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Craniometric Indicators of the Mandible in Primary School Children: Age- and Sex-Specific Morphological Changes

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Abstract: This scientific article investigates the craniometric indicators of the mandible (lower jaw) region in primary school children, analyzing their age- and sex-related morphological changes. The study measured the length, height, angles, and other key morphometric parameters of the mandible in boys and girls of different age groups. The differences between these measurements were statistically evaluated. The findings contribute to identifying the morphological patterns of facial-skeletal development in children and inform the development of individualized approaches in orthodontic, pediatric, and surgical practices.

Keywords: Mandible, craniometry, morphological changes, primary school age, sexual dimorphism.

INTRODUCTION

The morphological formation of the facial bones, including the mandible (lower jaw), plays a crucial role in the growth and development of the child's organism. Especially during primary school age, changes in the facial skeleton are quite active, closely linked to the refinement of numerous functions such as nutrition, occlusion (bite), speech development, and respiration.The morphometric dimensions of the mandible change with age, while sex-related differences arise with the gradual manifestation of sexual dimorphism in the child's organism. Therefore, analyzing the changes occurring in this anatomical region in relation to age and sex factors is of pertinent importance.The available scientific literature contains limited data on mandibular changes in children. In particular, the determination of precise morphometric indicators in primary school children holds significant practical value in orthodontic planning, pediatric diagnostics, and maxillofacial surgery. The aim of this study is to investigate the primary craniometric parameters of the mandible in boys and girls of primary school age and to analyze their age- and sex-related changes.

METHODOLOGY

Study Objective: To analyze the age- and sex-specific morphological changes in the craniometric indicators of the mandible in primary school children.

Study Material and Methods: The study population consisted of 180 boys and girls aged 7-12 years (grades 1-6) attending School #41 under the Department of Preschool and School Education in Izboskan District, Andijan Region. The research methods employed were craniometry and variational statistics (according to A.M. Merkov and L.N. Polyakov).

The following craniometric measurements of the mandible were taken using calipers:

Mandibular Diameter (Bigonial Width): The distance between the gonion (go) points on the right and left sides. This measurement represents the straight-line distance between the most prominent points on the angles of the mandible.

Height of the Mandibular Body: The distance between the gnation (gn) and infradental (id) points. This indicator represents the distance from the base of the interdental papilla between the central mandibular incisors to the lower border of the mandibular body.

Length of the Mandibular Body: The distance between the gonion (go) and gnation (gn) points.

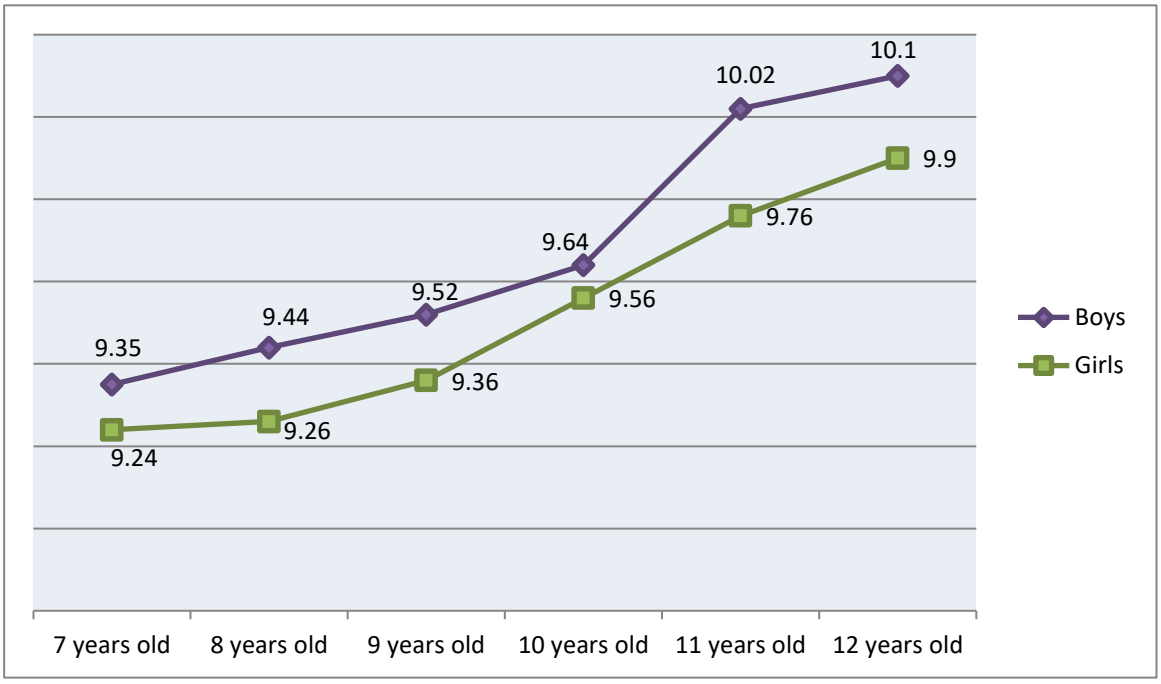
Length of the Mandibular Ramus: The distance between the tragion (tr) and gonion (gn) points.

