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Age and Gender-Specific Morphological Changes in Facial Area Craniometric Indicators and Facial Index in Children of Primary School Age

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ABSTRACT

Objective: *This article studies the age- and gender-dependent morphological characteristics of the facial area and facial index in children of primary school age.* ***Method:*** *The study involved analyzing morphological characteristics with attention to age and sex variables in primary school children.* ***Result:*** *The results showed that certain changes in facial morphology are observed with age, as well as some statistically significant differences between the sexes.* ***Novelty:*** *These data are of great importance in pediatrics, pediatric dentistry, plastic and reconstructive surgery, and in the determination of anatomical features.*

INTRODUCTION

The facial area is one of the main morphological structures that shape a person's appearance, and its dimensions and proportions change significantly with age. Especially during the school-going period — from 7 to 12 years — the development of the facial skeleton and soft tissues is intensive. Morphological changes in the structure of the face during this period are directly related not only to the growth and development indicators of children, but also to their individual characteristics depending on their gender [1].

Analysis of changes in facial craniometric indicators and facial index is of great diagnostic importance in assessing the normal and pathological development of the child's body, determining the adequacy of the facial shape from an aesthetic and functional point of view. At the same time, in pediatric practice, orthodontics, otorhinolaryngology and plastic surgery, taking into account age- and gender-related parameters of children's facial anatomy increases the effectiveness of the treatment strategy [2].

This article aims to determine how the main craniometric parameters of the face and facial index of primary school-age children change depending on age and gender. The results of the study provide a scientific basis for a deeper understanding of children's morphology and its application in clinical areas [3].

RESEARCH METHOD

Research Objective

Analysis of age- and gender-specific morphological changes in the facial area craniometric indicators and facial index in children of primary school age [4].

Research materials and methods. The objects of the study were 180 boys and girls in grades 1-6 (7-12 years old) studying at the 41st comprehensive school of the Izboskan district of Andijan region, affiliated with the Department of Preschool and School Education. Research methods: craniometric and variational-statistical methods [5].

Full face height is the distance between the nasion (n) and gnathia (gn) points. We measured this indicator with the help of a caliper in the normal position of the upper and lower teeth of children.

The height of the upper face is the distance between the nasion (n) and prostion (pr) points. This indicator was also measured with a caliper [6].

Upper face width is the distance between the fronto-molar-temporal (fmt) points on the right and left sides. It was measured with a caliper [7].

Midface width is the distance between the zygomolar (zm) points on both sides of the head. This indicator was measured with a caliper.

Cheek diameter is the maximum distance between the outer surfaces of the cheek arches on both sides of the head. This indicator was measured with a caliper between the zygoid (zy) points on the right and left sides in the direction of the frontal axis [8]. The facial index was measured using the following formula:

$$\text{Facial index} = \frac{\text{upper facial width}*100}{\text{cheek width}}$$

RESULTS AND DISCUSSION

The height of the upper face in 7-year-old boys was 5.31±0.22 cm, P<0.001, and in girls of the same age it was 5.38±0.32 cm, P<0.001. In subsequent years, this indicator increased at the same rate and reached 6.38±0.20 cm, P<0.001, in 12-year-old boys and 5.90±0.10 cm, P<0.001, in girls. This indicator increased by 7% in boys between 7 and 10 years of age and by 5% in 11 and 12 years of age [9]. In girls, it increased by 5.6% in 7-10 years of age and by 1% in 11-12 years of age, respectively. Based on the results obtained, we can say that between the ages of 10 and 12, growth in boys increases significantly compared to girls [10].

In Figure 1 shows that the size of the full height of the face in 7-year-old boys is 7.8±0.20 cm, P<0.001, and increases to 8.6±0.26 cm, P<0.001, between 8-10 years old, and the difference between the indicators is not very large. [11] In girls, the growth of the full height of the face is relatively slow at 7-9 years old (7.6±0.14 cm in 7-year-old girls, P<0.001; 8.2±0.22 cm in 9-year-old girls, P<0.001), and later this indicator grows relatively rapidly and equals 8.8±0.08 cm, P<0.001.

