

The Shovel-Shaped Character in the Maxillar Incisors of Modern Bulgarian Population

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As part of the national programme "Anthropological Characterization of the Bulgarian People" has been included also the study of a number of scopic features of the teeth and denture among which the presence and degree of expression of the shovel shape of the upper incisors' lingual surface. A total of 5289 individuals aged between 30 and 40 (2435 men and 2854 women) from 154 foci from the whole territory of Bulgaria. According to the presence of the shovel shape of the central upper incisors 2270 men and 2634 women have been investigated and for the lateral upper incisors — 2250 men and 2592 women respectively. The values of the data about the Bulgarian population are somewhat higher than the ones accepted in literature for the Europoid groups (about 15%), which can be assigned to the anthropological diversity of the Bulgarian population.

Key words: odontoanthropology, teeth, incisors, shovel-shape.

The study of a number of anthropological features of the teeth and denture has comprised an integral part of the national programme "Anthropological Characterization of the Bulgarian People" [4]. These features represent a part of the anthropological characterization of the individual, on the one hand, and are of interest per se, on the other. The descriptive features of the teeth and denture are hereditarily predetermined and reveal considerable differences in the representatives of the various racial and ethnic groups. Some of them have been studied in detail being in close connection to tooth morphology and others are in the process of being made more precise and additionally investigated. In anthropology, odontological anthropology respectively there is no unified and conventional, widely accepted method of odontoscopy [8]. Successful attempts for introducing some unification in the variable picture of the scopic investigation of the teeth were undertaken by D a h l b e r g [7] and Z u b o v [6, 7].

Aim

The aim of this study is to analyze and estimate the frequency and degree of expression of one of the basic odontoscopical features — the shovel-shape of the upper incisors in the contemporary Bulgarian population.

Material and Methods

A total of 5289 individuals (2485 males and 2864 females) aged between 30 and 40 years, from 154 foci from all over the country have been investigated. The data from the investigated contingent have been distributed into nine groups for the statistical processing, representing the population of the nine administrative regions of the country during the investigation period (1989-1993).

In the present study, out of the 26 explored odontoscopic features the shovel shaped character in the maxillar incisors has been investigated. The shape of the oral surface of the maxillar incisors has been registered in four grades after the method of H r d l i ě k a [4] ranging from 0 to 3.

Grade 0 — the lingual surface of the incisor is flat or evenly bent, the borders do not jut out as individual banks.

Grade 1 — the borders form slightly protruding banks, often spanning only a part of the lingual surface of the crown height.

Grade 2 — the lingual surface of the crown is defined by well discernible banks in all its height.

Grade 3 — The lingual surface is defined by strongly protruding crests.

The four shapes thus described have been recorded for the left and right intact incisors. For the upper left and right central incisors 2270 men and 2634 women have been investigated and for the upper left and right lateral incisors the numbers respectively are as follows: 2250 and 2592.

According to Z u b o v [7] the pronounced shovel shape incorporates grades 2 and 3 (after H r d l i ě k a [3]) and grade 1 merges with grade 0 being interpreted as absence of the shovel-shape. As early as 1961 H a n i h a r a exploring the manner of inheritance of the shovel-shape in the upper incisors arrives at the conclusion that this feature is being inherited in the monomeric way and is determined by a dominant gene [3]. Even more he assumes that grade 1 is a variety of grade 0 and is not genetically predetermined in contrast to grade 2, which is conceived as a variation of grade 3, and an expression of the "shovel-shape gene".

Results and Discussion

The results are presented in Tables 1 and 2 in absolute numbers and in per cent distribution for men and women separately, for nine regions and for the whole country in general, for the central and lateral incisors respectively.

The data about the central incisors of men show that for the whole country the shovel shape is missing in 70.8 per cent of the cases; grade 1 is displayed by 2.8%, grade 2 — 16.1 % and grade 3 — 10.3 %. Merging grades 0 and 1 absence of the shovel-shape character in 73.6: is established and presence of this feature is observed in 26.4 % (merging respectively grades 2 and 3). The highest percentage of the shovel-shapes presence in the upper central incisors (grade 2) is 16.1 %, i.e. the moderate variation is most frequently pronounced. The merging of grade 2 and grade 3 as recommended by Z u b o v [7] shows after the comparative analysis, that the highest percentage of pronounced shovel-shape — 33.9 % is found in the Plovdiv region and the lowest — 19.92 % in the Lovech region. The frequency of the strongly pronounced shovel shape (grade 3) of the upper central incisors of men is also the highest in the region of Plovdiv — 15.00 % and lowest in the region of Montana and the city of Sofia — 5.03 % and 5.31 % respectively.