RESULTS

The mandibular diameter indicator is almost equal in boys and girls at 7 years old (9.35 ± 0.04 cm, P<0.01, and 9.24 ± 0.12 cm, P<0.01, respectively). By age 10, this indicator increases by 3.3% in boys and 3.7% in girls. Over the period from 7 to 12 years old, this indicator increases by 7.9% in boys and 7.1% in girls.

Diagram No. 1

Growth Dynamics of Mandibular Diameter Indicators in Primary School Children (X±m, cm)



The height of the mandibular body measures 2.74 ± 0.06 cm (P<0.01) in 7-year-old boys and reaches 3.12 ± 0.16 cm (P<0.01) at age 10. Subsequently, growth slows slightly at ages 11-12, and we observe that the indicator equals 3.18 ± 0.08 cm (P<0.01) by the end of age 12. In girls, the indicator is 2.65 ± 0.04 cm (P<0.01) at age 7, 2.94 ± 0.08 cm (P<0.01) at age 10, and 3.10 ± 0.08 cm (P<0.01) at age 12.

Diagram No. 2

Growth Dynamics of the Height of the Mandibular Body Indicators in Primary School Children (X±m, cm)

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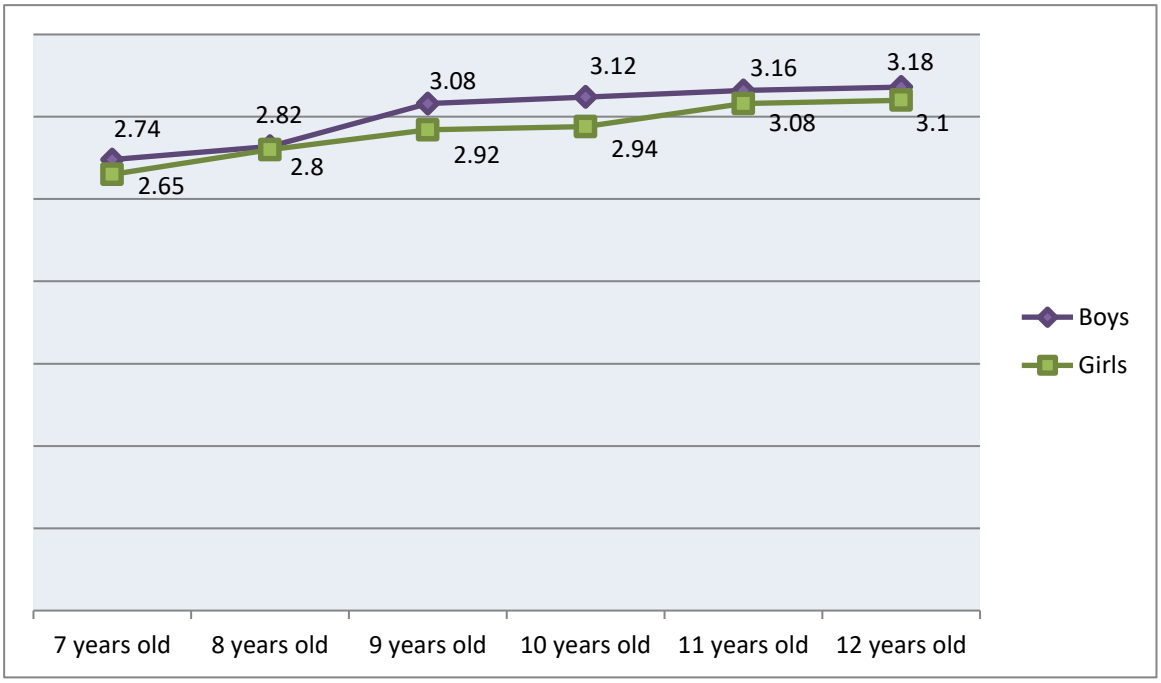

