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An Osteometric Study on Humerus

Estudio Osteométrico del Húmero

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SUMMARY: Humerus is the longest and thickest bone of the upper limb. As a long bone, it has two epiphysis and diaphysis. In this study, we aimed to conduct morphometric measurements belonging to human humerus. This study was conducted on 60 humerus (28 right, 32 left) in collections of Necmettin Erbakan University Meram Medicine Faculty Anatomy Laboratory. Digital calipers, osteometric board and precision scales for humerus bone measurements were used. Measurements were classified as measurements of diaphysis and proximal and distal epiphysis of humerus. Each bone weight was determined. Also nutrient foramen number and localization was determined. In this study, it was determined that mean right humerus length 30.41±1.73 mm, mean left humerus length 30.04±2.39 mm. It was identified that mean right humerus weight was 115.05±28.06 g, mean left humerus weigh twas 111.63±33.34 g. In 9 humerus (15 %), supratrochlear foramen has been observed. 6 of these were oval and 3 of them were round. Nutrient foramen has not been observed in two humerus (3.3 %). Also, medium and weak correlation was identified between many parameters. We believe that the obtained data from this study may be qualities of reference for sex determination from humerus.

KEY WORDS: Humerus; Morphometry, Osteometry.

INTRODUCTION

Humerus is the longest and thickest bone of the upper extremity and it forms the skeleton of the arm, and connects the shoulder and elbow joints to each other. Besides, it is very important for forensic and anthropological studies (Somesh *et al*., 2011; Desai & Shaik, 2012).

In morphometric analyses, it is very important to use well-preserved bones of the human body in terms of anthropological data. Besides the bone structure of the pelvis and cranium, humerus, tibia, femur, sternum, ulna, talus, calcaneus, radius bones are also used in anthropological studies. As a result of the bone deformities formed due to chemical and mechanical factors, the use of durable bones such as humerus has become very common for the sex determination. Therefore, humerus has been frequently used by researchers in forensic and anthropological studies (Bokariya *et al*., 2011; Tellioglu & Karakas, 2013). In line with this data, the aim of our study is to perform morphological measurements of humerus segments.

MATERIAL AND METHOD

Our study was performed with 60 humerus (32 left and 28 right humerus) obtained from the bone collection of Necmettin Erbakan University, Meram Medical University, Anatomy Laboratory. The permissions were obtained from Necmettin Erbakan University, Pharmaceuticals and Non-Medical Devices Research Ethics Board (2014/84). Digital calipers, measuring tape, osteometric board and precision scales were used in humerus measurements. Measurements of humerus were divided into three groups such as measurements of proximal epiphysis, diaphysis and distal epiphysis of humerus. Weights of each bone were measured by using precision scale. Furthermore, the number and the localization of foramen nutricium of the bones were also determined.

Measurements of proximal epiphysis of humerus:

MHL (Maximum humerus length): The distance between the highest point of the humeral head and the lowest point of the trochlea (Fig. 2).

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Fig. 1. A:TDHH: Transverse diameter measurement of humeral head and B: VDHH: Vertical diameter measurement of humeral head with digital caliper.

TDHH (Transverse diameter of humeral head): The diameter of the humerus head in the antero-posterior direction (Fig. 1).
VDHH (Vertical diameter of humeral head): The diameter of the bone in the lateral-medial direction (Fig. 1).
CSN(Circumference of surgical neck): The circumference located in the lower point of the humeral head.
BGL-BGW-BGD (Bicipital groove length, width ve depth) (Fig. 2).

Fig. 2. A. MHL: Maximum humeral length measurement wit osteometric board, B. DBG-WBG: Bicipital groove depth and width with digital caliper

HH-GT: The distance between the highest point of the humeral head and the highest point of the greater tubercule.
HH-CSN: The distance between the humeral head and the circumference of surgical neck.

Minimum diameter of humerus diaphysis (MINDHB), and maximum diameter of humerus diaphysis (MAXDHB) were measured by using digital caliper whereas the circumference length of humerus diaphysis (CLHB) was measured by using the measuring tape.

