

## **COMPARATIVE CHARACTERISTICS OF THE SIZES OF THE THYROID GLAND AND THE PARAMETERS OF THE PHYSICAL DEVELOPMENT OF CHILDREN 11 AND 12 YEARS OF AGE**

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### **ABSTRACT**

To conduct a comparative characteristic of the size of the thyroid gland and the parameters of physical development of children of 11 and 12 years of age. The study examined the morphometric parameters of the thyroid gland and anthropometric parameters in 11-year-old and 12-year-old boys and girls (n = 80). We tried to establish the average value of the normal volume of the thyroid gland and find out whether there is a relationship between the volume of the organ and the parameters of physical development.

Studies have shown that in boys of 11 and 12 years old included in our group, the growth rate of parameters of physical development and morphometric parameters of the thyroid gland is less than in girls of the same age.

On the basis of the data obtained, it was established that the physical development of 11 and 12-year-old boys, in comparison with girls, tends to lag behind. The prevalence of height and body weight in girls compared with boys is possibly associated with the early onset of their puberty. Anatomical parameters of the thyroid gland (length, width, volume) in boys of 11 and 12 years of age lag behind in comparison with girls of the same age.

**KEYWORDS:** ultrasound examination, thyroid gland, anthropometry measurement, morphometric indicators.

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### **INTRODUCTION:**

The problem of iodine deficiency diseases is the most important global medical, socio-economic problem of our time. The significance of the problem is due to the dire consequences of iodine deficiency in people of practically all age groups [1]. Iodine is one of the most important microelements for human life, involved in the functioning of the thyroid

gland, providing the formation of hormones (thyroxine and triiodothyronine). Insufficient intake of iodine in the body leads to disruption of thyroxine synthesis. This causes a compensatory diffuse enlargement of the thyroid gland as a result of its hyperfunction, and the so-called goiter with hypothyroidism develops, accompanied by a slowdown in metabolism, stunted growth and mental development of children [2].

Diseases of the thyroid gland (thyroid gland) in endocrine pathology are the second most common, occurring in 8–20% of the adult population of the world. According to the World Health Organization (WHO), more than 200 million people suffer from this pathology, in endemic foci this figure exceeds 50% [3]. Thyroid disorders in infants, children, and adolescents are common and usually treatable endocrine disorders. Thyroid hormones are essential for the normal development and growth of many target tissues, including the brain and skeleton. [4]. So, in iodine-deficient regions, the deterioration of the main indicators of physical development is shown: in particular, an increase in the number of children with disharmonious development. Schoolchildren with endemic goiter have low stature [5].

Numerous factors affect the size of the thyroid gland. Factors such as age, gender, weight, height, body mass index and body surface area were positively associated with thyroid volume. Diets that are deficient in iodine and even smoking cigarettes also affect thyroid volume [6]. An enlarged thyroid gland is called a goiter. Goiter is also known as goiter and thyrogaly. The most common cause of endemic goiter worldwide is iodine deficiency [7]. Analysis of the literature data of recent years indicates that much attention is paid to the problem of physical, sexual and intellectual development of modern children in areas of

iodine deficiency [8]. However, despite many years of struggle with iodine deficiency, the problem of iodine deficiency is still not resolved in many countries of the world, including Uzbekistan. Iodine deficiency diseases are the most common non-infectious pathology, both in Uzbekistan, in particular in the Bukhara region, and throughout the world. The problem of iodine deficiency diseases is the most important global medical, socio-economic problem of our time [9].

The diagnosis of thyroid pathology is currently impossible to imagine without ultrasound, which allows us to assess its volume, structure and location. Thus, the thyroid gland is an operational subsystem, operatively and adaptively reacting, the biological essence of which is the variability of tissues and its adaptation to the conditions of the factors of the external and internal environment that have changed for various reasons [10].

