

Anthropology

Changes in the Sizes of the Nose and Their Correlation to the Main Height Sizes of the Face in 7-17-year-old Schoolchildren from Sofia

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The presented results represent a part of complex anthropological survey on 7–17-year-old pupils from Sofia carried out as a longitudinal-transversal. The changes of four nose sizes, the nasal index and their correlation to three height sizes of the face have been traced. A total of 3602 individual measurements have been completed – 1778 for boys and 1824 for girls. The dynamics of growth of the studied features has been registered and a correlation dependency between them was found. Sexual dimorphism is best pronounced in the nose breadth and height sizes of the face.

Key words: anthropometry, nose, face, age peculiarities, correlation dependences.

Introduction

The nose is not only an organ related to life-saving functions such as respiration and smell but is an important feature of the morphological characteristics of the human face. This fact provokes the interest shown to the studies on the nose in various aspects [3, 8, 9, 11]. Investigating the nose in children and adolescents is of special importance [1, 2, 5, 6, 7, 10].

The aim of the present study is to trace the changes in the nose sizes between the years 7 and 17, to record the rate of growth of the features under study and the manifestation of sexual dimorphism as well as to look for a correlation dependency between the nose sizes, on the one hand, and the height and nose sizes, on the other.

Material and Methods

Schoolchildren, 7-17-year-old, from five Sofia schools are the object of the study. The investigation was planned as a longitudinal one but the yearly changes in the schoolchildren constituency would not allow for its realization as such. In order to add to the numbers of pupils from the different age groups so that they would not fall under 100 individuals every year new groups of students have been additionally studied. That is why the investigation was effectuated as a mixed one – longitudinal and transversal. A total of 3602 individual measurements after the classical method [4] have been carried out – 1778 for the boys and 1824 for the girls during the period 1993–2000 (October–November). The changes in the height (n-sn), length (n-pr), depth (pr-sn), breadth (al-al) and nasal index parallel to those of the physiognomical height (tr-gn), morphological height (n-gn), and the physiognomical upper face height (n-sto) in the age intervals 7–9 years, 9–11, 11–13, 13–15 and 15–17 have been traced. Variation and correlation analyses were used. The intersexual differences were evaluated by the statistical significance of the measurements' differences between both sexes for each feature separately. The reliability of the established intersexual differences were assessed according to the t-criterion of Student by significance level of $P < 0.05$. The rate of increase were computed by the formula $(X_2 - X_1) \times 100 / X_1$, in which X_1 is the mean value in the former year, and X_2 – the one in the next year.

Results and Discussion

The mean values of the main nose sizes grow unevenly between 7 and 17 years of age in both sexes (Table 1). The height and length of the nose in the boys grow most intensively between 11 and 13 and especially between 13–15 years of age after which the rate of growth is retarded (Fig. 1). The same sizes in the girls grow most intensively between 9 and 11 years of age and especially between 11 and 13 years of age after which the rate of growth is considerably lowered (Fig. 2). The height and length of the nose in the 7-year old is 79.3 % and 76.3% of the values for the adult Bulgarians and in the girls – 83.3%

