



## Humerus of Indian Wildcat (*Felis silvestris ornata*: Gray, 1830) - A Gross Osteological Study

Dharani Palanisamy\*<sup>1</sup>, M. P. S. Tomar<sup>2</sup>, Prasanth Babu Ankem<sup>2</sup>, Raj Sekhar Ullakula<sup>1</sup> and S. Dhileswara Rao<sup>2</sup>

<sup>1</sup>Assistant Professor (Contract basis), Department of Veterinary Anatomy, College of Veterinary Science (Sri Venkateswara Veterinary University), Proddatur, Kadapa (A.P.) INDIA

<sup>2</sup>Assistant professor, Department of Veterinary Anatomy, College of Veterinary Science (Sri Venkateswara Veterinary University), Proddatur, Kadapa (A.P.) INDIA

\*Corresponding Author: [dharanip92@gmail.com](mailto:dharanip92@gmail.com)

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### Abstract

The present investigation was performed on four humeri of adult Indian wildcat to observe its characteristic features. It was a long and slender bone with a well-developed shaft and two extremities. The shaft was prismatic in its upper third, cylindrical in the middle third and compressed antero-posteriorly in its remaining part. The lateral surface was marked with the crest of humerus, anteriorly and the tricipital line, posteriorly. The medial surface was wide and located below the intertubercular groove and it had nutrient foramen in the distal one third. The posterior surface was present only in distal 1/3rd of bone and was triangular. The proximal extremity composed of head, neck, lesser tubercle (medial tuberosity), greater tubercle (lateral tuberosity) and intertubercular groove (bicipital groove). The distal extremity was composed of two condyles, epicondyles, supracondylar foramen and olecranon fossa. The supracondylar foramen was present medially and elongated oval in shape.

**Keywords:** Humerus and Wildcat (*Felis silvestris ornata*)



## Introduction

The cats and its relatives are the member of family *Felidae* and are commonly called as felines. They are carnivores thus classified under the order carnivore of class Mammalia. The domestic cat is the only domesticated member of this family with a more common citation than that of its wild counterpart. Information on the domestication of cat and its distribution in different parts of Europe and other regions were summarized (Boyd *et al.*, 2001). Taxonomically, all the cats are considered under a single generic name viz. *Felis* which comprised of various specific names namely *F. domesticus* (for domestic cat) and *F. silvestris* (all the wild cats). The wild cats are comprised of different geographical sub types viz. the African wildcat (*F. silvestris lybica*), the Asian wildcat (*F. silvestris ornata*), the European wildcat (*F. silvestris silvestris*), the southern African wildcat (*F. silvestris cafra*) and the Chinese alpine steppe cat (*F. silvestris bieti*; Boyd *et al.*, 2001 and Badras *et al.*, 2007).

The wild cat is listed under the species of least concern in IUCN (International Union for Conservation of Nature and Natural Resources) red list due to its wide ranged distribution (Driscoll *et al.*, 2007). The geographical distribution of wild cats includes most of Africa, Europe and Southwest and Central Asia including India, China and Mongolia. Scanty literatures are available on anatomy of wild cats (IUCN red listed, 2013). Keeping this fact in mind, the present study was planned on the humerus bone of wild cats to record its specific features.

## Materials and Methods

The present study was conducted on the four humeri of an adult male wild cat in the Department of Veterinary Anatomy, College of Veterinary Science, Proddatur. The bones were collected after complete maceration and assessed for gross morphological features. The terminologies were adopted from (Konig and Liebich, 2009; Macdonald *et al.*, 2010 and Rosu *et al.*, 2016).

