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Anthropological Characteristics in the Facial Morphology of Different Ethnicities

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The present comparative cephalometric study of certain facial proportions of young men and women aims to enrich the knowledge of the head and face morphology in four ethnic populations from the Balkan Peninsula. The study includes 430 medical and dental students of four ethnicities at the Medical University of Plovdiv. The morphological height of the face (n-gn), maximal width of the face (zy-zy), height of the nose (n-sn), and width of the nose (al-al) were used to determine the morphological index of the face and height-width index of the nose. Excluding morphological facial index the data do not show statistically significant differences in the subcategory frequencies of both indices. The similarity in the facial characteristics of the examined ethnic groups could be due to genetic drift. The same racial identity, similar folk style and climatic conditions should also be borne in mind.

Key words: facial morphology, cephalometry, facial indices, ethnic groups.

Introduction

Morphological, quantitative and proportional differences between races and ethnic groups have been subject of numerous studies in the last century [1, 8]. The main traits that differentiate faces develop from adaptive mechanisms influenced by environmental factors and maintained during the evolution of man. Adaptation diversity has been considerably reduced during the period of human development. Significant differences within races become fewer and are caused mainly by microgenetic changes. These changes contribute to the differences between the racial subpopulations, termed prior anthropological types [2, 3].

As one of the most variable structures the craniofacial complex and especially the face appear of particular importance in the study of the human body morphology. Through its mimic the human face is an important means of communication and ensures the most direct contact with the surrounding world. The notion of attractive face can be briefly exposed as a face nice for the eye. The elaboration of objective criteria of attractive and unattractive face will provide valuable data for the esthetic and reconstructive surgery [4]. On the other hand, the head and face are often distorted by traumatic injuries or congenital malformations that require

reconstruction. Therefore, the knowledge of the craniofacial morphology, measurements and proportions is mandatory for reconstruction of the normal shape of the head and face [4, 5, 8]. The knowledge will be useful for artists, portraitists and facial illustrators.

The aim of the present comparative study of certain cephalometric proportions of young men and women is to enrich the knowledge of the morphology of the head and face in four ethnic populations from the Balkan Peninsula. The data will be useful for the needs of the craniofacial and reconstructive surgery as well as forensic identification.

Material and Methods

The study included 430 medical and dental students at the Medical University of Plovdiv. Of these 218 were Bulgarians, 63 Greeks, 77 Macedonians, and 72 Turks. Cephalometric measurements according to the rules of Martin-Saller were obtained

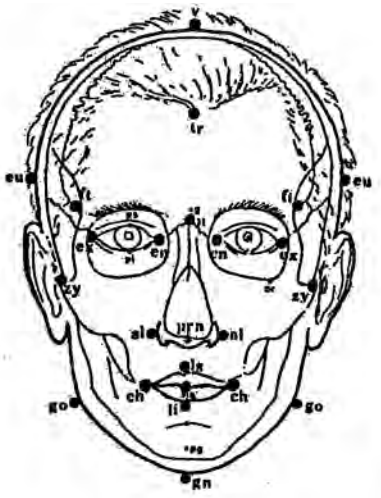

Fig. 1. Surface craniofacial landmarks used in cephalometric examinations

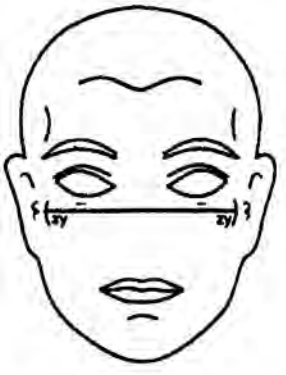

Fig. 2. Morphological height of the face (n-gn) and maximal width of the face (zy-zy)

