Indian Journal of Veterinary Anatomy 36(2): 104-108, December 2024

Morphological Studies on the Pelvis of Jungle Babbler (*Argya Striata*)

Rupam Sinha[1*], Archana Pathak[2], Anand Singh[3], Abhinov Verma[4], Shri Prakash Singh[5] and MM Farooqui[6]

Department of Veterinary Anatomy

College of Veterinary Science and Animal Husbandary, DUVASU, Mathura, 281001 India

Received: 27 September 2024; Accepted: 18 December 2024

ABSTRACT

Study was conducted on pelvic girdle of adult Jungle Babbler to record gross morphological parameters. It was a small elongated bone, narrow cranially (9.0 mm) and wide (25.0 mm) caudally. It was comprised of two equal half and each half was made up of an ilium, ischium and a pubis. The ilium was a thin, long plate of bone, the ischium was comparatively thick plate and the pubis was a slender rod–like bone. It had a pre-acetabular and a post acetabular part. The post-acetabular parts of the ilium were separated by the transverse processes of the lumbosacral vertebrae. The median crest was formed by the fused spinous process of the synsacrum and it was present cranially, but absent at the level of acetabulum while present in the caudal one third part. The pectineal process was absent. Acetabulum was formed by ilium, ischium and pubis. Its caudal extremity extended beyond the ilium and ischium and bent medially and formed pubic symphysis.

Keywords: Morphology, Jungle Babbler and Pelvic girdle.

INTRODUCTION

Jungle Babbler is non migratory birds having short rounded wings and a weak flight. They feed mainly on insects but also eat grains. Work has been conducted on pelvis of domestic fowl, turkey, peacock and white breasted waterhen (Pathak *et al.,*2017), chinese goose (Sathymoorthy*et al.,* 2020). No literature is available on the pelvis of jungle babbler. Hence the present study has been conducted.

MATERIALS AND METHODS

Carcass of adult jungle babbler was collected from campus, died due to cold and brought to the Department of Veterinary Anatomy, DUVASU, Mathura (UP). It was macerated and proper cleaning (Raghvan, 1964)was done to procure the bones. The pelvis was used for recording various morphological characters and compared with other birds.

RESULTS AND DISCUSSION

The pelvis of Jungle Babbler was a small, elongated bone, narrow cranially(9.0 mm) and wide (25.0 mm) caudally. It consisted of two equal halves and was made up of an ilium, ischium and a pubis (Fig.1), as reported by Nickel *et al.* (1977) in Fowl and Sathyamoorthy*et al*. (2020) in Chinese Goose. Japanese quail (Mehta *et al.,* 2014), Spot billed pelican (Sathyamoorthy *et al.,* 2012) and ostrich (Tamilselvan *et al.,* 2015) having various degrees of osseous fusion between their bones.

Ilium :

In jungle babbler ilium was a thin, long plate of bone, ischium was comparatively thick plate and the pubis was a slender rod–likebone (Fig.1, 2 & 3). The space between the pelvic bones was occupied by lumbosacral mass (Fig.1& 2)as reported by McLelland (1990) in Fowl and Sathyamoorthy*et al*. (2020) in Chinese Goose. It had a pre-acetabular and a post-acetabular part. The pre-acetabular part was13.2 mm long, 4.0 mm wide and concave in its length. The post-acetabular part was 14.0 mm long and 6.0mm wide in the cranial half and 5.0 mm wide in the caudal half (Fig.1 &2).It is in agreement with the observations of Rezk (2015) in cattle egret, Nickel *et al*. (1977) in fowl and Pathak *et al.* (2017) in peacock and domestic fowl. On the contrary much shorter preacetabular part than postacetabular part was observed in emu(Barvalia and Panchal, 2019), turkey (Pathak *et al.*, 2017), duck and goose (Nickel *et al.* 1977) and peahen (Sriranjini *et al.*, 2011) and longer pre-acetabular part than the post-acetabular part was observed in crested serpent eagle (Chaudhary *et al.,* 2019). These difference were may be due to sexual dimorphism in these bones of