Measurements of the humerus diaphysis:

MINDHB (Minimum diameter of humerus diaphysis): It is the diameter of the diaphysis of the bone in the antero-posterior direction (Fig. 3).

MAXDHB (Maximum diameter of humerus diaphysis): It is the diameter of the diaphysis of the bone in the medio-lateral direction (Fig. 3).
CLHB (Circumference length of humerus diaphysis)

Measurements of distal epiphysis of humerus:

LCH-WCH: Length of the capitulum - Width of the capitulum.
LTH-WTH: Length of the trochlea - Width of the trochlea.
LCF-WCF-DCF: Length, width and depth of the coronoid fossa.
LRF-WRF-DRF: Length, width and depth of the radial fossa.

Fig. 3. A: MINDHB:Minimum diameter measurement of humerus diaphysis, B: MAXDHB: Maximum diameter measurement of humerus diaphysis and C: WOF: Width measurement of olecranon fossa with digital caliper

LOF-WOF-DOF: Length, width and depth of the olecranon fossa. (Fig. 3).
POF-DTH: The distance between the proximal point of the olecranon fossa and distal point of the trochlea.
LE-ME: The distance between lateral epicondyle and medial epicondyle.

Maximum humeral length (MHL): The distance between the highest point of the humeral head and the lowest point of the trochlea was measured by using osteometric board whereas the dry weight of the bone was measured by using precision scale (Fig. 4). The number of nutrient foramen was determined by considering the proximal and distal margins of the bone. Furthermore, the number of supratrochlear foramen(SFT) and the vertical and transverse diameters of these holes were also measured. The obtained data were evaluated by using SPSS 21.0 (Statistical Package for Social Sciences). Data were analyzed by both descriptive (mean value, standard deviation, maximum and minimum values, percentages) and quantitative statistical methods. Results were evaluated statistically in % 95 confidence interval and differences were accepted significant if $p<0.01$.

Fig. 4. Weight measurement of humerus with precision scale

RESULTS

In this study, morphometric measurements were classified into three groups such as proximal epiphysis, humerus diaphysis and distal epiphysis of humerus. Mean, minimum, maximum and standard deviation values of all parameters were determined (Table I). According to morphometric measurements of bones, it was determined that mean of the right humerus length was 304.1±17.3 mm and the mean of the left humerus length was 300.4±23.9 mm. The mean weight of the right humerus was 115.05±28.06 g and the mean weight of the left humerus was111.63±33.34 g. Supratrochlear foramen was observed in the distal epiphysis of 9 humerus (15 %), and 6 of them (66.6 %) were oval appearance and 3 of them (33.3 %) had circular shape. It was detected that the mean right transverse diameter of supratrochlear foramen (TDSFT) was 5.23±3.74 and the mean right vertical diameter of supratrochlear foramen (VDSFT) was 3.91±1.91 mm and 4.80±2.65 mm, 4.21±1.29 mm for the left side respectively. Besides, in our study, nutrient foramen was also examined and it was detected that there was one nutrient foramen in 52 humerus (86.6 %), and there were two nutrient foramen in 6 humerus (10 %). There was no nutrient foramen in two humerus (3.3 %). Furthermore, there was a weak and moderate relationship between various parameters which were measured in our study (Tables II, III).

DISCUSSION

In anatomy, paleoanthropology and forensic medicine studies, various bones are frequently used for the sex

Table I. Mean values, standard deviations and minumum-maximum values of parameters belonging to humerus (mm). (Parameters related to MHL and GSN are centimeter, other parameters are milimeter).

