

Original Research Article

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Comparative Morphological Study of Os Coxae and Synsacrum Bones of Common Hawk Cukoo (*Hierococcyx varius*) and Yellow Billed Babbler (*Argya affinis*)

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ABSTRACT

Keywords

Oscoxae, Common hawk cukoo, Yellow billed babbler, Synsacrum

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The present study aimed to throw light upon the os coxae and synsacrum of common hawk cukoo and yellow billed babbler. The pelvic girdle was formed by ilium, ischium and pubis in both the birds. The ratio of preacetabular to postacetabular part of ilium was 1:1 and 3:2 in common hawk cukoo and yellow billed babbler respectively. The lateral border of post acetabular part of ilium showed a prominent projection behind the foramen ischiadicum in yellow billed babbler and it was absent in common hawk cukoo. A small pectineal process was noticed at the anterior end of the pubis below the level of acetabulum in yellow billed babbler and it was absent in common hawk cukoo. The synsacrum of common hawk cukoo and yellow billed babbler consisted of 11 and 15 vertebrae respectively. The differences in osteological features of os coxae and synsacrum may be due to their habits.

Introduction

Many of the morphological features of birds were considered to be adaptations to the habitat. The arched shape of the pelvic bones enables birds to carry the weight of the body, which was usually light, in the bipedal standing posture (King and Mc Lelland., 1975). The common hawk cukoo was the resident of Indian subcontinent. It was arboreal and rarely descends to the ground. The yellow billed babbler was endemic to southern India. It was sedentary with weak

flight. The behaviour associated with a specific habitat was favoured by a certain morphological feature and the observed morphology of a species should be some trade-off between the different selection pressures acting on the birds.

Literature pertaining to sternum (Botlagunta *et al.*, 2019) and fore limb bones (Supriya *et al.*, 2019) of common hawk cukoo and yellow billed babbler were only available. Whereas, literature pertaining to oscoxae and synsacrum of the common hawk cukoo and

yellow billed babbler was not available; hence, the present study was undertaken.

Materials and Methods

The carcass of common hawk cuckoo and yellow billed babbler were collected and the bones were procured by natural maceration by anaerobic microorganisms. The oscoxae and sysacrum was separated and kept in water added with 10 % washing soda (Na_2CO_3) for three days (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

The os-coxae of common hawk cuckoo and yellow billed babbler consisted of three bones namely the ilium, ischium and pubis (Fig. 1-5) as also reported in ostrich (Tamilselvan *et al.*, 2015) and peacock, peahen (Deshmukh *et al.*, 2016). The rhomboid shape lumbosacral mass lodged in the space between the pelvic bones (Mc Lelland, 1990). This is very much needed in flying birds to maintain posture during flying (Ilulis and pulea, 2011).

The ilium was narrow, elongated and consisted of pre-acetabular and post-acetabular parts as in domestic birds (Nickel *et al.*, 1977) and both parts were joined with lumbo-sacral mass which was also observed in Japanese quail (Mehta *et al.*, 2014), ostrich (Tamilselvan *et al.*, 2015), guinea fowl and pigeon (Lavanya *et al.*, 2017), Indian eagle owl (Sarma *et al.*, 2018) and crested serpent eagle and brown wood owl (Keneisenue *et al.*, 2019).

The ratio of preacetabular to postacetabular part of ilium was 1:1 and 3:2 in common hawk cuckoo and yellow billed babbler respectively. The ilium of the common hawk

cuckoo completely fused with lumbosacral mass to form a quadrilateral roof of the pelvis and the concavity of dorsal surface of preacetabular part was less (Fig. 3). Mehta *et al.*, (2014) also mentioned that the ilium consisted of pre and post acetabular parts and were fused with lumbosacral mass in Japanese quail. The dorsal surface of pre acetabular part was deeply concave in yellow billed babbler compared to common hawk cuckoo (Fig. 3, 4).

The ventral surface of posterior third of preacetabular part and post acetabular part was excavated to form renal fossa like in domestic birds (Nickel *et al.*, 1977). The renal fossa was oval in common hawk cuckoo (Fig. 1) and it was elongated in yellow billed babbler (Fig. 2). The lateral border of post acetabular part of ilium showed a prominent projection behind the foramen ischiadicum in yellow billed babbler and it was absent in common hawk cuckoo (Fig. 4, 5). The presence of similar projection also observed in Japanese quail (Mehta *et al.*, 2014).

