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Comparative Morphological Study of Pectoral Limb Bones of Common Hawk Cukoo (*Hierococcyx varius*) and Yellow Billed Babbler (*Argya affinis*)

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A B S T R A C T

The present study aimed to throw light upon the pectoral limb bones of common hawk cukoo (*Hierococcyx varius*) and yellow billed babbler (*Argya affinis*). Typical pectoral girdle was present in both the birds. The clavicles of common hawk cukoo joined at more open angle compared to yellow billed babbler. The direction of clavicle was backward in common hawk cukoo and downward and posteriorly in yellow billed babbler. The humerus consisted of prominent tuber for muscular attachment above the pneumatic foramen in common hawk cukoo. Comparatively large interosseous space observed between the radius and ulna bones of yellow billed babbler. The lateral surface of ulna in common hawk cukoo showed the six prominences for the roots of the flight feathers. The length of ulna was larger than humerus in common hawk cukoo and that of humerus was longer than radius and ulna in yellow billed babbler. This shows poor flying capability in yellow billed babbler than common hawk cukoo.

Introduction

The common hawk cukoo was the resident of Indian subcontinent and it was arboreal and rarely descends to the ground. The yellow billed babbler was endemic to southern India.

It was sedentary with short rounded wings and weak flight. The forelimb of birds was modified to form wings as an adaptation for flight. An appreciable work was done on the shoulder girdle of birds like pigeon, crow, owl, green-winged macaw, pigeon hawk and kite (John *et al.*, 2014, Indu *et al.*, 2012 and John *et al.*, 2017). To our knowledge little work has been reported on the skeletal system of these birds. Hence, the present study was undertaken.

Materials and Methods

The carcass of common hawk cukoo and yellow billed babbler were collected and the bones were procured by natural maceration by anaerobic microorganisms and wing bones were kept in water added with 10 % washing soda (Na_2Co_3) (Duzler *et al.*,2006). Then bones were washed in tap water and dried under room temperature. The morphology of bones was studied and the length of the long bones was measured by using vernier calipers.

Results and Discussion

Pectoral girdle

Typical pectoral girdle was present in both the birds with coracoids, clavicle and scapula. All the three bones participated to form foramen triosseum. The scapula is long blade like bone and is attached to ribs. In common hawk cukoo the posterior extremity ends on upper aspect of fifth rib and in yellow billed babbler it ended on sixth rib. The dorsal border is convex and ventral border was concave. Anterior end present a depression laterally and it assisted to form the glenoid cavity in the usual way, contributing about half the surface to the glenoid cavity intended for humeral head. In yellow billed babbled the clavicular process reaches far forward, to make an extensive articulation with the head of the clavicle (Fig. 2). The subacromial pneumatic foramen was not observed in both the birds under study but it was noticed in crow (John *et al.*, 2014) and in kite (John *et al.*, 2017).

The coracoid was rod like, directed backward, downward and inwards to meet the sternum. Shaft of the coracoids was cylindrical and only distal third was flattened antero-posteriorly (Fig. 2). These findings were in accordance with those of duck (Rajani *et al.*, 2018) and cylindrical shafts were reported in pigeon hawk and kite (John *et al.*, 2017). The upper extremity showed hook like process medially. The lower extremity was wide. The pneumatic foramen was absent in the coracoids of both the birds. These findings were in accordance with Hofling and Alvarenga (2001) as the common hawk cukoo and yellow billed babbler belong to order cuculiformes and Passeriformes respectively. Whereas pneumatic coracoid had been reported in many flight birds such as pariah kite (Tomar *et al.*, 2010), crow (John *et al.*, 2014), pigeon hawk and kite (John *et al.*, 2017).

