

Anthropometrical characteristic of human bone remains from Shekerdzha mound and Gabrova mound, village of Kamen, Sliven region (Bronze Age)

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The aim of this study is to perform anthropometrical characteristics of the preserved bone remains from Shekerdzha mound and Gabrova mound, village of Kamen, Sliven Region, dated in the Bronze Age. The anthropometrical investigation includes 41 measurements and 15 indexes of the skull and 38 measurements and 15 indexes of the bones of postcranial skeleton. The stature is calculated according to the formulae given by Pearson - Lee and the tables given by Trotter - Gleser. The finds of human bone remains from the Bronze Age are not numerous, so this study can be used as a basis for comparison for subsequent studies of bone material from this epoch.

Key words: anthropometrical characteristic, bone remains, Bronze Age

Introduction

In the summer of 2011, archaeologists from TEMP (Thracian Expeditions for Mound Research), led by Dr. Diana Dimitrova, carried out excavations in two mounds near the village of Kamen – Shekerdzha mound and Gabrova mound. Village of Kamen is situated in southeastern Bulgaria, 15 km southeast of the town of Sliven. Shekerdzha mound is located 1 km north of the village and has a diameter of about 45 m and a height of 5 m. In this mound are found 10 burials, which are dated in Bronze Age according to the archaeological data. Gabrova mound is located close to the north houses of the village. Its diameter is 32 m and the height is about 2,60 m. Nine of the burials in this mound were made in the Early Bronze Age [7]. According to the found artifacts, the archaeologists confirm the hypothesis that the local population is bearer of the Yamna Culture from Radnevo, which characterizes with specific pit graves – kurgans, in which the dead bodies were placed in a supine position with bent knees. The mounds were built by stone heaping in a circle. The archaeologists prove that these artifacts are related to the ethnogenesis of Thracians. The grave artifacts as clay lamps, bracelets, jewelry, and ceramics, show that this population moved from northeast to southwest [6].

The aim of the study is to perform anthropometrical characteristics of the preserved bone remains from Shekerdzha mound and Gabrova mound, village of Kamen, Sliven Region, dated in the Bronze Age.

Material and Methods

The human skeletal remains from Shekerdzha mound and Gabrova mound are accepted in IEMPAM –BAS in September 2011. The bones are cleaned and some of them are restored. After age and sex determination, the presence of bone remains of 33 individuals is established (Table 1). The skulls and the bones of postcranial skeleton are examined by classical anthropological methods [1, 4, 5]. The investigation includes 41 measurements and 15 indexes of the skull and 38 measurements and 15 indexes of the bones of postcranial skeleton.

Table 1. Age and sex of the buried individuals from Shekerdzha mound and Gabrova mound

Age group	Infans I	Infans II	Juvenilis	Adultus			Maturus			Senilis			?	
				♂	♀	?	♂	♀	?	♂	♀	?	♂	♀
Sex	-	-	-	♂	♀	?	♂	♀	?	♂	♀	?	♂	♀
Shekerdzha mound	3	-	1	6	-	-	1	-	-	-	-	-	-	-
Gabrova mound	7	-	-	6	2	2	2	1	1	-	-	-	1	-

Only bones of the adult individuals are measured in the present study. The small sample does not enable to apply descriptive statistics. The signatures of the burials are identical with these of the archaeologists.

The stature is calculated on the basis of the length of the limb long bones according to the methods of Pearson – Lee [2] and Trotter – Gleser [3].

Results and Conclusion

The measurements and indexes of the skulls are presented in Tables 2 and 3. The measurements and indexes of the bones of postcranial skeleton are presented in Tables 4-9. The stature data are presented in Table 10. Intensively red-coloured bones with ochre are observed in both mounds.

The finds of human bone remains from the Bronze Age are not numerous, so this study can be used as basis for comparison for subsequent studies of bone material from this epoch. The Bronze Age finds are of certain interest, because of their antiquity as well as in connection with the ethnogenesis of the population in the territory of Bulgaria.

