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Anthropo-odontometrical investigation of bone remains from medieval necropolis (IX - X centuries A.D.) near the village of Batin (Rousse region, Bulgaria)

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440 maxillar and 457 mandibular teeth of permanent dentition were measured after the classic odontometrical method as part of thorough anthropological investigation. After processing data and analysis of the received results a conclusion was figured that the population buried in Medieval necropolis near Batin, Rousse region (IX-X century A.D.) according to the Crown Index of lower molars is classified as mesodontal, but according to the average value of upper molars it is microdontal, as it is for the rest of the europoid population. The lower values of average Crown Index for upper molars can be explained with proto-Bulgarian ethnos participation, respectively slight Mongoloid features, which confirm craniometric characteristics.

Key words: anthropology, odontometric, the Medieval ages.

In 1978 Dimitar Stanchev an archaeologist from the Historical museum in Rousse excavated a medieval necropolis near the village of Batin, Rousse region. According to archaeological data the necropolis is dated back to about second half of IXth and beginning of Xth century and includes 98 burials.

Material and Methods

Anthropological distribution of the bone remains according to their sex and age is as follows: from 98 individuals - 61 adult ones (36 of female and 25 of male sex); 10 individuals in the juvenile age; 4 - in second and 23 in first infant age. The age of adults is in the interval from 20-25 years to 40-45 years. In 6 of the adults skulls there are traces of artificial deformation of one-band type and one of the two-band type, expressed to a slight degree. Availability of artificial deformation in skulls from the necropolis is a certain proof of proto-Bulgarian ethnos participation in the population buried in this necropolis.

The stature determined by the length of the limb bones after the Pearson-Lee formulae is within the limits of 143 to 173 cm for female individuals and of 164 to 177 cm for the male ones, while after Trotter-Gleser formulae these limits are respectively 154-185 cm and 177-187 cm. Stature values determine the population buried in this necropolis as tall and very tall.

The biostatistical characteristics of the main cranial indexes in adult individuals buried in this necropolis show that the skulls of both sexes are predominantly mesocranial, orthocranial and metriocranial. The transversal Fronto-occipital Index determines the male skulls as metriometrical (on the eurimetopic border) while the female skulls - as eurimetopic. Medium values of the Facial Index determine male skulls as leptoprosops and the female ones - as mesoprosops [2.7]. After the Facial Protrusion Index the skulls of both sexes are predominantly orthognats.

The metric and scopic characteristics of the skulls belonging to buried in the Medieval necropolis (IX-X century A.D.) near the village of Batin, Rousse region give reasons to admit an insignificant admixture of mongoloid features.

An odontometry of the permanent teeth was carried out as part of the anthropological investigation of the buried bone remains. By the routine method with an adapter calliper (with sharp ends) the following sizes: mesiodistal size, vestibulo-oral size and height of teeth crown (Fig. 1) were taken from 440 maxillar and 457 mandibular permanent teeth with or without initial attrition.

The mesiodistal size called "tooth breadth" by some authors [3], [5], "length" by some [1] and "mesiodistal diameter" [8] is the linear distance between the most anterior points of the tooth crown to the medial and distal directions. In the different tooth groups these points are situated at different distances from the cutting edge or the masticatory surface.

The vestibulo-oral size also called "tooth thickness" [3] and the "vestibulo-lingual diameter" [8] is determined by the most anterior points on the vestibular and

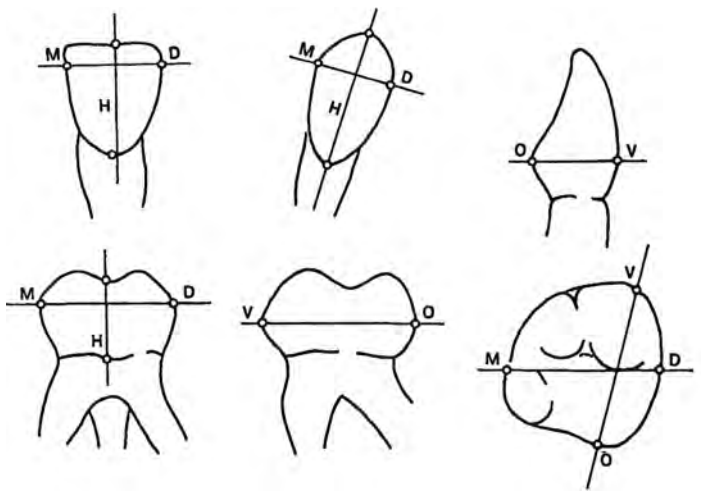

Fig. 1. Points and sizes of tooth crowns according to Martin [2] and Zubov [8]