1,3,4. Assistant Professor, 2.Professor, 5. Associate Prof. 6. Prof. & Head

*Corresponding Author: drsinhanbu@gmail.com

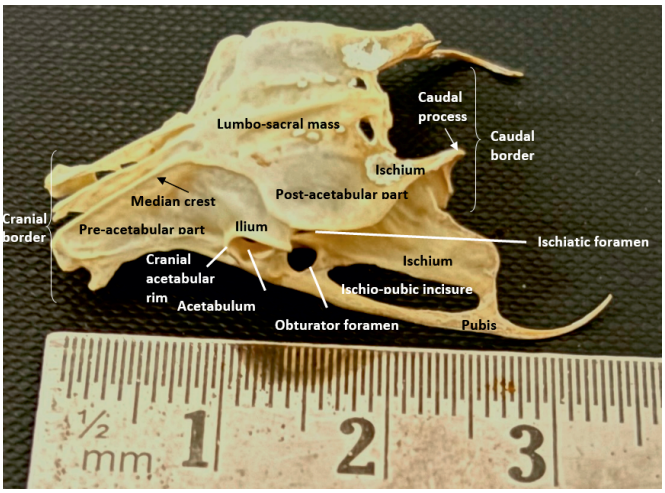

Fig. 1. Pelvic girdle of Jungle Babbler – dorso-lateral view

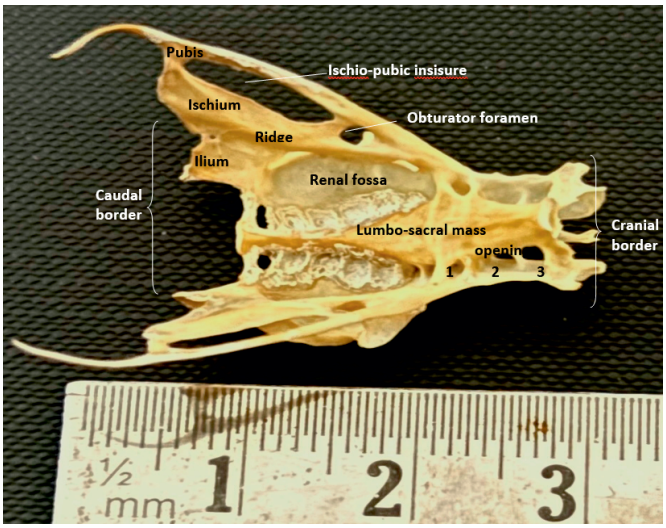

Fig. 2. Pelvic girdle of Jungle Babbler – ventral view

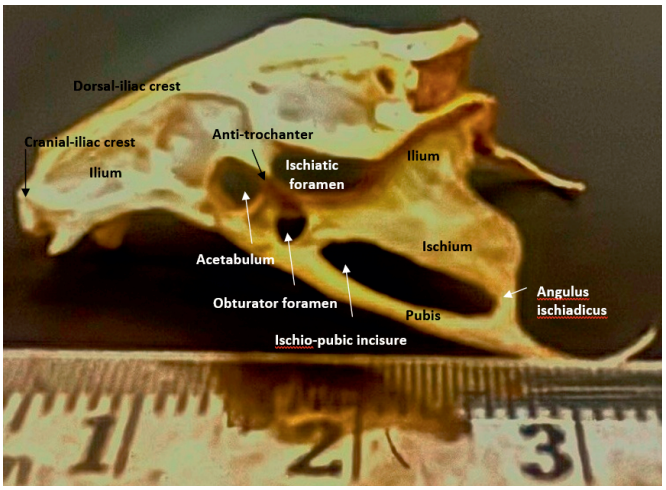

Fig. 3. Pelvic girdle of Jungle Babbler-Lateral view

mentioned birds. In the present study, the pre-acetabular part was quadrilateral in shape. Its gluteal surface was concave(Fig.1) as reported by Sathyamoorthy*et al*. (2020) in chinese goose. However it was lying vertical to the long axis of the body in emu (Santhilakshmi*et al.,* 2007). The cranial border of the ilium was narrow, slightly convex and triangular in shape and projected cranially and it formed the cranial iliac crest (Fig.1), however cranial border of the ilium was notched at the middle and projected laterally in emu (Barvalia and Panchal, 2019).The dorsal border was convex and fused with the dorsal ends of the lumbosacral mass completely and formed a bony bridge (Fig.1). It also formed the dorsal iliac crests (Fig.3). The dorsal iliac crest was less prominent and present on either side of the dorsal median ridge and extended from the cranial border up to the caudal border of the acetabulum (Fig.3) as observed by Mehta *et al.* (2013) in quail, Sathyamoorthy *et al*. (2020) in Chinese goose and Sreeranjini *et al*. (2011) in peahen. The lateral borders were thin and slightly concave with a small projection cranially formed the craniala cetabular rim (Fig.1&3) while Sathyamoorthy *et al*. (2020) in chinese goose found that this border was joined with the cranial border of the pectineal process and in peahen the lateral border of the pre-acetabular part of ilium was highly concave (Sreeranjini *et al*., 2011). The pelvic surface of the pre-acetabular part of the ilium was fused with the transverse processes of the lumbosacral mass (Fig.2) as reported by Sathyamoorthy *et al*. (2020) in chinese goose. On the contrary in pigeon (Lavanya *et al*., 2017) and in peahen (Sreeranjini *et al*., 2011) the cranial one third of the dorsal border of the ilium did not fuse with the lumbo sacral spines. The pelvic surface showed three openings on either side of the bodies of the lumbosacral mass for the exit of the spinal nerves (Fig.2). However Sathyamoorthy *et al*. (2020) in Chinese goose found six opening and four large foramina were noticed in indian eagle owl (Sarma *et al*., 2018) and in crested serpent eagle (Chaudhary *et al*., 2019). Caudally about the level of acetabulum the pelvic surface showed a deep depression, the renal fossa, which was oval in shape (Fig.2). It is in accordance with the observations of Rezk (2015) in cattle egret, Sathyamoorthy *et al*. (2020) in chinese goose and Sarma *et al*. (2018) in indian eagle owl. However Pathak *et al.