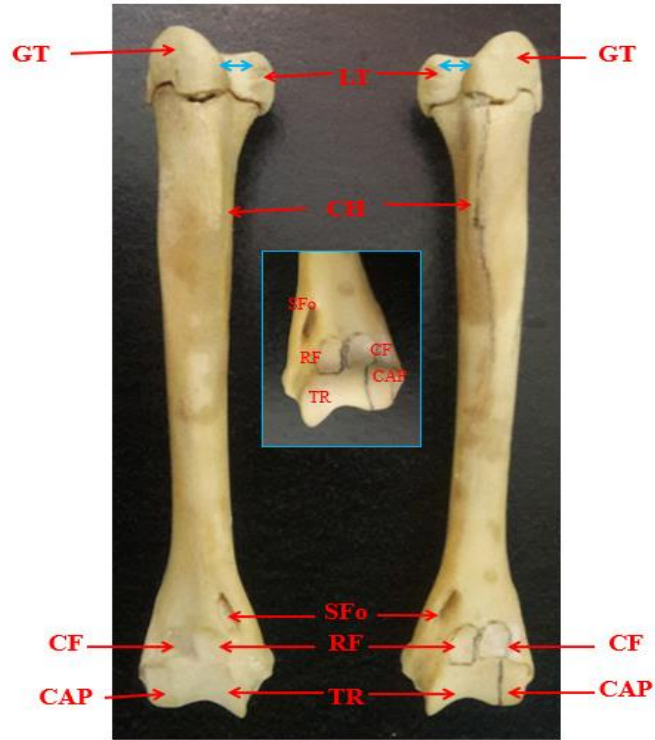
## Results and Discussion

The humerus of the wild cat was a long and slender bone placed obliquely downward and backward. It had a shaft and two extremities. The shaft had four surfaces and was prismatic in its upper third, cylindrical in the middle third and compressed antero-posteriorly in its remaining part. Whereas, the shaft of tiger's humerus was compressed antero-posteriorly in its upper third, cylindrical in middle third and compressed medio-laterally in its remaining part (Macdonald *et al.*, 2010). The Anterior surface was in the form of crest of humerus in upper part which became wide in distal half (Fig.1).

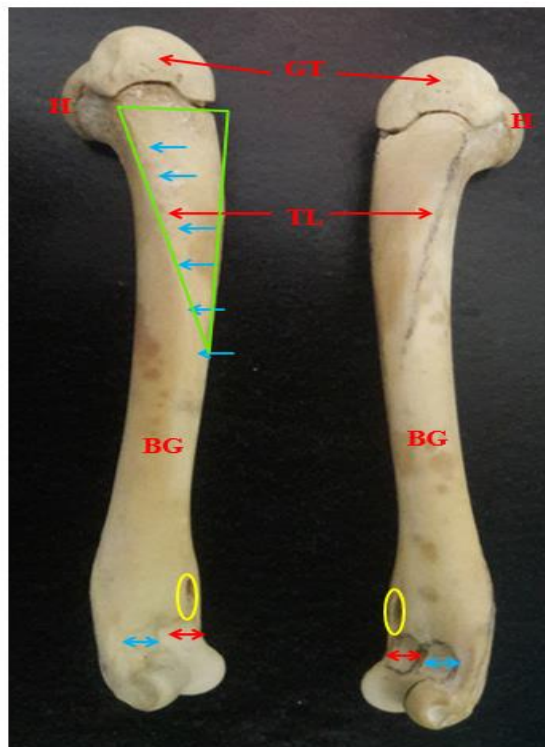
The lateral surface was triangular with its maximum width proximally while it got merged with anterior surface distally. The anterior margin of this surface was formed by crest of the humerus and the posterior margin by the tricipital line (Fig.2). The tricipital line was terminated into deltoid tuberosity which was in the form of rough indistinct area. Similarly, the deltoid tuberosity was underdeveloped in orange rumped agouti (Nomina Anatomica Veterinaria, 2017). Whereas, the deltoid tuberosity was well developed in other carnivores (Konig and Liebich, 2009; Macdonald *et al.*, 2010 and Nzalak *et al.*, 2010).

The medial surface was wide and located below the intertubercular groove and it had nutrient foramen in the distal one third. Then distally it was terminated in lateral margin of the supracondylar foramen (Fig 3). The posterior surface was present only in distal 1/3<sup>rd</sup> of bone and was triangular. It was demarcated with supracondylar crest laterally and medial margin of the supracondylar foramen, medially. Similar observations were recorded in earlier reports (Macdonald *et al.*, 2010 and Sundaram *et al.*, 2015).

