

GROSS ANATOMICAL STUDY ON THE PELVIC GIRDLE OF CONURE (*PYRRHURA MOLINAE*)

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ABSTRACT

Gross anatomical structure of pelvic bone in conure bird was studied. The shape of the pelvic girdle was in the form of inverted blade and consisted of ilium, ischium and pubis, constituting the two pelvic bones of which the ilium was largest and between the two pelvic bones, the rhomboid shaped lumbosacral mass was observed. Above the level of acetabulum ilium was separated by a small bony ridge as pre and post acetabular part. Posterior end of ilium had a slender, linear and extended part and had a straight process which projected ventrally. There was no ilioneural canal. Ilium, ischium and pubis formed the acetabulum. The caudodorsal rim of acetabulum presented a triangular facet an anti-trochanter. Ischium was a thick and triangular bony plate below the level of posterior rim of the acetabulum. Ventral border of the ischium had an obturator foramen with broader caudal end. Ilium formed synostosis with pubis and ischium and a large ischio-pubic notch were also formed. Pubis was thin, slender bone extended behind the medial border of ischium. Ischium was bent posteromedially. Pubis was not fused with ischium to form obturator foramen, but formed a notch-like structure. The pectineal process was less developed.

Key words: Conure, Osoxae, Lumbosacral mass, Obturator foramen, Acetabulum and Anti-trochanter

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INTRODUCTION

Conures are a diverse, loosely defined group of small to medium sized parrots.

They belong to several genera within a long-tailed group of the New World parrot subfamily Arinae. Variability in the morphology of pelvic girdle in different orders of birds were used as evidence in various types of locomotion. The two footed standing position of the birds was by the pelvic limbs which support the body weight while walking, rigid union of pelvic bones with the vertebral column, provision of maximum area for the

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attachment of the muscles which bear the bulk of the body weight. Structural diversity was noticed on the hind limb of different birds and so the gross morphological studies on conure bird were carried out to overcome the less available information on the skeletal system of Psittacidae family.

MATERIALS AND METHODS

Materials for the present study were gathered from the carcasses of three conure birds that were brought to the Department of Veterinary Pathology, Madras Veterinary College, Chennai and were utilized for the study. Post mortem examination, did not reveal any skeletal abnormalities. Then the carcasses were macerated by wet maceration technique (Ajayi *et al.*, 2016). The various disarticulated bones were cleaned with fresh water and soaked in 10 to 15 % NaHCO₃ solution for refined and intense cleaning. After drying the morphological studies of pelvic girdle were performed.

RESULTS AND DISCUSSION

In the present study, the pelvic bone in conure bird was relatively large. It was composed of ilium, ischium and pubis as in domestic birds (Nickel *et al.*, 1977). Pelvis was an elongated structure with narrow pre-acetabular part and broader post-acetabular part in conure as in duck, goose and peahen (Sreeranjini *et al.*, 2011). Ilium was a thin bony plate and ischium was also a bony plate however thicker when compared to that of ilium. Pubis was a slender rod-like bone. Roughly quadrilateral shaped lumbosacral

mass filled the space between the pelvic bones as in fowl (Nickel *et al.*, 1977).

Ilium

Ilium of conure was the largest and longest bone of oscoxae. Pre-acetabular part was larger and post-acetabular part was smaller as in peahen (Sreeranjini *et al.*, 2011), in emu (Kumar and Singh, 2014), pigeon (Lavanya *et al.*, 2017) and in blue and yellow macaw (Sathyamoorthy *et al.*, 2019).

Pre-acetabular part was lesser in its length and broader whereas the post-acetabular part was larger in length and tapered was observed. At the point of acetabulum, a short ridge separated the ilium as pre- and post- acetabular part (Fig.1). This ridge was larger and continued in ilium from its anteromedial angle to the caudal extremity in peahen (Sreeranjini *et al.*, 2011). Whereas, no line of demarcation observed in emu (Kumar and Singh 2014) and in coturnix quail it terminated just caudal to acetabulum (Metha *et al.*, 2014). The dorsal spinous process of thoracic vertebrae and the transverse process of lumbar vertebrae of lumbosacral mass combined with the ventral surface of the pre acetabular part of ilium (Fig. 2). Cranial and dorsal borders of the ilium was flat and at the centre between the lumbosacral mass and ischium and continued with pre-acetabular part (Fig. 1). The pre-acetabular part of ilium combined with its dorsal spinous processes of lumbosacral mass as in Indian eagle owl (Sarma *et al.*, 2018) and in blue and yellow macaw (Sathyamoorthy *et al.*, 2019). Cranially the crests were very near separated and caudally far and the