oral crown surfaces perpendicular to the mesiodistal one. In most teeth these points are situated in the cervical third of the tooth crown.

For the different tooth groups the crown height ("height of tooth" according to Martin [3] is determined differently. For the incisors it is the linear distance along the vertical axis from the medium point of the cutting edge to the lowest enamel-cement border point on the vestibular surface. For the canines and the premolars the crown height is linear distance along the vertical axis between the apex of vestibular cusp and the lowest situated point of the enamel-cement border on the vestibular surface. For the molars was used the method of Martin [3] which measures the height up to the masticatory tooth surface, without taking into account cusp height. As a level on the masticatory surface is accepted the lowest between the two vestibular cusps. The crown height of the molar is the distance from the above-mentioned point to the lowest vestibular one of the enamel-cement border, and parallel to the vertical axis of the tooth.

Stemming from the mesiodistal and the vestibulo-oral sizes the Index, the Module and the Crown Robustness Coefficient were calculated.

The Crown Index is the per cent correlation between vestibulo-oral and mesiodistal sizes $\left(J = \frac{VO}{MD} \times 100\right)$ and characterizes the shape of the crown and degree of its protrusion. The average value of the Upper Molar Index is about 120. Europoids have the highest value - 125 and more. For the Mongoloids the average value of the Index is under 120. The value of the Average Index of the lower molars population is under 100. There is a rubrication about it (dolichodontism - up to 89.9; mesodontism - from 90.0 to 99.9 and brachidontism - over 100).

The crown Module characterizes the general crown mass and is the sum of the mesiodistal and vestibulo-oral sizes divided by two $\left(M = \frac{MD + VO}{2}\right)$. The average value of upper molar Crown Module gives the best overall characteristic of absolute dentition sizes. Based on its values a rubrication is introduced (microdontism - up to 10.19; mesodontism - from 10.20 to 10.49 and macrodontism - over 10.50). Most microdontal are the southern branches of the Europoid race; macrodontism is a negroid race characteristic, mongoloids and the northern branches of the Europoid race are mesodontal [9].

Together with the Module as an index of the general mass crown robustness is also used. It is the result from the multiplication of the mesiodistal and vestibulo-oral sizes ($Rb = VD \times MD$).

Results and Discussion

The findings were processed by the method of variation statistics (Table 2). They are represented as follows: for both sexes - males and females; for the right and the left teeth named accordingly; separately about the maxilla and mandibula.

For the first lower molar the mesiodistal size is the biggest; with the close value is the first upper molar but for the vestibulo-oral size the value is of a reverse correlation. Both sizes are the biggest for the molar group. Crown height is of biggest value for the lower canine; next in value is the crown height of the upper central incisor.

T a b l e 1. Biostatistical characteristic of the three main sizes of the tooth crowns in burials of both sexes in the medieval necropolis (IX-X century A.D.), BY Batin, Rousse region