* (2017) observed that in peacock it was deep caudally and in turkey it was large, deep and oval while in white breasted water-hen it was shallow cranially but rounded and very deep caudally. On the contrary, in emu (Mehta *et al.,* 2013) and in caudally bar-headed goose (Sasan *et al.,* 2017) renal fossa was not present and in japanese Quail (Mehta *et al*. 2014) it

was comparatively deeper. In jungle babbler, the post-acetabularpart of the ilium was quadrilateral in shape and was 12.0 mm long and extended up to the level of middle of the caudal end of the sciatic foramen and becomes wide at caudal aspect (10.5mm) and sloping upward (Fig.1 &3) however, Nickel *et al*. (1977) reported in duck and goose and Sathyamoorthy *et al*. (2020) in Chinese goose that it was projected backward and downward in direction. Barvalia and Panchal (2019) reported that in emu the post-acetabular part was prismatic, narrower but longer than the pre-acetabular part and in coturnix quail (Fitzgerald, 1969) and indian eagle owl (Sarma *et al.*, 2018) the post-acetabular part was narrow dorsally. Whereas in peahen, the pre-acetabular part was longer and wider than the post-acetabular part (Sreeranjini *et al.,* 2011). The sciatic foramen was 5.0 mm long and 4.0 mm wide in jungle babbler (Fig.3) however in peahen the sciatic foramen was oval in shape and was 2.30 cm long and 1.30 cm wide (Sreeranjini *et al*.,2011). McLelland (1990) reported that this foramen transmits the siatic nerves in birds. In emu, the ischium and ilium were separated and had the ilio-ischiatic incisure, rather than a foramen (Kumar and Singh,2014). Behind the sciatic foramen the ilium and ischium were fused (Fig.3). In the jungle babbler, the median crest formed by the fused spinous process of the synsacrum and it was present cranially, but absent at the level of acetabulum and was present in the caudal one third part (Fig.1). Lavanya *et al*. (2017) observed that, in pigeon, the bony ridge was present throughout the length of the lumbo sacralmass whereas, in guinea fowl, the bony ridge formed by the spines of synsacrum was noticed only in the anterior part and caudally it was seen as a narrow groove. The os-coxae of the jungle babbler did not show air cavities and pneumatic foramina. In contrary, Sreeranjini *et al.* (2011) noticed that the pelvic girdle of peahen present large number of air cavities.

