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ONTOGENIC TRANSFORMATIONS OF MORPHOMETRIC PARAMETERS OF THE SUPRA-, INFRAORBITAL AND MENTAL FORAMINA IN THE PERINATAL PERIOD OF ONTOGENESIS

Abstract. *57 specimens of 4-10-month human fetuses and 7 newborns were examined by means of up-to-date anatomical methods with the aim to identify location of the supra-, infraorbital and mental foramina on the facial part of the skull during the perinatal period of ontogenesis. Nonsynchronous enlargement of the distance from the supraorbital foramen to bregma in the right and left, distance between supra- and infraorbital and mental foramina was found to be specific for the examined morphometric parameters of the location of the supra-, infraorbital and mental foramina in fetuses and newborns, except parameters of the distance between the mental foramen and inferior margin of the jaw in the right and left which are characterized by their gradual enlargement. Parameters of the distance from the supraorbital foramen to bregma in the right and left in the fetuses and newborns are characterized by the two periods of an accelerated and two periods of slow development: 6-7-month and 10 month of the neonatal period – the periods of an accelerated development, 4-6-month and 7-10 month – the periods of slow development. Distance between the supra- and infraorbital foramina in the left and right has two period of an accelerated development – since 4th till 7th months of development and since the 8th month till the neonatal period; and since the 7th till the 8th month of development – a slow period. Distance between the infraorbital and mental foramina in the right and left has two periods of an accelerated development – the 6-7 month and 8-9 month, and slow development – the 7-8 months. Distance between the supra-, infraorbital and mental foramina is characterized by similar periods of the first accelerated and slow development including 5-7th and 7-8th month respectively, and the second period of an accelerated development differs: distance between the supraorbital foramina since the 9th month till the neonatal period, for distance between the infraorbital foramina since the 9th till the 10th month of development, for distance between the mental foramina – 8-9th months of development – the second period of an accelerated development. The periods of 7-8 months, 10 month and the neonatal period are critical periods of development for all the parameters examined.*

Key words: *supra-, infraorbital, mental foramina, morphometry, fetus, newborn/neonate.*

The study of human anatomical variability, morphometric characteristics, interrelation of organs, anatomical structures and their parts at all the stages of human development is rather relevant nowadays. Investigation of the bony formations of the skull including foramina, fissures and canals is of great interest [3, 7, 10]. Prognostication of the state of structures located in them, possible causes and consequences of their compression are of great importance as well. Doctors who are specialized in the facial part of the head concentrate their attention on the knowledge of sizes, shape and topography of the supraorbital, infraorbital and mental foramina, since they are the places where trigeminal nerve branches emerge from. To determine the projection of the bony foramina onto the skin will promote the diagnostics of lesions of the trigeminal nerve branches (pain during palpation in these points) and their treatment (anesthesia or nerve block in case of neuritis) [8, 11]. For many years the vertical facial line connecting these foramina (supraorbital, infraorbital and mental) is called in medicine as Hyrtl's fissure. Meanwhile, there are some discussions and information found in the literature that these foramina are not located along one line [9]. In addition, the information concerning the distance between the foramina from the contralateral sides differs. Such kind of information can be of a certain interest to

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determine facial asymmetry and to estimate the data of up-to-date methods of radiologic diagnostics [2, 4, 5]. At the same time, today the information concerning anatomical details valuable for applied direction in craniology has become more and more [1, 6].

Objective: to determine morphometric peculiarities of location of the supraorbital, infraorbital and mental foramina in fetuses and neonates.

Materials and methods. The study was conducted on 57 specimens of 4-10-month human fetuses and 7 newborns (including 5 isolated complexes of organs) of both sexes without external signs of anatomical deviations or defects, without visible macroscopic anomalies different from the normal cranial structure by means of adequate anatomical methods: macropreparation, making topographic-anatomical sections, computed tomography, craniometry. Craniometric examination was made in the horizontal auricular-orbital plane, so-called "Frankfurt horizontal line", and every object was fixed in the craniostat before. The following parameters were examined in the study: distance from the supraorbital foramen to bregma in the right and left, distances between the supra- and infraorbital foramina, distances between the infraorbital and mental foramina, distances between the mental foramina to the edge of the mandible in the longitudinal direction; distances between the supra-, infraorbital and mental foramina in the transverse direction.

The data obtained were statistically processed by means of the licensed program RStudio. Null hypothesis was checked concerning the samples taken from one distribution or distributions with similar median values:

H_0: {every group possesses similar distribution}

H_1: { every group does not possess similar distribution}

Student's test, nonparametric Kruskal-Wallis test (it answers the question whether there is difference between group distribution, but does not indicate what groups are different), Conover-Iman test to compare stochastic dominance and obtain results between different paired comparisons after Kruskal-Wallis test for stochastic dominance among k groups. The values were considered to be statistically considerable with $p<0,05$.

The character of distributions for every variation series obtained, mean values for every parameter investigated, standard quadratic variation, and percentile scale of the parameters were characterized. The study was conducted keeping to the World Medical Association (WMA) Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects (1964-2000) and the order of the Ministry of Health of Ukraine № 690 dated on 23.09.2009. The study is a fragment of a complex planned initiative scientific-research work of M.H. Turkevych Department of Human Anatomy, the Department of Anatomy, Clinical Anatomy and Operative Surgery of Bukovinian State Medical University, the Ministry of Health of Ukraine: «Regularities of the Sexual-Age Structure and Toographic-Anatomical Transformations of Organs and Structures of the Body at the Prenatal and Postnatal Stages of Ontogenesis. Peculiarities of Perinatal Anatomy and Embryotopography», state registration number 0120U101571.

Results. Analysis of the morphometric parameters of distance from the supraorbital foramen to bregma in the right in fetuses and neonates by means of a box diagram (Fig.1) enabled to state that the difference between the median values of samples (the horizontal line in the box) is statistically significant. Kruskal-Wallis test gave the following results: since $p<0,05$, the difference between the median values of the groups is statistically significant. Conover-Iman test compared morphometric parameters of distance from the supraorbital foramen to bregma in the right in the age groups and found that median difference is statistically significant for all the possible pairs, except the following ones: «5 month – 6 month», «7 month – 8 month», «8 month – 9 month» and «9 month – 10 month».

Information about the group average distances from the supraorbital foramen to bregma in the right by the age groups is presented in Table 1. The results presented in Table 1 are indicative of a considerable (statistically significant) difference of mean values for all the groups except the pairs «5 month – 6 month», «7 month – 8 month», «8 month – 9 month» i «9 month – 10 month». These pairs are similar to those made by Conover-Iman test for median values.

Table 1

Statistical indices of distance from the supraorbital foramen to bregma in the right in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	20,04	0,43	(22,23; 21,10)
5 month	24,07	0,83	(22,23; 25,91)
6 month	24,98	0,83	(23,15; 26,81)
7 month	34,78	0,92	(32,72; 36,84)
8 month	37,67	1,07	(34,91; 40,43)
9 month	39,54	0,86	(37,15; 41,93)
10 month	40,70	0,49	(39,34; 42,06)
Neonates	52,81	1,28	(49,69; 55,93)

The results presented in Table 1 are indicative of a considerable (statistically significant) difference of mean values for all the groups except the pairs «5 month – 6 month», «7 month – 8 month», «8 month – 9 month» i «9 month – 10 month». These pairs are similar to those made by Conover-Iman test for median values.

The diagram of mean values of distance from the supraorbital foramen to bregma in the right in fetuses and neonates (Fig. 2) is indicative of the intensity of transformations of these parameters.

A box diagram (Fig.3) can be made after determination of distance from the supraorbital foramen to bregma in the left in fetuses and neonates. The results of the diagram can show the difference between the median values of samples (a horizontal line in the box) which is statistically significant. Kruskal-Wallis test gave the following results: since p<0,05, the difference between the median values of the groups is statistically significant. Conover-Iman test compared morphometric parameters of distance from the supraorbital foramen to bregma in the left in the age groups and found that median difference is statistically significant for all the possible pairs, except the following ones: «5 month – 6 month», «8 month – 9 month» and «9 month – 10 month».

Information about the group average distances from the supraorbital foramen to bregma in the left by the age groups is presented in Table 2.

Table 2

Statistical indices of distance from the supraorbital foramen to bregma in the left in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	19,73	0,34	(18,90; 20,56)
5 month	24,17	0,78	(22,43; 25,91)
6 month	24,62	0,79	(22,89; 26,35)
7 month	34,47	0,82	(32,64; 36,30)
8 month	37,87	0,93	(35,49; 40,25)
9 month	40,16	0,86	(37,78; 42,54)
10 month	43,00	1,73	(38,20; 47,80)
Neonates	14,17	0,15	(54,54; 59,68)

Table 2 demonstrates a considerable (statistically significant) difference of the mean values for all the groups except the pairs «5 month – 6 month», «7 month – 8 month», «8 month – 9 month» and «9 month – 10 month». Here there is a little different result than that one according to Conover-Iman test for median values. It is explained by the fact that data are not normally distributed in the groups, therefore, in this particular case the median should be considered as a measurement of the central tendency.