Table 2. Cranial measurements

No by Martin	Cranial features	Burial signatures	Shekerdzha mound		Gabrova mound								
			9	10 n.	24(3)	24(4)	24(5)	25	30(1)	30(2)	30(3)	30(4)	31
			♂, Ad	♂, Ad	♀, Ad	♂, Ad	♀, Ad	♂, Mat	♂, Ad	♂, Ad	♂, Ad	♂, Ad	♂, Mat
1	Glabella-occipital length	-	-	191,0 VL	-	-	194,0 VL	-	-	208,0 VL	-	194,0 VL	
7	Length of <i>foramen magnum</i>	-	-	-	-	-	-	-	-	-	38,0 L	-	
8	Maximum cranial breadth	-	-	129,0 S	-	-	154,0 VL	-	-	-	-	-	
9	Least frontal breadth	-	104,0 VL	91,0 M	-	-	-	95,0 M	-	101,0 L	93,0 S	-	
12	Biasterionic breadth	-	-	-	-	-	125,0 VL	-	-	-	112,0 L	-	
16	Breadth of <i>foramen magnum</i>	-	-	-	-	-	-	-	-	-	31,0 L	-	
43	Upper facial breadth	-	-	104,0 L	-	-	-	-	-	-	-	-	
44	Biorbital breadth	-	-	99,0	-	-	-	-	-	-	-	-	
46	Middle facial breadth	-	-	92,0 M	-	-	-	-	-	-	-	-	
48	Upper facial height	-	-	63,0 S	-	-	-	-	-	-	-	-	
48 ₍₁₎	Height of alveolar part	-	-	12,0	-	-	-	-	-	-	13,0	-	
48 ₍₂₎	Lower facial height	-	-	-	-	-	-	-	-	-	54,0	-	
51	Orbital breadth	44,0 L	-	-	-	-	-	-	-	-	40,0* S	-	
52	Orbital height	36,0 VS	-	31,0 VS	-	-	-	-	-	-	29,0* VS	-	
54	Nasal breadth	-	-	24,0 M	25,0 M	-	-	-	-	-	22,0 VS	-	
55	Nasal height	-	-	50,0 M	-	-	-	-	-	-	-	-	
56	Length of nasal bones	-	-	-	-	-	-	-	-	-	22,0	-	
60	Maxilloalveolar length	-	-	55,0 L	53,0 M	-	-	-	-	-	56,0 L	-	
61	Maxilloalveolar breadth	-	-	68,0 VL	58,0 VS	-	-	-	63,0 M	65,0 VL	66,0 VL	-	
62 ₍₁₎	Front palatal length	-	-	42,0	38,0	-	-	-	34,0	35,0	37,0	-	
63	Palatal breadth	-	-	44,0 VL	34,0 VS	-	-	-	38,0 S	40,0 M	42,0 L	-	
64	Palatal height	-	-	10,0	12,0	-	-	-	14,0	15,0	12,0	-	