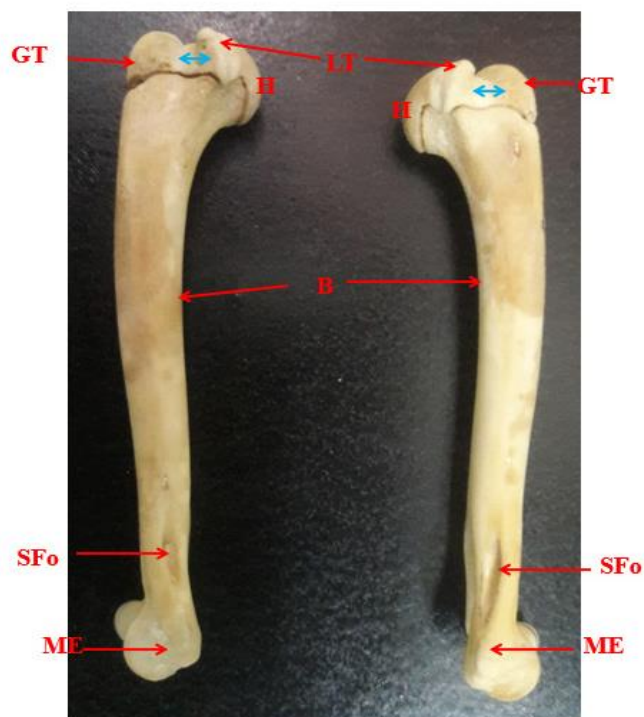
The proximal extremity composed of Head, neck, lesser tubercle (medial tuberosity), greater tubercle (lateral tuberosity) and intertubercular groove (bicipital groove) (Fig. 1&4).



**Figure 1:** Anterior view of humerus of Indian wild cat showing Greater tubercle (GT), Lesser tubercle (LT), Intertubercular groove (blue double arrow), Crest of humerus (CH), Supracondylar foramen (SFo), Coronoid fossa (CF), Radial Fossa (RF), Trochlea (TR) and Capitulum (CAP); (Inset): Anterior view of distal extremity of humerus



**Figure 2:** Lateral view of humerus of Indian wild cat showing Greater tubercle (GT), Head (H), Tricipital line (TL, blue arrows), Lateral surface (Triangle), Brachial groove (BG), Supracondylar foramen (Yellow circle), Radial fossa (red double arrow) and Coronoid fossa (blue double arrow).

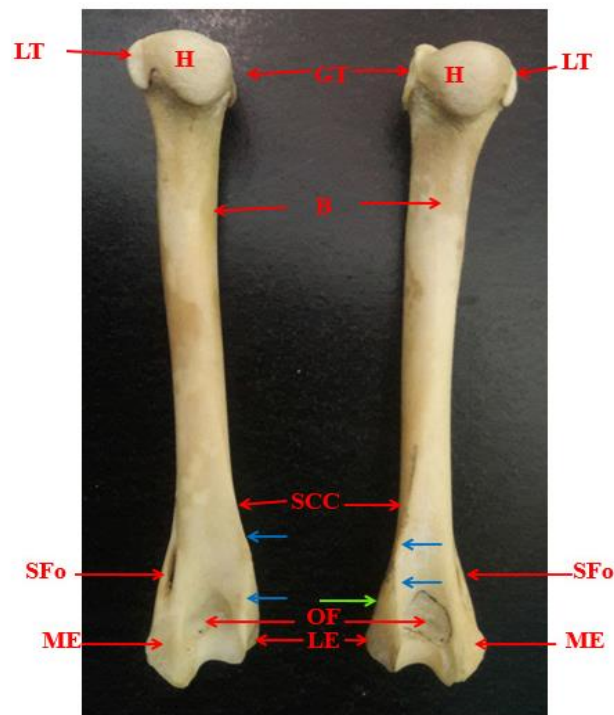


**Figure 3:** Medial view of humerus of Indian wild cat showing Greater tubercle (GT), Lesser tubercle (LT), Head (H), Intertubercular groove (blue double arrows), Body (B), Supracondylar foramen (SFo) and Medial epicondyle (ME).

