

Estimating the Body Weight of Dogs Unearthed from the Van-Yoncatepe Necropolis in Eastern Anatolia

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Abstract: Two burial chambers dating back to 1000 BC have been brought to light in the Van-Yoncatepe necropolis in Eastern Anatolia. In these two chambers (M5 and M6), plenty of skeletal remains belonging to dogs buried together with humans were discovered. The finds were a dog skeleton lying in-situ in burial chamber M5 and a number of bones scattered in three layers in burial chamber M6. Humeral and femoral circumferences were used to estimate the body weight of these dogs, and the data obtained from these measurements enabled us to further our knowledge of the formats of Van-Yoncatepe dogs. The dog from burial chamber M5 was estimated to have a body weight of 20.963 kg. The measurements of the bones discovered in M6 revealed that the dogs in this chamber might have had a mean body weight of 28.105 kg. Considering their weights, it was concluded that Van-Yoncatepe dogs could be placed in the group of large-size dogs. These dogs were deemed to assume significant social roles in and to have a close relation with the prehistoric societies living in the area at that time.

Key Words: Body weight, bone measurements, dog, Van-Yoncatepe, Early Iron-Age

Doğu Anadolu'daki Van-Yoncatepe Nekropol'ünde Ortaya Çıkarılan Köpeklerin Vücut Ağırlıklarının Tahmini

Özet: Van-Yoncatepe nekropolünde (Doğu Anadolu), insan ile beraber gömülmüş çok sayıda köpek iskeletleri bulunan ve M.Ö. 1. binyılın başlarına tarihlendirilen iki adet mezar odası tespit edildi (M5 ve M6). M5 mezar odasında in-situ durumda bir adet köpek iskeleti bulunurken, M6 mezar odasında 3 gömü katmanı halinde dağılmış olarak çok sayıda köpek kemiklerine rastlandı. Yoncatepe köpeklerinin formatlarının belirlenmesine katkı sağlamak üzere vücut ağırlıkları tahmini yapıldı. Bu amaçla, humeral ve femoral circumferences'den yararlanıldı. M5 mezar odasındaki köpeğin vücut ağırlığı ortalama 20,963 kg, M6 mezar odasındaki köpeklerin vücut ağırlığı ise ortalama 28,105 kg olarak tahmin edildi. Vücut ağırlıkları dikkate alınınca, Yoncatepe köpeklerinin genelde büyük ebatlı köpeklere yakın olduğu gözlenmekteydi. Sosyal yaşamdaki görevleri açısından, büyük formattaki bu köpeklerin bölgenin tarih öncesi durumuyla yakın ilişkide olduğu kanısına varıldı.

Anahtar Sözcükler: Vücut ağırlığı, kemik ölçümleri, köpek, Van-Yoncatepe, Erken Demir Çağı

Introduction

Body size is a major factor in animal ecology and crucial with respect to the mechanical properties of the skeleton in terrestrial animals (1). Besides, it is of great significance in the morphological appearance of animals and has a marked effect on animal's life history (2,3).

The relation between body weight and various skeletal measurements has so far made it possible to form a logical estimate of both the body weight and the size and morphologies of animals (4-8).

Apart from the much utilised method of dental and mandibular measurements taken on the mandibles and

teeth found widespread in archaeological sites (9,10), osteometric measurements of the long bones of large extant and extinct carnivores have also well served to estimate body mass (6). Relations between skull morphometries and body mass have also been examined (11).

Such postcranial elements as the length, diameters and circumference of the long-bones and distal articular surface area of proximal limb have been used to estimate body mass (1,6,8,12,13).

In an attempt to estimate the body mass of various animal species, several scholars have used different

formulations based on long-bone measurements (1,6-8,11,13,14).

Further to our previous study performed on the Van-Yoncatepe dogs (11), we herein examined the humeral and femoral circumferences, and tried to estimate the body weight of the same dogs.

Materials and Methods

In this study, we used bone materials of the dogs unearthed from the necropolis of the Van-Yoncatepe Castle, which dates back to the beginning of the 1st millennium BC, Early Iron Age (15,16).

Van-Yoncatepe Castle (Eastern Anatolia) is 15 km south-east of *Tushpa* (Tuşpa), the capital of *Urart*. The excavations carried out from 1999 through 2002 in the necropolis situated to the north of the castle revealed that there are existed two burial chambers (M5 and M6). The finds were a dog skeleton lying in-situ in burial chamber M5 and plenty of bones scattered around in the three layers of burial chamber M6.

For the determination of body weight, the humeral and femoral midshaft circumference measurements were used and the calculation carried out with the aid of equations proposed by Anyonge (6) for the calculation of the body weight of carnivores. The Anyonge (6) equations were employed with due consideration of the application-related explanations provided by Wroe et al. (7). The following formulae, proposed by the latter, were used:

$$\text{Weight in grams} = 10^{(2.88 \times \log (f)) - 3.4}$$

$$\text{Weight in grams} = 10^{(2.47 \times \log (h)) - 2.72}$$

Log (f): femoral circumference taken at the midpoint on the long axis.

Log (h): humeral circumference taken at a point 35% back from the distal end of the humerus.