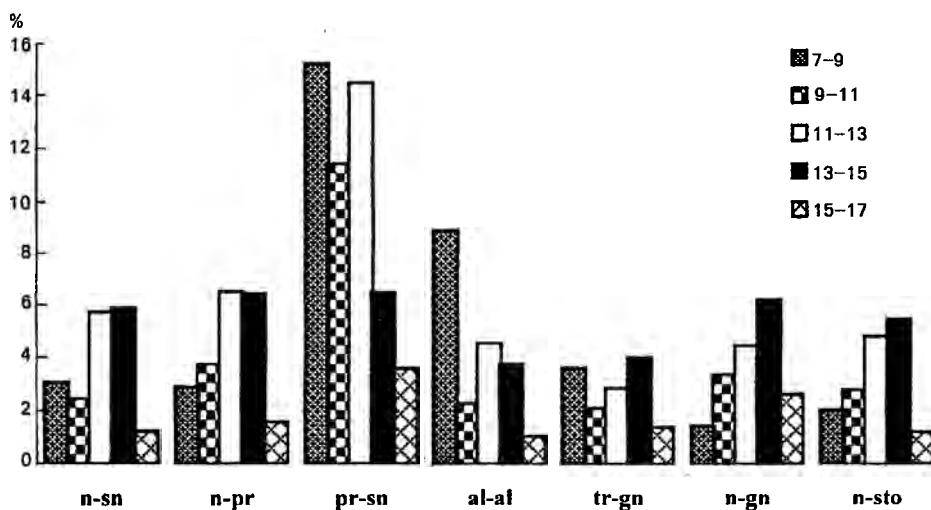


Fig. 1. Rate of increase in the nose measurements and in the height sizes of the face (boys)

Table 1. Age changes in the nose measurements and in the size of facial heights

Feature	Age (years)	Boys			Girls		
		<i>n</i>	\bar{X}	<i>SD</i>	<i>n</i>	\bar{X}	<i>SD</i>
Nose height	7	182	44.07	3.00	177	43.32	2.75
	9	189	45.41	2.88	181	44.79	2.75
	11	183	46.53	2.83	204	46.18	3.07
	13	166	49.18	3.32	184	48.39	3.01
	15	124	52.06	3.89	137	48.83	2.98
	17	118	52.70	3.11	137	49.03	3.16
Nose length	7	182	41.44	3.17	177	40.72	2.97
	9	189	42.64	3.05	181	42.04	2.99
	11	183	44.24	2.92	204	44.15	3.11
	13	166	47.11	3.46	184	46.55	3.01
	15	124	50.13	3.78	137	46.93	3.09
	17	118	50.92	3.16	137	47.31	3.25
Nose depth	7	182	12.48	1.38	177	12.62	1.51
	9	189	14.38	1.40	181	14.71	1.66
	11	183	16.02	1.68	204	16.60	1.82
	13	166	18.39	1.75	184	18.70	1.86
	15	124	19.58	2.52	137	19.43	1.94
	17	118	20.28	2.06	137	19.26	1.88
Nose breadth	7	182	29.34	1.84	177	28.47	1.86
	9	189	31.93	1.73	181	30.99	1.75
	11	183	32.66	1.73	204	32.14	1.91
	13	166	34.14	1.88	184	33.44	1.89
	15	124	35.42	1.91	137	33.14	2.00
	17	118	35.79	2.10	137	33.11	2.10
Nasal index	7	182	66.85	5.79	177	65.95	5.66
	9	189	70.57	5.58	181	69.46	5.82
	11	183	70.42	5.40	204	69.88	6.12
	13	166	69.72	5.75	184	69.34	5.62
	15	124	68.45	6.66	137	68.14	6.14
	17	118	68.20	6.25	137	67.82	6.28
Physiognomical face height	7	182	160.47	7.60	177	156.44	7.70
	9	189	166.21	7.66	181	161.76	7.79
	11	183	169.69	7.92	204	166.32	8.24
	13	166	174.51	8.84	184	171.02	8.53
	15	124	181.46	8.08	137	172.88	7.35
	17	118	183.98	13.37	137	172.01	7.36
Morphological face height	7	182	101.00	4.77	177	98.16	3.99
	9	189	102.44	4.45	181	100.00	4.47
	11	183	105.85	4.82	204	103.69	4.92
	13	166	110.53	5.50	184	107.79	5.14
	15	124	117.36	6.14	137	108.99	4.97
	17	118	120.43	6.73	137	110.12	5.42
Physiognomical upper face height	7	182	62.85	3.42	177	60.85	3.13
	9	189	64.13	3.50	181	62.75	3.11
	11	183	65.92	3.37	204	64.97	3.53
	13	166	69.08	3.97	184	67.24	3.58
	15	124	72.81	4.05	137	67.57	3.40
	17	118	73.69	3.88	137	68.07	3.71

and 80.5% respectively. At 17 the height and length of the nose in boys reaches 94.8% and 93.8% of the mean values for adult (Bulgarians National Anthropological Programme, 1989–1992). In the 17-year-old girls the percentages are very close to those of the 17-year-old boys – 94.3% and 93.5% respectively. The nose breadth by contrast to the height and length grows most intensively between 7 and 9 years of age in both sexes with the rate of growth slowing down between 9 and 11. Between 11 and 13 another surge in growth is observed in both sexes especially in the boys. The breadth in the boys continues to grow and at 15 it reaches the mean values for grown-up Bulgarians. In the girls this phenomenon is recorded as early as 11 years of age. The depth of the nose is

