Comparative Anatomical Study on the Isthmus of Pati and Chara-Chemballi Ducks *(Anas platyrhynchos domesticus)* during Laying Periods

Anil Deka\(^1\), G. Baishya\(^2\), Kabita Sarma\(^3\), K. B. Dev Choudhry\(^4\) and J. Rajkhowa\(^5\)
Department of Anatomy and Histology, College of Veterinary Science
Assam Agricultural University, Khanapara, Guwahati- 781022 (Assam)

Received: 4 March 2014; Accepted: 3 April 2014

ABSTRACT

Grossly, the isthmus was short and narrow in comparison to magnum and was situated ventral to the caudal lobe of the left kidney. Histologically, the tunica mucosa of isthmus of both Pati and Chara-Chemballi ducks were having primary, secondary and tertiary folds. It was lined by simple ciliated columnar epithelium with goblet cells in both ducks. Histochemically, the surface epithelium and glandular layers of isthmus showed intense PAS reaction in Chara-Chemballi duck than Pati duck.

**Key words:** Anatomy, Duck, Isthmus, Laying, Pati

The Pati duck population constitutes a major indigenous non-descript duck variety in the state of Assam. On the other hand, Chara-Chemballi duck is an indigenous variety of Kerala. Present investigation is intended to study the isthmus of Pati and Chara-Chemballi laying ducks at 42 weeks of age. This study would help to understand the anatomical conformation of isthmus of Pati and Chara-Chemballi ducks.

**MATERIALS AND METHODS**

In the present investigation, Pati and Chara-Chemballi ducks twelve each 42 weeks age of were procured from Pathsala, Barpeta district and State Institute and Rural Development, Khanapara, respectively. The gross anatomical characteristics of isthmus were studied and the different biometrical measurements viz the length, breadth and thickness were recorded by Vernier callipers. The tissues were collected, fixed in 10% neutral buffered formalin and processed for paraffin embedding method. The sections of 5 µ were stained with hematoxyline and eosin, Van Gieson’s method for collagen fibres, Gomori’s method for reticular fibres, Hart’s method for elastic fibres, Bielschowsky’s method for axis cylinder and dendrites and McManus’ method for glycogen (Luna, 1968). Different micrometrical parameters were recorded by means of standard method of micrometry using Nikon E 200 camera mounted microscope and Image Pro Express Ver-2.0 Software. The data were analyzed as per methods described by Snedecor and Cochran (1994).

**RESULTS AND DISCUSSION**

Grossly, the isthmus of both Pati and Chara-Chemballi ducks was short and narrow in comparison to magnum and was situated ventral to the caudal lobe of the left kidney as reported by Romanoff and Romanoff (1949) in fowl. The line of demarcation between the magnum and isthmus was marked by a sharp narrow band of tissue which was considered as neck (Figs. 1, 2). The present value of length, breadth, thickness and weight of Pati ducks were 1.61±0.04 cm, 0.80±0.02 cm, 0.70±0.03 cm and 0.63±0.03 gm, respectively and in Chara-Chemballi ducks were 2.38±0.13 cm, 0.66±0.03 cm, 1.02±0.08 cm and 0.87±0.00 gm, respectively. However Mohammad pour *et al.* (2012) reported length12.18±3.36 cm, width 8.92±1.65 mm, thickness1.64±0.29 mm and weight 5.30±3.05gm, respectively in laying duck whereas, Patki *et al.* (2012) found that the length, width and weight of isthmus were12.31±0.17 cm, 1.49±0.01 cm4.42±0.05 gm, respectively in Kuttanad duck at 24 weeks of age. The length of isthmus was 1.61±0.04 cm and 2.38±0.13 cm, respectively, in Pati and Chara-Chemballi ducks. Romanoff and Romanoff (1949) reported that in laying hen the isthmus was short and slightly reduced in diameter and the length ranged from about 4 to 12 cm, with a mean length and diameter of about 8 cm and 1 cm, respectively.
Histologically, the tunica mucosa of isthmus of both Pati and Chara-Chemballi ducks was folded and numerous primary, secondary and tertiary folds were present towards the lumen (Figs. 3, 4). The primary folds were angular in appearance and projecting to the centre of the lumen. They also contained similar type of secondary folds. The secondary folds in some region of the mucosa were associated with tertiary folds at the base of primary folds as reported by Ghule et al. (2011) in Japanese quail. The lining epithelium of isthmus of both Pati and Chara-Chemballi ducks were simple ciliated columnar with goblet cells. These observations were similar to the findings of Mohammadpour et al., (2012) in laying ducks. In both Pati and Chara-Chemballi ducks, the lamina propria-submucosa was filled with branched tubular glands. This layer contained more amounts of reticular fibres and less amount of collagen, elastic and nerve fibres in Chara-Chemballi duck as reported by Naragude et al., (2000) in Rhode Island red birds.

The tunica muscularis was consisted of an inner circular and an outer longitudinal layer with connective tissue fibres in both Pati and Chara-Chemballi ducks. The tunica serosa was consisted of loose connective tissue along with few lymphocytic aggregations and blood vessels and nerve fibres as reported by Mehta and Guha (2012) in laying hen. The mean height of lamina epithelialis mucosae of isthmus was 24.030±0.340 µ in Pati duck and 27.765± 0.420 µ in Chara-Chemballi duck. However, Naragude (2000) reported that the height of epithelium was 3.64±0.50 µ in Rhode Island red birds. Histochemically, the surface epithelium and glandular layers of isthmus showed intense PAS positive reaction in Chara-Chemballi as compared to Pati duck (Fig. 5). These might be due more amount of glycogen in Chara-Chemballi ducks as compared to Pati ducks.

**REFERENCES**