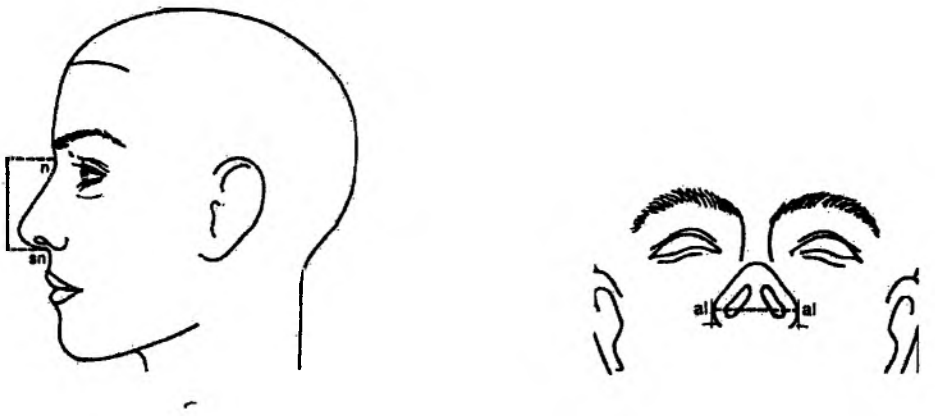

Fig. 3. Height of the nose (n-sn) and width of the nose (al-al)

from each subject [6]. Morphological height of the face (n-gn), maximal width of the face (zy-zy), height of the nose (n-sn), and width of the nose (al-al) were used to determine the morphological index of the face and height-width index of the nose [7].

The data obtained were analyzed by ANOVA analysis and Mann-Whitney U test at level of significance $p<0.05$.

Results

Height-width index of the nose

In the females of the four ethnic groups the height-width index varied between 50.9 and 60.7, i.e., they were leptorrhines with high and narrow nose (Table 1). Of the Bulgarian females 78% were leptorrhines, 16% were hyperleptorrhines, and 5.7% mesorrhines. The Turkish females presented with higher persentage of leptorrhines — 82.4%, smaller percentageage of hyperleptorrhines — 11.8% and similar percentage of mesorrhines compared with the Bulgarian females. The Macedonians presented mainly as leptorrhines — 71.7% but the percentage of hyperleptorrhines and mesorrhines was higher than in the Bulgarian and Turkish females (17.4% and 10.9%, respectively). The Greek females were leptorrhines in 68.8% and the hyperleptorrhines were of the highest percentage (21.9%) compared with the other

Table 1. Height-width index of the nose in the females of the four ethnic groups

	Bulgarians		Greeks		Macedonians		Turks		Statistical significance*	
Subcategory	Number	%	Number	%	Number	%	Number	%	F	*p*
									0.587	0.632
Hyperleptorrhine	17	16	7	21.9	8	17.4	4	11.8		
Leptorrhine	83	78.3	22	68.8	33	71.7	28	82.4		
Mesorrhine	6	5.7	3	9.4	5	10.9	2	5.9		
Hamerrhine	0	0	0	0	0	0	0	0		
Hyperhamerrhine	0	0	0	0	0	0	0	0		

*One-way ANOVA with Tukey's honesty significance (HSD) for multiple comparisons - <0.05

Table 2. Height-width index of the nose in the males of the four ethnic groups

Subcategory	Bulgarians		Greeks		Macedonians		Turks		Statistical significance*	
	Number	%	Number	%	Number	%	Number	%	F	*p*
									0.919	0.453
Hyperleptorrhine	8	7.1	1	3.2	2	6.5	4	10.5		
Leptorrhine	76	67.9	20	64.5	27	87.1	27	71.1		
Mesorrhine	27	24.1	10	32.3	2	6.5	7	18.4		
Hamerrhine	1	0.9	0	0	0	0	0	0		
Hyperhamerrhine	0	0	0	0	0	0	0	0		

*One-way ANOVA with Tukey's honesty significance (HSD) for multiple comparisons - <0.05

ethnic groups. Typical wide nose appearance — hamerrhine and hyperhamerrhine, was found in none of the females. There were no statistically significant difference in the subcategory frequency of the height-width index as a whole (ANOVA, F=0.587, p=0.632) and between single ethnic groups (p>0.05).

The males of the four ethnic groups presented as leptorrhines with index values between 63.0 and 65.0 (Table 2). The highest percentage of leptorrhines was found in the Macedonians (81.1%), followed by the Turks (71.1%), and almost equal percentage in the Bulgarians and Greeks (67.1% and 64.5%, respectively). The Turks showed the highest percentage of hyperleptorrhines (10.5%) and the Greeks the smallest (3.2%). Mesorrhines were most frequent in the Greeks and Bulgarians, 32.3% and 24.1%, respectively. The difference in frequency of the subcategories reached statistical significance neither as a whole (ANOVA, F=0.919, p=0.453) nor between single ethnic groups (p>0.05).