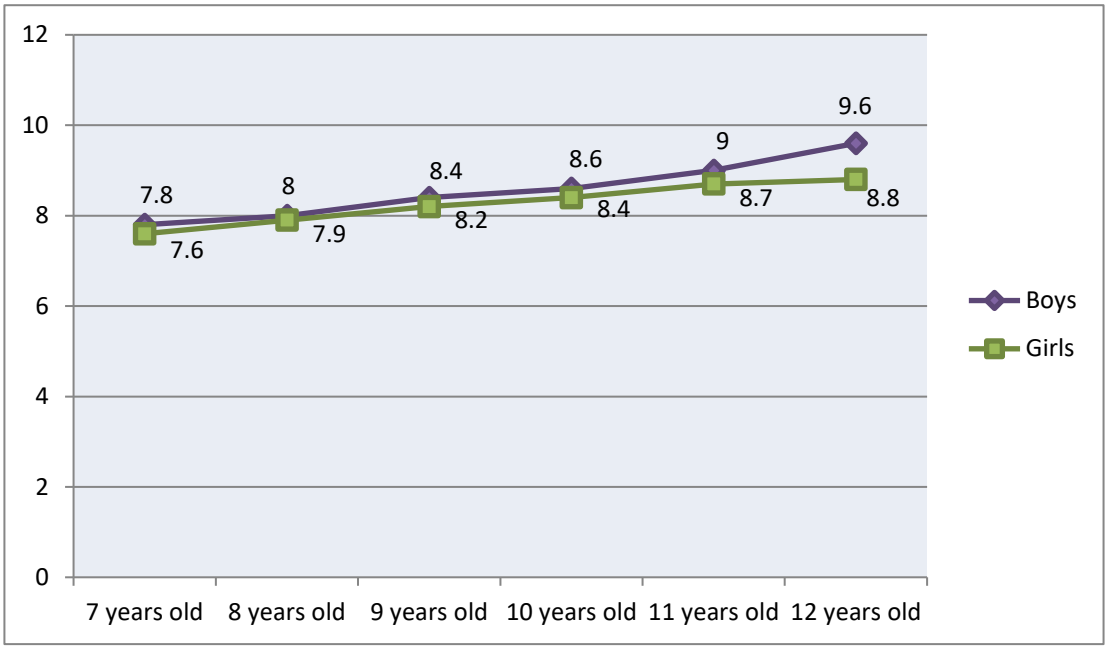

Figure 1. Dynamics of growth of full facial height (X±m, in cm) in children of primary school age.

In Figure 2 shows that the upper facial width in 7-year-old boys is 10.00±0.30 cm, P<0.001, and by 10 years of age this figure increases to 10.84±0.36 cm, P<0.001, and by 12 years of age it increases to 11.54±0.06 cm, P<0.001. In girls this figure is 9.80±0.26 cm, P<0.001, at 10 years of age 10.70±0.24 cm, P<0.001, and at 12 years of age 10.96±0.24 cm, P<0.001.