Ischium :

The ischium of the jungle babbler was triangular, elongated plate of bone, narrow cranially and broad caudally (Fig.1). It was 14.00 mm long, 5.0mm wide behind the acetabulum and 9.0mm wide at the caudal end. It extended from the acetabulum to the caudal border of the os-coxae. Its cranial part involved in the formation of caudal rim of acetabulum (Fig.3), as observed by Sathyamoorthy *et al*. (2020) in Chinese goose and Nickel *et al*. (1977) in duck. It was placed in as lanting position and extended laterally. The caudo ventral angle of the ischium presented a broad plate like projection, the angulus ischiadicus which joined syndesmotically with the dorsal border of the pubis (Fig.3). It is in accordance with the observations of Sathyamoorthy *et al*. (2020) in chinese goose and Nickel *et al*. (1977) in duck and goose. But in peahen the angulus ischiadicus was blunt and did not fuse with the pubis (Sreeranjini *et al.,* 2011). The lateral surface of the ischium was slightly concave in the cranial half and slightly convex in the caudal half (Fig.3) and its medial surface showed a thick, rounded ridge throughout the length (Fig.2). In present finding the cylindrical shaped is ischiatic foramen was observed. On the contrary it was oval shaped in the fowl and peacock and drop shaped in turkey (Pathak *et al.* 2017). It showed a small, smooth area immediately behind the acetabulum and behind this it showed a small bony ridge and later it was continued by the long thin slightly concave ventral border of the ischium (Fig.3).Between ventral border of ischium and the dorsal border of the pubis, it enclosed a large ischio-pubic incisure and posteriorly closed by the junction between the angulus ischiadicus and the pubis (Fig.3). The ischio-pubic incisures was 10.0 mm long and 2.50 mm wide at the center however Sathyamoorthy *et al*. (2020) found in chinese goose that this ischio-pubic incisures was 7.0 cm long and 1.0 cm wide at the centre. However in duck and goose (Nickel *et al*., 1977), the pubo-ischiatic incisure was not divided but remained as a narrow elongated oval incision. On the contrary in fowl (Nickel *et al*.,1977),guinea fowl and pigeon (Lavanya *et al*., 2017) and indian eagle owl (Sarma *et al*., 2018) the ischio-pubic in cisure was divided into an obturator foramen in front and an incisure behind. Deshmukh *et al*. (2016) reported that in pea fowl, the angulus ischiadicus, the ventral end of the caudal border of the ischium was blunt and did not fuse with the pubis. McLelland (1990) reported that the ischiatic foramen transmit the ischiatic nerves in birds. In emu, the ischium and ilium were separated and had the ilio-ischiatic in cisure, rather than a foramen (Kumar and Singh, 2014). The caudal border of the pelvis was formed by the caudal borders of ilium and the ischium (Fig.1& 3). The caudal border was very wide (18.50 mm) and shallow because of the deviation of the caudal part of the ilium and ischium laterally. The caudal border presented a deep notch between the ilium and

ischium (Fig.1&3), as reported by Nickel *et al*. (1977) in goose. In duck only a small notch was present (Nickel *et al*., 1977). Kumar and Singh (2014) reported in emu, that the posterior extremity of the os-coxae was interrupted due to non-continuation of all the three bones.

Pubis :

