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Gross anatomical studies on metacarpal bones of Bluebull (*Boselaphus tragocamelus*)

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Abstract

In this research, a gross anatomical and morphometrical study of the metacarpal bone of Blue bull has been done. A total of six Blue bulls specimens were taken in this investigation. Blue bull specimens were taken from Bikaner Zoo after the permission of Forest Department. The result suggested that metacarpus of Blue bull consist two metacarpal bones i.e. one large metacarpal another small metacarpal bone. Large metacarpal bone formed by fusion of III and IV metacarpal bones. II metacarpal and V metacarpal bones are not fused and small in size known as splint bone. I metacarpal bone is absent. Two surfaces and two borders are present in shaft. The outline of cranial surface was semi-cylindrical. Cranial surface was smooth. In blue bull, shape of small metacarpal bone was rounded cord like.

Keywords: Bluebull, morphometrical, metacarpals and condyles

Introduction

Bluebull (*Boselaphus tragocamelus*) is the biggest antelope of Asia and found in both village area and forest where sufficient grasses present for grazing. According to Wildlife Protection Act (1972), Blue bull comes under Schedule III (Bagchi *et al.*, 2004) [1]. The body of Blue bull is very big so that skeleton of this is also very large and massive. The skeleton of Blue bull is divided in axial and appendicular skeleton. This osteo-morphological study help veterinarian in vetero-legal case related to blue bull because there is scarcity of literature on skeleton of Blue bull.

Materials and Methods

Permission was taken from the entire forest department. Skeletons of 6 dead adult Blue bull (*Boselaphus tragocamelus*) were dug out from Bikaner Zoo and later different bones were separated from their skeletons. In total six specimens, three were male and three were female. Whether the blue bull is male or female was found out by taking information from the people keeping it in Bikaner Zoo. Osteo-morphological specimens of Blue bulls were investigated by measuring their gross morphological features.

Result and Discussion

The metacarpus of Blue bull was long bone and made up of two metacarpal bones. The large metacarpal bone formed by fusion of III and IV metacarpal bones (fig.1). These results matched to Chauveau (1905) [3], McFadyean (1953) [11] in sheep and goat, Garrett (1988) [7] in goat, Jangir (2010) [10] in chinkara etc. The septum of the fusion became partially absorbed. The radiograph confirmed the fusion of the two bones. One small metacarpal, metacarpal II was also present in blue bull in agreement with the reports of Chauveau (1905) [3], McFadyean (1953) [11], Choudhary and Singh (2016c) [4] in blackbuck and dissimilarity with the reports of Frandson *et al* (2009) [6] in horse and Jangir (2010) [10] in Chinkara, where two splint bones namely metacarpal II and metacarpal V were present. However, 5 metacarpals are present in cat and rabbit (Chauveau, 1905) [3], in dog (Chauveau, 1905) [3], in lion (Nzalak *et al.*, 2010) [12] in Orange rumped agouti (Sundaram *et al.*, 2015) and in Hedgehog (Girgir *et al.*, 2016) [9].

Two surfaces and two borders recorded in shaft (fig1). The outline of cranial surface was smooth and semi-cylindrical, similar to the findings of Jangir (2010) [10] in chinkara and Choudhary and Singh (2016c) [4] in blackbuck.

This surface offered a shallow dorsal longitudinal groove similar findings were given by Jangir (2010) ^[10] in chinkara but which was deep in ox, sheep and goat (Chauveau, 1905) ^[3]. It lodged a proximal and a distal foramen (fig2), which was similar to the reports of Budras and Robert (2003) ^[2] in bovine, Jangir (2010) ^[10] in chinkara, Choudhary (2011) ^[5] in Chital. The palmar plane was flat in outline and it offered a deep longitudinal groove which infatuated similar foramina. These foramina communicated with the similar foramina on the caudal surface through transverse canals. These findings are identical to the reports of Budras and Robert (2003) ^[2] in bovine, Jangir (2010) ^[10] in chinkara and Choudhary and Singh (2016c) ^[4] in blackbuck.