Accurate assessment of thyroid volume in patients of all ages is important for correct diagnosis of goiter and sonographic monitoring of thyroid disease. This is especially important in pediatrics because linear measurements of the developing thyroid gland correlate poorly with age, sex, or body composition variables. Various methods are used to assess the size and volume of the thyroid gland. Sonographic volume and visual examination and palpation are used to evaluate the thyroid gland. Although the size of the thyroid gland can be easily assessed by physical examination, due to the superficial location of the gland, palpation has low sensitivity and specificity for the management and diagnosis of thyroid disease. Therefore, the volume of the thyroid gland measured by sonography is more accurate than the size of the thyroid gland determined on physical examination [11]. Thyroid ultrasound is the most common, extremely useful, safe and

cost-effective way to visualize the thyroid gland and its pathology [12]. Medical examination must be cost effective. In a hospital or emergency department, the cost of thyroid ultrasound is documented to be quite low [13]. Indicators of physical development (PD) and body type are important not only in medicine, but also in physical education, as well as in sports [14]. Continuous monitoring of RF allows you to determine the characteristics of the growth and development of children, formed in the conditions of a certain lifestyle and environment, as well as timely identify deviations from the normal level of RF and develop measures to prevent and eliminate developmental disorders [15, 16].

Thus, the thyroid gland is an operational subsystem that responds promptly and adaptively, the biological essence of which is the variability of tissues and its adaptation to the conditions of the factors of the external and internal environment that have changed for various reasons.

Purpose of the study - To carry out a comparative characteristic of the size of the thyroid gland and parameters of physical development of children of 11 and 12 years of age.

## **MATERIAL AND METHODS:**

The research was carried out in secondary school No. 7 in the city of Bukhara on the basis of a bilateral agreement by the Bukhara State Medical Institute. (No. 517 02/05/2020). The results of examination of 80 children (40 boys and 40 girls) 11 and 12 years old were studied. All examined children were divided into 2 groups, comparable in age, sex and clinical and functional indicators. We established the average value of the normal volume of the thyroid gland and found out whether there is a relationship between the volume of the organ and the size of the body.

The correlation dependence of the size of the thyroid gland with the parameters of physical development was calculated by the formula :

$$r = \frac{\sum dx \cdot dy}{\sqrt{\sum d^2 x \cdot \sum d^2 y}}$$

Double correlation coefficient (Pearson method), where

- r - correlation coefficient
- dx - the difference between the options in the first line from the average value calculated for this line.
- dy is the difference between the options in the second row from the average calculated for that row.

For anthropometric measurements, the methodology of anthropometric studies of children was used (Morphometric characteristics of assessing the physical development of children and adolescents, methodological recommendations of N.Kh. Shomirzaev, S.A. Ten and I. Tukhtanazarova, 1998). The anthropometric study included measurements of body length, body weight, trunk length, and chest circumference.

Ultrasound studies were carried out on the basis of the Bukhara Regional Endocrinological Dispensary (No. 420 01/29/2020) and was devoted to the study of the ultrasound anatomy of the thyroid gland. The study was carried out on a SONOACE R3-RUS apparatus with linear (7.5 MHz) and convex (3.5 MHz) transducers.

Mathematical processing was carried out directly from the general data matrix Excel 7.0 using the capabilities of the STTGRAPH 5.1 program, the indices of the standard deviation and the error of representativeness were determined.

## RESULTS AND DISCUSSION:

Ultrasound parameters of the thyroid gland in children 11 and 12 years of age are shown in Table 1.

Table 1. Comparative characteristics of ultrasound indicators of the thyroid gland in children from 11-12 years of age

Indicators	11years old (n= 40)		12years old (n= 40)	
	Girls (n =20)	boys (n =20)	Girls (n = 20)	boys (n = 20)
Width (mm)	15,8 ± 0,50*	15,1 ± 0,19	16,2 ± 0,35*	15,9 ± 0,25
Thickness (mm)	19,2 ± 0,50*	19,1 ± 0,19	19,7 ± 0,50*	19,4 ± 0,25
Length (mm)	40,1 ± 0,06*	38,0 ± 0,87	41,5 ± 1,27*	40,2 ± 0,62
The volume of the gland in the sum cm3	13,0 ± 1,01*	11,4 ± 0,40	14,5 ± 1,02*	13,0 ± 0,48

Note: \* - significant values of 12-year-old children were noted compared with 11-year-old children  $p \leq 0.05$ .

Data of anthropometric parameters of 11-year-old children

As a result of the research, it was found that the height of 11-year-old girls varied from 136.2 cm to 157.4 cm, on average  $145.3 \pm 1.31$  cm, and in boys of the same age from 135.3 to 150.6 on average  $144.3 \pm 0.95$  cm.

The body length of 11-year-old girls is in the range from 26.3 to 37.2 cm, averaging  $32.6 \pm 0.68$  cm, and in boys from 30.4 to 36.8, the average is  $34.3 \pm 0.40$  cm.

