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Morphometric Features of the Cranial Region in Children with Hearing Loss

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Abstract: Based on the studies carried out, the most vulnerable critical periods were studied and evaluated, which is very important in conducting preventive measures, which reveal the structural and functional mechanisms of changes in anthropometric dimensions of the head in children with hearing loss. The need to compare the learning and sexual differences of morphological indicators of the cranial sphere in children with hearing impairment is based on morphological and morphometric justification and effectiveness. The results of research, analysis and evaluation of the effect of hearing loss on the formation of the craniofacial region in children are presented.

Keywords: hearing loss, morphological indicators, cranial sphere.

Hearing dysfunction – there is no dynamics of its improvement in this process, both independently and as a result of therapeutic effects-is defined as hearing impairment [2].

It is worth noting that the role of the hereditary factor as the main factor in congenital hearing impairment is somewhat exaggerated, but this factor undoubtedly has the right to exist, since there is evidence that children of deaf parents are born with more hearing impairment than parents with hearing impairment[3]. It is worth noting that the risk of having children with deafness is more common in couples where at least one father or mother is born deaf in the family, as well as in families where there is a difference in the age range between the two spouses. Also, in children with chromosomal disorders, this risk increases [4].

Materials and methods

This research work was carried out at boarding school No. 123 in Bukhara (№ 517 02.05. 2020) conducted on the basis of bilateral agreements of the Bukhara State Medical Institute[12]. Children were divided into 2 groups (n=60): I was a group of children with no hearing from infancy to 12 (n=58); and a group of healthy children from infancy to 12 (n=65) were examined. To conduct anthropometric measurements, a methodology for anthropometric study of children was used (morphometric features of assessing the physical development of children and adolescents – methodological recommendation / / N.X. Shamirzaev, S.A. Ten and I. Tokhtanazarova, 1998y). The anthropometric study included head size scales. To determine the anthropometric dimensions of the head in children with hearing loss, the same actions were performed[13].

To measure the circumference of the head, a measurement was carried out using a centimeter tape from the back of the head, that is, from the outer drum of the ensa bone, from the sides over the base of the sucker-like tumor of the cheekbone and from the top of the outer ear Supra[14].

Research results and discussion

Studies have shown that hearing-impaired infant boys have an average head circumference of 36.8±0.53 cm, the longitudinal size of the base of the skull is four – 12.0±0.27 cm, and the transverse size of the head is on average 9.2±0.28 cm. The transverse size of the forehead averaged - 7.4±0.29 cm, the vertical diameter of the head averaged – 6.9±0.34 cm, the width of the base of the head and the longitudinal dimensions averaged – 7.5±0.24 cm and 9.3±0.28 cm.

Males with one-year-old hearing loss have an average head circumference of 45.2±0.16 cm, the longitudinal size of the base of the skull is four - 12.8 ± 0.08 cm, and the transverse size of the head is

on average 9.3 ± 0.30 cm. The transverse size of the forehead is on average - 8.4±0.52 cm, the vertical diameter of the head is on average – 8.1±0.37 cm, the width of the base of the head is on average – 9.2±0.48 cm, and the longitudinal size is on average – 10.0±0.59 cm.

2 – year-old hearing-impaired boys have an average head circumference of 47.1±0.15 cm. The longitudinal size of the base of the skull was between – 13.3± 0.26 cm and the transverse size of the head averaged - 10.8 ± 0.23 cm. At this age, the transverse size of the forehead is on average – 9.8±0.28 cm, the vertical diameter of the head is on average – 9.4±0.20 cm, the width of the base of the head is on average – 10.6±0.31 cm, and the longitudinal size of the base of the head is on average – 11.8±0.22 cm.

the results obtained showed that 3 - year – old hearing – less boys had an average head circumference of 48.3±0.23 cm, the longitudinal size of the base of the head averaged 14.5±0.14 cm, and the transverse size of the head averaged 11.1±0.27 cm. The transverse size of the forehead is on average – 10.6±0.15 cm, the vertical diameter of the head is on average – 10.4±0.32 cm, the width of the base of the head is on average – 11.8±0.52 cm, and the longitudinal size of the base of the head is on average – 12.7±0.30 cm.

At age 4, the head sizes of hearing-less boys were barely different from the head sizes of 3-year-old boys-but, significant differences were found from the sizes of 1-and 2-year-old boys ($P>0.05$). 4-year-old boys have an average head circumference of 48.8±0.41 cm, the longitudinal size of the head base averages 14.7±0.24 cm, and the transverse size of the head averages 11.2 ± 0.29 cm, the transverse size of the forehead averages 10.7±0.26 cm, the vertical diameter of the head averages 10.5±0.38 cm, the width of the head base averages 12.4±0.48 cm, and the longitudinal size of the head base averages 12.9±0.26 cm.