65	Condylar breadth of mandible	-	135,0 VL	-	112,0 S	-	130,0 VL	120,0 M	111,0 S	116,0 S	120,0 M	112,0 S
65 ₍₁₎	Coronoid breadth of mandible	-	110,0	-	-	-	95,0	105,0	-	99,0	101,0	90,0
66	Bigonal breadth	-	103,0 M	-	95,0 S	-	104,0 L	90,0 VS	87,0 VS	98,0 M	100,0 M	90,0 VS
67	Front mandible breadth	50,0 VL	48,0 L	50,0 VL	48,0 L	44,0 M	50,0 VL	48,0 L	45,0 M	46,0 M	45,0 M	42,0 VS
68	Mandibular length	-	91,0 VL	-	83,0 L	-	96,0 VL	88,0 VL	84,0 VL	85,0 VL	88,0 VL	85,0 VL
68 ₍₁₎	Condylar length	-	118,0 VL	-	108,0 M	-	116,0 VL	115,0 VL	109,0 L	110,0 L	115,0 VL	112,0 L
69	Mental height	36,0 L	-	29,0* M	33,0 M	29,0 M	31,0 S	33,0 M	-	35,0 L	39,0 VL	30,0 S
69 ₍₁₎	Height of <i>corpus mandibulae</i>	35,0 L	33,0 L	27,0* S	-	30,0* L	31,0 M	32,0 M	31,0 M	32,0 M	32,0 M	27,0 VS
69 ₍₂₎	Height of <i>corpus mandibulae</i> at the level of the 2 nd molar	33,0	30,0	25,0*	28,0	-	30,0	28,0	24,0	28,0	27,0	22,0
69 ₍₃₎	Thickness of <i>corpus mandibulae</i>	12,0 M	15,0 VL	14,0*	15,0 VL	14,0* VL	13,0 M	14,0 L	12,0 M	12,0 M	13,0 M	11,0 S
70	Condylloid height	-	67,0 L	-	70,0 VL	-	68,0 L	60,0 M	56,0 S	63,0 M	62,0 M	54,0 S
70a	Projection height from <i>capitulum mandibulae</i>	-	63,0 M	-	67,0	-	63,0	58,0	53,0	61,0	60,0	52,0
70 ₍₁₎	Front coronoid height	-	70,0	-	72,0*	-	69,0	65,0	52,0	63,0*	63,0	58,0
70 ₍₂₎	Least condylloid height	51,0	52,0	-	55,0	43,0	48,0	54,0	48,0	52,0	52,0	46,0
70 ₍₃₎	Depth of <i>incisura mandibulae</i>	17,0	15,0	-	16,0*	13,0	16,0	13,0	9,0*	14,0*	12,0	14,0
71	Breadth of <i>ramus mandibulae</i>	38,0	36,0	-	32,0	28,0	38,0	31,0	31,0	30,0	33,0	32,0
71a	Least breadth of <i>ramus mandibulae</i>	36,0 L	35,0 M	-	31,0 S	28,0 S	38,0 VL	30,0 S	30,0 S	29,0 VS	33,0 M	31,0 S
71 ₍₁₎	Breadth of <i>incisura mandibulae</i>	37,0	37,0	-	29,0	36,0	32,0	34,0	33,0*	30,0*	37,0	33,0
79	Mandibular angle	-	120° M	-	115° S	-	116° S	124° M	124° M	122° M	119° M	125° L

* - measurements are measured on the right side, as it was impossible to be measured on the left one

VS – very small; S – small; M – moderate; L – large; VL – very large / categories by Alekseev – Debets [5]/

Table 3. Cranial indexes and rubrications

No by Martin	Burial signatures Cranial indexes	Shekerdzha mound		Gabrova mound								
		9	10 n.	24(3)	24(4)	24(5)	25	30(1)	30(2)	30(3)	30(4)	31
		♂, Ad	♂, Ad	♀, Ad	♂, Ad	♀, Ad	♂, Mat	♂, Ad	♂, Ad	♂, Ad	♂, Ad	♂, Mat
8:1	Cranial index	-	-	67,5 VS, hyperdolicho- cran	-	-	79,4 M mesocran	-	-	-	-	-
9:8	Frontoparietal index	-	-	70,5 L eurymetop	-	-	-	-	-	-	-	-
12:8	Parietooccipital index	-	-	-	-	-	81,2 L	-	-	-	-	-
48:46	Upper midfacial index	-	-	68,5 S	-	-	-	-	-	-	-	-
52:51	Orbital index	81,8	-	-	-	-	-	-	-	-	72,5* VS chamae conch	-
54:55	Nasal index	-	-	48,0 M mesorhin	-	-	-	-	-	-	-	-
61:60	Maxilloalveolar index	-	-	123,6 L dolicho- uran	109,4 S dolicho- uran	-	-	-	-	-	117,9 M brachyuran	-
64:63	Palatal height index	-	-	22,7 chamae staphylin	35,3 ortho staphylin	-	-	-	36,8 ortho staphylin	37,5 ortho staphylin	28,6 ortho staphylin	-
16:7	Index of <i>foramen magnum</i>	-	-	-	-	-	-	-	-	-	81,6 M	-