Ischium bone was triangular, and its thick anterior angle participated in the formation of acetabulum in both the species under study. As reported by Nickel *et al.*, (1977) in domestic fowl, the dorsal border of ischium along with the lateral border of post acetabular part of ilium formed the sciatic foramen posterior to the acetabulum in both the species. The ventral border of ischium in both the birds under study was convex and the obturator foramen was formed by the ventral border of ischium behind acetabulum and middle part of pubis (Fig. 1, 2 and 5) like in Japanese quail (Mehta *et al.*, 2014). Posterior border of the ischium was free. The posterior border of ischium in common hawk cuckoo was convex and in the yellow billed babbler it was concave in the upper part and convex in the lower part (Fig. 4, 5). The caudal border of spotted billed pelican was cocave

(Satyamoorthy *et al.*, 2012). In case of peahens (Sreeranjani *et al.*, 2012) and Japanese quail (Mehta *et al.*, 2014) the ventral end of

the caudal border formed angulus ischiadicus which was blunt and not fused with pubis.

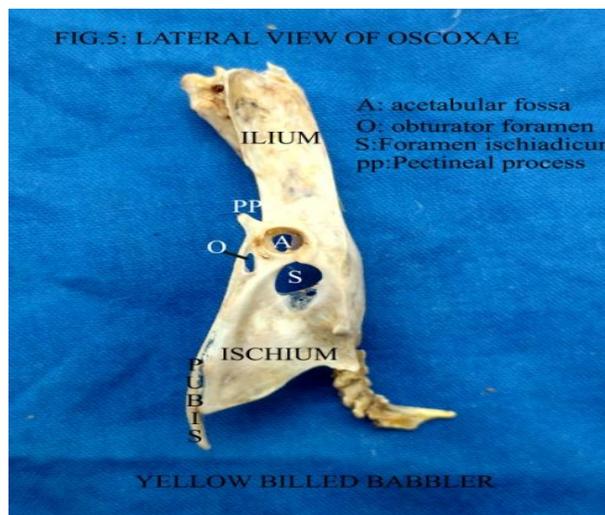
Fig.1 and 2



Fig.2 and 4



Fig.5



The pubis was thin bent rod like bone, attached to ischium and projected beyond it

(Fig. 1 and 2). A small pectineal process was noticed at the anterior end of the pubis below

the level of acetabulum in yellow billed babbler (Fig. 5) as noted in guinea fowl (Lavanya *et al.*, 2017) peahen (Sreeranjini *et al.*, 2011) and domestic fowl (Nickel *et al.*, 1977) and there was no pectineal process seen in common hawk cuckoo as reported by and Sarma *et al.*, (2018) in Indian eagle owl, Lavanya *et al.*, (2017) in pigeon and Mehta *et al.*, (2014) in Japanese quail. In both the species under study pubis also participated in the formation of acetabulum like in pidgeon (Ilulis and Pulea, 2011), in pea hens (Sreeranjani *et al.*, 2011) and in spotted billed pelican (Satyamoorthy *et al.*, 2012). Contrary to this in Japanese quail pubis bone was not participated in the formation of acetabulum (Mehta *et al.*, 2014).

In both the species, the acetabulum was perforated and circular in outline (Fig. 5) like in peacock and peahen (Deshmukh *et al.*, 2016). A large triangular shaped anti-trochanter was observed in the dorso-caudal aspect of the in both the species under study as described in Indian eagle owl (Sarma *et al.*, 2018). The facet noticed on the anti-trochanter is for articulation with trochanter major of the femur as mentioned in cattle erget (Resk, 2015), spot-billed pelicans (Sathyamoorthy *et al.*, 2012), guinea fowl and pigeon (Lavanya *et al.*, 2017).

The synsacrum composed of last thoracic vertebrae, lumbosacral mass and the first coccygeal vertebra (Fig. 1 and 2). The synsacrum of common hawk cuckoo and yellow billed babbler consisted of 11 and 15 vertebrae respectively. The supraspinous process of last thoracic and those of first few lumbar vertebrae interposed between the dorsal border of pre acetabular part of ilium. Thus the supraspinous processes of synsacrum divide the cranialis ilioneuralis as in Japanese quail (Mehta *et al.*, 2014).

In conclusion the comparative anatomy of os coxae in common hawk cuckoo and yellow

billed babbler revealed that the os coxae was formed by ilium, ischium and pubis, and it showed minor differences between two species. It is concluded that the differences in osteological features of os coxae and synsacrum may be due to its flying and terrestrial habits.

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