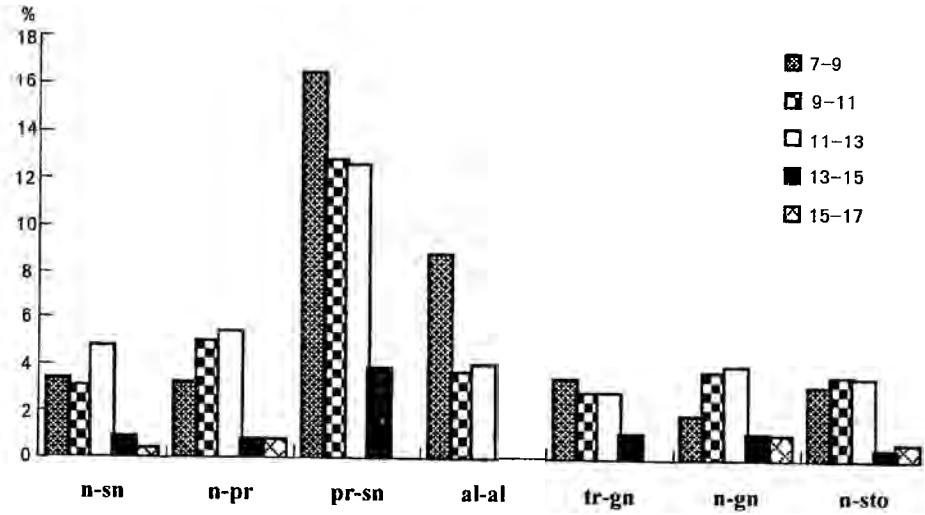


Fig. 2. Rate of increase in the nose measurements and in the height sizes of the face (girls)

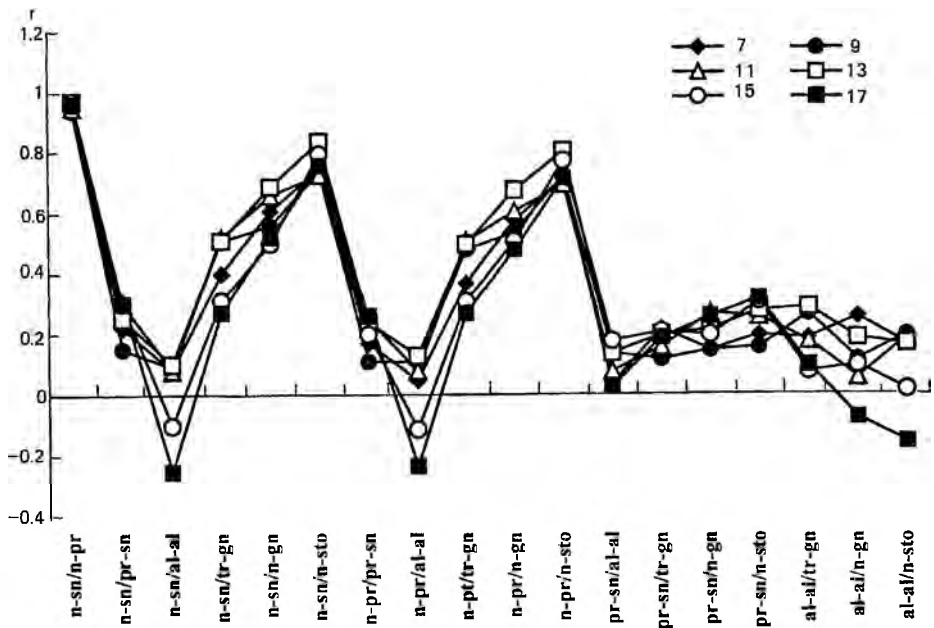


Fig. 3. Correlation (r) between the nose measurements and the height sizes of the face (boys)