The diagram of mean values of distance from the supraorbital foramen to bregma in the left in fetuses and neonates (Fig. 4) is indicative of the intensity of transformations of these parameters.

Analysis of the morphometric parameters of distance between the supra- and infraorbital foramina in the right (Fig. 5) and in the left (Fig. 6), in fetuses and neonates by means of making the box diagram enables to state that the difference between the median values of samples (a horizontal line in the box) is statistically significant. Kruskal-Wallis test gave the following results: since p<0,05, the difference between the median values of the groups is statistically significant. Conover-Iman test compared morphometric parameters of distance between the supra- and infraorbital foramina in the right and left in the age groups and found that median difference is statistically significant for all the possible pairs, except the following ones: «7 міс – 8 міс» and «10 міс – neonates».

Information about the group average distances between the supra- and infraorbital foramina in the right by the age groups is presented in Table 3, and in the left – in Table 4.

Tables 3 and 4 demonstrate a considerable (statistically significant) difference of the mean

Table 3

Statistical indices of distance between the supra- and infraorbital foramina in the right in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	10,16	0,13	(9,85; 10,47)
5 month	11,75	0,19	(11,32; 12,18)
6 month	13,41	0,33	(12,68; 14,14)
7 month	15,64	0,37	(14,81; 16,47)
8 month	16,48	0,47	(15,28; 17,68)
9 month	20,00	0,56	(18,45; 21,55)
10 month	22,82	0,18	(22,32; 23,32)
Neonates	24,41	0,70	(22,71; 26,11)

Table 4

Statistical indices of distance between the supra- and infraorbital foramina in the left in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	10,24	0,18	(9,80; 10,68)
5 month	11,47	0,19	(11,05; 11,89)
6 month	13,22	0,28	(12,60; 13,84)
7 month	15,58	0,34	(14,83; 16,33)
8 month	16,20	0,50	(14,91; 17,49)
9 month	19,80	0,53	(18,32; 21,28)
10 month	22,50	0,17	(22,02; 22,98)
Neonates	24,21	0,71	(22,46; 25,96)

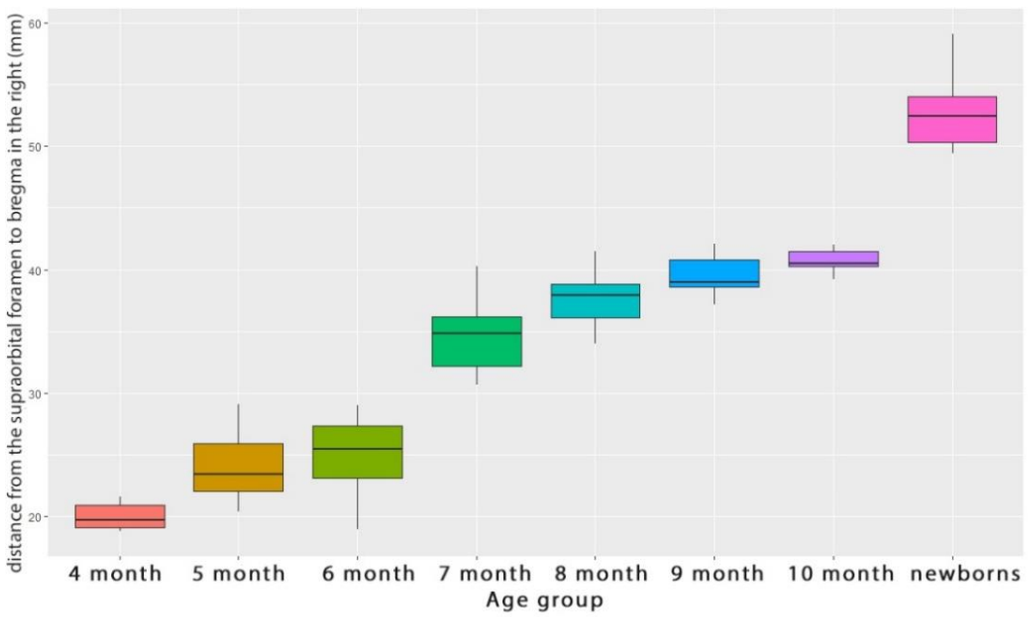

Fig. 1. Box diagram of the distance from the supraorbital foramen to bregma in the right by the age groups

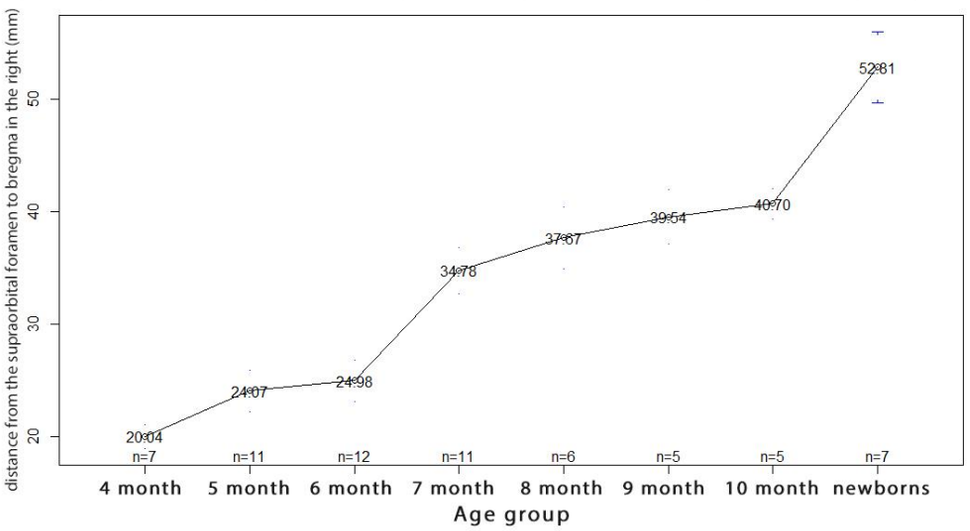

Fig. 2. Diagram of mean values of the distance from the supraorbital foramen to bregma in the right by the age groups

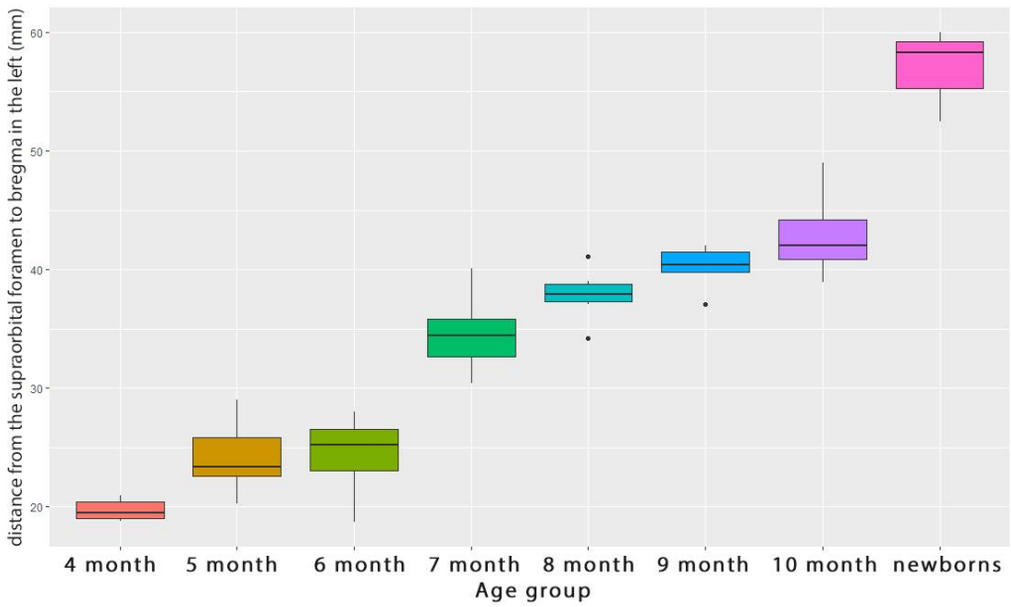

Fig. 3. Box diagram of the distance from the supraorbital foramen to bregma in the left by the age groups