Morphological index of the face

In the females the morphological facial index varied between 87.2 and 87.7, i.e., leptoprosopes prevail in all ethnic groups (Table 3). The highest percentage of leptoprosopes showed the Turkish females (58.8%), followed by the Macedonians (39.1%) and Bulgarians (36.8%). The lowest percentage of leptoprosopes was in the Greek females (34.4%). The Greek and Bulgarian females presented with the highest percentage of hyperleptoprosopes (31.2% and 30.2%, respectively) and the lowest percent was found in the Turkish females (17.6%). High percentage of mesoprosopes was found in the Bugarian (24.5%), Greek (21.9%) and Macedonian (28.3%) females and much lower in the Turkish females (17.6%). Hypereuriprosopes were found in low percentage in the Bulgarian (3.8%) and Macedonian (4.3%) females and absent in the Greek and Turkish females. The last two groups presented with comparatively high percentage of euriprosopes — 12.5% in the Greek and 11.8% in the Turkish

Table 3. Morphological index of the face in the females of the four ethnic groups

Subcategory	Bulgarians		Greeks		Macedonians		Turks		Statistical significance*	
	Number	%	Number	%	Number	%	Number	%	F	*p*
									2.503	0.096
Hyperprosope	3	3.8	0	0	2	4.3	0	0		
Euriprosope	6	5.7	4	12.5	1	2.2	4	11.8		
Mesoprosope	26	24.5	7	21.9	13	28.3	4	11.8		
Leptoprosope	39	36.8	11	34.4	18	39.1	20	58.8		
Hyperleptoprosope	32	30.2	10	31.2	12	26.1	6	17.6		

*One-way ANOVA with Tukey's honesty significance (HSD) for multiple comparison s - <0.05

Table 4. Morphological index of the face in the males of the four ethnic groups

Subcategory	Bulgarians		Greeks		Macedonians		Turks		Statistical significance*	
	Number	%	Number	%	Number	%	Number	%	F	p
									5.087	0.012
Hyperprosope	6	5.4	0	0	1	3.2	1	2.6		
Euriprosope	21	18.8	3	9.7	2	6.5	7	18.4		
Mesoprosope	28	25.0	4	12.9	12	38.7	9	23.7		
Leptoprosope	40	35.7	13	41.9	10	32.3	16	42.1		
Hyperleptoprosope	17	15.2	11	35.5	6	19.4	5	13.2		

*One-way ANOVA with Tukey's honesty significance (HSD) for multiple comparisons - <0.05

females. The difference in frequency of the subcategories of the morphological facial index failed to reach statistical significance as a whole (ANOVA, F=2.503, p=0.096) and between single ethnic groups (p>0.05).

The males of the four ethnic groups were mainly leptoprosopes with index mean values varying between 88.0 and 91.3 (Table 4). Leptoprosopes were most numerous in the Turks (42.1%) and the Greeks were close (41.9%). In lower frequency leptoprosopes were found in the Bulgarians (35.7%) and Macedonians (32.3%). The highest percentage of hyperleptoprosopes was found in the Greeks (35.5%) and the lowest in the Turks (13.2%). Mesoprosopes were most frequent in the Macedonians (38.7%), and all but 12.9% in the Greeks. The highest percentage of euriprosopes was found in the Bulgarians (18.8%) and Turks (18.4%). Hypereuriprosopes were not present only in the Greeks. The analysis revealed statistically significant differences in the frequency of the subcategories of the morphological facial index as a whole (ANOVA, F=5.087, p=0.011). Statistically significant between-group differences were found between the Bulgarians and Greeks (U=22.5, p=0.03) and between the Bulgarians and Macedonians (U=23.00, p=0.03).

Conclusions

Like previous studies the present study data, together with the fact that the facial morphology is genetically determined, suggest that the similarity in the facial characteristics of the examined ethnic groups be due to mixture of the genetic background. Formation of the examined ethnic groups results from a long historical period and close coexistence. The same racial identity, similar folk style and climatic conditions should also be borne in mind.

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