	Right Humerus				Left Humerus			
Parameters	**N**	**Min.**	**Max.**	**Mean±SD**	**N**	**Min.**	**Max.**	**Mean±SD**
MHL	26	27.50	34.20	30.41±1.73	31	26.30	34.40	30.04±2.40
TDHH	24	34.15	44.47	38.29±3.04	30	32.27	45.68	38.66±3.92
VDHH	24	35.70	49.33	42.41±3.25	30	35.49	51.74	42.94±4.01
GSN	26	7.30	10.90	8.69±0.99	31	7.20	10.60	9.32±0.85
LBG	26	58.82	87.09	75.59±6.05	31	65.65	96.24	77.20±6.83
WBG	26	6.12	10.42	8.06±1.16	31	6.53	10.25	8.15±0.92
DBG	26	2.17	7.24	4.89±1.38	31	2.20	6.25	4.48±0.99
HH-GT	24	3.44	8.77	6.39±1.44	29	2.62	8.97	5.83±1.72
HH-GSN	26	27.7	40.05	33.08±3.30	31	20.96	38.68	32.50±3.40
M_NDHB	28	17.20	25.14	20.63±2.15	32	15.29	23.70	19.67±2.30
MAXDHB	28	14.44	24.28	20.36±2.35	32	18.11	25.02	20.59±1.98
CLHB	28	5.70	7.40	6.58±0.47	32	6.10	8.20	6.85±0.57
LCH	28	15.81	22.83	18.32±1.60	31	13.76	20.42	17.34±1.84
WCH	28	14.13	18.68	15.84±1.21	31	13.95	20.45	17.12±1.84
LTH	28	17.02	25.10	21.13±1.92	31	16.45	25.45	20.71±2.04
WTH	28	14.78	22.53	17.71±2.34	31	9.08	20.60	15.88±2.38
LCF	28	6.48	13.66	11.24±1.59	32	4.41	50.93	12.54±7.66
WCF	28	10.09	16.18	12.95±1.73	32	6.05	15.64	12.42±2.07
DCF	28	4.99	9.35	7.44±1.14	32	3.90	10.37	6.82±1.35
LRF	28	6.90	10.55	8.52±1.23	32	5.05	10.14	8.03±1.43
WRF	28	9.78	15.03	12.82±1.79	32	8.47	16.38	10.90±1.89
DRF	28	2.17	7.26	3.41±1.10	32	1.46	6.47	3.34±1.01
LOF	28	16.73	23.00	19.10±1.45	32	16.18	23.08	19.46±1.94
WOF	28	20.14	30.71	24.72±2.31	32	20.71	29.82	25.16±2.45
DOF	28	9.82	16.74	13.41±1.78	32	12.05	18.02	14.60±1.44
POF-DTH	28	29.82	38.94	33.81±2.70	32	28.52	42.06	35.69±3.13
LE-ME	26	49.42	69.37	58.21±4.58	31	46.30	64.44	56.36±5.01
ME-TH	26	19.50	29.84	24.62±2.41	31	20.28	32.42	26.17±3.23
VDSTF	3	2.42	6.07	3.91±1.91	6	2.85	6.31	4.21±1.29
TDSFT	3	2.11	9.40	5.23±3.74	6	2.54	9.58	4.80±2.65
WH	23	59.78	169.03	115.05±28.06	26	47.20	172.78	111.63±33.34

determination. Sex determination can be estimated (almost 100% reliability) by using primarily pelvis and secondarily skull skeleton bones. Particularly, femur and humerus which are resistant to chemical and mechanical factors, are frequently used in morphometric measurements. Even though individuals in society have similar anatomical structures, there are various differences between female and male individuals. When the sex determination is performed from the skeleton, all morphological characteristics which show the gender difference are examined. These features can be frontal eminence, occipital bone, and other skull bones, features of the face, toot and mandible, the strength and massiveness of long bones, and the general structure of pelvic bone. Furthermore, it is also very important to obtain morphometric values by considering the size differences of various bones in male and female skeletons (Somesh *et al*.; Desai & Shaik; Tellioglu & Karakas; Harun, 2008). In our study, morphometric features of humerus were identified in order to provide a reference study to other studies which aim to perform sex determination by using humerus.