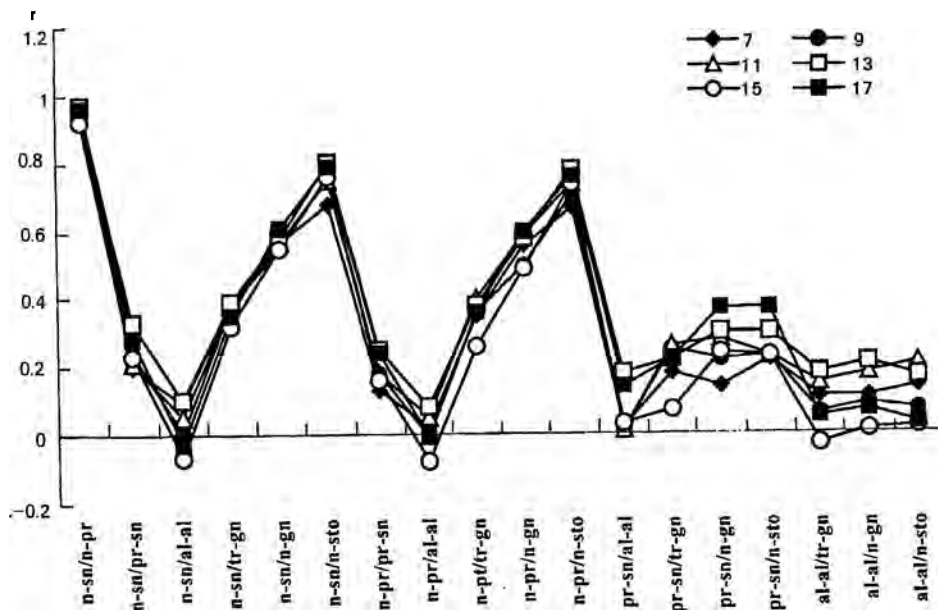


Fig. 4. Correlation (r) between the nose measurements and the height sizes of the face (girls)

the most early to reach the mean values for the grown-up Bulgarians in both sexes even at 10–11 years of age. The growth rate of the height face sizes is analogous to the one of the nose sizes. The nasal index in 7–17 years old boys is in the limit values of the categories leptorrhin-mesorrhin while in the girls it is in the leptorrhin category. Taking into account the values of the correlation coefficient (r) there is found an exceptionally great correlation dependency between the height and length of the nose in all age groups of both sexes. Of the face sizes the correlation of the height and length of the nose with the physiognomical upper face height is the greatest followed by that of the nose height and length with the morphological height of the face (Fig. 3, 4). By contrast to the height sizes of the face in which sexual dimorphism is well pronounced even at 7 years of age, in the height and length of the nose it emerges after 13 years of age especially between 15 and 17 ($P < 0.01$). Sexual dimorphism is well pronounced in the nose breadth as early as 7 years of age ($P < 0.001$) and in the depth of the nose after 15 years of age ($P < 0.01$).

Conclusion

The period under study between 7 and 17 years of age is characterized with dynamic changes in the sizes of the nose, which take place parallel to those of the face. The breadth and depth of the nose grow most intensely – between 7 and 9 years of age. In the other sizes of the nose and face the rate of growth is most intensive – between 13 and 15 years of age in the boys and between 11 and 13 years of age in the girls. The greatest correlation dependency is found between the height and length of the nose, on the one hand, and between the nose height and length and between the latter with the physiognomical upper face height, on the other. Sexual dimorphism is most clearly expressed in the nose breadth and the face height sizes as early as 7 years of age and in the nose

height and length after 13 years of age. The knowledge about the occurring changes could be made use of in comparative age characterizations anthropological expert evaluations and plastic surgical interventions as well.

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