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Morphology of Shoulder Girdle in Japanese Quail (*Coturnix coturnix japonica*)

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ABSTRACT: The shoulder girdle of Japanese quail was made up of shoulder blade or scapula, coracoid and collar bone or clavicle. All the three bones of the shoulder girdle were very thin, plate like and extremely lightweight in nature. The scapula was a long rib like bone located parallel to the vertebral column. The coracoid was strong, thick and directed downwards and backwards with medially directed hook like projection. The clavicle was a thin curved plate of bone directed forwards, downwards and inwards to join the clavicle of opposite side. The present study was conducted to reveal the anatomical structure of shoulder girdle in Japanese quail.

Keywords: Shoulder girdle, Scapula, Clavicle, Coracoid

INTRODUCTION

Japanese quail which belongs to Phasianidae (pheasant) family is different from the common quail. Ainsworth *et al*. (2009) reported that the species was developed through domestication of common quail in China and then in Japan during 12th century and it was originally bred as domestic songbirds which became popular in 20th century for its meat and egg production. Japanese quail was a useful research species that were commonly utilized in different fields of investigations. The shoulder girdle of birds that is entirely bony forms the connection between the trunk and wings. It provides stability and flexibility for the upper limb (wings) by articulating with humerus in the glenoid fossa. It is made up of shoulder blade or scapula, coracoid and collar bone or clavicle. In avian species, many are good flyers while a few species are poor flyers. Their adaptation to the mode of locomotion depends on their skeletal conformation. The shoulder girdle forms a rigid structure and fulfils the requirements for flight and acts as a surface area for the insertion of wing muscles (Mehta *et al*., 2014). Literatures pertaining to the bones forming the shoulder girdle of Japanese quail were meagre hence the present study was undertaken.

MATERIALS AND METHODS

Carcasses of eight adult Japanese quails of either sex of six months of age were collected from the Department of Meat Science, Veterinary College and Research Institute, Namakkal. Further, the carcasses were subjected to maceration for about two months and after proper cleaning, the bones of shoulder girdle were separated and air dried as reported by Raghavan (1964). In the present study, the different morphological features of the bones in shoulder girdle *viz.*, scapula, clavicle and coracoid of Japanese quail were studied.

RESULTS AND DISCUSSION

In Japanese quail, all the three bones of shoulder girdle *viz.*, scapula, coracoid and clavicle, were very thin and plate like when compared to domestic fowl (King and McLelland, 1984). It is extremely lightweight but strong enough to withstand the stresses of taking off, flying and landing (Fig. 1).

SCAPULA

The scapula was a long rib like bone located parallel to the vertebral column and extended upto the cranio-lateral border of the ilium. The surfaces of the scapula were very thin and their borders were not much sharp as noticed by Sharma and Dubal (2018) in small Indian Kite. The cranial end of the scapula was presented with a small hook like pointed end which articulated with humerus and this feature was not seen in domestic fowl (Bradley and Grahame, 1960). As reported by Patkhi *et al.* (2010) in crow, the cranial extremity had acromion process for articulation with coracoid and clavicle. The caudal extremity was very thin, plate like and little broad in Japanese quail. But Shabir *et al.* (2013) mentioned that the caudal end of the scapula was thicker in Geese.

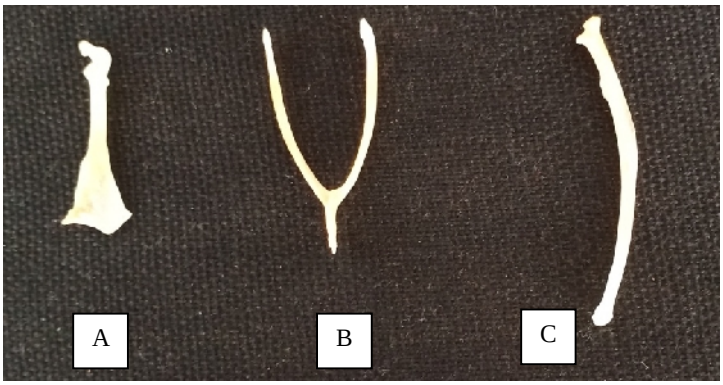

Fig. 1. Photograph depicting the bones of shoulder girdle of Japanese quail A - Coracoid, B – Clavicle, C- Scapula.

CORACOID

It was the strongest bone and acts like a wing strut in preventing the wing muscles from compressing the thorax on the downstroke (King & McLelland, 1984). The coracoid was strong, thick and directed downwards and backwards. The proximal end of the coracoid had medially directed hook like projection. It had an articular facet on the hook like process and another articular facet below for articulation with the clavicle and scapula. The proximal end of the coracoid, clavicle and cranial end of the scapula joined together to form the foramen triosseum (Tomar *et al*., 2010). But in Pigeon, Gerardo and Dino (2011) reported that only the procoracoid bone was involved in the formation of triosseal canal. The distal end of the coracoid was triangular and plate like which had a round facet at one end for articulation with the sternum.

CLAVICLE

It was a thin curved plate of bone directed forwards, downwards and inwards to join the clavicle of opposite side. The proximal extremity towards the scapula was narrow, directed inwards and articulated with scapula and coracoid and formed foramen triosseum. The distal extremity fused with the bone of opposite side to form flattened plate of bone called hypocleidium as in domestic fowl (King and McLelland, 1984).

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