The following explanation given by Wroe et al. (7) was taken into consideration when applying the formulae:

“Anyonge’s (6) equations give estimates based on femoral and humeral circumference data independently . . . Corrections for logarithmic transformation bias could not be performed on these results because Anyonge (6) did not present necessary raw data, i.e. femoral and humeral circumference values for the specimens included in his analysis. Consequently, these are likely to represent underestimates, as the logarithmic transformation bias value can not be less than 1.0 (17)”.

This was how we obtained data that would give an idea of what the size and morphologies of the Van-Yoncatepe dogs were like. Then came the comparison of these data with those of present dog races, followed by group and breed classification of these archaeological dogs from Van-Yoncatepe.

Results

Humerus and femur mid-shaft circumferences were calculated for both the right and left bones. From these calculations, the body weight of the dog from burial chamber M5 was estimated to be between 19.994-21.930 kg, with a mean value of 20.963 kg (Table 1). The results of the calculations of each bone were close to one another, showing that the method employed was accurate.

As to the skeletal remains from burial chamber M6, we took measurements on the mid-shaft circumferences of 72 long bones (humerus 35, femur 37) unearthed from the three different burial layers. Using these measurements, we estimated that the dogs buried in this chamber had a mean body weight of 28.105 kg. The weight of the dogs from M6 ranged between 16.507 and 44.612 kg (Table 2). To ensure the accuracy of our results, separate calculations for the right and left bones

Table 1. Estimated body weight of the dog unearthed from burial chamber M5.

	Side	Mid-shaft circumferences (mm)	Estimated weight (kg)	Average (kg) right-left	Average (kg) humerus-femur
Humerus	Right	43.56	21.308	21.619	20.963
	Left	44.07	21.930		
Femur	Right	43.34	20.618	20.306	
	Left	42.88	19.994		

Table 2. Estimated body weight of dogs unearthed from burial chamber M6.

Bone	Side	N	Mid-shaft circumferences (mm)	SD	Estimated weight (kg)		Min.	Max.	Cv
					Mean	SD			
Humerus	Right	19	48.09	4.110	27.554	6.056	20.390	44.612	21.979
	Left	16	49.63	3.360	29.643	4.860	22.562	36.976	16.395
	Total	35	48.88	3.920	28.650	5.749	20.390	44.612	20.066
Femur	Right	15	47.23	4.360	26.973	7.050	16.507	38.121	26.137
	Left	22	47.97	4.080	28.142	6.929	19.081	43.219	24.622
	Total	37	47.67	4.150	27.666	6.905	16.507	43.219	24.958

were made. It was remarkable that the calculations produced similar results.

Discussion

Dogs might have played an important role in handling herds in Van-Yoncatepe during the Early Iron Age, because sheep, goat and cattle breeding were prevalent (15,16). It has also been asserted by the same authors that the Van-Yoncatepe region was thickly wooded and rich in prey, enabling the neighbouring societies to live widely on hunting and stockbreeding, and to use dogs both as hunting partners and sheepdogs. This role imposed on dogs in the Early Iron Age societies suggests that they were the sporting breeds in the hound group. It is in support of this view that the Van-Yoncatepe dogs were generally large-size and dolichocephalic in type (11).

It was asserted that the shoulder height of Van-Yoncatepe dogs was lower than that of the present dog races (11). However, the size of these dogs was close to that of the present dog races, according to the results of a study performed on the shoulder height (Onar and Belli, unpublished data) and the present study conducted on the body weight.

The size of the Van-Yoncatepe dogs (shoulder height: 52.15-60.13 cm; body weight: 19.994-29.643 kg) were close to those of the large races; this supports the view that formats of some dog races have grown slowly since the Middle Ages (18,19). The data obtained from both the previous (11) and present studies indicated that the Van-Yoncatepe dogs were in the group of large-size races and were not kept as pets (11).

Many dogs were buried together with a man/woman in burial chambers M5 and M6 revealed the relationship between man and dog in the Early Iron Age. The

assertion that dogs, being the best friend of man, continued to be his loyal guard even after death (20) might explain this burial tradition observed in the Van-Yoncatepe necropolis. However, we strongly believe that this close relationship showed the significant role of dogs in the societies of that time. In support of our above view, the Van-Yoncatepe excavation team has so far found no evidence to suggest that dogs from burial chambers M5 and M6 were sacrificed for any reason.

It has been reported that dog meat was consumed in several plains groups, and that the size of dogs played a role in determining the consuming choices of these groups (21). However, in the Van-Yoncatepe necropolis, there was no osteological evidence to show that the people consumed dog meat (11). There is no historical record to the contrary, either. Therefore, we believe that the dogs from burial chambers M5 and M6 were not consumed as food but had a socio-economic relationship with the people living in and around Van-Yoncatepe during the 1st millennium BC.

In conclusion, when we compared the data obtained from the estimated body weight of the M5 and M6 dogs with those of present dog races (6,7,22,23), we concluded that the Van-Yoncatepe dogs were close to the sporting breeds in the Gundog and Hound group. Van-Yoncatepe dogs served as hunting partners and as sheepdogs, and this was how they attained a significant position in the Early Iron Age societies living in and around the Van-Yoncatepe region.

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