The body weight in girls ranged from 29.4 kg to 49.2 kg, on average  $35.3 \pm 1.22$  kg, in boys of the same age from 24.6 kg to 45.4 kg, on average  $34.3 \pm 1.28$  kg.

Chest girth in 11-year-old girls ranged from 60.3 cm to 77.2 cm, averaging  $66.3 \pm 1.04$  cm, chest girth in 11-year-old boys ranged from 62.2 cm to 77.4 cm, averaging  $68.4 \pm 0.94$  cm (see Fig. 1).

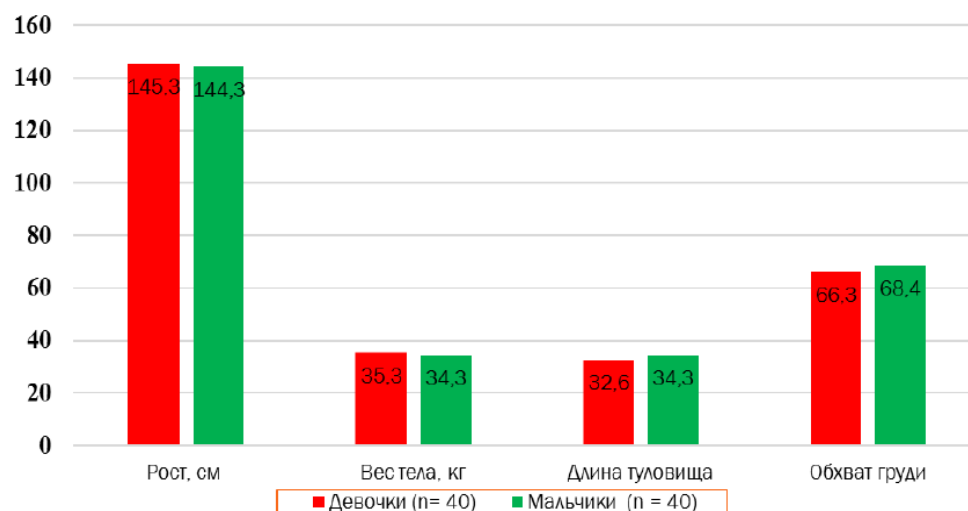


Figure 1. Comparative characteristics of morphological parameters of 11-year-old children

## DATA OF ANTHROPOMETRIC PARAMETERS OF CHILDREN 12 YEARS OF AGE:

Studies have shown that the height of girls 12 years of age is in the range from 145.2 cm to 166.4 cm, averaging  $152.3 \pm 1.31$  cm. The body weight ranged from 28.3 kg to 66.2 kg, the average was  $40.3 \pm 2.34$  kg.

The study revealed that the height of 12 year old boys ranged from 140.3 cm to 154.2

cm, on average it was  $148.4 \pm 0.86$  cm. Body weight on average  $36.3 \pm 0.62$  kg (from 32, 2 kg to 42.4 kg).

As a result of the research, it was found that the body length of 12 year old female children varied from 30.3 cm to 37.2 cm, averaging  $34.4 \pm 0.43$  cm, in boys of the same age from 28.4 to 36.3 the average is  $32.3 \pm 0.49$  cm. The chest girth in 12-year-old girls varied

from 60.4 cm to 86.3 cm, averaging  $68.4 \pm 1.61$  cm, the chest girth in 12-year-old girls boys

ranged from 64.3 cm to 73.2 cm, averaging  $70.3 \pm 0.55$  cm (see Figure 2).