68:65	Mandibular index	-	67,4 dolicho steno mandib ular	-	74,1 dolicho steno mandib ular	-	73,9 dolicho steno mandib ular	73,3 dolicho steno mandib ular	75,7 dolicho steno mandib ular	73,3 dolicho steno mandib ular	73,3 dolicho steno mandib ular	75,9 dolicho steno mandib ular
69 ₍₂₎ :69	Height index of mandible	91,7	-	86,2	84,9	-	96,8	84,9	-	80,0	69,2	73,3
71:70	Index of ramus mandibulae	-	53,7	-	45,7	-	55,9	51,7	55,4	47,6	53,2	59,3
66:65	Breadth index of mandible	-	76,3	-	84,8	-	80,0	75,0	78,4	84,5	83,3	80,4
70 ₍₃₎ :70 ₍₁₎	Index of <i>incisura mandibulae</i>	46,0	40,5	-	55,2	36,1*	50,0	38,2	27,3	46,7	32,4	42,4
69 ₍₃₎ :69 ₍₁₎	Height-thickness index of corpus mandibulae	34,3 S	45,5 L	51,9 VL	51,7 VL	46,7 L	42,0 L	43,8 L	38,7 M	37,5 M	40,6 M	40,7 M
<p>VS – very small; S – small; M – middle; L – large; VL – very large /categories by Alekseev – Debets [5]/ The rubrications are determined according to Martin – Saller (1957).</p>												

Table 4. Measurements and indexes of the long bones of the upper limb

No by Martin	Burial signatures Features of the long bones of upper limb	Shekerdzha mound				Gabrova mound											
		1	4	6	10 n.	25	28(2)	30	30(1)	30(2)	30(3)	30(4)	31				
		♂, Ad	♂, Ad	♂, Ad	♂, Ad	♂, Mat	♂, Ad	?, Ad	♂, Ad	♂, Ad	♂, Ad	♂, Ad	♂, Mat				
		dex.	sin.	dex.	sin.	dex.	sin.	dex.	dex.	dex.	sin.	dex.	sin.	dex.	sin.	sin.	
1	Greatest humeral length	-	-	-	-	297,0	301,0	-	-	-	297,0	291,0	332,0	-	283,0	280,0	-
4	Epicondylar breadth	-	-	65,0	71,0	65,0	63,0	72,0	-	63,0	64,0	-	68,0	-	63,0	-	62,0
9	Greatest transversal diameter of <i>caput humeri</i>	47,0	45,0	-	-	45,0	43,0	-	-	-	42,0	-	43,0	-	41,0	41,0	-
10	Greatest sagittal diameter of <i>caput humeri</i>	52,0	49,0	-	-	47,0	47,5	-	-	-	46,5	-	49,5	-	43,0	43,0	-
7	Least circumference of humeral shaft	-	-	-	-	-	65,0	-	-	-	63,0	62,0	69,0	-	62,0	62,0	-
7a	Humeral midshaft circumference	-	-	-	-	-	69,0	-	-	-	65,0	63,0	71,0	-	70,0	76,0	-
7:1	Humerus robusticity index	-	-	-	-	-	21,6	-	-	-	21,2	21,3	20,8	-	21,9	22,1	-
9:10	Index of transversal section of <i>caput humeri</i>	90,4	91,8	-	-	95,7	90,5	-	-	-	90,3	-	86,9	-	95,3	95,3	-
1	Greatest radial length	-	-	-	-	239,0	241,0	-	242,0	-	-	-	-	254,0	-	-	-
3	Least circumference of radial shaft	-	-	-	-	44,0	44,0	-	42,0	-	-	-	-	46,0	-	-	-
5(5)	Radial midshaft circumference	-	-	-	-	47,0	46,0	-	44,0	-	-	-	-	56,0	-	-	-
1	Greatest ulnar length	-	-	-	-	256,0	260,0	-	-	-	-	-	-	268,0	-	-	-
3	Least circumference of ulnar shaft	-	-	-	-	45,0	44,0	-	-	-	-	-	-	37,0	-	-	-
-	Ulnar midshaft circumference	-	-	-	-	51,0	57,0	-	-	-	-	-	-	51,0	-	-	-