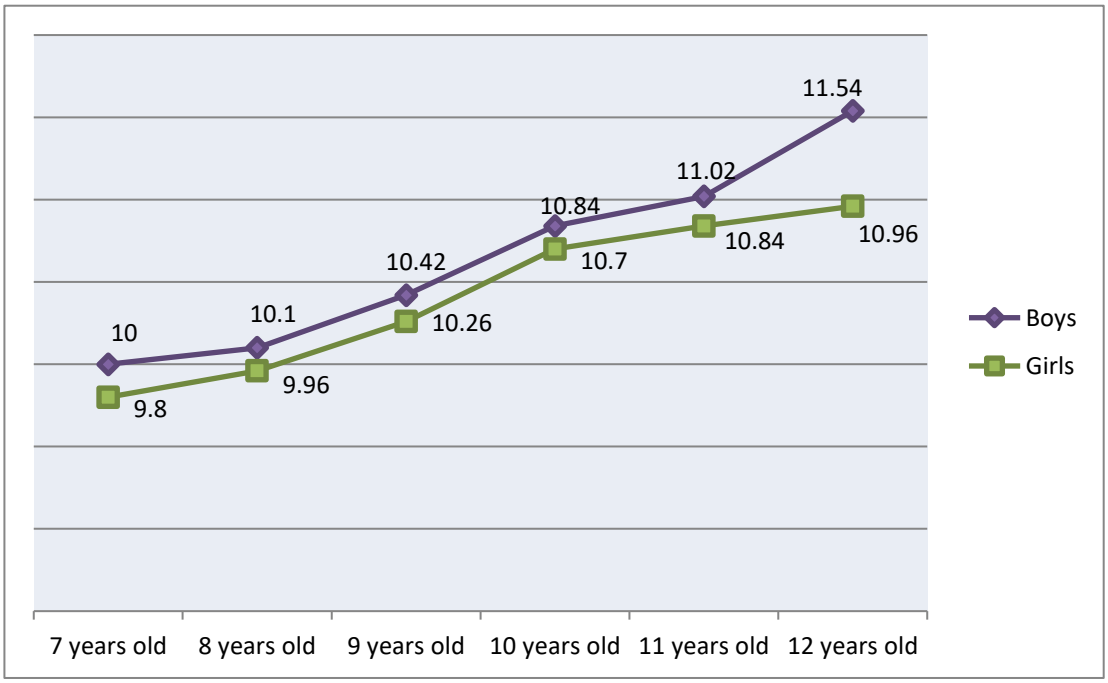

Figure 2. Dynamics of growth of upper facial width indicators in children of primary school age (X±m, in cm).

In Figure 3 and 4 show that the average width of the face in 7-year-old boys is 9.52±0.22 cm, P<0.001, and by the age of 10 this figure reaches 9.96±0.08 cm, P<0.001. [12] This figure increases relatively intensively between the ages of 10 and 12, that is, from 9.96±0.08 cm at the age of 10, P<0.001, to 10.90±0.22 cm at the age of 12. The average width of the face in 7-year-old girls is 9.80±0.12 cm, P<0.001, and at the age of 10, it increases to 10.10±0.10 cm, P<0.001, and at the age of 12, it increases to 10.50±0.12 cm, P<0.001 [13].

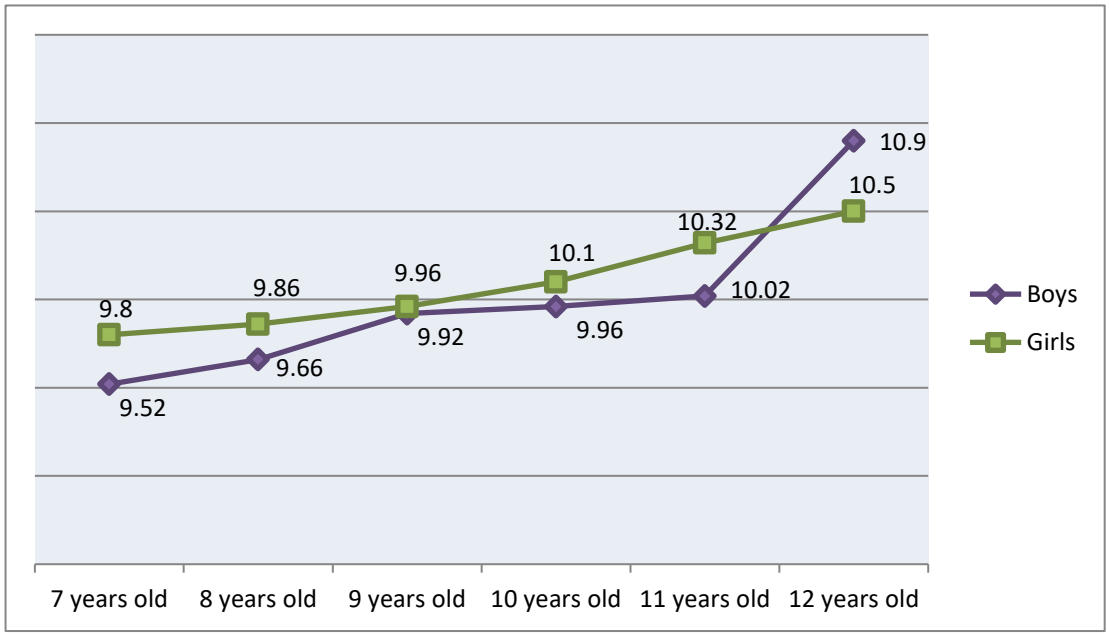

Figure 3. Dynamics of growth of average facial width indicators in children of primary school age (X±m, in cm).