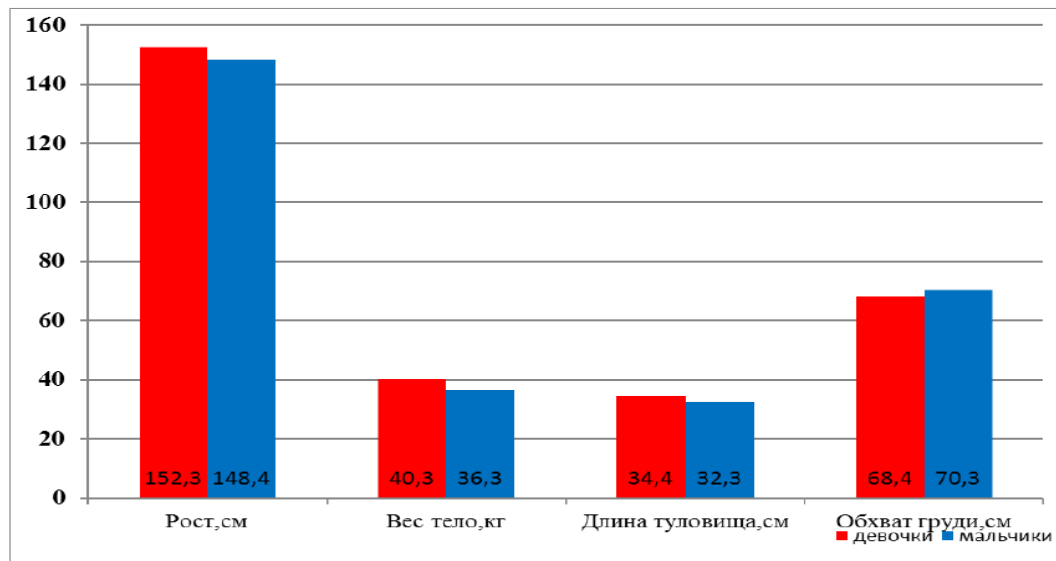


Figure 2. Comparative characteristics of morphological parameters of 12-year-old children

An ultrasound scan of the thyroid gland showed that the width of the gland in 11-year-old girls was 0.7 mm more than in boys of the same age, and 0.3 mm more in 12-year-old girls than in the opposite sex.

Ultrasound examination showed that the thickness of the thyroid gland in 11-year-old girls was 0.1 mm more than in boys of the same age, and in 12-year-old girls it was 0.3 mm higher than that of boys of the same age. The length of the thyroid gland in 11-year-old girls is 2.1 mm longer than in boys of the same age, and in 12-year-old girls it was 1.3 mm longer than in boys of the same age. It was found that the volume of the thyroid gland in girls 11 years old was 1.6 cm<sup>3</sup> more than in the opposite sex of the same age. Comparison of the volume of the thyroid gland in girls and boys of 12 years of age showed that it more on average revealed an excess of 1.5 cm<sup>3</sup> in girls (see table).

Anthropometric studies among 11-year-old male and female children showed that the growth parameters of male children are, on average, 1.0 cm less than those of girls of the

same age, and 12-year-old girls are 3.9 cm higher than boys. peers. When measuring weight, it turned out that the body weight of 11-year-old girls was 1.0 kg more than that of boys of the same age, and 12-year-old girls weigh 4.0 kg more than representatives of the opposite sex. When measuring body length in 11-year-old children, it was found that girls lag behind boys by an average of 1.7 cm, and in 12-year-old girls, on average, 2.1 cm behind boys of the same age. The chest circumference of 11-year-old girls is 1.9 cm less than that of the opposite sex, and of 12-year-old girls, the chest circumference is 2.1 cm less than that of boys of the same age.

Calculation of the correlation coefficient by the Pearson method ( $r = 0.97 \pm 0.10$ ) showed that an increase in the size of the thyroid gland increases the height and body weight. This condition has a strong positive correlation.

Our data coincide with the data of Zimmermann M.V. (2003) that the volume of the thyroid gland of the examined children increases depending on gender and age.

According to A.I. Popovsky (2005), N.A. Belyakova (2006), D.B. Demin (2006) and R.N. Trefilov. (2007) in children who live in different climatic and geographical regions, there are significant differences in the ratio of morphometric parameters and the volume of the thyroid gland, in particular, our studies conducted in the Bukhara region are clear evidence of this.

The study of the macroanatomy of the thyroid gland showed that the thyroid gland in pubertal girls from the Bukhara region has typical structural features that are described in the literature (Vasilieva O.A., 2011).

### CONCLUSIONS:

Based on the data obtained, it was established that the physical development of 11 and 12-year-old boys in comparison with girls tends to lag behind. The prevalence of height and body weight in girls compared with boys is possibly due to the early onset of their puberty. Anatomical ultrasound parameters of the thyroid gland (length, width, volume) in boys 11 and 12 years of age are less than in girls of the same age. From this it follows that in girls with an enlarged thyroid gland, there is a natural increase in anthropometric parameters such as height and weight.

Thus, the ecological disadvantage of the Bukhara region causes changes in morphological parameters in the thyroid gland, which may be prerequisites for the occurrence of anthropometric changes in puberty in girls. Moreover, if in boys these shifts are insignificant, then in the future there is a clear tendency towards their intensification.

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