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ANTHROPOMETRIC CHARACTERIZATION OF OS ZYGOMATICUM (THE CHEEK BONE) IN THE HUMAN

Yordan Yordanov

Institute of Experimental Morphology and Anthropology with museum at BAS, Sofia

ABSTRACT. An anthropological characterization of the sizes of the so-called „cheek-bone triangle“ (Porion-Orbitale-Zygomaxillare-Porion) has been made. This renders the possibility of determining the slant angle of the cheek-bone (the so-called „vertical profiling“) and the registration of the skull facial part plane as a racial-diagnostic feature.

KEY WORDS. skull, os zygomaticum (cheek-bone), anthropometry.

The cheek-bone occupies the upper lateral part of the skull facial portion in man. It serves to a great extent as a link between the face part and the brain one of the skull – a link to the frontal, sphenoidal and temporal bones.

The location of the zygomatic bone against the frontal and sagital planes determine the horizontal profiling of the face and its width sizes as well.

In studies on the appearances and degree of asymmetry in the facial part of the skull it was established that they are most pronounced in the mid-face portion, i.e. in the morphological structure maxilla-os zygomaticum (1, 2).

The tilt of the cheek-bone against the Frankfurt horizontal plane is one of the racial-diagnostic features in the anthropological characterization of the individual (7, 4). M. Gerasimov (5) has defined it as „vertical profiling“ degree of flatness of the skull facial part. As a typical trait of the Mongoloid race he has established the values of the angle which the cheek-bone forms with the horizontal plane (around 90^o), the so-called vertical shape of the cheek-bone. According to M. Gerasimov (6) the angle of the cheek-bone tilt in Europeans is 50^o and is even smaller. As a rule, the profiling of the cheek bones in Mongoloids is not smaller than 65^o, most often nearing 70^o and in certain series even exceeding 80^o.

In the present study we set ourselves the task to explore on Bulgarian material the ratio of the cheek bones to the Frankfurt horizontal plane and the appearances of asymmetry in the lateral part of the human skull facial proportion.

MATERIAL

A total of 410 skulls belonging to individuals of the male sex, Bulgarians aged 20-43 years from the ossuary of the Sofia military cemetery, warriors perished in the wars 1913-1917

METHODS

The following sizes in centimeters – porion-orbitale, porion-zygomaxillare, orbitale-zygomaxillare have been bilaterally taken using the classical method (3). Their values are used for constructing triangles typifying the sizes of the „cheek-bone triangle" termed by us in that way. Their angles have been bilaterally measured (fig. 1).

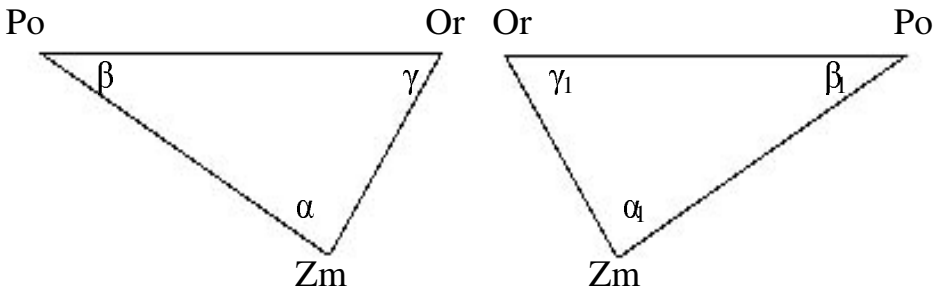

Fig. 1. *„Cheek-bone triangle"*

For the right side they are denoted as α, β, γ, and for the left one – α_1, β_1, γ_1.

The data are processed with the methods of variation statistics (Table 1, 2, 3). The difference between them used for objectivizing the cheek-bone stand in its ratio to the Frankfurt horizontal plane and as a manifestation of bilateral symmetry has been sought.

Since the „cheek-bone triangles" represent a projection of the area confined by the sizes they do not supply objective data about its surface and that is why it is not calculated.

RESULTS

The data in Table 1 about the mean values of the sizes taken show that for the left side they are insignificantly larger than the ones for the right. The 2,1 mm difference for the Orbitale-Zygomaxillare size can be accounted for by the fact that the left half of the skull facial part is narrower and the entrance to the left orbit is situated higher than in the right one (8).