dorsal border of post- acetabular part was the continuation of pre-acetabular crest (Sarma *et al.*, 2018). The bony plate formed by the fused transverse processes of the synsacrum separated widely the post-acetabular parts of the ilium from each other (Fig-1). But in peahen the transverse process of lumbar vertebrae and sacral vertebrae were united at the posterior part of ventral border of ilium (Sreeranjini *et al.*, 2011). Pelvic bone of conure bird at the lateral border revealed the presence of ilium and ischium were separated by a prominent ridge. Ischiatic foramen extended from the post-acetabular part of ilium to the edge of the posterior process (Fig. 3). A slender and linear posterior part of ilium continued posteriorly as a bony process at its medial aspect. Ischium was fused with pelvic surface of ilium with a clearly demarcated posterior process that projected laterally (Fig.1). Iliac fossa was a deep depression observed on the medial surface of ilium for the lodgement of kidney (Fig.4) as in fowl by (Nickel *et al.*, 1977). Ilium, ischium and pubis was involved in forming perforated and round acetabulum as in other domestic birds. In conure the formation of acetabulum involved only the ilium and ischium but not the pubis. The acetabulum was wider at the caudal portion and less wide in the cranial portion and the lateral and medial parts were thin. The anti-trochanter was a small bony projection observed on the anterior part of dorsal border of acetabulum (Fig.3) (Nickel *et al.*, 1977) in domestic birds as a pointed triangular facet at the postero-medial part of acetabulum (Sarma *et al.*, 2018) in eagle and (Sathyamoorthy *et al.*, 2019) in macaw.

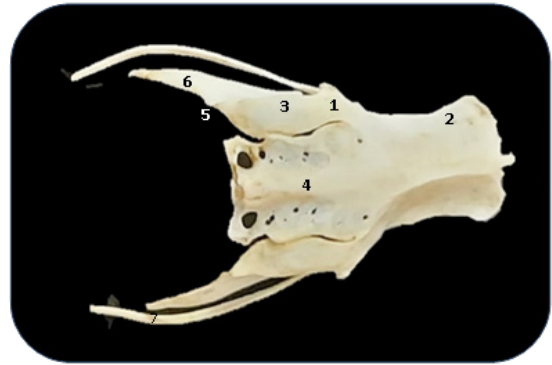


Fig. 1: Dorsal view of pelvic girdle of conure

1- Ilium, 2- Pre-acetabular part, 3- post-acetabular part, 4- lumbosacral mass, 5- Caudal process, 6 – Ischium, 7- Pubis

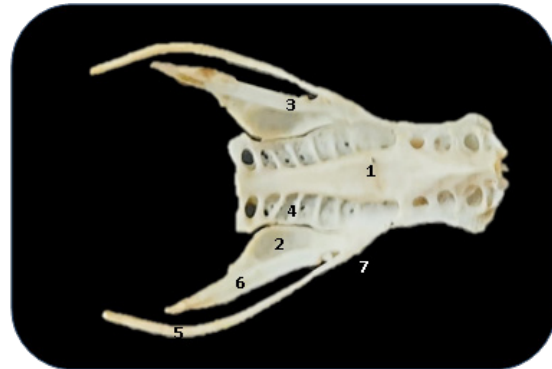


Fig. 2: Ventral view of the pelvic girdle of conure

1 - Lumbosacral mass, 2 - Renal fossa, 3 - Ridge, 4- Transverse process, 5 - Pubis and 6 - Ischium, 7 - pectineal process

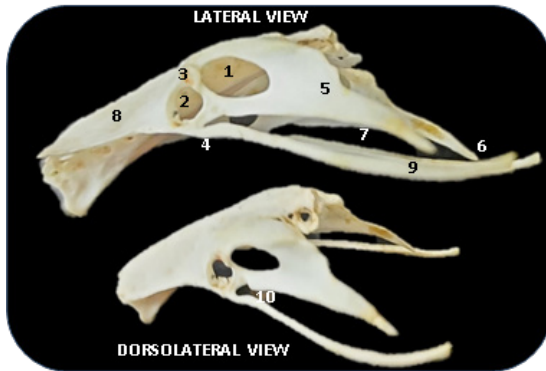


Fig. 3: Lateral and Dorsolateral view of the pelvic girdle of conure

- 1 - Ischiatic foramen, 2 - Acetabulum, 3 - Antitrochanter, 4 - pectineal process, 5 - Ischium, 6 - Angulus ischiadicus, 7 - Ischio-pubic incisure, 8 - Ilium, 9 - Pubis and 10 - Obturator foramen (notch)