In this investigation proximal extremity (fig 3) demonstrated two slightly concave facets, separated to each other by a median ridge in front and a shallow groove behind in blue bull, comparable to the observations of Choudhary and Singh (2016c) ^[4] in blackbuck. The lateral facet was smaller than the medial one. Fused second and third and fourth carpals respectively in blue bull were articulated with facets (fig 3), unlike horse (Getty, 1975) ^[8] and dromedary (Smuts and Bezuidenhout, 1987) ^[13], where second, third and fourth carpals articulated with facets. A small facet for articulation with the small metacarpal bone in blue bull found just below this articular surface was similar to ox, (Chauveau, 1905) ^[3]. There was the metacarpal tuberosity at the dorso-medial

aspect, which was small in agreement with the result of Choudhary (2011) ^[5] in chital.

In this research, the distal extremity was divided by a dorso-palmar cleft into two condyles (fig.4) in blue bull simulating the reports of McFadyean (1953) ^[11] and Garrett (1988) ^[7] in goat and Budras and Robert (2003) ^[2] in bovine, Jangir (2010) ^[10] in chinkara. On the contrary it was not seperated in horse (Getty, 1975) ^[8]. Though in dromedary the divided condyles are not straight but angulated (Smuts and Bezuidenhout, 1987) ^[13]. A each condyle divided into two articular areas by dorso-palmar ridge. The axial one was lower than the abaxial articular area. These observations obey the reports of McFadyean (1953) ^[11] and Choudhary and Singh (2016c) ^[4] in blackbuck.

In the present study small metacarpal (fig.5) was rounded cord like bone in Blue bull. Two variably curved surfaces found in shaft; on the opposing here are three surfaces in horse (Getty, 1975) ^[8]. The dorsal surface was rough and articular, while the palmar surface was smooth and non-articular. The proximal extremity was curved in metacarpal II. It possessed a curved articular facet for articulation with the corresponding facet on the large metacarpal in agreement with the results of Chauveau (1905) ^[3], McFadyean (1953) ^[11], Choudhary and Singh (2016c) ^[4] in blackbuck and Choudhary (2011) ^[5] in chital.



Fig 1: Dorsal view of Right large Metacarpal

1. Proximal extremity of metacarpal
2. Dorsal groove
3. Shaft
4. Distal foramen
5. Medial condyle
6. Lateral condyle
7. Sagittal cleft/ Dorso-palmar cleft



Fig 2: Palmar view of right metacarpal
 1. Proximal foramen
 2. Facet for small metacarpal
 3. Longitudinal groove
 4. Distal foramen
 5. Medial condyle
 6. Lateral condyle
 7. Sagittal cleft/ Dorso-palmar cleft



Fig 3: Proximal view of right large metacarpal
 1. Medial facet
 2. lateral facet
 3. Shallow groove

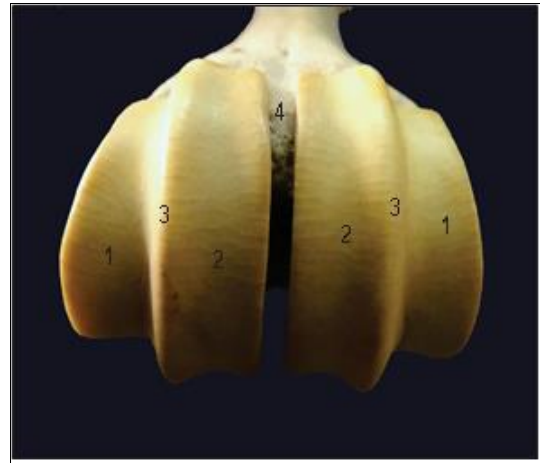


Fig 4: Distal extremity of right large metacarpal
 1. Abaxial articular area
 2. Axial articular surface
 3. Dorso-palmar ridge



Fig 5: Small metacarpal
 1. Proximal part of small metacarpal
 2. Shaft of small metacarpal

Conclusion

It can be concluded that metacarpus bone of blue bull was cord like bone consisted two metacarpal bones i.e. large and small metacarpal bones in which large metacarpal bone formed by fusion of III and IV metacarpal bones. Along with that one small metacarpal bone i.e. splint bone and metacarpal II also found. These morphometrical findings help field and zoo veterinarians in different veter-legal cases because Blue bull is IUCN listed animal and literature on its anatomy and physiology is very less.

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