Desai *et al*. (2014) stated that anatomical data are very crucial in order to optimize the shoulder implants. Besides, they also emphasized that there were no sufficient data on metric values related to bone anatomical structure of the distal humeral hemiarthroplasty. Therefore, they aimed to create a data bank for the implant design by performing morphometric measurements of CT images of distal epiphysis. As a conclusion, they determined that WCH, LCH, WTH and LTH were respectively 17,2±2 mm, 23±2 mm, 22±3 mm, and 18±2 mm. Furthermore, they showed that there was a significant relationship between LCH-WCH (r=0.772), WTH-WCH (r=0.676), and WTH-LTH (r=0.454). There was a significant difference between WCH and LCH and capitulum had an ellipsoid appearance instead of spherical appearance. In our study, WCH, LCH, WTH and LTH were found in right-left humerus significantly as 15.84±1.21-17.12±1.84,18.32±1.60-17.34±1.84, 17.71±2.34-15.88±2.38, 21.13±1.92-20.71±2.04 mm. Furthermore, the association between LCH-WCH and WTH-

Table II. Pearson correlation coefficient between parameters belonging to right humerus.

PARAMETERS		WH	LE-ME	POF-DTH	LOF	WOF	DCF	WCF	WTH	LTH	WCH	LCH	CLHB	MAXDHB	M_NDHB	GSN	VDHH	TDHH	MHL
MHL	r	0.827**	0.630**	0.599**	0.510**	0.485*	0.452*	0.443*	0.624**	0.402*	0.391*	0.459*	0.537**	0.494*	0.432*	0.638**	0.459*	0.574**	1
	P	0.000	0.001	0.001	0.008	0.012	0.021	0.024	0.001	0.042	0.048	0.018	0.005	0.010	0.027	0.000	0.024	0.003	
TDHH	r	0.597**	0.0734**	0.292	0.202	0.493*	0.248	0.166	0.799**	0.600**	0.383	0.631*	0.724**	0.646*	0.464*	0.731**	0.873**	1	
	P	0.003	0.000	0.166	0.344	0.014	0.243	0.440	0.000	0.002	0.064	0.001	0.000	0.001	0.022	0.000	0.000		
VDHH	r	0.780**	0.814**	0.398	0.255	0.452*	0.360	0.387	0.858**	0.626**	0.331	0.626**	0.781**	0.750**	0.557**	0.813**	1		
	P	0.000	0.000	0.054	0.228	0.027	0.084	0.062	0.000	0.001	0.114	0.001	0.000	0.000	0.005	0.000			
GSN	r	0.785**	0.808**	0.375	0.550**	0.450*	0.300	0.455*	0.800**	0.564**	0.572**	0.647**	0.888**	0.845**	0.739**	1			
	p	0.00	0.000	0.059	0.04	0.021	0.136	0.020	0.000	0.003	0.002	0.000	0.000	0.000	0.000				
MINDHB	r	0.584**	0.598**	0.234	0.235	0.543**	0.398*	0.629**	0.473*	0.248	0.419*	0.509**	0.750**	0.639**	1				
	P	0.003	0.001	0.231	0.228	0.003	0.036	0.000	0.011	0.204	0.027	0.006	0.000	0.000					
MAXDHB	r	0.674**	0.634**	0.245	0.411*	0.327	0.224	0.430*	0.739**	0.460*	0.449*	0.624**	0.793**	1					
	P	0.000	0.001	0.209	0.030	0.089	0.251	0.022	0.000	0.014	0.016	0.000	0.000						
CLHB	r	0.783**	0.739**	0.203	0.234	0.361	0.388*	0.588*	0.712**	0.500**	0.416*	0.639**	1						
	p	0.000	0.000	0.301	0.230	0.059	0.042	0.001	0.000	0.007	0.028	0.000							
LCH	r	0.595**	0.657**	0.283	0.321	0.420*	0.206	0.232	0.723**	0.574**	0.535**	1							
	P	0.003	0.000	0.145	0.095	0.026	0.293	0.235	0.000	0.001	0.003								
WCH	r	0.429*	0.481*	0.237	0.303	0.240	0.064	-0.014	0.416*	0.576**	1								
	p	0.041	0.013	0.225	0.117	0.218	0.746	0.944	0.028	0.001									
LTH	r	0.541**	0.657**	0.488**	0.250	0.122	0.338	0.090	0.695**	1									
	P	0.008	0.000	0.008	0.200	0.536	0.079	0.650	0.000										
WTH	r	0.758**	0.809**	0.513**	0.505**	0.387*	0.246	0.315	1										
	p	0.000	0.000	0.005	0.006	0.042	0.208	0.103											
WCF	r	0.497*	0.394*	0.357	0.215	0.340	0.571**	1											
	p	0.016	0.046	0.062	0.273	0.077	0.002												
DCF	r	0.419*	0.393*	0.224	-0.028	-0.013	1												
	p	0.047	0.047	0.251	0.887	0.947													
WOF	r	0.491*	0.502**	0.280	0.246	1													
	P	0.017	0.009	0.149	0.207														
LOF	r	0.329	0.351	0.602**	1														
	p	0.126	0.078	0.001															
POF-DTH	r	0.367	0.550**	1															
	p	0.085	0.004																
LE-ME	r	0.743**	1																
	p	0.000																	
WH	r	1																	
	P																		