T a b l e 1. Degree and per cent distribution of the shovel shaped character in the upper central incisors of modern Bulgarian population

No	Regions	Men									Women									
		N	0		1		2		3		N	0		1		2		3		
			n	%	n	%	n	%	n	%		n	%	n	%	n	%			
1	Sofia City	226	151	69.91	20	8.85	36	15.93	12	5.31	263	197	74.90	31	11.79	31	11.79	4	1.52	
2	Districts	Sofia	288	211	73.26	6	2.08	38	13.20	33	11.46	332	258	77.72	4	1.20	41	12.35	29	8.73
3		Plovdiv	260	167	64.23	5	1.92	49	18.85	39	15.00	319	167	64.23	5	1.92	49	18.85	39	15.00
4		Haskovo	276	175	63.40	10	3.62	53	19.20	38	13.78	333	175	63.40	10	3.62	53	19.20	38	13.78
5		Bourgas	238	168	70.59	3	1.26	36	15.13	31	13.02	320	168	70.59	3	1.26	36	15.13	31	13.02
6		Montana	306	219	71.57	8	2.61	63	20.59	16	5.23	312	219	71.57	8	2.61	63	20.59	16	5.23
7		Lovech	251	194	77.29	7	2.79	30	11.95	20	7.97	292	241	82.53	7	2.40	31	10.62	13	4.45
8		Rousse	179	139	77.65			21	11.73	19	10.62	189	158	83.60			19	10.05	12	6.35
9		Varna	246	176	71.55	5	2.03	40	16.26	25	10.16	274	213	77.74	16	5.84	30	10.95	15	5.47
10		Whole country	2270	1607	70.79	64	2.83	366	16.12	233	10.26	2634	2055	80.2	93	3.53	318	12.07	168	6.38

Table 2. Degree and per cent distribution of the shovel shaped character in the upper lateral incisors of modern Bulgarian population

No	Regions	Men								Women										
		N	0		1		2		3		N	0		1		2		3		
			n	%	n	%	n	%	n	%		n	%	n	%	n	%			
1	Sofia City	227	145	63.88	24	10.57	44	19.38	14	6.17	259	175	67.57	24	9.27	46	17.76	14	5.40	
2	Districts	Sofia	286	203	70.98	6	2.10	33	11.54	44	15.38	327	253	77.38	4	1.22	32	9.78	38	11.62
3		Plovdiv	257	158	61.48	7	2.72	53	20.62	39	15.18	313	158	61.48	7	2.72	53	20.62	39	15.18
4		Haskovo	277	173	62.45	7	2.53	48	17.33	49	17.69	332	173	62.45	7	2.53	48	17.33	49	17.69
5		Bourgas	233	161	69.10	4	1.72	36	15.45	32	13.73	309	161	69.10	4	1.72	36	15.45	32	13.73
6		Montana	302	203	67.22	5	1.66	60	19.86	34	11.26	310	203	67.22	5	1.66	60	19.86	34	11.26
7		Lovech	248	180	72.58	8	3.22	37	14.92	23	9.28	287	226	78.75	9	3.14	28	9.75	24	8.36
8		Rousse	176	135	76.70			22	12.50	19	10.80	189	157	83.07	1	0.53	20	10.58	11	5.82
9		Varna	244	173	70.90	5	2.05	35	14.34	31	12.71	266	203	76.32	16	6.01	29	10.90	18	6.77
10		Whole country	2250	1531	68.04	66	2.93	368	16.36	285	12.67	2592	1965	75.81	89	3.43	324	12.50	214	8.26

In the studied female individuals the shovel shape of the upper central incisors is missing in 78 %, with grade 1 are 3.5 %, grade 2 — 12.1 % and grade 3 — 6.4 %. Upon combining of grade 0 with grade 1 the shovel-shape absence grows to 81.6 % and the feature is present in 18.4 %. As in the case of men the most widespread variation is the moderately expressed one, i.e. grade 2 — 12.1 %. The highest percentage of pronounced shovel-shape of the upper incisors (grades 2 and 3) is registered in the Plovdiv region (33.85 %) and the lowest one in the Lovech region (15.1 %). The strongly expressed variations of the shovel-shape (grade 3) are also most common in the Plovdiv region — 15.0 % and they are most rare in the city of Sofia and the Lovech region — 1.52 % and 4.45 % respectively.

Taking into account sexual dimorphism it can be stated that pronounced shovel-shape of the upper central incisors (grades 2 and 3) is more common in the individuals of male sex amounting to 7.92 % which is also confirmed by the data about the strong expression of the feature (grade 3) with an intersexual difference of 3.88 % of prevalence for the men.