Jaw	Teeth	MD-size			VO-size			Crown height		
		n	M	m	*n*	M	m	*n*	M	m
m	8	22	8.12	0.11	23	10.30	0.16	10	5.56	0.12
a	7	64	9.28	0.09	61	10.92	0.10	33	5.96	0.09
x	6	74	10.19	0.10	74	11.04	0.06	34	6.24	0.07
i	5	70	6.17	0.08	72	8.79	0.06	27	6.76	0.11
l	4	68	6.48	0.08	73	8.51	0.08	26	7.20	0.08
l	3	60	7.35	0.06	66	8.14	0.08	23	9.71	0.18
a	2	46	6.50	0.08	51	6.07	0.06	25	9.30	0.14
	1	44	8.24	0.11	45	6.97	0.07	20	9.82	0.18
m										
a	1	31	4.86	0.08	45	5.66	0.06	12	8.00	0.19
n	2	51	5.57	0.07	60	6.12	0.05	24	8.30	0.22
d	3	59	6.46	0.06	73	7.37	0.07	24	10.36	0.16
i	4	71	6.35	0.06	75	7.31	0.06	28	7.82	0.11
b	5	67	6.45	0.05	71	7.84	0.07	28	7.30	0.18
u	6	64	10.50	0.06	67	10.17	0.05	25	6.60	0.13
l	7	71	10.07	0.07	70	9.62	0.08	28	6.35	0.10
a	8	46	9.89	0.10	46	9.36	0.09	15	5.94	0.10

T a b l e 2. Biostatistical characteristic of the index, module and coefficient of robustness of the tooth crowns in burials of both sexes in the medieval necropol (IX-X century A.D.) by Batin, Rousse region

Jaw	Teeth	Index (I)			Module (M)			Robustness (Rb)		
		n	M	m	*n*	M	m	*n*	M	m
m	8	22	126.8	1.7	22	9.2	0.10	23	85.4	2.5
a	7	62	117.8	1.0	63	10.1	0.09	63	101.7	1.5
x	6	73	108.1	0.7	74	10.6	0.07	73	112.3	1.2
i	5	69	141.6	0.9	68	7.6	0.06	67	55.4	0.8
l	4	63	134.5	0.8	68	7.6	0.06	67	55.0	0.8
l	3	58	110.4	0.8	59	7.7	0.06	59	59.6	1.0
a	2	44	94.7	1.0	45	6.3	0.07	44	39.7	0.9
	1	43	84.8	0.9	44	7.5	0.08	44	57.1	1.0
m										
a	1	31	117.0	1.9	31	5.2	0.07	31	27.3	0.7
n	2	53	109.3	1.6	53	5.9	0.07	53	33.3	0.7
d	3	59	112.2	0.9	61	6.9	0.06	61	48.0	0.8
i	4	70	114.0	0.8	73	6.9	0.05	73	46.7	0.7
b	5	64	120.1	0.8	67	7.2	0.05	67	51.7	0.8
u	6	62	96.7	0.5	62	10.3	0.06	61	105.8	1.1
l	7	68	96.3	0.5	68	9.8	0.07	68	96.9	1.4
a	8	43	96.3	0.7	43	9.7	0.09	43	91.8	2.7

Tooth crown height is of biggest value for the frontal tooth group - canines and incisors. Teeth without attrition were used for measuring the crown height.

According to the Crown Index rubrication of the mandibular molars the medieval population buried in Medieval necropolis (IX-X century A.D.) near the village of Batin, Rousse region is characterized by mesodontism. The average Upper Molar Index is 117.57 that is under 120 - a value which can be appropriate for the mongoloid race.

The Crown Module value is biggest for the first upper molar; with values close to the ones of the first lower molar and the second upper molar. According to the rubrication accepted as an average value of the Crown Module of the upper molars (in this case - 9.97) the population from the necropolis near Batin is described with microdontism, specific for the great europoid race south branch.

The Robustness Coefficient shows a value distribution close to the one for the Crown Module - the biggest one is for the first upper molar.

Conclusion

The review of the metric data about tooth crowns of permanent teeth in the medieval population (IX-X century A.D.) buried near Batin, Rousse region, it is clear that the centre of masticatory act is normally in the area of the first molars. Maxillar teeth are of a bigger volume and a bigger mass. The population characterized as a mesodontal for the mandibular molars and microdontal for the maxillar molars. These data conform with the odontometrical characteristics of south branches of the europoid race. The lower values (under 120) of the Crown Index for the upper molar group (117.56) can be explained with the availability of slight mongoloid features coming from the proto-Bulgarian ethnos participation [11.9].

In conclusion we can note that the performed odontometrical investigation of the burials in the Medieval necropolis near Batin, Rousse region (IX-X century A.D.) confirms the craniometric results proving the belonging of these individuals to the europoid race stem in spite of the presence of slight mongoloid features.

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