Table III. Pearson correlation coefficient between parameters belonging to left humerus.

PARAMETERS		WH	LE-ME	POF-DTH	LOF	WOF	DCF	WCF	WTH	LTH	WCH	LCH	CLHB	MAXDHB	M_NDHB	GSN	VDHH	TDHH	MHI
MHL	r	0.751**	0.810**	0.705 **	0.437*	0.642**	0.666**	0.614**	0.633***	0.4519**	0.629**	0.431*	0.700**	0.505**	0.530**	0.742**	0.824**	0.865**	1
	P	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.004	0.002	0.000	0.000	0.000	
TDHH	r	0.768**	0.514**	0.519**	0.411*	0.641**	0.731**	0.606**	0.620**	0.640**	0.778	0.520**	0.805**	0.670*	0.636**	0.756**	0.913**	1	
	P	0.000	0.004	0.003	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000		
VDHH	r	0.766**	0.728**	0.492**	0.262	0.583*	0.629**	0.498*	0.592**	0.626**	0.723**	0.487*	0.773**	0.611**	0.695**	0.802**	1		
	P	0.000	0.000	0.006	0.162	0.001	0.000	0.005	0.001	0.000	0.000	0.007	0.000	0.000	0.000	0.000			
GSN	r	0.745**	0.572**	0.487**	0.370*	0.648**	0.426*	0.356*	0.421*	0.548**	0.556**	0.526**	0.829**	0.707**	0.665**	1			
	p	0.00	0.001	0.005	0.041	0.000	0.017	0.050	0.020	0.002	0.001	0.001	0.000	0.000	0.000				
MINDHB	r	0.637**	0.124	0.222	0.200	0.409*	0.475**	0.479**	0.382*	0.644**	0.408*	0.432*	0.704**	0.627**	1				
	P	0.000	0.507	0.221	0.272	0.020	0.006	0.006	0.034	0.000	0.023	0.015	0.000	0.000					
MAXDHB	r	0.512**	0.409*	0.277	0.304	0.583**	0.423*	0.415*	0.342	0.521**	0.435*	0.377*	0.837**	1					
	P	0.008	0.022	0.124	0.091	0.000	0.016	0.018	0.060	0.003	0.014	0.036	0.000						
CLHB	r	0.589**	0.573**	0.459**	0.403*	0.639**	0.455**	0.460**	0.343	0.642**	0.493*	0.479**	1						
	p	0.002	0.001	0.008	0.022	0.000	0.009	0.008	0.059	0.000	0.005	0.006							
LCH	r	0.550**	0.587**	0.490**	0.022	0.553**	0.183	0.414*	0.386*	0.732**	0.648**	1							
	P	0.004	0.001	0.005	0.906	0.001	0.326	0.021	0.032	0.000	0.000								
WCH	r	0.653**	0.722**	0.410*	0.129	0.565**	0.442*	0.412*	0.544**	0.549**	1								
	p	0.000	0.000	0.022	0.488	0.001	0.013	0.013	0.002	0.002									
LTH	r	0.593**	0.752**	0.543**	0.195	0.583**	0.325	0.532**	0.490**	1									
	P	0.001	0.000	0.002	0.294	0.001	0.074	0.002	0.005										
WTH	r	0.529**	0.631**	0.51**	0.155	0.454*	0.514**	0.725**	1										
	p	0.005	0.000	0.003	0.405	0.010	0.003	0.000											
WCF	r	0.611**	0.691**	0.381*	0.135	0.468**	0.673**	1											
	p	0.001	0.000	0.031	0.463	0.007	0.000												
DCF	r	0.504**	0.531**	0.268	0.302	0.048*	1												
	p	0.009	0.002	0.138	0.093	0.010													
WOF	r	0.673**	0.548**	0.548**	0.486**	1													
	P	0.000	0.001	0.001	0.005														
LOF	r	0.256	0.134	0.442*	1														
	p	0.207	0.474	0.011															
POF-DTH	r	0.621**	0.455**	1															
	p	0.001	0.010																
LE-ME	r	0.685**	1																
	p	0.000																	
WH	r	1																	
	p																		

*Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

WCH in the right and left humerus was lower compared to the findings of Desai *et al*. and higher compared to the association between WTH-LTH (Tables I, II, III).

Salles *et al*. (2009) performed a study with 40 dry adult humerus and they examined the relationship between maximum humerus length and various parameters. They found that there was a significant association between the right maximum humerus length and LE-ME (r=0.69), LTH (r=0.83), TDHH (r=0.77) and VDHH (r=0.77) (p<0.01). Besides, the relationship between the maximum left humerus length and LE-ME, LTH, TDHH and VDHH were determined respectively as r=0.63, r=0.74, r=0.65, r=0.57. In our study, the relationship between MHL and LE-ME, LTH, TDHH and VDHH was different than the relationship found in the study of Salles *et al*., and the length was higher in the left humerus compared to the right humerus (Tables II, III).

In literature, maximum humerus length (MHL) has been determined in various studies. Particularly, it has been specified that the length of the total humerus gives important data about the characteristic features of the population in forensic and anthropological cases (Table IV). In this study, it was determined that mean MHL was 304,1±17,3 mm and 300,4±23,9 mm respectively on the right and left side of the diaphysis. Conclusively, it was found that mean MHL values of our study were compatible with findings of Latimer & Lowrance (1965), Akman *et al*. (2006); Udhaya *et al*. (2011) and Niraj *et al*. (2014); they were lower compared to findings of Bokariya *et al*., Salles *et al*.; and higher compared to findings of Somesh *et al*., Desai & Shaik and Desai *et al*.

Table IV. Maximum humeral lenght (mm).

	MHL	
Researchers	**Right**	**Left**
Akman *et al*. (2006)	307.1±20.8	304.8±20.8
Bokariya *et al*. (2011)	312.9±1.74	307.0±1.27
Niraj *et al*. (2014)	308.5±19.16	307.2±16.13
Somesh *et al.* (2011)	299.6±22.5	309.6±20.6
Desai & Shaik (2012)	292.3±22.9	289.45±21.8
Salles *et al.* (2009)	313±23	305±16
Latimer & Lowrance (1965)	303±17.71	300.85±18.35
Udhaya *et al*. (2011)	302.8±24.4	299.9±20.1
Our study	304.1±17.3	300.4±23.9

Olecranon fractures have 10 % incidence among all extremity lesions. Lesions can occur due to the direct or indirect trauma and particularly due to the forcing excessive extension of the elbow joint. Therefore, anatomical metric values of olecranon can be reference to orthopedic surgeons about fracture reconstruction and the design of various implants. Desai & Shaik determined that the distance between lengths of proximal and distal edges of olecranon fossa (LOF) and mean values in the right and left directions were respectively 19.10±1,45 and 19.46±1,94 mm. These distances were measured as 20.2±1.9 mm in female and 20.3±1,3 mm in male by Churchill & Smith (2000).