The differences between the sizes Porion-Orbitale and Porion-Zygomaxillare at an average of 10 mm are with a prevalence for the first size (Table 2) with values almost equal in both sides. The percent distribution of the differences according to their size – from 2 to 20 mm shows to the right 16% at the most are of 11 mm and to the left these of 9 mm are 17,4%. In the interval of 8-13 mm are the most common cases – 76,2% to the right and 76,7% to the left. This gives grounds for accentuating

the fact that the greater the differences are the greater the probability is for a more pronounced vertical profiling of the cheek-bone.

From the data in Table 3 one can deduce that the mean values of angle γ which determines the vertical profiling of the cheek bones are 57,08° to the right and 59,07° to the left. This categorically defines that Bulgarians under study according that parameter as part of the Europeoid race. In single cases the γ- angle displays maximum values of 94° -84 ° and minimum ones from 33 ° -39 °, i.e. the variation width is 55 ° to the right and 63 ° to the left. The difference of 2 ° between the angles on the right and left is with prevalence for the left side. This can be explained with the lower values of the width sizes of the skull facial part on the left.

The angle α is 106,16 ° on the right and 104,10 ° on the left, the difference of 2 ° is with prevalence for the right side, i.e. the side with greater width sizes.

The angle β is 16,77 ° to the right and 17,05 ° to the left with a minimum difference of 0,28 ° with prevalence for the left side which is almost full equality.

The method used until now records the angle of the cheek-bone slant against the Frankfurt horizontal plane on a profile (sideways) craniograph.

As a result from our investigations we suggest by using the values of the three sides of the so-called „cheek-bone triangle“ – Porion-Orbitale, Porion-Zygomaxillare and Orbitale-Zygomaxillare by the help of he trigonometric function *cos* to calculate its angles. For example: skull No. 27, Sofia military cemetery. Po-Zm=73 mm; Po-Or=83 mm; Or-Zm=28 mm

$$cos\ \gamma = \frac{PoOr2+ZmOr2-ZmPo2}{2PoOr.ZmOr} = \frac{6889+784-5329}{2.83.28} = 0,504$$

The value of the angle γ is established as 60 ° by the trigonometric table. The same formula is used for calculation of the angle β which is 18 ° consequently angle α is 102 °. The designated angle γ of a defined value of 60 ° yields precise data about the cheek-bone vertical profiling in our case skull No. 27 adultus without using sideways craniograph. In this way the possibilities for anthropological investigations on the skull are broadened.

The asymmetry manifestations in the „cheek-bone triangle“ are in accordance with the asymmetry characteristics of the mid-face part.

The data about the values of the cheek-bone vertical slant defined the male skulls studied by us as strictly Europeoid.

The method thus forwarded for the cause of its calculation would facilitate the craniometric studies.

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Tabl.1. Biostatistical characteristics of the sizes in mm Porion-Orbitale, Porion-Zygomaxillare and Orbitale-Zygomaxillare to the right and left in skulls of adult males, Bulgarians, side, size, variation width

Side	right			left		
Size	Porion-Orbitale	Porion-Zygo maxillare	Orbitale-Zygo maxillare	Porion-Orbitale	Porion-Zygo maxillare	Orbitale-Zygo maxillare
n	407	405	410	402	403	407
x	82,25	71,87	24,6	82,30	72,7	26,7
s	4,28	3,95	2,66	2,67	3,76	2,64
m	0,21	0,20	0,13	0,20	0,19	0,13
min	66	54	18	69	58	18
max	95	85	34	94	88	33
Variation width	29	31	16	25	30	15

Tabl. 2. Biostatistical characteristics of the size differences in mm, Po-Or and Po-Zm to the right and left in skulls of adult males, Bulgarians.

Side	Right	Left
n	402	400
x	10,38	9,78
s	2,67	2,67
m	0.13	0.13
min	2	20
max	19	2
Variation width	17	18

Tabl. 3. Biostatistical characteristics of the „cheek-bone triangle“ angles in degrees on the right and left in adult male skulls, Bulgarians.

angles	α	α¹	β	β¹	γ	γ¹
n	398	398	398	398	398	398
x	103,16	104,10	16,77	17,05	57,08	59,07
s	7,69	7,40	2,22	5,39	6,89	6,72
m	0,38	0,37	0,11	0,27	0,34	0,34
min	68	69	12	12	39	33
max	129	136	28	27	94	96
Variation width	61	67	16	15	55	63