At the age of 5 years, the size of the head circumference of hearing – less boys was found to be on average – 49.9±0.30 cm, the longitudinal size of the base of the skull – 14.8±0.44 cm, at that age the transverse size of the head of a child was found to be on average-11.4±0.36 cm. The transverse size of the forehead averaged – 10.8±0.20 cm, the vertical diameter of the head averaged – 10.8±0.18 cm, the width of the base of the head averaged – 12.8±0.56 cm, and the longitudinal size of the base of the head averaged – 13.2±0.31 cm.

One-to-one significant difference in head sizes was found ($P<0.05$) in 6-year-old hearing-impaired boys compared to 3-4-year-old boys, but almost no differences were found when compared to the head sizes of 5-year-old hearing-impaired boys. In deaf and weak hearing children aged 6 years, the head circumference is on average - 51.3 ± 0.46 cm, the longitudinal size of the head base is on average - 15.0±0.37 cm, the transverse size of the head is on average-11.5±0.36 cm, the transverse size of the forehead is on average – 11.0±0.25 cm, the vertical diameter of the head is on average – 11.3±0.34 cm, 0.43 cm.

The head size data from hearing-impaired boys taken at the age of 7 showed almost no differences compared to data from 6-year-old boys ($P\geq0.05$).In 7 – year - old deaf children, the size of the head circumference was found to be on average-51.7±0.45 cm, the longitudinal size of the base of the head on average -15.2±0.22 cm, and the transverse size of the head on average-11.9±0.29 cm. in children of this age, the transverse size of the forehead is on average – 11.3±0.28 cm, the vertical diameter of the head is on average – 11.7±0.29 cm, the width of the base of the head is 13.5±0.46 cm, and the longitudinal size of the base of the head is on average – 13.8±0.22 cm[21].

All morphometric indicators of the head studied in 8-year-old hearing-impaired boys differed significantly from those of 3-6-year-old boys ($P<0.05$), but results similar to morphometric indicators of the head of 7-year-old boys were obtained. At this age, the boys have an average head circumference of 52.7±0.45 cm, the head has an average longitudinal size of 15.4±0.33 cm, and the head has an average transverse size of 12.8±0.34 cm. The transverse size of the forehead is on average – 11.4±0.27 cm, the vertical diameter of the head is on average – 11.9±0.22 cm, the width of the base

of the head is 13.8±0.46 cm, and the longitudinal size of the base of the head is on average – 13.9±0.24 cm[22].

In 9-year-old hearing-impaired boys, the size of the head circumference varied from an average of 53.2±0.42 cm. The longitudinal size of the head was on average – 16.1±0.33 cm, and in turn the transverse size of the head was on average – 12.9±0.36 cm. At this age, the transverse size of the forehead averaged – 11.5±0.27 cm, the vertical diameter of the head averaged – 12.6±0.27 cm, the width of the base of the head reached 14.0±0.39 cm, and the longitudinal size of the base of the head averaged – 14.2±0.22 cm[23].

With the growing age of the child, a gradual increase in the size of the head with regard to age was also observed in 10-year-old boys without hearing. Morphometric indicators of the head of boys of this age were practically no different from those obtained from the indicators of boys of 8 and 9 years ($P>0.05$), but significant changes were noted compared to boys of 3-7 years ($P<0.05$). Boys in their 10s have an average head circumference of 53.4±0.48 cm, head longitudinal mean of -16.4±0.26 cm, head transverse length mean of - 13.5±0.29 cm, forehead transverse size mean of - 11.6±0.32 cm, head vertical diameter mean of – 12.9±0.36 cm, head base width of 14.2±0.49 cm and head longitudinal mean of – 14.6±0.19 cm.

At the age of 11, hearing – impaired boys had an average head circumference of 54.1±0.53 cm, a longitudinal head size average of 17.0±0.28 cm, and at that age, the transverse head size of the boys had an average length of 13.9 ± 0.34 cm. At this age, the transverse size of the forehead of children is on average – 11.8±0.27 cm, the vertical diameter of the head is on average – 13.4±0.20 cm, the width of the base of the head is 14.5±0.54 cm, and the longitudinal size of the base of the head is on average – 14.9±0.25 cm.

