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RESEARCH ARTICLE

Gross morphometric studies on sternum and ribs of emu (*Dromaius novaehollandiae*)

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Abstract : Study was conducted on 3 adult emus to record gross morphometric parameters. The sternum was collected after post mortem examination from Department of Veterinary Pathology, Ranchi Veterinary College Kanke, Ranchi. The sternum of emu was large broad and bowl shaped located at antero-ventral aspect the body cavity. The cranial border was 8.12±0.8 cm broad. The dorsal surface was concave which measured 3.00±0.12 cm concavity. The ventral surface was more convex, rough and without keel bone. Antero-lateral process was 2.4±.06 cm in length which was directed upward. Post extremities or metasternum was thin and triangular in shape. Unlike other birds postero-lateral process was absent. Five pairs of articular facets present on either side for attachment of sternal ribs. Nine pairs of ribs were present. The length of rib were varied from 12.00 cm to 19.00 cm. The lateral surface was convex while medial surface concave. The cranial and caudal border were smooth and thin. The uncinate processes was absent. The proximal extremities of vertebral rib had head, neck and tubercle. The head was 1.9±0.30 cm in length which articulated with the facet of the body of the vertebrae. The average length of tubercle was 3.30±0.40 cm and articulated with the surface of the transverse process of the vertebra.

Key words : Sternum, Rib, Emu, Gross morphology

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INTRODUCTION

Emu is second largest extant bird in the world by height, after ostrich. They are totally marketable birds and their feathers, eggs and toenails are being used as creative jewelry accents for fashion items and uniquely in craft goods such as backgrounds for fine artistic paintings. Therefore, emu farming is considered as a profitable in agriculture sector. The emu has heavily muscled pelvic limb allowing high speed running and defense against the enemies. The pelvic limbs are prone to fracture due to heavy weight, height, running and kicking habits. The present study will provide detail knowledge of sternum and ribs for better treatment and ailment of clinical conditions. Ramayya *et al.* (2007) described the detailed gross anatomy of sternum and ribs of emu but investigation on the gross morphometric

is meager. Keeping the above view in fact the present study has been designed.

RESEARCH METHODOLOGY

Carcasses of three adult emu of 2-3 years of age were collected from Department of Veterinary Pathology, Ranchi Veterinary College, Kanke, Ranchi after postmortem examination. After maceration and proper cleaning (Raghavan, 1964) the sternum and rib were used for recording various morphological characterization and comparasion with other domestic birds.

RESULTS AND DISCUSSION

Sternum of emu was large and unsegmented bone situated antero-ventral aspect of thorax. It was bowl shaped (Fig. 2) bone which provide attachment to sternal ribs. Above finding is in agreement with the finding of Jayachitra *et al.* (2015) in emu. Sathyamoorthy *et al.* (2012) reported in spot billed pelican that sternum was large, broad and quadrilateral in shape, Brett and Hopkins (1991) stated that sternum was broad, smooth, bowl shaped breast plate like bone without keel in all ratites, Murey and fowler (1991) observed that it was soup like bone in emu. Sternum consisted of two borders, two surface and two extrimities. The cranial border was 8.12±0.8cm broad. The dorsal surface was deeply concave (Fig.1) which measured 3.00±0.12cm concavity and ventral surface was convex (Fig. 2) as reported by Nickel *et al.* (1977) in duck and the dorsal surface divided anterioly as costal sternum and posteriorly into metasternum (Fig.1) and the keel bone was absent in emu on metasternum as reported by Ramayya *et al.* (2007) in emu. The cranial extremity was short which bears two blunt processes with a notch in between them laterally (Fig.1). This finding is tallies with the finding of Jayachitra *et al.* (2015) in emu. Anterior border bears cranio-lateral process directed upward (Fig.1) which was 2.4±.06 cm in length as reported by Ramayya *et al.* (2007) in emu. Post extremities or metasternum was thin and triangular in shape (Fig.1). Unlike other birds postero-lateral process was absent. The lateral border bears five pairs of costal articular facets (Fig.1). Jayachitra *et al.* (2015) stated that the lateral border of sternum caudal to the antero-lateral process presented articular areas correspond to the number of sternal. The ventral surface was more convex (Fig. 2) which provide attachment to the breast muscles. On the ventral surface there was a sternal crest in mid position (Fig.2). Sathyamoorthy *et al.* (2012) stated that the sterna crest was present along the midline of the ventral surface of the sternum and it was triangular in shape when viewed laterally and small and extended only upto the cranial half and caudal to this the ventral surface was free in spot billed