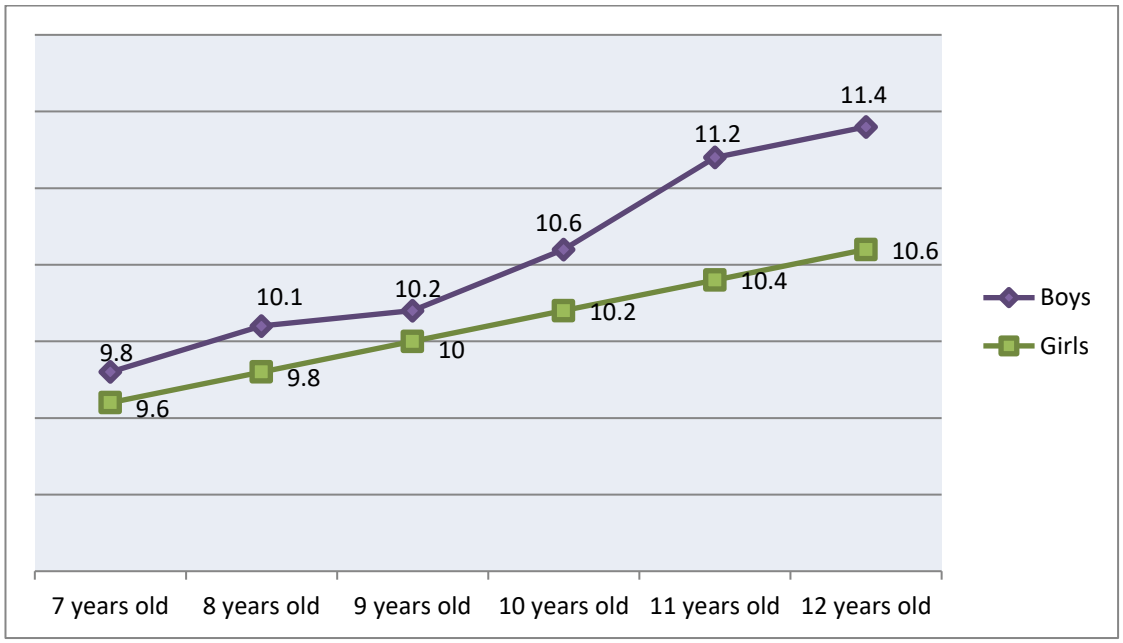

Figure 4. Dynamics of growth of cheek diameter indicators in children of primary school age (in X±m, cm).

In Table 1 shows that one of the main indicators explaining the width of the face is the cheek diameter [14]. The cheek diameter increases in girls of the studied age at the same rate, that is, in girls at the age of 7 it is 9.6±0.34 cm, P<0.01, in girls it increases to 10.2±0.40 cm, P<0.01, and in girls at the age of 10 it increases to 10.6±0.36 cm, P<0.01. The cheek diameter indicators increase by 16% in boys and by 11% in girls [15]. Cheek diameter increases intensively from 7 to 12 years of age in boys from 9.8±0.22 cm, P<0.01, to 11.4±0.16 cm, P<0.01, respectively, and in girls from 9.6±0.34 cm, P<0.01, to 10.6±0.36 cm, P<0.01.

Table 1. Growth dynamics of facial index (X±m, in cm) in children of primary school age.

Child's age	Gender	Craniometric indicators Facial index
7 years old	Boy	100,01
	Girl	100,18
8 years old	Boy	99,20
	Girl	100,68
9 years old	Boy	99,32
	Girl	102,6
10 years old	Boy	100,44
	Girl	102,96
11 years old	Boy	99,18
	Girl	101,38
12 years old	Boy	100,50
	Girl	100,62

The facial index decreases in boys between the ages of 7 and 10, and increases relatively between the ages of 11 and 12. In girls, the facial index increases between the ages of 7 and 10. Then, between the ages of 11 and 12, it decreases by 1.1 times.

CONCLUSION

Fundamental Finding : The study demonstrated that craniometric parameters of the facial area in primary school children undergo significant, age- and gender-specific morphological changes. As children grow, facial width, height, and facial index show gradual increases typical of developmental maturation. For instance, cheek diameter in boys intensively increases from age 7 to 10, reaching 11.4±0.16 cm at age 12, which is 1.2

times larger than in girls. Boys generally exhibit higher facial dimensions, indicating early signs of sexual dimorphism. **Implication :** These findings underscore the importance of establishing gender-specific normative data in pediatrics and medical anthropology and have practical relevance for orthodontics, maxillofacial surgery, aesthetic medicine, and child health monitoring. **Limitation :** Despite these insights, the individual variability and complexity of facial development limit the generalizability of the results across all populations. **Future Research :** Future studies should involve broader statistical samples to refine normative references and deepen understanding of developmental patterns in diverse child populations.

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