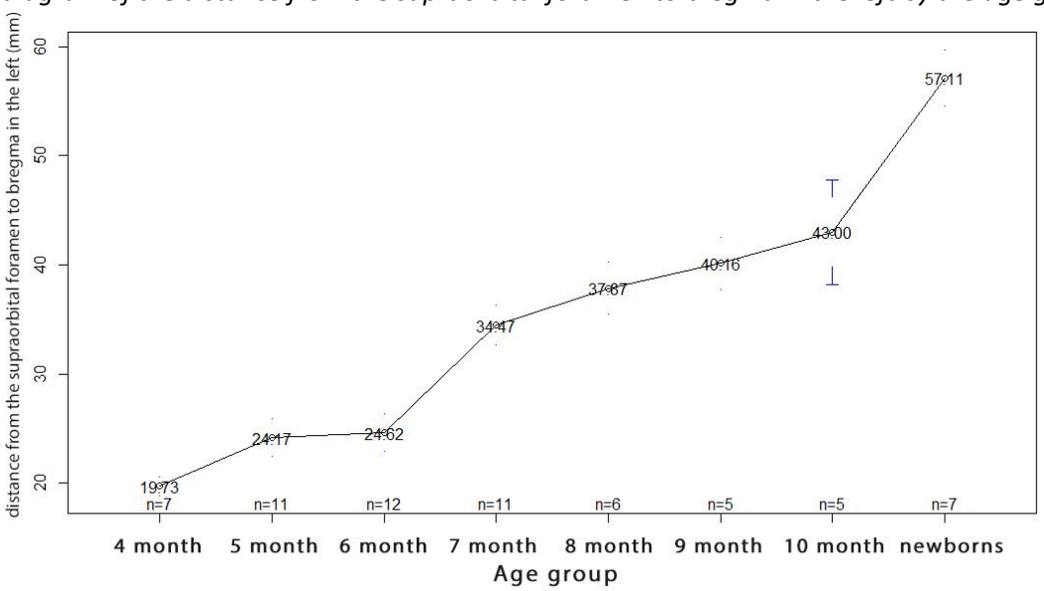

Fig. 4. Diagram of mean values of the distance from the supraorbital foramen to bregma in the left by the age groups

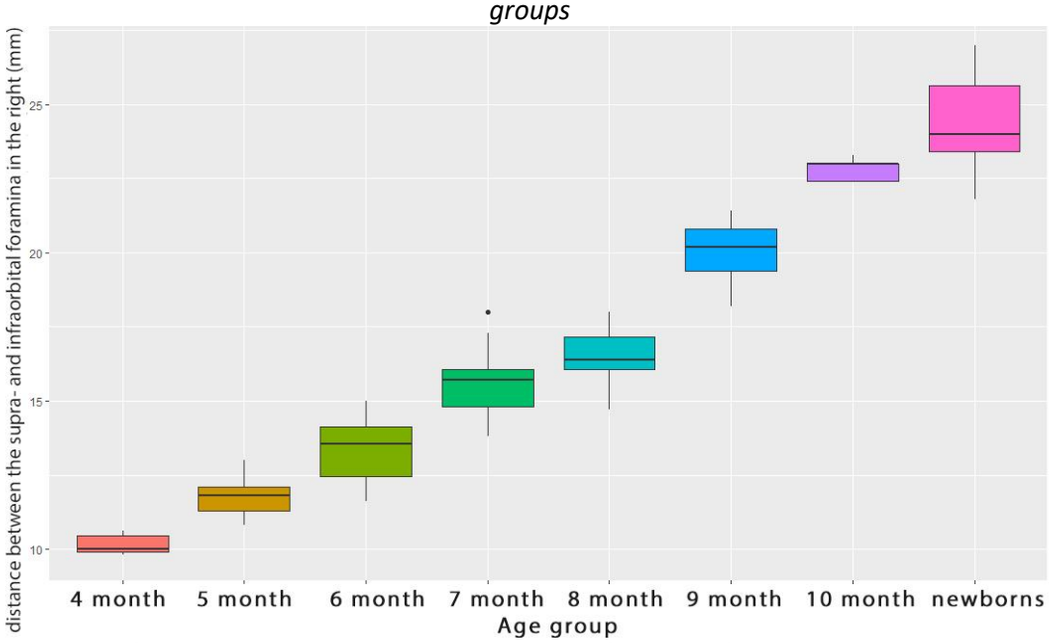

Fig. 5. Box diagram of the distance between the supra- and infraorbital foramina in the right by the age groups

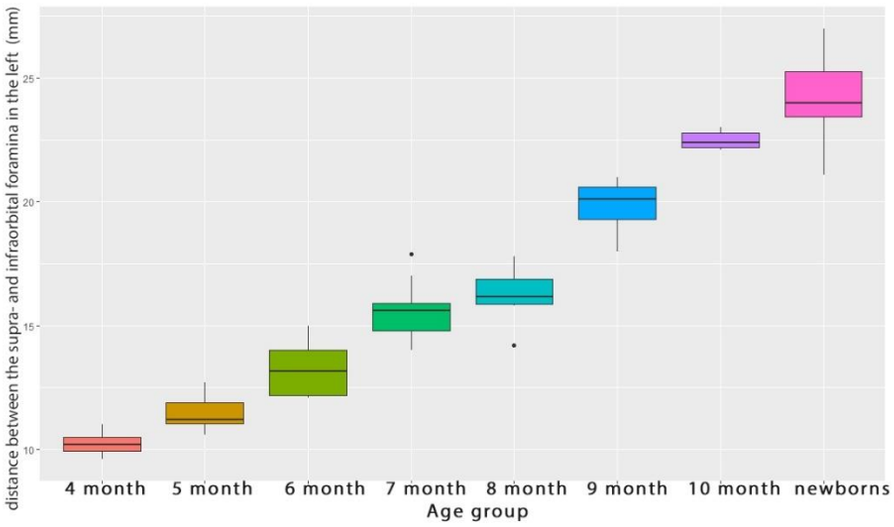

Fig. 6. Box diagram of the distance between the supra- and infraorbital foramina in the left by the age groups

values for all the groups except the pairs: «7 month – 8 month» and «10 month – neonates». These pairs are similar to those made by Conover-Iman test for median values.

The diagram of mean values of the distance between the supra- and infraorbital foramina in the right (Fig. 7) and left (Fig. 8) in fetuses and neonates is indicative of the intensity of transformations of these parameters.

Comparison of the morphometric parameters of the distance between the infraorbital and mental foramina in the right (Fig. 8) and left (Fig. 9) in fetuses and neonates by means of construction of the box diagram enables to state that the difference between the median values of samples (a horizontal line in the box) is statistically significant. Kruskal-Wallis test gave the following results: since $p<0,05$, the difference between the median values of the groups is statistically significant. Conover-Iman test compared morphometric parameters of distance between the infraorbital and mental foramina in the right and left in the age groups and found that median difference is statistically significant for all the possible pairs, except the following ones: «4 month – 5 month», «5 month – 6 month», «7 month – 8 month», «9 month – 10 month», «9 month – neonates» and «10 month – neonates».

Information about the group average distances between the infraorbital and mental foramina in the right by the age groups is presented in Table 5, and in the left – in Table 6.

Tables 5 and 6 demonstrate a considerable (statistically significant) difference of the mean values for all the groups except the pairs: «4 month – 5 month», «5 month – 6 month», «7 month – 8 month», «9 month – 10 month» and «10 month – neonates». The results are practically similar to those made by Conover-Iman test for

Table 5

Statistical indices of distance between the infraorbital and mental foramina in the right in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	9,40	0,12	(9,11; 9,69)
5 month	9,71	0,28	(9,09; 10,33)
6 month	10,56	0,56	(9,33; 11,79)
7 month	12,97	0,39	(12,11; 13,83)
8 month	12,36	0,80	(10,14; 14,58)
9 month	17,78	0,22	(17,21; 18,35)
10 month	18,86	0,18	(18,35; 19,37)
Neonates	19,28	0,18	(18,82; 19,74)

Table 6

Statistical indices of distance between the infraorbital and mental foramina in the left in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	9,39	0,09	(9,17; 9,61)
5 month	9,55	0,25	(9,00; 10,10)
6 month	10,43	0,58	(9,15;11,71)
7 month	12,95	0,40	(12,06; 13,84)
8 month	12,56	0,73	(10,53; 14,59)
9 month	17,60	0,13	(17,24; 17,96)
10 month	18,96	0,10	(18,69; 19,23)
Neonates	19,00	0,15	(18,62; 19,38)

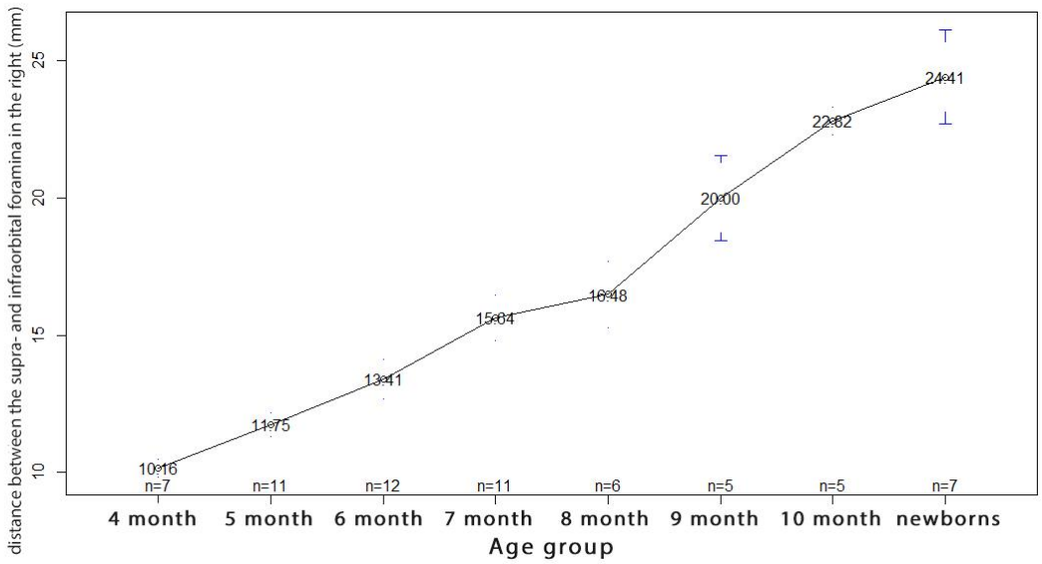

Fig. 7. Diagram of mean values of the distance between the supra- and infraorbital foramina in the right by the age groups