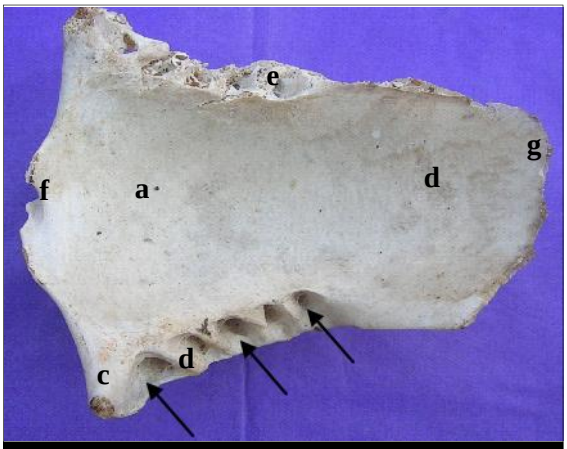

Fig. 1: Dorsal surface of sternum showing (a) costal sternum (b) metasternum (c) craniolateral process (d) inter articular area (e) lateral border (f) cranial extremity (g) caudal extremity and (→) costal articular facets

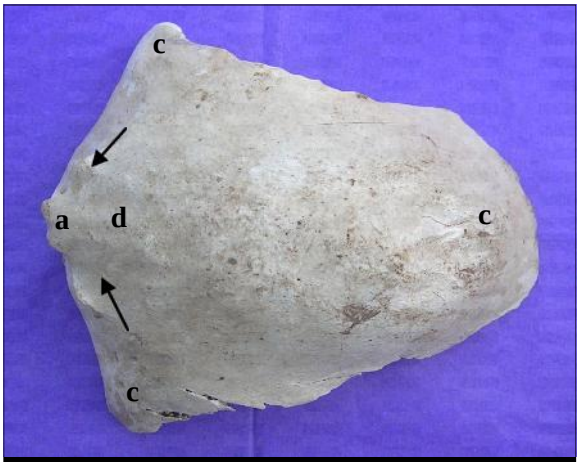

Fig. 2 : Ventral surface of sternum showing (a) cranial extremity (b) caudal extremity (c) craniolateral process (d) sternal crest and →low ridges

Fig. 3: Ventral view of rib of emu showing (a) head tubercle (c) neck (d) shaft and (e) ventral extremity

pelican. Sternal crest was provided with low ridges (Fig.2) on both the sides. Sathyamoorthy *et al*. (2012) observed that low ridges were present on the ventral surface in emu. In emu 9 pairs of ribs were present as reported by Ramayya *et al*. (2007) however, Brett and Hopkins (1991) describe that 9 pair of rib were present in ostrich and 10 pairs of rib present in rhea. The vertebral rib were articulate with the thorasic vertebrae and situated dorsolateral aspect of the thorax. Each rib consist of a shaft and two extremities, two surfaces and two borders (Fig.3). The length of rib were varied from 12.00 cm to 19.00cm. The lateral surface was convex while medial surface concave (Fig.3). The cranial border was thin and caudal border comparatively thik. The uncinate processes were absent in emu as described by Ramayya *et al*. (2007) in contrary to above finding Brett and Hopkins (1991) reported that small uncinate process were present in 6th rib of emu and on 4th to 6th ribs in ostrich, the proximal extremities of vertebral rib had head, neck and tubercle. The head was 1.9±0.30 cm in length (Fig.3) which articulated with the facet of the body of the vertebrae. The average length of tubercle was 3.30±0.40 cm (Fig.3) and articulated with the surface of the transverse process of the vertebra as observed by Ramayya *et al*. (2007) in emu. Sternal ribs which joints proximally with the distal extremity of respective vertebral rib and formed gliding joint and the sternal extremity articulated with the sternal fovea on the lateral border of the sternum as described by Nickel *et al*. (1977) in gallopavo and cygnus.

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