



Mini Research Paper

Morphology and Morphometry of Tarsals of the Leopard (*Panthera pardus*)

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Abstract

The morphological study on the tarsal bones was conducted of four leopards. Tibial tarsal was second largest tarsal bone. Tibial tarsal had head, body and neck. The body of tibial tarsal had cranio-proximally located trochlea. The ridges of the trochlea the tarsal bone were not of equal size. The fibular tarsal was the largest and longest bone of the tarsus. The weight and area of fibular tarsal bone 17.90±0.11 gm and 8.68±0.12cm. The tuber calcanei of fibular tarsal formed the proximal half of the bone. The sustentaculum tali of fibular tarsal were medial in position. The central tarsal was present on the medial side of the tarsus and articulated with all other tarsal bone. First tarsal was compressed transversely. First tarsal presented facet for articulation with central tarsal, second tarsal and first metatarsal. Second tarsal was wedge shaped and smallest of the tarsal bones. Third tarsal was irregularly elongated in shape, wide in front and narrow behind. Fourth tarsal was thick, massive bone which accommodated central and third tarsal on its medial side. Distal surface of fourth tarsal had a large articular facet for articulation with the IV and V metatarsal bone.

Keywords: Tibial tarsal, fibular tarsal, central tarsal, first tarsal, second tarsal, third tarsal, fourth tarsal and leopard

Introduction

Over 100 years ago, there were huge populations of leopards worldwide. The Leopard (*Panthera Pardus*) is found throughout India with the exception of deserts and the Sundarban mangroves. It is the most common and widely distributed species among large carnivores in India Johnsingh et al¹.

Today, there are counting populations of leopard across to ever shrinking range. The Leopard is listed in table-1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Poaching of wild animals, particularly of leopard for bone trade has been increased recently and used as a substitute of tiger bones. Due to which, unfortunately these species are at the verge of extinction. Till date, morphological studies on the tarsal bones are scanty as compared to domestic animals. Considering the paucity of literature on the gross morphology and morphometry of tarsals of leopard the study was undertaken.

Material and Methods

Gross morphological and morphometric study was carried out on tarsals of four adult leopards. The various parameters of tarsal of leopard were recorded with the help of Vernier caliper/thread/ scale in cm. The data collected were analyzed for mean and standard error as per the standard procedure of Panes and Sukhatme² and Snedecor and Cochran³

Results and Discussion

All the tarsal bone i.e. Tibial tarsal, fibular tarsal, central tarsal, first tarsal, second tarsal, third tarsal and fourth tarsal is shown in Fig 1. Recorded measurement is given in table-1.

Tibial tarsal was second largest tarsal bone and was medial bone of first row. The trochlear ridges directed craniodorsally. Tibial tarsal had head, body and neck. The body of tibial tarsal had cranio-proximally located trochlea similar finding had been reported in dog by Sisson⁴. The ridges of the trochlea were not of equal size. The trochlear ridges were slightly oblique. The lateral one was longer, wider than the medial one. Medial one was smaller with sharp edge. The ridges were separated by cranio-dorsal grooves. Laterally, the body had slightly concave smooth facet articulated with the styloid process of the ulna. Caudally, the body had two facet separated by deep wide groove. The lateral articular area was concave and about double the size of medial. The medial articular area was straight and oval in shape. Head of tibial tarsal was directed medio-distally and is in line with the Pandit⁵ in tiger who reported that the head of tibial tarsal was distal extension of the bone separated by a constricted neck. The weight and area of tarsal bone 9.60 ± 0.12 and 6.47 ± 0.12.

The fibular tarsal was the largest and longest bone of the tarsus. The distal half of the bone had a wide transverse groove and presented three processes. The tuber calcanei formed the proximal half of the bone. Its free proximal end was bulbous

and compressed. The medial and lateral processes separated by a wide groove. The sustentaculum tali of fibular tarsal were medial in position. On the plantar side, of this surface, there was shallow groove for the passage of the tendons. The dorsomedial side had a concave, oval facet for articulation with the medial articular surface of the tibial tarsal and it tallied with finding of Pandit² in tiger. The dorsal articular surface was convex for articulation with the tibial tarsal. Distally, the bone presented an articular large facet.

The central tarsal was present on the medial side of the tarsus and was placed between proximal and distal row. It articulated with all other tarsal bone. Proximally, it had a large, concave, oval facet for articulation with head of tibial tarsal and a small facet for articulation with the fibular tarsal. Distally, the central tarsal presented facet for articulation with the first, second and third tarsal and laterally for the proximal half of fourth tarsal.

First tarsal was compressed transversely. It presented facet for articulation with central tarsal, second tarsal and first metatarsal.

Second tarsal was the smallest of the tarsal bones. It was a wedge shaped. It articulated with central tarsal proximally, the third tarsal laterally, first tarsal medially and second metatarsal distally.

Third tarsal was irregularly elongated in shape, wide in front and narrow behind. The plantar side was in the form of round tuberosity. Its proximal surface articulated with central tarsal. Distally, it articulated III metatarsal. Laterally it presented a curved facet for articulation with the corresponding facet of the fourth tarsal. Medially, it had a facet for articulation with second tarsal and metatarsal bones.

Fourth tarsal was thick, massive bone which accommodated central and third tarsal on its medial side. The similar observation was supported by Sisson⁴ in dog and Pandit⁵ in tiger. Proximal surface presented a large facet for articulation mainly with fibular tarsal and partly with the tibial tarsal. Medially, it presented articular facet for articulation with the central and third tarsal. Its distal surface had a large articular facet for articulation with the IV and V metatarsal bone. The distal half of the lateral surface had a wide groove for the passage of the tendons.

Table -1
Mean± S.E Mean and S.E. of tarsals of leopard

S.No.	Tarsals	Weight (gm)	Area (cm)
1.	Tibial tarsal	9.60 ±0.12	6.47±0.12
2.	Fibular tarsal	17.90±0.11	8.68±0.12
3.	Central tarsal	3.37±0.11	2.95±0.11
4.	First tarsal	0.62±0.06	0.56±0.07
5.	Second tarsal	0.84±0.05	0.77±0.04
6.	Third tarsal	2.48±0.04	1.93±0.05
7.	Fourth tarsal	3.02±0.06	1.80±0.06



Figure-1
Tarsals, From left to right: First row-Tibial Tarsal, Fibular Tarsal, Second row- Central Tarsal, Fourth Tarsal, Third row- First Tarsal, Second Tarsal, Third Tarsal

Conclusion

The aim of study of is to develop baseline data. The information obtained by the study will be of academic importance and help to compare with tarsals of the other species.

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