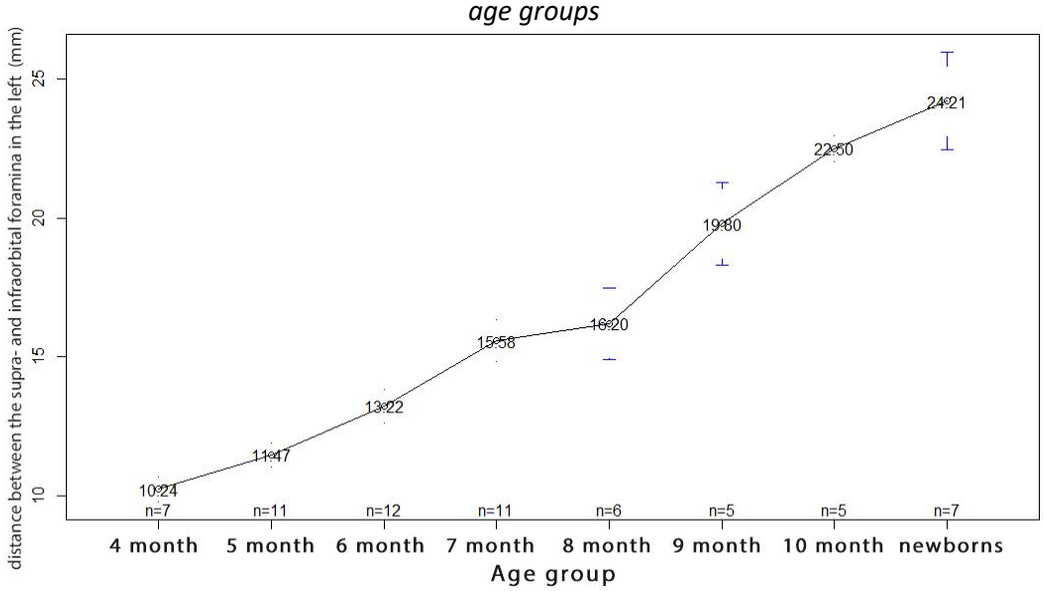

Fig. 8. Diagram of mean values of the distance between the supra- and infraorbital foramina in the left by the age groups

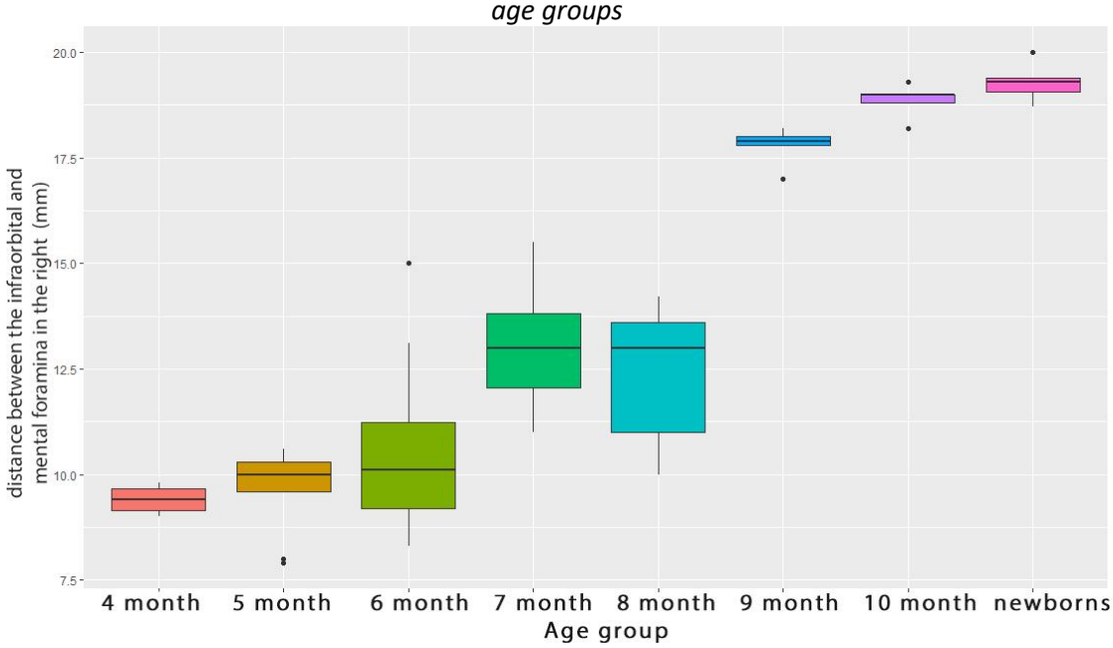

Fig. 8. Box diagram of the distance between the infraorbital and mental foramina in the right by the age groups

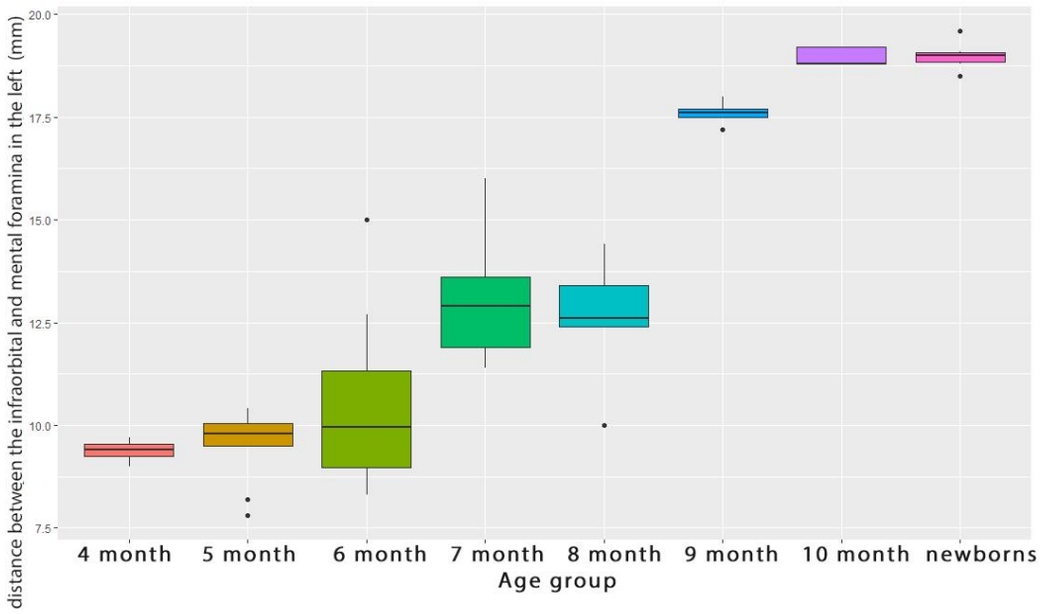

Fig. 9. Box diagram of the distance between the infraorbital and mental foramina in the left by the age groups

median values (except one pair «9 month – neonates»).

The diagram of mean values of the distance between the infraorbital and mental foramina in the right (Fig. 10) and left (Fig. 11) in fetuses and neonates is indicative of the intensity of transformations of these parameters.

Analysis of the morphometric parameters of the distance between the mental foramen and inferior edge of the mandible in the right (Fig. 12) and left (Fig. 13) in fetuses and neonates by means of construction of the box diagram enables to state that the difference between the median values of samples (a horizontal line in the box) is statistically significant. Kruskal-Wallis test gave the following results: since $p<0,05$, the difference between the median values of the groups is statistically significant. Conover-Iman test compared morphometric parameters of distance between the mental foramen and inferior edge of the mandible in the right in the age groups and found that median difference is statistically significant for all the possible pairs, except the following ones: «5 month – 6 month», «6 month – 7 month», «8 month – 9 month», «9 month – 10 month» and «10 month – neonates», and for the same morphometric parameters in the left the median difference is statistically significant, except the pairs of the adjacent categories.

Information about the group average distances between the mental foramen and inferior edge of the mandible in the right by the age groups is presented in Table 7, and in the left – Table 8.