In the present study, the pubis was long (24.0 mm), thin, bent rod-like bone which followed the ventral border of the ischium and projected well beyond the caudal border of the os coxae and bent medially (Fig.1 &3) as reported by Pathak *et al.* (2017) in fowl and in peacock, turkey and white-breasted waterhen which goes in conformity with the observation in spot-billed pelican (Sathymoorthy*et al.* 2012) and japanese quail (Mehta *et al.* 2014). It was thin cranially in its cranial one third, slightly thicker in the middle one third and formed a syndesmotic junction with the plate- like angulus ischiadicus and in the caudal one third free part its width decreased and at the caudal end it ended in a shovel-like process which curved medially (Fig.2). It is in agreement with the observations of Sathyamoorthy *et al*. (2020) in Chinese goose and Nickel *et al*. (1977) in duck and goose. Mehta *et al.* (2014) reported that, in japanesequail the pubis did not project beyond the ilium and ischium. In indian eagle owl the caudal end of the pubis was bent medially to meet with its fellow of opposite side (Sarma *etal*., 2018).In jungle babbler the dorsal border of the pubis was concave cranially and sharply convex caudally from the junction with the angulusischiadicus (Fig.1)Similarly Sathyamoorthy *et al*. (2020) reported in Chinese goose that it was concave cranially and convex caudally and in ostrich (Tamilselvan *et al*., 2015) the pubis was a long slender bone, dorsally concave in front and convex behind. In jungle babbler the pectineal process was absent (Fig.3) as reported in japanese quail (Mehta *et al.,* 2014), indian eagle owl (Sarma *et al.,* 2018) and spot-billed pelicans (Sathyamoorthy *et al.,* 2012), pigeon (Nickel *et al.,* 1977)and much smaller in duck and goose(Nickel *et al.,* 1977), however it was rudimentary in peahen (Sreeranjini *et al.*, 2011), while Sathyamoorthy *et al*. (2020) reported a short pectineal process in chinese goose. Nickel *et al.* (1977) reported that the pectineal process was long thorn-like in the fowl. Kumar and Singh (2014) reported that, in Emu the pectineal process was slightly broader towards the cranial extremity of pubis to participate in the formation of acetabulum. He also informed that, under development of this process might lead to paralysis of hind limb.

Acetabulum :

In the present study, the acetabulum was formed by ilium, ischium and pubis (Fig.3) as observed by Sathyamoorthy *et al.* (2019)in Macaw. It was circular, small (2.0mm diameter) and perforated(Fig.3).However acetabulum was rounded and pierced by large foramen in turkey, peacock, white-breasted water hen (Pathak *et al.,* 2017) and in fowl (Nickel *et al.,*1977). Nickel *et al.* (1977) reported that, in fowl and duck, the pubis was not involved in the formation of acetabulum. Caudodorsal rim of the acetabulum showed a bony prominence measured 2.5 mm long, with thick edges and carried a concave, elongated, quadrilateral shaped facet with rounded dorsal border and a straight ventral border, projecting dorsolaterally, the anti-trochanter (Fig.3) as observed by Rezk (2015) in cattle egret and Sarma *et al*. (2018) in indian eagle owl. McLelland (1990) reported that, the anti-trochanter femur articulation reinforces weak adductor muscles and limits abduction of the limb. Hertel and Campbell (2007) found that, in birds, the anti-trochanter serves as a brace to prevent abduction of the hind limb and to absorb stress that would otherwise be placed on the head of the femur during bipedal locomotion. Its caudal extremity extended beyond the ilium and ischium and bent medially and formed pubic symphysis (Fig.1 & 2). The pubic symphysis supported the weight of the abdomen. The caudal one third of pubis also fused dorsally with the ischium. The cranial end of pubis participated in the formation of acetabulum (Fig.3) as reported by Sathyamoorthy *et al*. (2020) in Chinese goose and Nickel *et al.* (1977) in pigeon and goose, but in fowl and duck it was fused with the ischium below the acetabulum.

REFERENCES

Barvalia, I. and Panchal, K.M. 2019. Gross and biometric studies on pelvic bone of the emu (*Dromaius novaehollandiae*).*The Indian Journal of Veterinary Sciences and Biotechnology,* 14 **:** 21-24.

Choudhary, O.P., Arya, R.S., Kalita, P.C., Doley, P.J., Rajkhowa, T.K. and Kalita, A. 2019. Comparative gross morphological studies on theos coxae of crested serpent eagle (*Spilornischeela*) and brown wood owl (*Strixleptogrammica*). *Journal of Animal Research,* 9 :439-442.

Deshmukh, S.K., Karmore, S.K., Gupta, S.K., Kodape, S. and Prakash, R. 2016. Comparative biometrical studies on the os coxae and synsacrum of peacock and peahen. *Veterinary Practitioner,* 17 : 41-42.

Fitzgerald, T.C. 1969. The Coturnix Quail, Anatomy and Physiology. The Iowa State University Press, Ames, Iowa, pp. 26-27.

Hertel, F. and Campbell Jr., K.E. 2007. The anti-trochanter of birds: Formand function in balance. *The Auk,*124 : 789-805.