The trend of increasing the morphometric indicators of the head with age has also continued in 12-year-old boys with no hearing. Results from head sizes of hearing-less boys of the same age were similar to those of boys aged 9-11 ($P>0.05$). The data obtained showed that 12 – year-old hearing-impaired boys had an average head circumference of 54.8±0.37 cm, a longitudinal head size of 17.2±0.32 cm on average, and a transverse head size of 14.3±0.27 cm on average. The transverse size of the forehead was found to be moderate – 11.9±0.18 cm, the vertical diameter of the head was moderate – 13.7±0.35 cm, the breadth of the skull base was 14.7±0.53 cm, and the longitudinal size of the skull base was found to be moderate – 15.3±0.21 cm.

Thus, morphometric indicators of the head in hearing-less boys under the age of 12 years from a newborn were found to be the same growth rate as in the second period of childhood compared to infancy: the head circumference 1.5 times (22.8%), the longitudinal size of the head base 1.4 times (11.3%), the transverse size of the head, the transverse was found to have grown.

Morphometric indicators of head sizes in hearing-impaired girls.

Studies have shown that newborn hearing-less girls have an average head circumference of 34.9±0.60 cm, with longitudinal and transverse head sizes averaging 11.0±0.47 cm and 8.2±0.68 cm. In infant girls, the transverse size of the forehead averaged 6.4±0.85 cm, the vertical diameter of the head averaged 8.3±0.39 cm, while the width of the base of the head averaged 9.7±0.62 cm, while the longitudinal size of the base of the head averaged 8.6±0.58 cm.

In 1 year old hearing-impaired girls under examination, the head circumference is on average - 46.2±0.23 cm, the longitudinal size of the base of the head is on average-12.1 ± 0.33 cm, and the transverse size of the head is on average 9.0 ± 0.30 cm. It was found that the transverse size of the forehead averaged – 7.2±0.48 cm, the vertical diameter of the head averaged – 9.6±0.28 cm, the width of the base of the head averaged – 10.2±0.48 cm, and the longitudinal size of the head averaged – 9.4±0.41 cm.

The head circumference of two-year-old hearing-less girls averaged 47.9±0.15 cm, the longitudinal size of the skull base averaged 13.3± 0.32 cm, and the transverse size of the head averaged 10.1 ± 0.30

cm. At this age, the transverse size of the forehead is on average – 8.7±0.22 cm, the vertical diameter of the head is on average – 10.8±0.19 cm, the width of the base of the head is on average – 11.1±0.36 cm, and the longitudinal size of the base of the head is on average – 11.3±0.27 cm.

Reliable differences ($p \leq 0.05$) were found in morphometric head indicators in 3-year-old hearing-impaired girls compared to infant girls. in 3-year-old non-hearing children, the head circumference is on average – 45.8±0.52 cm, the longitudinal size of the base of the head is on average – 14.0±0.31 cm, and the transverse size of the head is on average 10.9±0.25 cm. The transverse size of the forehead was found to be on average – 10.7±0.23 cm, the vertical diameter of the head on average – 11.7±0.26 cm, the width of the base of the head and the longitudinal dimensions on average – 11.9±0.64 cm and 12.2±0.32.

Morphometric head sizes in 4-year-old hearing-less girls were found to have significant reliable differences ($p \leq 0.05$) compared to head sizes in infant girls, and imperceptible differences ($P \geq 0.05$) compared to 2-and 3-year-old hearing-less girls. In deaf children with 4 – year – old hearing loss, the head circumference averaged-47.5±0.52 cm, and the longitudinal and transverse dimensions of the head averaged-14.8±0.36 cm and 11.2±0.24 cm. The transverse size of the forehead was found to be on average – 10.8±0.24 cm in this year – old hearing – less girls, the vertical diameter of the head was on average – 11.9±0.26 cm, the width of the head base was on average-12.3±0.51 cm, while the longitudinal size of the head base was on average-12.5±0.37 cm.

With the age of the child, changes in head sizes were also detected. Healthy female children with 5-year-old hearing loss were found to have imperceptible differences ($p \leq 0.05$) in head sizes compared to those of female children with 4-year-old hearing loss. At this age, hearing – less girls have an average head circumference size of 48.8±0.50 cm, head longitudinal size average of 15.0±0.27 cm, and head transverse size average of 11.3±0.33 cm, forehead transverse size average of 10.9±0.26 cm, head vertical diameter average of 12.4±0.33 cm, head base width and longitudinal length average of 12.7±0.56 cm.