Table 7

Statistical indices of distance between the mental foramen and inferior edge of the mandible in the right in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	1,81	0,08	(1,61; 2,01)
5 month	2,09	0,07	(1,94; 2,24)
6 month	2,39	0,17	(2,03; 2,75)
7 month	2,59	0,16	(2,23; 2,95)
8 month	3,25	0,23	(2,66; 3,84)
9 month	3,50	0,09	(3,24; 3,76)
10 month	3,96	0,05	(3,82; 4,10)
Neonates	4,17	0,09	(3,95; 4,39)

Table 8

Statistical indices of distance between the mental foramen and inferior edge of the mandible in the left in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	1,81	0,08	(1,61; 2,01)
5 month	2,06	0,07	(1,92; 2,2)
6 month	2,25	0,15	(1,91; 2,59)
7 month	2,51	0,17	(2,13; 2,89)
8 month	3,13	0,18	(2,66; 3,60)
9 month	3,40	0,09	(3,14; 3,66)
10 month	3,76	0,08	(3,53; 3,99)
Neonates	4,04	0,09	(3,81; 4,27)

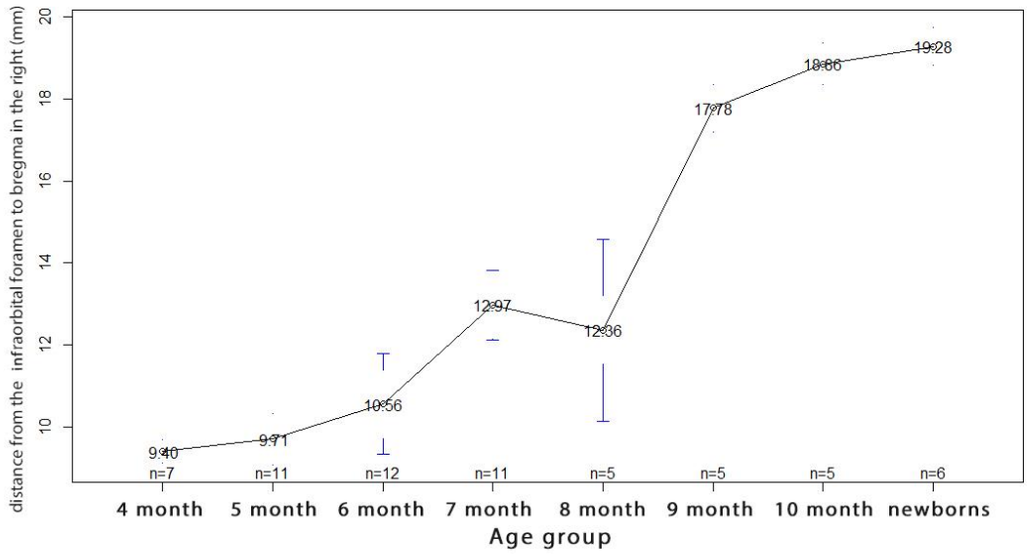

Fig. 10. Diagram of mean values of the distance between the infraorbital and mental foramina in the right by the age groups

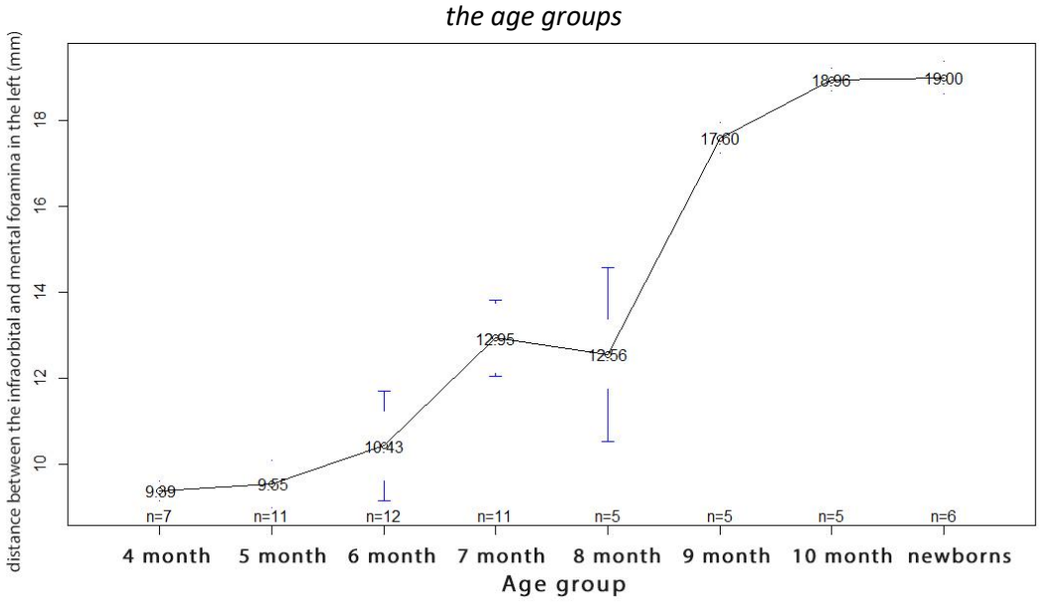

Fig. 11. Diagram of mean values of the distance between the infraorbital and mental foramina in the left by the age groups

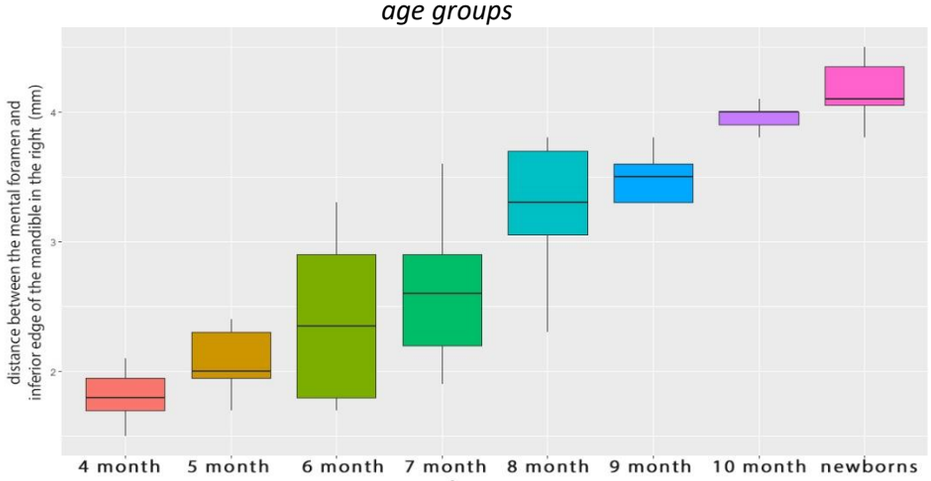

Fig. 12. Diagram of mean values of the distance between the mental foramen and inferior edge of the mandible in the right by the age groups

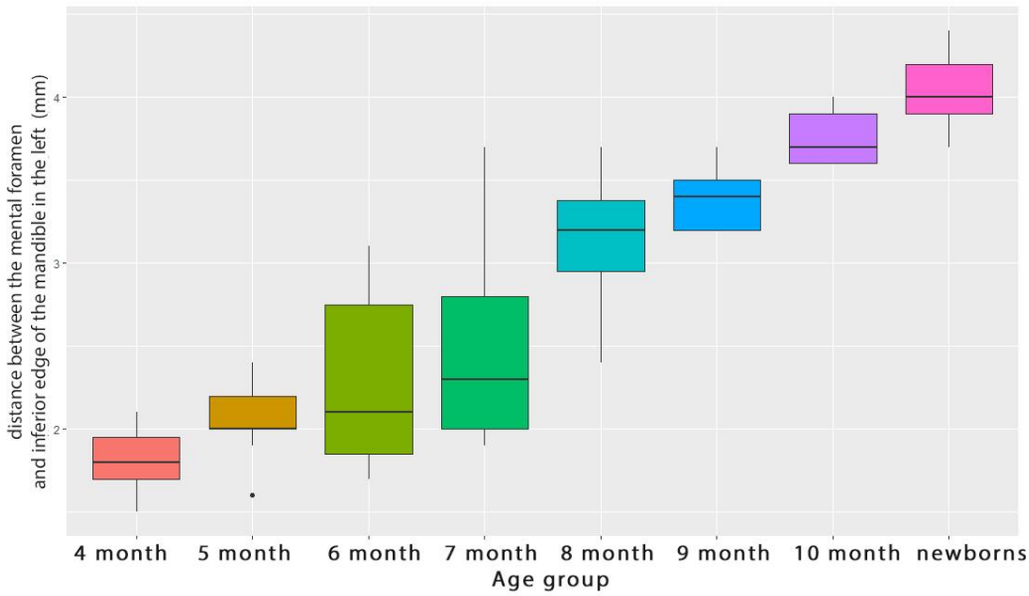

Fig. 13. Diagram of mean values of the distance between the mental foramen and inferior edge of the mandible in the left by the age groups

Tables 7 and 8 demonstrate a considerable (statistically significant) difference of the mean values for all the groups except the pairs of adjacent categories. Here there is a little different result for the morphometric parameters of distance between the mental foramen and inferior edge of the mandible in the right than that one according to Conover-Iman test for median values. It is explained by the fact that data are not normally distributed in the groups, therefore, in this particular case the median should be considered as a measurement of the central tendency.

The diagram of mean values of distance between the mental foramen and inferior edge of the mandible in the right (Fig. 14) and left (Fig. 15) in fetuses and neonates is indicative of the intensity of transformations of these parameters.

Analysis of the morphometric parameters of the distance between the supraorbital foramina by means of construction of the box diagram by the age groups (Fig. 16) enables to conclude that the difference between the median values of samples (a horizontal line in the box) might be statistically significant. Kruskal-Wallis test gave the following results: since p-value<0.05, the difference between the median values of the groups is statistically significant.