The head was round, spherical, elongated oval and inclined caudally and connected to the shaft by a distinct sharp neck only caudally (Fig.4) is similar to the findings in various carnivores (Macdonald *et al.*, 2010; Palanisamy *et al.*, 2018; Siliceo *et al.*, 2015; Sundaram *et al.*, 2015; Olawoye *et al.*, 2011; Olude *et al.*, 2010). Anteriorly, it was notched and continues with an intertubercular groove. The intertubercular groove was semilunar or roughly “J” shaped (proximal view), wide and smooth. However, it was ‘L’ shaped in proximal view of the humerus in Miocene amphicyonid *Magericyon anceps* (Palanisamy *et al.*, 2018). The greater tubercle was well developed and undivided which was found to be similar to the finding in other carnivores (Macdonald *et al.*, 2010; Palanisamy *et al.*, 2018 and Siliceo *et al.*, 2015). The greater tubercle was slightly higher than the head and it formed the lateral boundary of the intertubercular groove (Fig.1) which tallied earlier observations in tiger (Macdonald *et al.*, 2010) and Miocene amphicyonid *Magericyon anceps* (Palanisamy *et al.*, 2018). The lateral surface of the greater tubercle presented a depression caudally.

The lesser tubercle was small, convex and anteriorly it was closely attached to the head (Fig.4). It formed the medial boundary of the intertubercular groove as found to be similar to earlier reports in tiger (Macdonald *et al.*, 2010). The distal extremity was composed of two condyles, epicondyles, supracondylar foramen and olecranon fossa (Fig. 1&4) as also reported in various mammalian species (Macdonald *et al.*, 2010; Nomina Anatomica Veterinaria, 2017; Palanisamy *et al.*, 2018; Siliceo *et al.*, 2015 and Sundaram *et al.*, 2015) however, the supracondylar foramen was the characteristic feature of feline humerus (Konig and Liebich, 2009; Macdonald *et al.*, 2010; Sundaram *et al.*, 2015 and Tomar *et al.*, 2014).

The medial condyle was in the form of the trochlea, which had a sharp medial ridge while the lateral condyle was consisted of convex and smooth capitulum (Fig. 1- Inset). The lateral epicondyloid crest was extending from lateral epicondyle and it ran obliquely to merge with lateral supra condylar crest (Fig.4).



**Figure 4:** Posterior view of humerus of Indian wild cat showing Greater tubercle (GT), Lesser tubercle (LT), Head (H), Body (B), Supracondylar foramen (SFo), Olecranon fossa (OF), Lateral epicondyle (LE), Medial epicondyle (ME), Lateral epicondylar crest (green arrow) and Supracondylar crest (SCC, blue arrows)

The presence of the epicondyloid crest was in accordance with earlier reports (Macdonald *et al.*, 2010 and Nzalak *et al.*, 2010). The lateral supracondylar crest was sharp ridge-like and it was originated from just above to the posteromedial margin of capitulum, which ran vertically upwards and continued as lateral border of humerus (Fig.4). This border formed the lower margin of brachial groove. The medial epicondyloid crest was indistinctly distinguishable from medial supracondylar crest which was originating from medial epicondyle and progressed upwards to form the outer margin of supracondylar foramen whereas the medial supracondylar crest was originated from the medial ridge of trochlea and ran upwards to form the internal margin of supracondylar foramen (Fig.4). The supracondylar foramen was present medially and elongated oval in shape as reported in other felines (Boyd *et al.*, 2001; Konig and Liebich, 2009 and Tomar *et al.*, 2014).

Anteriorly, above the condyles, two articular facets were present namely radial and coronoid fossa, which were separated by a non-articular raised line (Fig.1-Inset). The ratio of radial and coronoid fossae was 1:1. The separate coronoid and radial fossae were also reported in tiger (Macdonald *et al.*, 2010) and cheetah (Tomar *et al.*, 2014). However, they have not mentioned about the ratio between them. Posteriorly, a deep and wide olecranon fossa was present (Fig.4). In the epicondyles, medial one was in the form of tubercle and more prominent than the lateral one (Fig.3&2) which was found to be similar to the finding in other carnivores (Siliceo *et al.*, 2015). However, the lateral epicondyle was well developed than the medial epicondyle in orange rumped agouti (Sundaram *et al.*, 2015).

## Conclusion

The present study provided the basic gross osteological details about the humerus of Indian Wild cat which revealed that there was no difference observed between the right and left humeri.

## Conflict of Interests

There is no conflict of interest.

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