Table 5. Measurements and indexes of the bones of the shoulder girdle

No by Martin	Features of bones of the shoulder girdle	Burial signatures			Shekerdzha mound		Gabrova mound			
		4	6	10 n.	25	30(2)	30(3)	30(4)		
		♂, Ad	♂, Ad	♂, Ad	♂, Mat	♂, Ad	♂, Ad	♂, Ad		
		sin.	dex.	sin.	dex.	dex.	dex.	dex.	sin.	
1	Anatomical breadth of scapula	-	-	-	-	-	-	-	157,0	-
2	Anatomical length of scapula	-	-	-	100,0	-	-	98,0	99,0	
12	Length of <i>cavitas glenoidalis</i>	45,0	42,0	41,0	41,0	-	46,0	38,0	39,0	
13	Breadth of <i>cavitas glenoidalis</i>	27,0	33,0	29,0	30,0	-	31,0	29,0	28,5	
2:1	Scapular index	-	-	-	-	-	-	62,4	-	
13:12	Length-breadth index of <i>cavitas glenoidalis</i>	60,0	78,6	70,7	73,2	-	67,4	76,3	73,1	
1	Greatest clavicular length	-	-	-	134,0	142,0	-	134,0	-	
6	Clavicular midshaft circumference	-	-	-	43,0	37,0	-	37,0	-	
6:1	Clavicular robusticity index *	-	-	-	32,1	26,1	-	27,6	-	

* - index by Alekseev, 1966

Table 6. Measurements and indexes of sternum

No by Martin	Features of sternum	Burial signatures	Shekerdzha mound	Gabrova mound	
			10 n.	25	30(4)
			♂, Ad	♂, Mat	♂, Ad
1	Total length		137,0	160,0	-
2	Length of <i>manubrium sterni</i>		46,5	59,0	46,0
3	Length of <i>corpus sterni</i>		92,0	108,0	-
4	Greatest breadth of <i>manubrium sterni</i>		66,5	-	61,0
5	Greatest breadth of <i>corpus sterni</i>		-	38,0	-
2:1	Length index of <i>manubrium sterni</i>		33,9	36,9	-
3:1	Length index of <i>corpus sterni</i>		67,2	67,5	-
5:1	Length-breadth index of <i>sternum</i> *		-	23,8	-
5:3	Length-breadth index of <i>corpus sterni</i> *		-	35,2	-