Between the ages of 7 and 12, the length of the mandibular body increases by a factor of 1.2 in boys (from 9.02±0.24 cm, P<0.01, to 11.30±0.16 cm, P<0.01), while in girls it increases by 21% (from 9.10±0.14 cm, P<0.01, to 11.10±0.24 cm, P<0.01).

The height of the mandibular ramus in 7-year-old boys is 4.56±0.26 cm, P<0.01, while at 10 and 12 years old it is 5.60±0.14 cm, P<0.01, and 6.22±0.14 cm, P<0.01, respectively. During this period (between the ages of 7 and 12), the indicator increases by 36%. In girls, it is 4.82±0.16 cm, P<0.01 at 7 years old; 5.46±0.14 cm, P<0.01 at 10 years old; and 6.14±0.26 cm, P<0.01 at 12 years old. In girls aged 7-12, the indicator increases by 27%.

Diagram No. 3:

The dynamics of the growth of the mandibular body length indicators in children of primary school age (X±m, cm).

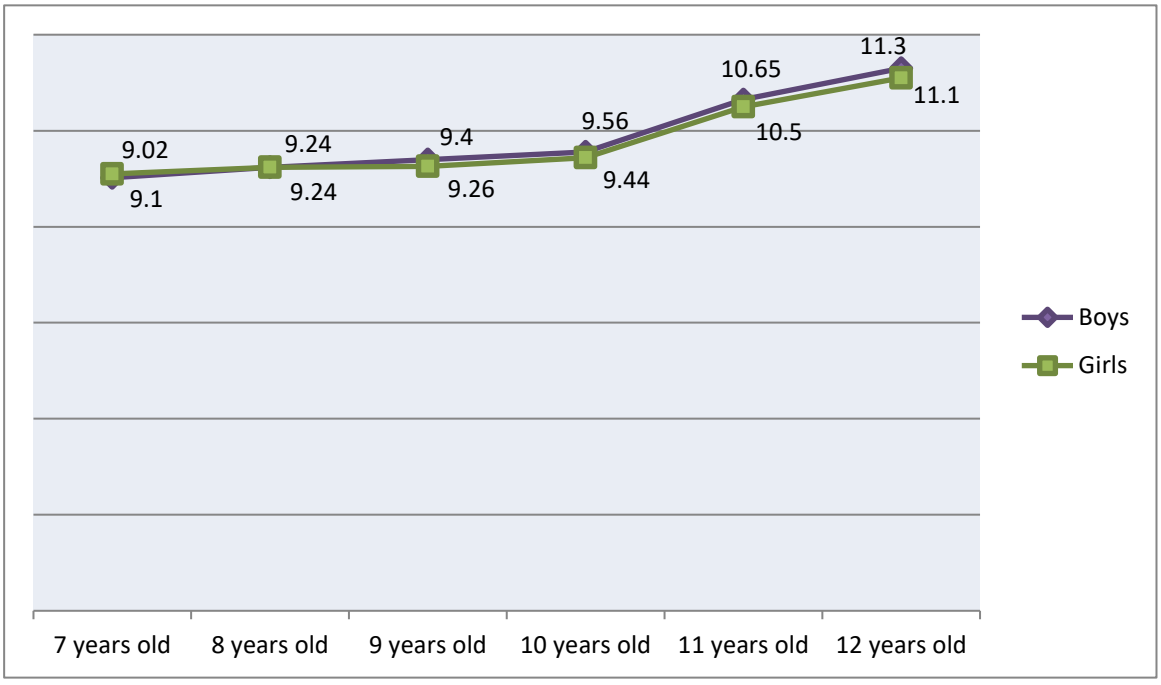

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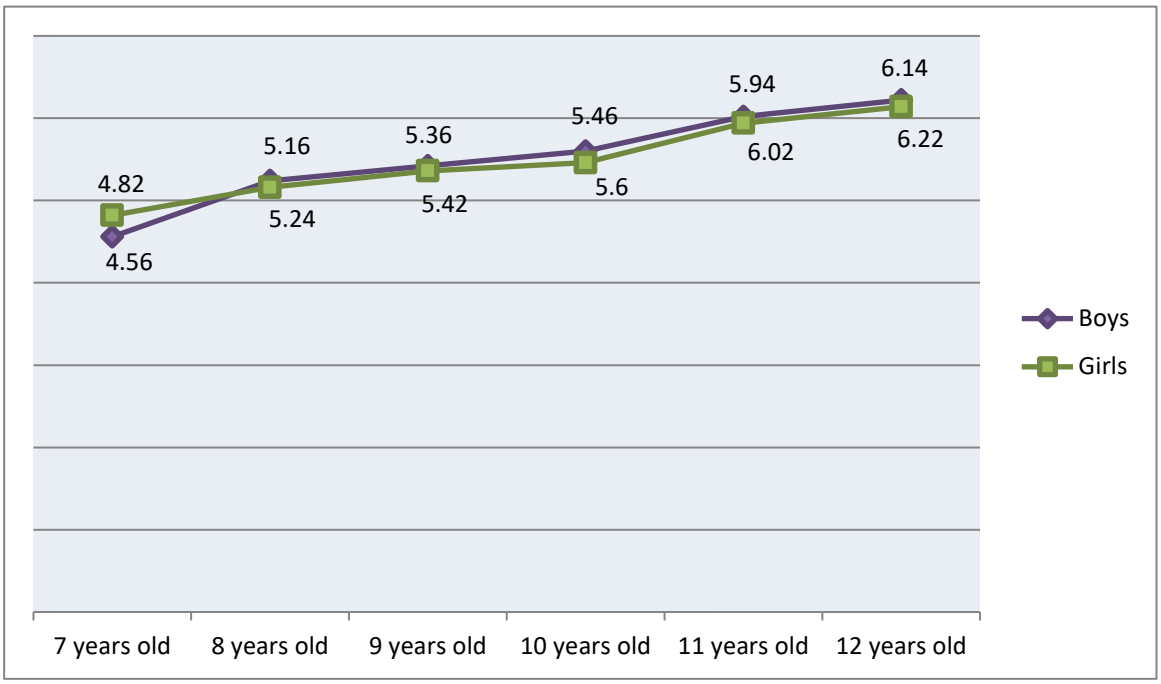
Diagram No. 4:

The dynamics of the growth of mandibular ramus height indicators in children of primary school age (X±m, cm).



CONCLUSION:

The height of the mandibular body grows differently in males and females between the ages of 7 and 12, and by age 12, the indicators are almost equal. The period of relatively intensive growth occurs between the ages of 7 and 10. The most rapid growth periods for the length of the mandibular body occur between the ages of 10 and 12 in both sexes.In the process of growth and development of the child's body, the morphological formation of the facial bones, including the mandible, plays an important role. In particular, changes in the facial skeleton are more active during primary school age, and this situation is closely related to the improvement of many functions such as nutrition, bite, speech formation, and breathing.

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