Kumar, P. and Singh, G. 2014. Gross anatomy of wing and pelvic limb bones in emu (*Dromaius novaehollandiae). Indian Journal of Veterinary Anatomy*, 26 : 82-86.

Lavanya, C., Jayachitra, C., Iniyah, K. and Balasundaram, K. 2017. Comparative anatomy of os coxae in guinea fowl and pigeon. *International Journal of Current Microbiology and Applied Science*s, 6 : 3655-3659.

McLelland, J.A. 1990. Colour Atlas of Avian Anatomy, Wolf Publishing Ltd., England.pp.42-43.

Mehta, S., Guha, K. and Singh, K.K. 2013. Gross anatomical studies on the os coxae and synsacrum of emu (*Dromaius novaehollandiae*). *Indian Veterinary Journal*, 90 : 79-81.

Mehta, S., Guha, K., Shalini, S. and Kumar, C. 2014. Gross anatomical studies on the os coxae and synsacrum of Japanese quail. *Indian Journal of Veterinary* Anatomy, 26 : 126-127.

Nickel, R., Schummer, A. and Seiferle, E. 1977. Anatomy of the Domestic Birds, 1sted.Verlag Paul Parey, Berlin, Hamburg, pp.13-19.

Pathak, A., Gupta, S.K., Verma, A., Farooqui, M.M. and Gupta, V. 2017 Comparative anatomical studies on the pelvis of fowl (*Gallus domesticus*), turkey *(Meleagris gallopavo*), peacock *(Pavo cristatus)* and white-breasted waterhen (*Amaurornisphoenicurus*)*Indian Journal of Poultry Science,* 52 : 83-86

Rezk, H.M. (2015). Anatomical investigation on the appendicular skeleton of the cattle egret *(Bubulcusibis). Journal of Experimental and Clinical Anatomy,* 14: 5-12.

Raghavan, D. 1964. Anatomy of Ox. Indian Council of Agricultural Research, New Delhi

Santhilakshmi, M., Chandra Sekhara Rao, T.S., Jagapathi Ramayya, P. and Ravindra Reddy, Y. 2007. Gross anatomical studies on the oscoxae and femur of Emu (*Dromaiusnovaeholl andiae*). *Indian Journal of Poultry Science,* 42 : 61-63.

Sathyamoorthy, O.R., Chruchil, R.R. and Dhamotharan, S. 2020 Morphological and morphometric studies on the pelvic girdle of chinese goose (*ansercygnoides*). *Indian Journalof Veterinary& Animal Science Research* 49 : 1-9

Sarma, K., Suri, S. and Sasan, J.S. 2018. Gross anatomical studies on oscoxae of Indian eagle owl (*Bubobengalensis*). *Exploratory Animal and Medical Research,* 8 : 208-210.

Sasan, J.S., Suri, S. and Sarma, K. 2017. Gross anatomical studies on the oscoxae of bar-headed goose (*Anserindicus*). *The Indian Veterinary Journal,* 94 : 09-10.

Sathyamoorthy, O.R., Richard Churchil, R. and Karunakaran, N. 2019. Gross anatomical studies on the pelvicgirdle of blue and yellow macaw (*Araararauna*). *Journal of Entomology and Zoology Studies*, 7 : 694-698.

Sathyamoorthy, O.R., Thirumurugan, R., SenthilKumar, K. and Jayathangaraj, M.J. 2012. Gross morphological studies on the pelvic girdle of spot-billed Pelicans (*Pelicanusphilippensis*). *Indian Journal of Veterinary Anatomy,* 24 : 109-110.

Sreeranjini, A.R., Ashok, N., Indu, V.R., Lucy, K.M., Syam, K.V., Chungath, J.J. and Harshan, K.R. 2011. Morphological studies on the pelvicgirdle of a peahen (*Pavo cristatus*). *Journal of Indian Veterinary Association,* 9 : 46-48.

Tamilselvan, S., Iniyah, K., Jayachitra, S., Sivagnanam, S., Balasundaram, S. and Lavanya, C. 2015. Gross anatomy of Os coxae of Ostrich (*Struthiocamellus*). *International Journal of Current Microbiology and Applied Science*s 4 : 201-205.