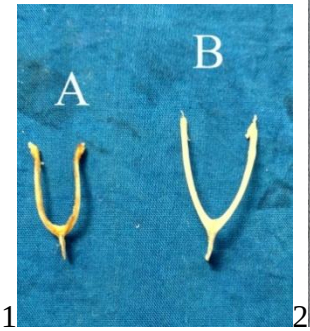
The clavicle bones of common hawk cukoo were very much curved and the direction of clavicles was backward. In yellow billed babbler it was projected downward and backward. The hypocledium in common hawk cukoo was oval and in yellow billed babbler it was triangular and its apex was towards the sternum (Fig. 2). The clavicles of common hawk cukoo joined at more open angle compared to yellow billed babbler (Fig. 1). The Clavicles united to form "Y" shaped furcula in domestic fowl (Nickel *et al.*, 1977). The hypocleideum was rudimentary in duck and completely absent in ostrich (Rajani *et al.*, 2018). Whereas, Hofling and Alvarenga, (2001) stated that birds belonging to Picidae, Indicatoridae, Galbulidae and coraciformes lack a hypocleideum. The present study revealed absence of pneumatic foramina in both the birds under study. Presence of pneumatic foramina was reported in pigeon hawk (John *et al.*, 2017).

The humerus (stylopodium) was curved, cylindrical, long bone. Both the birds consisted pneumatic foramen on their medial side of the proximal extremity but in yellow billed babbler it was larger. Above the pneumatic foramen, humerus of common hawk cukoo consisted of prominent tuber for muscular attachment.

Table.1

Name of the bone	Length of bone in centimetres	
	Common hawk cukoo	Yellow billed babbler
coracoid	2.24	3.28
scapula	2.95	4.60
humerus	3.87	4.42
radius	3.65	3.72
ulna	3.96	4.10
carpometacarpus	1.85	2.22

Fig.1–6



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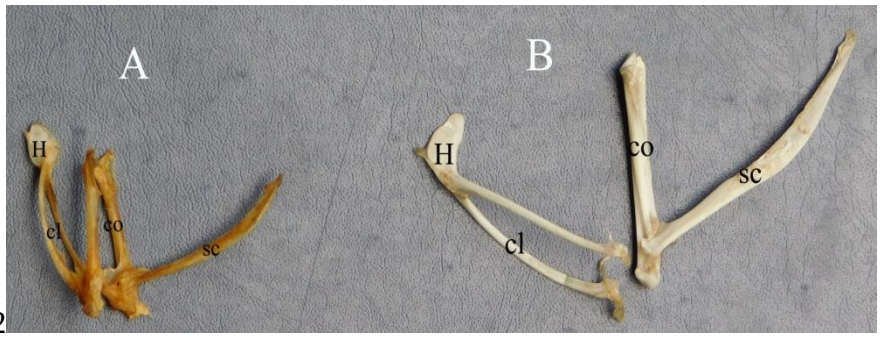

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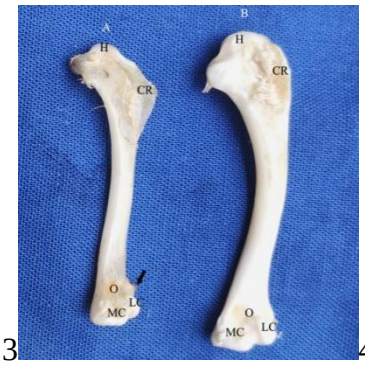

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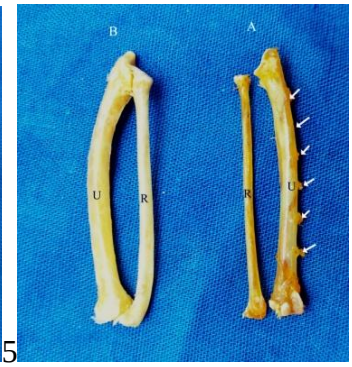

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A: COMMON HAWK CUKOO; B: YELLOW BILLED BABBLER

1:CLAVICLES,2:PECTORAL GIRDLE,3:LATERAL VIEW OF HUMERUS,4:MEDIAL VIEW OF HUMERUS,5:RADIUS AND ULNA(six arrows shows processes for attachment of flight feathers),6:MANUS

Co:coracoid, ci:clavicle, sc:scapula, H: hypocledium, CR:crest of humerus, H:head of humerus, MC:medial condyle, LC:lateral condyle, o: olecranon fossa, U:ulna, R:radius, II: second carpometacarpus,III: third carpometacarpus, IV:fourth carpometacarpus, p_1: first phalanx, p_2:second phalanx

The head of humerus was larger and rounded in yellow billed babbler (Fig. 4). The crest of humerus was a thin, sharp prominent laterally projecting ridge in common hawk cukoo and also presented a little inward curvature in yellow billed babbler (Fig. 3). It was like a blunt, tuberous, thick, linear ridge in ostrich (Rajani *et al.*, 2018) and in emu (Maxwell and Larsson, 2007). The caudal extremity of bone extended up to cranial border of ilium in both the species of present study. Nickel *et al.*, (1977) recorded that the humerus extended up to cranial border of ilium in domestic fowl, duck and pigeon and up to hip joint in goose. The medial condyle was larger than the lateral condyle and olecranon fossa was seen in both the species. Just above the lateral condyle and on lateral border prominent tubercle was present in common hawk cukoo.