* - index by Alekseev, 1966

Table 7. Measurements and indexes of the long bones of lower limb

No by Martin	Burial signatures Features of the long bones of lower limb	Shekerdzhia mound	Gabrova mound							
		10 n.	24(4)	23		25		31		
		♂, Ad	♂, Ad	♂, ?		♂, Mat		♂, Mat		
		dex.	dex.	dex.	sin.	dex.	sin.	dex.	sin.	
1	Greatest femoral length	-	451,0	-	-	-	-	-	-	
18	Vertical diameter of <i>caput femoris</i>	-	-	-	-	46,0	-	-	-	
19	Sagittal diameter of <i>caput femoris</i>	-	-	-	-	45,0	-	-	-	
19:18	Index of transversal section of <i>caput femoris</i>	-	-	-	-	97,8	-	-	-	
1	Total length of tibia	-	-	-	-	-	-	-	371,0	
1a	Greatest length of tibia	408,0	-	-	-	-	-	377,0	381,0	
3	Greatest breadth of proximal tibial epiphysis	-	-	-	-	-	-	-	71,0	
6	Greatest breadth of distal tibial epiphysis	-	-	50,0	53,0	-	55,0	-	51,0	
10	Tibial midshaft circumference	-	-	-	-	-	-	-	85,0	
10b	Least circumference of tibial shaft	-	-	-	-	-	-	75	75,0	
3:1	Index of the breadth of proximal tibial epiphysis*	-	-	-	-	-	-	-	19,1	
10:1	Tibial robusticity index*	-	-	-	-	-	-	-	22,9	
10b:1	Length-thickness index of tibia	-	-	-	-	-	-	19,9	20,2	
1	Greatest length of fibula	-	-	-	-	-	-	-	355,0	
4	Fibular midshaft circumference	-	-	-	-	-	-	-	44,0	
4a	Least circumference of the fibular shaft	-	-	-	-	-	-	-	37,0	
4a:1	Length-thickness index of fibula	-	-	-	-	-	-	-	10,4	
* - index by Alekseev, 1966										

Table 8. Measurements and index of calcaneus

No by Martin	Burial signatures Features of calcaneus	Shekerdzha mound			Gabrova mound								
		2	10 n.	23	25		30(1)	30(2)		30(3)	30(4)	31	
		♂, Mat	♂, Ad	♂, ?	♂, Mat		♂, Ad	♂, Ad		♂, Ad	♂, Ad	♂, Mat	
		dex.	sin.	sin.	dex.	sin.	sin.	dex.	sin.	sin.	sin.	dex.	sin.
1	Greatest length of calcaneus	87,0	89,0	89,0	86,0	-	81,5	73,0	73,0	84,5	76,0	84,0	86,5
4	Height of calcaneus	45,0	-	45,0	40,0	41,0	40,0	37,5	37,0	42,5	38,5	38,0	39,0
4:1	Length-height index of calcaneus I *	51,7	-	50,6	46,5	-	49,1	51,4	50,7	50,3	50,7	45,2	45,1

* - index by Alekseev, 1966

Table 9. Measurements and index of talus

No by Martin	Burial signatures Features of talus	Shekerdzha mound				Gabrova mound									
		1	6		10 n.	23	25	30(1)		30(2)	30(3)		30(4)	31	
		♂, Ad	♂, Ad		♂, Ad	♂, ?	♂, Mat	♂, Ad		♂, Ad	♂, Ad		♂, Ad	♂, Mat	
		sin.	dex.	sin.	sin.	sin.	sin.	dex.	sin.	sin.	dex.	sin.	sin.	dex.	sin.
1	Length of talus	62,0	55,0	58,0	55,0	64,0	57,0	53,0	51,0	52,0	56,5	55,0	54,0	55,0	55,0
2	Breadth of talus	49,0	46,5	-	45,0	47,5	46,0	42,5	-	42,0	45,5	46,0	41,0	40,0	41,0
2:1	Length-breadth index of talus	79,0	84,5	-	81,8	74,2	80,7	80,2	-	80,8	80,5	83,6	75,9	72,7	74,5

Table 10. Stature /in cm/ of the individuals from Shekerdzha mound and Gabrova mound (categories by Martin – Saller [1])

Burial signatures	Shekerdzha mound	Gabrova mound					
	10 n.	24(4)	25	30(1)	30(3)	30(4)	31
Stature	♂, Ad	♂, Ad	♂, Mat	♂, Ad	♂, Ad	♂, Ad	♂, Mat
Pearson-Lee	173,3 tall	166,1 medium	160,6 below medium	156,6 short	167,9 above medium	152,1 short	166,4 medium
Trotter-Gleser	-	168,75 above medium	167,2 above medium	162,0 below medium	173,7 tall	157,2 short	169,5 above medium

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