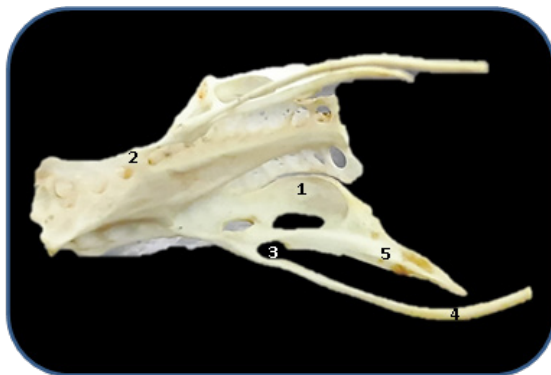


Fig. 4: Ventrolateral view of the pelvic girdle of conure

- 1 - Renal fossa, 2 - Transverse process, 3 - Obturator foramen (notch), 4 - Pubis and 5 - Ischium

Ischium

Ischium was a thin triangular bone and its narrow anterior part involved in forming the acetabulum (Fig.3). Ischium was noticed medial to the ilium and continued to the posterior border of pelvic bones (Nickel *et al.*, 1977), in domestic fowl (Sreeranjini *et al.*, 2011), in peahen (Lavanya *et al.*, 2017) guinea fowl and pigeon and (Sarma *et al.*, 2018) in eagle. The ischiatic foramen was observed beyond the acetabulum (Fig.3), along its medial part of post-acetabulum. The ischiatic foramen was formed by the adjacent borders of ilium and ischium as reported by (Nickel *et al.*, 1977) in duck and goose. The lateral surface of the ischium had a ridge which extended up to the mid-dorsal border of lumbosacral mass in conure (Fig.3). Below and behind the ventral border of the ischium at its posterior level on the rim of acetabulum, a small oval obturator foramen was incomplete caudally. A similar finding was observed in blue and yellow macaw where the gap was found to be larger when compared to conure (Sathyamoorthy *et al.*, 2019).

A large ischio-pubic incisures were noticed behind the obturator foramen (Fig.3). Anterior border of ischium was flat and continued downward as a sharpened, slender bony process called as angulus ischiadicus (Fig.3), as observed in pigeon (Lavanya *et al.*, 2017) and Indian eagle owl (Sarma *et al.*, 2018). The angulus ischiadicus was united by a cartilage with pubis. Pelvic surface of the ischium was curved and presented two ridges, one ridge overhung to the acetabular

rim at its cranial border and continued to the ischium, another ridge continued from obturator foramen and reached the ischium at its caudal extremity (Fig.2). Ischium was pointed at its medial border, and the posterior border of pelvis was formed by ischium along with ilium (Nickel *et al.*, 1977).

Pubis

Pubis of conure bird was a thin bone extended posteriorly beyond the ischium and curved ventrally (Fig.1). Pubis terminated in a blunt process and projected beyond the ilium and ischium. The pubis was same in width throughout its length, whereas it was narrow anteriorly and wide posteriorly. Dorsal surface was flat and the pelvic surface was curved. Pubis was involved in the formation of cotyloid cavity at its anterior end in pigeon and goose (Nickel *et al.*, 1977) for the formation of acetabulum whereas, the pubis of fowl and duck, (Nickel *et al.*, 1977) below the acetabulum fused with ischium and was not involved in the formation of acetabulum (Nickel *et al.*, 1977). Pubis did not fuse with ischium to form obturator foramen but was in the form of a notch (Fig 4).

CONCLUSION

Pelvic girdle was huge bone, inverted blade shaped and composed of two pelvic bones, each consisted of ilium, ischium and pubis. The two hip bones were engaged with lumbosacral mass. Caudodorsal rim of the acetabulum showed the presence of a small bony projection the anti-trochanter. Ischium was a thick bony plate and roughly triangular

in shape. Below the posterior border of ischium at the level of caudal rim of the cotyloid cavity, the obturator foramen was observed. Beyond this foramen a ischio-pubic incisure was noticed. Pubis extended caudally beyond the ischium and curved medially. Pubis did not fuse with ischium to form obturator foramen. The obturator foramen was incomplete caudally. These morphological variations in the pelvic bone of conure were supposedly for their adaptations in flying and terrestrial habit.

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