Conover-Iman test found that statistical median difference is statistically significant for all the possible age groups, except the following pairs: «7 month – 8 month», «7 month – 9 month», «8 month – 9 month» and «10 month – neonates».

Information about the group average distances between the supraorbital foramina by the age groups is presented in Table 9.

Table 9 demonstrates a considerable (statistically significant) difference of the mean values for all the groups except the following pairs: «7 month – 8 month», «7 month – 9 month», «8 month – 9 month», «8 month – 10 month», «9 month – 10 month» and «10 month – neonates».

The diagram of mean values of the distance between the supraorbital foramina in fetuses and neonates (Fig. 17) is indicative of the intensity of transformations of these parameters.

Analysis of the morphometric parameters of the distance between the supraorbital foramina

Table 9

Statistical indices of distance between the supraorbital foramina in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	11,31	0,16	(10,92; 11,70)
5 month	12,72	0,30	(12,05; 13,39)
6 month	19,49	0,81	(17,72; 21,26)
7 month	23,50	0,71	(21,91; 25,09)
8 month	23,08	0,42	(21,99; 24,17)
9 month	23,98	0,10	(23,70; 24,26)
10 month	26,78	1,37	(22,99; 30,57)
Neonates	29,39	0,42	(28,37; 30,41)

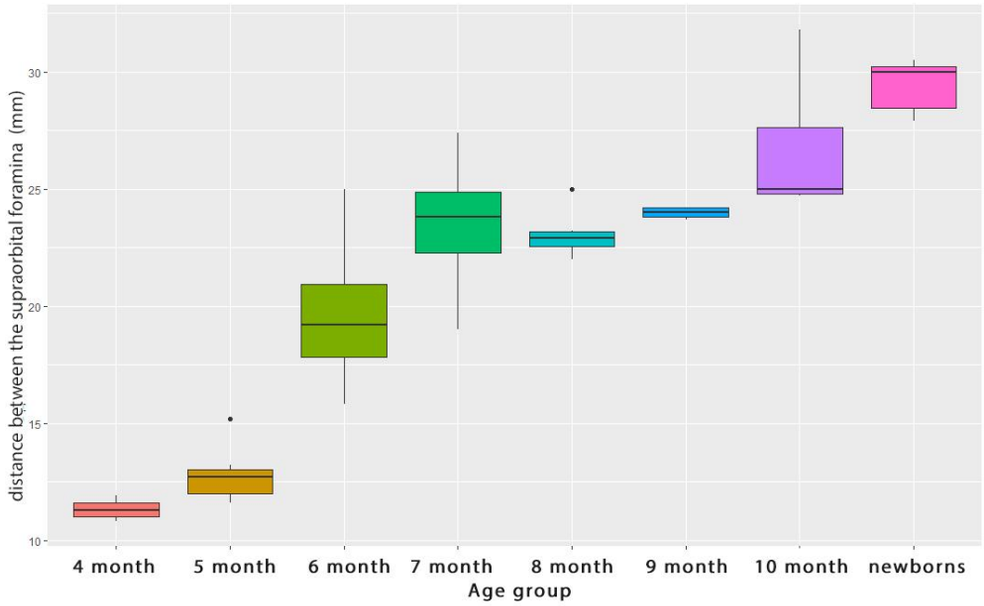

Fig. 15. Box diagram of the distance between the supraorbital foramina by the age groups

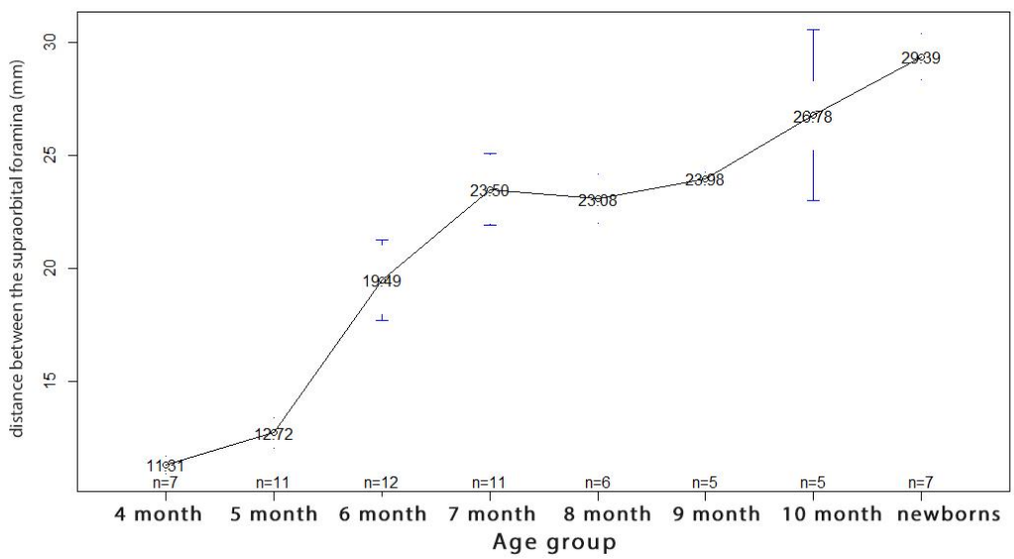

Fig. 16. Diagram of mean values of the distance between the supraorbital foramina by the age groups

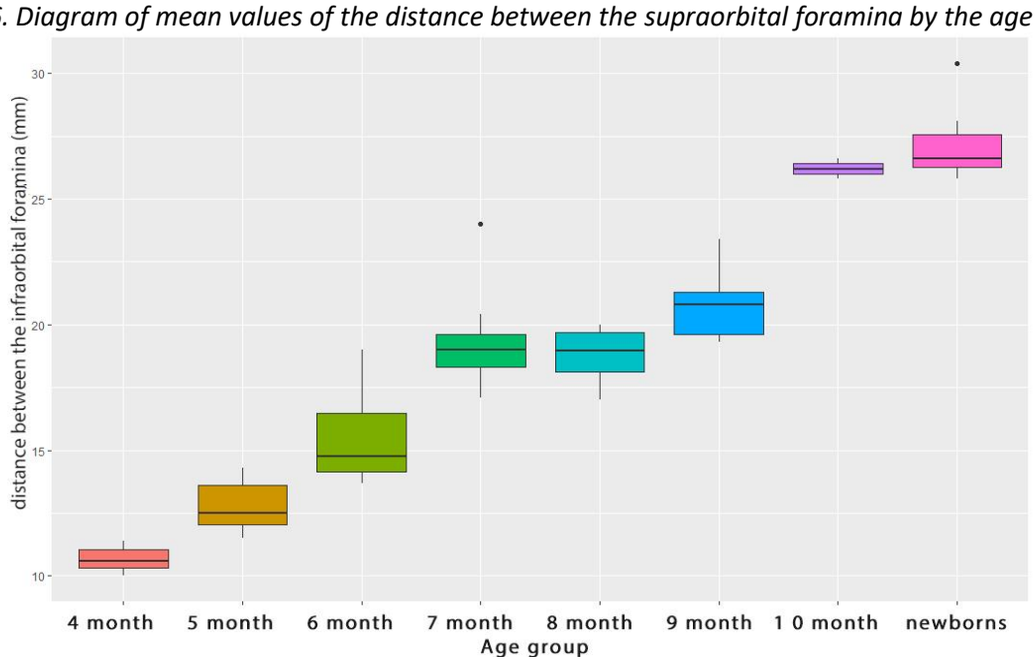

Fig. 17. Box diagram of the distance between the infraorbital foramina by the age groups

by age groups enabled to design the box diagram (Fig. 17), presenting the difference between the medians of samples (a horizontal line in the box) which is statistically significant.

Figure 17 demonstrates that the difference between the medians of samples (a horizontal line in the box) might be statistically significant. Kruskal-Wallis test afford ground to consider that the difference between the median values of the groups is statistically significant since p-value<0.05. Conover-Iman test compared the morphometric parameters of the distance between the supraorbital foramina and found that statistical median difference is statistically significant for all the possible pairs, except the following ones: «7 month – 8 month» and «10 month – neonates».

Information about the group average distances between the infraorbital foramina by the age groups is presented in Table 10.

Table 10 demonstrates a considerable (statistically significant) difference of the mean values for all the groups except the following pairs: «7 month – 8 month», «7 month – 9 month» and «10 month – neonates».

The diagram of mean values of the distance between the infraorbital foramina in fetuses and neonates (Fig. 18) is indicative of the intensity of transformations of these parameters.

Analysis of the morphometric parameters of the distance between the mental foramina in fetuses and neonates enabled to design the box diagram (Fig. 19), presenting the difference between the medians of samples (a horizontal line in the box) which is statistically significant.

Kruskal-Wallis test gave the following results: since p<0.05 the difference between the median values of the groups is statistically significant.

Conover-Iman test compared the morphometric parameters of the distance between the mental foramina by the age groups and found that the median difference is statistically significant for all the possible pairs, except the following ones: «7 month – 8 month» and «10 month – neonates».