Olecranon and coronoid fossa are separated from each other by a thin bone plate. This plate presents till the age of 7. Later, a foramen, named as septal apertura or supratrochlear foramen is frequently formed in this bone plate. It is emphasized that individuals, who have this anatomical variation, can bring their elbow joint to the extension position. This foramen was defined for the first time by Meckel (1970) and there are important findings which show that this foramen has also been studied in other primates. Recently, intramedullary fixation of the humerus has commonly performed following traumatic injuries and pathological fractures. In line with these data, it is very important to have knowledge related to the anatomical structure of the humerus while planning the preoperative period. In literature, there are various studies in which the prevalence of having supratrochlear foramen is examined in different populations (Table V). Kaur & Zorasingh (2013), performed a study with 80 dry humerus samples and they showed that a rate of supratrochlear foramen was 27.5 % and according to their

Table V. Prevalance of SFT (%).

Researchers	Population	Samples	Prevalence of SFT (%)
Öztürk *et al.* (2000)	Egyptians	114 dired humeri	7.90
Çimen *et al*. (2003)	Turks	114 dired humeri	12.05
Singhal & Rao (2007)	South Indians	150 dired humeri	28
Nayak *et al.* (2009)	Indians	384 dired humeri	34,3
Li *et al.* (2015)	Chinese	262 dired humeri	10.3
Kaur & Zorasingh (2013)	Indians	80 dired humeri	27.5
Erdo_mu_ *et al*. (16)	Turks	166 dired humeri	10.8
Ndou *et al.* (2013)	South africans	1076 dired humeri	32.5
Diwan *et al.* (2013)	North Indians	1776 dired humeri	24.1
Patel *et al.* (2013)	Indians	565 dired humeri	23.5
Sunday *et al.* (2014)	Nigerians	65 dired humeri	27.7
Kumarasamy *et al.* (2011)	Indians	214 dired humeri	31.3
Our study (2016)	Turks	60 dired humeri	15

findings, left humerus were more commonly observed supratrochlear foramens compared to right humerus. This rate was found by Nayak *et al*., (2009) as 34.3 %, by Erdogmus *et al*., (2014) as 10.8 % and by Li *et al*., (2015) as 10.3 %. In our study, it was shown that this rate was lower compared to the rate obtained in the study of Kaur & Zorasingh and it was higher compared to rates obtained from studies performed by Nayak *et al*., Erdogmus *et al*., and Li *et al*. Besides, it was also detected that the supratrochlear foramen commonly had an oval appearance.

AYDIN KABAKCI, A. D.; BUYUKMUMCU, M.; YILMAZ, M. T.; CICEKCIBASI, A. E.; AKıN, D. & CIHAN, E. Estudio osteométrico del húmero. *Int. J. Morphol., 35(1)*:219-226, 2017.

RESUMEN: El húmero es el hueso más largo y grueso del miembro superior. Como un hueso largo, tiene dos epífisis y una diáfisis. En este estudio, se pretende realizar mediciones morfométricas pertenecientes al húmero humano. Este estudio se realizó en 60 húmeros (28 derechos, 32 izquierdos) en colecciones del Laboratorio de Anatomía de la Facultad de Medicina Meram,Necmettin Erbakan University, Se utilizaron calibradores digitales, tableros osteométricos y escalas de precisión para medir el húmero. Las mediciones se clasificaron como medidas de húmero proximal, corporal y distal. Se determinó el peso de cada hueso. También se determinó el número y la localización de los forámenes nutricios. La longitud media del húmero derecho fue de 30,41 ± 1,73 mm y la del húmero izquierdo fue de 30,04 ± 2,39 mm. El peso medio del húmero derecho fue 115,05 ± 28,06 g y el izquierdo 111,63 ± 33,34 g. En 9 húmeros (15 %), se observó un foramen supratroclear, seis de ellos eran ovales y tres redondos.No se observó foramen nutricio en dos húmeros (3,3 %). Además, se identificó una correlación media y débil entre varios parámetros. Creemos que los datos obtenidos de este estudio pueden ser de referencia para la determinación del sexo de un individio a partir del húmero.

PALABRAS CLAVE: Húmero; Morfometría; Osteometría.

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