The ulna was massive than radius in both the species of present study. The length of ulna (zeugopodium) was larger than humerus (stylopodium) in common hawk cukoo and that of humerus was longer than radius and ulna in yellow billed babbler. This shows poor flying capability in yellow billed babbler than common hawk cukoo. According to Nickel *et al.*, (1977), radius and ulna were longer than humerus in pigeon while, in the domestic birds, they were shorter than humerus. The lateral surface of ulna in common hawk cukoo showed the six prominences for the roots of the flight feathers (Fig. 5). The proximal extremity of radius presented a concave articular area while distal extremity was flattened from side to side to articulate with radial carpal. The ulna showed two concave articular areas on their proximal extremity and trochlea on their distal extremity. Distal extremity showed two condyles in both the species and unveiled contact with the two free carpal bones. Comparatively large interosseous space observed between the radius and ulna bones of yellow billed babbler. The radial and ulnar carpal bones were present in both the species under study. The carpometacarpus showed three bony elements (second, third and fourth), medial of which was second one and it was like a nodule. The third metacarpal was the largest of the three. The second digit showed one phalanx which is pointed rod. The third digit showed two phalanges out of them first phalanx was quadrilateral and second phalanx was triangular. The fourth digit showed single small triangular phalanx (Fig. 6).

References

Duzler, A., Ozgel, O. and Dursun, N. 2006. Morphometric analysis of the sternum in avian species. *Turk J Vet Anim Sci*., 30: 311-314.

Hofling, E. and Alvarenga, H.M.F. 2001. Osteology of the Shoulder girdle in Piciformes, Passeriformes and related groups of birds. Zoologischer Anzeiger., 240:196-208.

Indu, V.R., K.M. Lucy, A.R. Sreeranjini, S. Maya, N. Ashok and K.V. Sayam, 2012. A comparative study on the pectoral girdle of Green winged macaw and Pea hen. *Journal Vet. A. Sci*., 43: 56-58.

John, M. A., Sasan, J.S., Singh, A.D. and Choudry, A.R. 2014. Comparative morphometry of the shoulder girdle of Pigeon (*Columba livia*), Crow (*Corvuss plendens*) and Owl (*Otus bakomoena*). *Ind. Vet. J*., 91(04): 43-45.

John, M.A., Choudhury, A.R., Khan, M., Ahmad, K., Baba, M.A., Dar, F.A. and Rafiq, A. 2017. Comparative anatomical studies on shoulder girdle of pigeon hawk (*Falco columbarius*) and kite (*Millvus migrans*). *Indian J. Vet. Anatomy.* 29 : 25-27

Maxwell, E.E. and Larsson, H.C.E. 2007. Osteology and mycology of the wing of the emu (*Dromaius*

novaehollandiae), and its bearing on the evolution of vestigial structures. *J. Morph.* 268: 423-441

Nickel, R., Schummer, A. and Seiferle, E. 1977. Anatomy of the Domestic Birds. 2nd edn, Verlag Paul Parey, Berlin, Hamburg.

Rajani C.V., K.P. Surjith, P.M. Deepa,and H.S. Patki. 2018. Morphological Studies of Pectoral Limb Bones in Ostrich (*Struthio camelus*), Duck (*Anas platyrhynchos domesticus*) and Domestic Fowl (*Gallus domesticus).* *Indian J. Vet. Anatomy* 30 (2): 88-91.

Tomar, M.P.S., Vaish, R., Rajput, N. and Shrivastav, A.B. 2010. Gross morphometrical studies on the pectoral girdle of Pariah kite. *Journal A. Vet. Adv.*, 9(19): 2482-2484.

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