Information about the group average distances between the mental foramina by the age groups is presented in Table 11.

Table 11 demonstrates a considerable (statistically significant) difference of the mean

Table 10

Statistical indices of distance between the infraorbital foramina in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	10,67	0,20	(10,18; 11,16)
5 month	12,80	0,30	(12,14; 13,46)
6 month	15,55	0,52	(14,04; 16,70)
7 month	19,30	0,54	(18,09; 20,51)
8 month	18,78	0,48	(17,56; 20,00)
9 month	20,88	0,73	(18,85; 22,91)
10 month	26,20	0,14	(25,81; 26,59)
Neonates	27,20	0,60	(25,73; 28,67)

Table 11

Statistical indices of distance between the mental foramina in fetuses and neonates

Age group	Mean	Standard error of the mean	Confidence interval of the mean
4 month	10,43	0,18	(9,99; 10,87)
5 month	12,17	0,54	(10,96; 13,38)
6 month	14,35	0,38	(13,52; 15,18)
7 month	18,75	0,52	(17,59; 19,91)
8 month	17,98	0,71	(16,15; 19,81)
9 month	24,66	0,13	(24,29; 25,03)
10 month	25,78	0,32	(24,90; 26,66)
Neonates	26,49	0,40	(25,52; 27,46)

values for all the groups except the following pairs: «7 month – 8 month», «9 month – 10 month» and «10 month – neonates».

The diagram of mean values of the distance between the mental foramina in fetuses and neonates (Fig. 20) is indicative of the intensity of transformations of these parameters.

Discussion. Identifying the mean values of all the possible parameters characterizing ontogenetic transformations of the morphometric parameters of the supra-, infraorbital and mental foramina, that is, determining anatomical variability in the location of these foramina of the facial part of the skull during the perinatal period of ontogenesis, we can state that during this period all of them undergo nonsynchronous enlargement. They are characterized by the periods of accelerated and slow development, except the parameters of distance between the mental foramen and inferior edge of the mandible in the right and left, which are characterized by their gradual enlargement. The parameters of

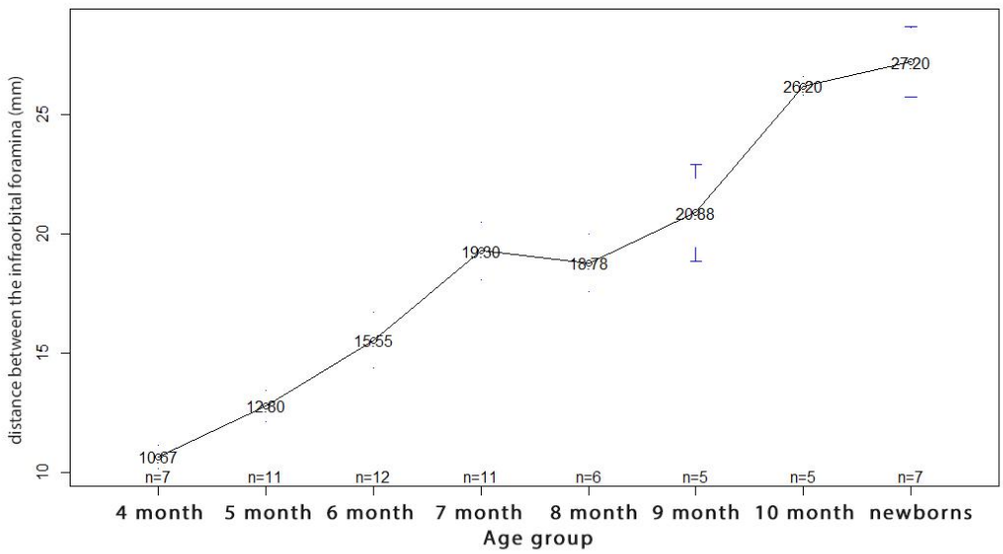

Fig. 18. Diagram of mean values of the distance between the infraorbital foramina by the age groups

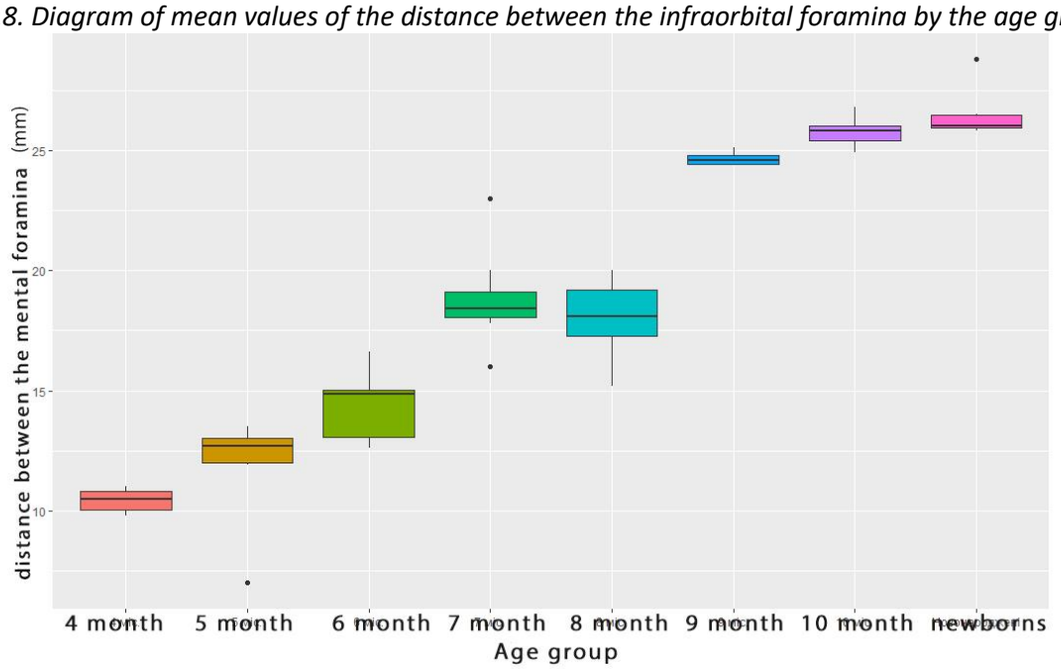

Fig. 19. Box diagram of the distance between the mental foramina in fetuses and neonates

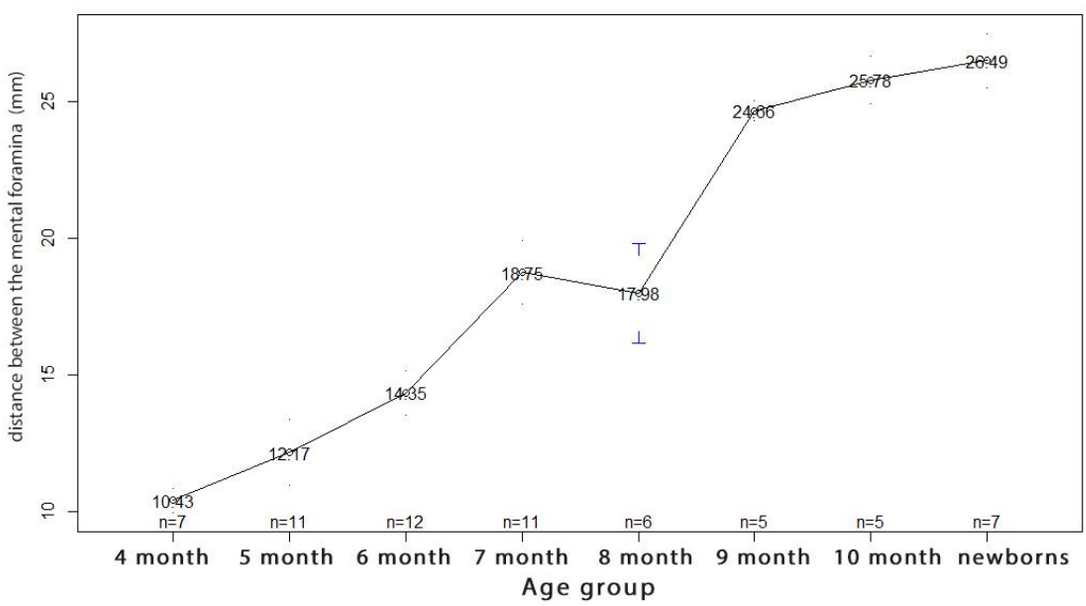

Fig. 20. Diagram of mean values of the distance between the mental foramina by the age groups

distance from the supraorbital foramen to bregma in the right and left in fetuses and neonates are characterized by the two periods of an accelerated development and the two periods of a slow development. They accelerated periods are: 6-7th month and 10 month – neonatal period; the slow ones are: 4-6th and 7-10 months. The morphometric parameters of distance between the supra- and infraorbital foramina in the right and left, increase most intensively since the 4th till the 7th months of development, and since the 8th month till the neonatal period. These parameters increase inconsiderably (the period of a slow development) since the 7th till the 8th months. The distance between the infraorbital and mental foramina in the right and left is characterized by the two periods of an accelerated development: 6-7 month and 8-9 month of development. The period of 7-8 month is the period of a slow development. The distances between the supra-, infraorbital and mental foramina are characterized by similar periods of the first accelerated and slow development: 5-7 and 7-8 month respectively. The second period of an accelerated development differs. The second period of an accelerated development for the distance between the supraorbital foramina is from the 9th month of development till the neonatal period; for the distance between the infraorbital foramina – since the 9th till the 10th month of development; for the distance between the mental foramina – 8-9 months of development.