The shovel-shape in the upper lateral incisors in the male sample is missing in the 68.0 % of the cases, grade 1 is registered in 2.9 %, grade 2 — 16.4 % and with grade 3 are 12.7 % of the cases. The combining of grade 0 with grade 1 yields an absence of the shovel-shape in 70.97 % and the well pronounced variation (the merging of grades 2 and 3) is found in 29.03 %.

The highest percentage of pronounced shovel-shape is found in the Plovdiv region — 35.80 % and the lowest in the Rousse region 23.30 %. The city of Sofia and the Lovech region show the lowest frequency of the strong expression of the feature — 6.17 % and 9.28 % respectively and it is highest in the Haskovo region — 17.69 %.

In the women's sample the data show that the shovel-shape of the upper lateral incisors is missing in 75.8 % of the cases, grade 1 is registered in 3.4 %, grade 2 — 12.5 % and with grade 3 are 8.3 % of the cases.

The practical absence of the shovel-shape (grade 0 and 1) is registered in 79.24 % of the cases and the expression of the feature (grades 2 and 3) in 20.76 %. The most common incidence of the feature is in its medium degree (grade 2) — 12.5 %. Upon combining grades 2 and 3 for the shovel-shape of the upper lateral incisors in women it can be observed that the sample under study from the Plovdiv Region shows the highest incidence of this feature and the one from Rousse region — the lowest (16.04 %). The strong expression of the feature is most common in Haskovo region (17.69 %) and it is most rare in the city of Sofia and the Rousse region with 5.40 % and 5.82 % respectively.

The differences between men and women show that the absence of the shovel-shape of the lateral upper incisors is more common in the female individuals while its expression (grade 2 and 3) is by 8.27 % more frequent in men.

The comparison of incidence of the shovel-shape between central and lateral upper incisors in both sexes shows that in men this feature is more often missing in the upper central incisors and in women, though by a very small margin, it is the other way about — the feature is more often missing in the upper lateral incisors. The well pronounced shovel-shape (grades 2 and 3) is more common for the lateral upper incisors — 2.65 % for men and 2.30 for women. These data are in agreement with the known from the literature, that the lateral upper incisor belongs to the most variable teeth of the human denture. This is the reason for it to express more often the extreme grades of the shovel-shape on its lingual surface. Most often a certain discord is ob-

served in the degree of expression of the shovel-shape in the upper central and lateral incisors of one and the same denture.

The shovel-shape character (grades 2 and 3) in all four upper incisors is more strongly pronounced (by about 8 %) in the male individuals. It is also noteworthy that the percentage of the shovel-shape of the upper incisors is higher in the population of Plovdiv region of South Bulgaria and that it is lower in Lovech and Rouse regions of Northern Bulgaria (tables 1 and 2).

The shovel-shape character of the incisors represents one of the best-known, well-established and most demonstrative odontological racial-diagnostic features. The summed-up incidence of grades 1 and 2 of shovel-shape in the upper central incisors in Mongoloid groups usually exceeds 70 % in contrast to the Europoid and African Negroid groups where it is rarely higher than 15 % [2]. The data from the present study show values somewhat higher than the ones found in the literature on the Europoid population, which is explained by the anthropological diversity of the population of the Republic of Bulgaria.

References

1. Dahlberg, A., O. Mikkelsen. The shovel-shaped character in the teeth of the Pina-Indians. Proceedings of the 16th Annual Meeting. — Amer. J. Phys. Anthr., 1947, No 5, 234-235.
2. Hanihara, K. Criteria for classification of crown characters of the human deciduous dentition. — Linruigaki zassi, 69, 1961, No 28, 23-36.
3. Hanihara, K. Mongoloid dental complex in the deciduous dentition. — Zinguigaku zassi, 74, 1966, No 749, 9-19 (по Зубов).
4. Hrdlička, A. Shovel-shaped teeth. — Amer. J. Phys. Anthr., 1920, No 3, 429-465.
5. Yordanov, Y., A. Nacheva, S. Ranelova, et al. Preliminary data of the investigation of the national programme "Anthropological characterization of the Bulgarian population", — Acta cytobiologica et morphologica, 3, 1993, 35-69.
6. Зубов, А. Одونتология. Москва, Наука, 1968, 146—148.
7. Зубов, А. Этническая одонтология. Москва, Наука, 1973, 100-106.
8. Йорданов, Й. Наръчник по антропология за медици и стоматолози. С., УИ „Св. Климент Охридски“, 1977, 80 с.