Female hearing - less 6 – year – old have an average head circumference of 49.3±0.57 cm, an average longitudinal size of the base of the skull is 15.1±0.44 cm, and an average transverse size of the head is 11.6±0.32 cm. At this age, the transverse size of the forehead averaged – 11.0±0.24 cm, the vertical diameter of the head averaged – 12.5±0.35 cm, the width of the base of the head and the longitudinal dimensions averaged – 13.4±0.44 cm.

With the growing age of seven – year – old children with hearing loss, in dynamics, it was found that their head sizes also increase with age: the size of the head circumference averaged-51.4±0.51 cm, the longitudinal size of the base of the head averaged -15.2±0.44 cm, and the transverse size of the head averaged-11.7±0.27 cm. The transverse size of the forehead is on average – 11.2±0.20 cm, the vertical diameter of the head is on average – 12.9±0.30 cm, the width of the base of the head and the longitudinal dimensions are on average – 13.4±0.42 cm and 13.5±0.32 cm.

Morphometric indicators of head sizes in 8-year-old hearing-less girls were found to be reliable differences ($P \geq 0.05$) compared to morphometric indicators of healthy 4-and 5-year-old girls, and imperceptible differences ($P \leq 0.05$) compared to 6-and 7-year-old girls. Female hearing-impaired 8 – year – old were found to have an average head circumference of 52.1±0.48 cm, an average longitudinal size of the skull base of 15.6±0.44 cm, and an average transverse size of the head of 12.4±0.29 cm. In children without hearing at this age, the transverse size of the forehead averaged – 11.3±0.29 cm, the vertical diameter of the head averaged – 13.2±0.24 cm, the width of the base of the head averaged – 13.6±0.36 cm, while the longitudinal size of the base of the head averaged – 13.8±0.29 cm.

Head sizes of 9-year-old hearing-less girls were obtained similar to those of 8-year-old healthy girls. 9 – year - old hearing-impaired girls have an average head circumference of 52.9±0.45 cm, while the longitudinal and transverse head size averages 16.0±0.34 cm and 12.9±0.40 cm. The transverse size of the forehead was found to be on average – 11.4±0.25 cm, the vertical diameter of the head on average

– 13.7±0.28 cm, the width of the base of the head on average – 13.7±0.37 cm, and the longitudinal length of the base of the head on average-14.1±0.23 cm.

In 10 – year – old hearing impaired girls, the head circumference was found to be on average-53.0±0.50 cm, the longitudinal size of the head on average -16.6±0.38 cm, and the transverse size of the head on average-13.6±0.34 cm. In this age of hearing – impaired girls, the transverse size of the forehead averaged – 11.6±0.27 cm, the vertical diameter of the head averaged – 14.2±0.26 cm, while the width of the base of the head averaged – 13.9±0.39 cm, while the longitudinal size of the base of the head averaged-14.5±0.30 cm.

Based on the results obtained, eleven – year – old hearing-impaired girls had an average head circumference of 53.7±0.49 cm, while the longitudinal and transverse size of the head averaged 16.7±0.29 cm and 13.7±0.31 cm. The transverse size of the forehead was found to average – 11.7±0.21 cm, the vertical diameter of the head averaged – 14.6±0.23 cm, the width of the base of the head and the longitudinal length averaged – 14.1±0.38 cm and 14.9±0.26 cm.

12 - year - old hearing-less girls have an average head circumference of 54.4±0.51 cm, while the longitudinal size of the head averages 17.6±0.38 cm and the transverse size of the head averages 14.0±0.34 cm. In these elderly hearing impaired, the transverse size of the forehead averaged – 11.8±0.33 cm, the vertical diameter of the head averaged – 15.1±0.28 cm, the width of the skull base was 14.3±0.43 cm, and the longitudinal size of the skull base averaged – 15.2±0.25 cm.

Conclusion

As you can see, some morphometric indicators of the head with an increase in the age of the child practically grow in different age periods of childhood, but the intensity of the growth rate of some indicators is not the same in the younger periods of childhood. Thus, morphometric indicators of the head in hearing - less girls under the age of 12 years from a newborn were found to be the same growth rate as in the second period of childhood compared to infancy: head circumference and head longitudinal size 1.5 times (32.4% - 11.5%), head transverse size 1.6 times (22.2%), forehead transverse size 1.8 times (25.3%), head vertical diameter and head longitudinal size 1.7 times (15.7% - 20.2%) and the transverse size of the head was found to have increased 1.4 times (14.4%).

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