Analysis of the results obtained after Conover-Iman test concerning statistically significant medians of the parameters examined of the supra-, infraorbital and mental foramina in fetuses and neonates enabled to conclude that the pairs «7 month – 8 month» and «10 month – neonates» are not reliable for practically all the parameters examined, except the distance from the supraorbital foramina to bregma in the right and left. Therefore, the periods of 7-8 month, 10 month and the neonatal period are the most critical periods of development for the parameters examined.

Conclusions. 1. Nonsynchronous enlargement of the distance from the supraorbital foramen to bregma in the right and left, distance between supra- and infraorbital and mental foramina was found to be specific for the examined morphometric parameters of the location of the supra-, infraorbital and mental foramina in fetuses and newborns, except parameters of the distance between the mental foramen and inferior margin of the jaw in the right and left which are characterized by their gradual enlargement. 2. Parameters of the distance from the supraorbital foramen to bregma in the right and left in the fetuses and newborns are characterized by the two periods of an accelerated and two periods of slow development: 6-7-month and 10 month of the neonatal period – the periods of an accelerated development, 4-6-month and 7-10 month – the periods of slow development. Distance between the supra- and infraorbital foramina in the left and right has two period of an accelerated development – since 4th till 7th months of development and since the 8th month till the neonatal period; and since the 7th till the 8th month of development – a slow period. Distance between the infraorbital and mental foramina in the right and left has two periods of an accelerated development – the 6-7 month and 8-9 month, and slow development – the 7-8 months. Distances between the supra-, infraorbital and mental foramina are characterized by similar periods of the first accelerated and slow development including 5-7th and 7-8th month respectively, and the second period of an accelerated development differs: distance between the supraorbital foramina since the 9th month till the neonatal period, for distance between the infraorbital foramina since the 9th till the 10th month of development, for distance between the mental foramina – 8-9th months of development – the second period of an accelerated development. For distance between the infraorbital foramina since the 9th till the 10th month of development, for distance between the mental foramina – 8-9th months of development – the second period of an accelerated development. 3. The periods of 7-8 month, 10 month and the neonatal period are the most critical periods of development for all the parameters examined.

Prospects of further studies: to determine morphometric parameters of location of the supra-, infraorbital and mental foramina during the postnatal period of ontogenesis.

References

1. Aziz SR, Marchena JM, Puran A. Anatomic characteristics of the infraorbital foramen: a cadaver study. Journal of Oral and Maxillofacial Surgery. Volume 58, Issue 9, September 2000, Pages 992-996. https://doi.org/10.1053/joms.2000.8742.

2. Gayvoronskiy IV, Kirillova MP Variantnaya anatomiya nadglaznichnoy vyrezki i podglaznichnogo otverstiya u vzroslogo cheloveka [Variant anatomy of the supraorbital notch and infraorbital aperture in human]. Morfologicheskie vedomosti. 2012;4:19-25. (in Russian).

3. Gupta T. Localization of important facial foramina encountered in maxillo-facial surgery. Clin. Anat. 2008 Oct;21(7):633-40.

4. Hizay A, Sindel M. Metoptic Canal and Warwick's Foramen: Incidence and Morphometric Analysis by Several Reference Points in the Human Orbit. Eurasian J Med. 2019 Feb;51(1):1-4. Published online 2018 Nov 30. doi:10.5152/eurasianjmed.2018.17353.

5. Pelé A, Berry PA, Evanno C, Jordana F. Evaluation of Mental Foramen with Cone Beam Computed Tomography: A Systematic Review of Literature. Radiol Res Pract. 2021 Jan 6;2021:8897275. doi: 10.1155/2021/8897275. PMID: 33505723; PMCID: PMC7806401.

6. Shepit'ko VI. Novi mozhlyvosti komp'iuternoi tomohrafii v antropometrychnykh doslidzhenniakh cherepa [New features of computer tomography in anthropometric studies of the skull]. Svit medytsyny ta biolohii. 2014;2 (44):203-8. (in Ukrainian).

7. Slobodian OM, Kuzniak NB, Lavriv LP. Zakonomirnosti perynatal'nykh orhanometrychnykh parametriv dilianok i struktur holovy [Patterns of perinatal organometric parameters sections and structures of the head.]. Visnyk problem biolohii i medytsyny. 2016; Vyp. 2, T.2(129):314-7. (in Ukrainian).

8. Smit S, Hutchinson EF, Kramer B. A morphometric analysis of the immature human infraorbital canal. Surg Radiol Anat. 2021 Feb;43(2):201-10. doi: 10.1007/s00276-020-02563-y. Epub 2020 Sep 12. PMID: 32918571.

9. Tomaszewska A, Kwiatkowska B, Jankauskas R. The localization of the supraorbital notch or foramen is crucial for headache and supraorbital neuralgia avoiding and treatment. Anat Rec (Hoboken). 2012 Sep;295(9):1494-503.

10. Zmysłowska E, Radwanski M, Ledzion S, Leski M, Zmyslowska A, Lukomska-Szymanska M. Evaluation of Size and Location of a Mental Foramen in the Polish Population Using Cone-Beam Computed Tomography. BioMed Research International, vol. 2019, Article ID 1659476, 8 pages, 2019. https://doi.org/10.1155/2019/1659476.

11. Zozulia YuA, Trosh RM, Shamaev MY, Palamar OY, Sambor VK, Rohozhyn VA. Xipyphichna anatomiia supraorbital'noho ta supraorbital'no-pterinal'noho dostupiv do dna peredn'oi cherepnoi yamky ta seliarno-khiazmal'noi dilianky [Surgical anatomy of supraorbital and supraorbital-peterinal accesses to the bottom of the anterior cranial fossa and the segmented-chiasmal area]. Ukrains'kyi neirokhirurhichnyi zhurnal. 2001;4:84-91. (in Ukrainian).

CONTENT:

Pohorielova O.O., Shevchenko O.S.
THE EFFECT OF PRESCRIBING A COMPLEX OF ESSENTIAL AMINO ACIDS ON THE LEVEL OF HUMAN-BETA-DEFENSIN-1 IN PATIENTS WITH DRUG-SUSCEPTIBLE AND DRUG-RESISTANT PULMONARY TUBERCULOSIS 3

Goltsev K.A., Zamiatin P.N.
REMOTE THERMOMETRIC STUDY OF CHANGED SKIN COATS IN PATIENTS WITH PURULENTLY NON-HEALING WOUNDS 8

Belous M., Zamiatin P.N.
TYPES OF SURGICAL INTERVENTIONS IN SUFFICIENTS WITH TRAUMATIC INJURIES TO THE SPLEEN, DEPENDING ON THE NATURE OF THE INJURY 11

Khrebtii H.I., Kotsiubynska K.M., Sokoliuk V.B., Stetsyk N.I., Malyshevska I.V.
ENDOTHELIAL DYSFUNCTION AND INSULIN RESISTANCE 15

Khrebtii H.I., Malinevska-Biliichuk O.V., Nesterovska R.A.
FORMING OF CLINICAL THINKING BY STUDENTS OF HIGHER EDUCATIONAL MEDICAL ESTABLISHMENTS 21

Bilinskyi I.I., Popovych Yu.I., Fedorak V.M.
MORPHOLOGICAL CHANGES IN NEURONS OF THE INTRAMURAL DUODENAL APPARATUS IN CASE OF EXPERIMENTAL STREPTOZOTOCIN-INDUCED DIABETES MELLITUS AND STRESS 25

Bulyk R.Ye., Yosypenko V.R.
EFFECT OF MELATONIN ON DAILY OSCILLATIONS OF THE DENSITY OF MELATONIN RECEPTORS 1A IN NEURONS OF THE LATERAL PREOPTIC NUCLEUS OF THE HYPOTHALAMUS IN RATS UNDER DIFFERENT LIGHT MODE 32

Lomakina Yuliia, Khushaali Rajesh, Chernovska Nadiia, Balan Irina
EFFECT OF MELATONIN ON DAILY OSCILLATIONS OF THE DENSITY OF MELATONIN RECEPTORS 1A IN NEURONS OF THE LATERAL PREOPTIC NUCLEUS OF THE HYPOTHALAMUS IN RATS UNDER DIFFERENT LIGHT MODE 38

Slobodian O.M., Kostiuk V.O., Proniayev D.V., Lukashiv T.O.
ONTOGENIC TRANSFORMATIONS OF MORPHOMETRIC PARAMETERS OF THE SUPRA-, INFRAORBITAL AND MENTAL FORAMINA IN THE PERINATAL PERIOD OF ONTOGENESIS 44

Kondrat A-I.V., Zhurakivska O.Ya.
AGE FEATURES OF TESTICULAR MORPHOLOGICAL CHANGES IN DIABETES MELLITUS 59

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