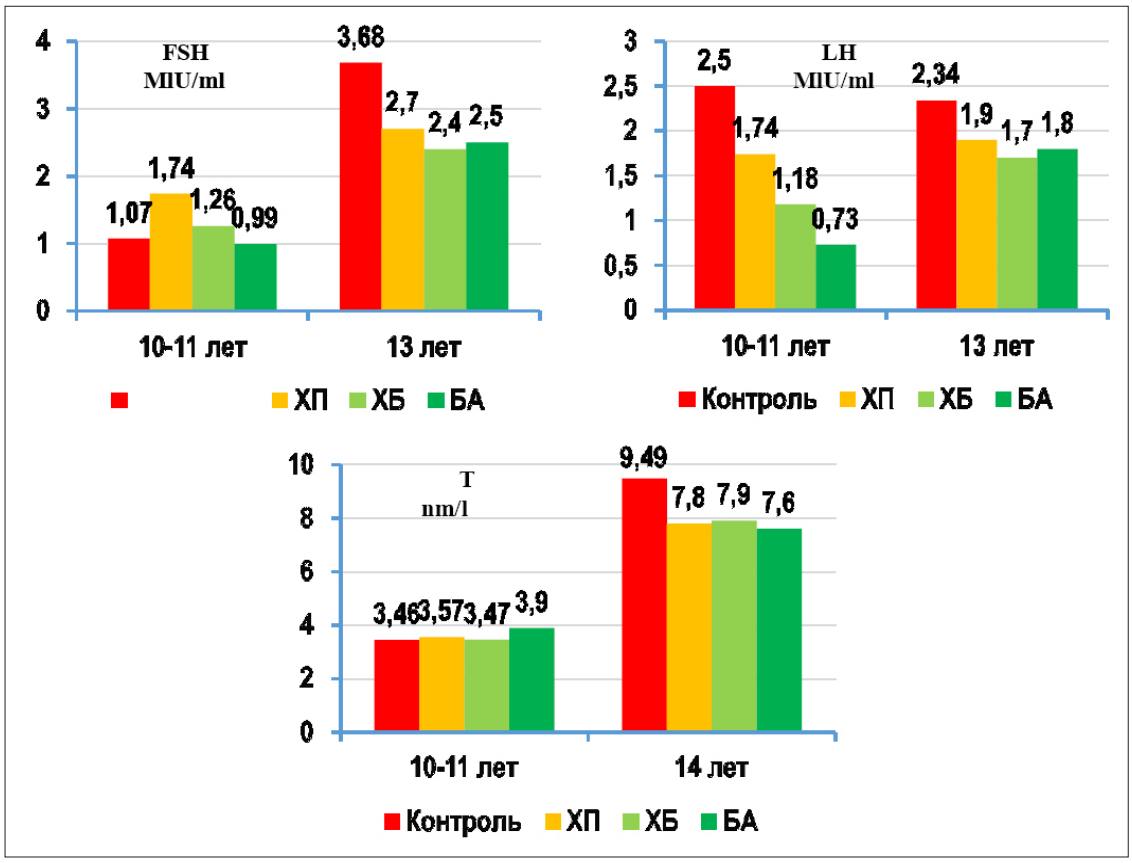

Fig2. *Hormonal characteristics of the pituitary-ovarian system in girls with CLD*

In female patients with CLD, there was no significant predominance of FSH levels in the blood serum at the beginning of puberty (P <0.05; P <0.001). The LH content throughout puberty was significantly lower and remained low in late puberty (P <0.05; P <0.001).

When studying the level of FSH and LH, depending on the clinical variants of CLD, we noted the most profound changes in the group of BA patients. It was found that the level of estradiol in girls with CLD was significantly low in older age groups (P <0.001). During the analysis, depending on the severity of the disease, we found that the level of sex hormones was significantly lower in patients with severe CP and CP. In female patients with severe BA, the level of sex hormones was significantly (P <0.05) higher than in the control group.

Thus, the results of the study allowed us to conclude that CLD negatively affects the sexual development of children, which dictates the need to develop certain practical measures in this direction.

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