GROSS ANATOMICAL STUDIES ON PROVENTRICULUS OF POST HATCH UTTARA FOWL

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ABSTRACT

Present study was conducted on proventriculus of Uttara Fowl at the age of 0, 7, 28 and 112 days. Proventriculus was collected from six birds of each age group for gross morphological and morphometrical studies. The proventriculus was an elongated, small, spindle shaped, thick walled organ, extended from fifth thoracic to third lumbo sacral vertebrae and its long axis was slopped from left to right. Its mucosa consists of numerous, wide, rounded, grossly visible papillae. The morphometrical observation of the proventriculus like weight, volume, diameter at the middle, wall thickness, longitudinal length and cross sectional area were showed significant difference amongst the four age groups. These parameters revealed corresponding increase with the advancing age of the birds.

Key words: Gross morphology, morphometry, proventriculus and Uttara fowl

Introduction

The indigenous fowl or poultry, forms the backbone of the backyard poultry farming in India specially in the Kumaon region of Uttarakhand, is said to be descended from the Red jungle fowl. The proventriculus (glandular stomach) is the first part of bird’s stomach, where digestive enzymes like gastric pepsin, hydrochloric acid and mucous are released and mixed with food before going to the gizzard.

Materials and Methods

The study was conducted on 24 apparently healthy birds of either sex reared at the Instructional Poultry Farm, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. Based on the age, birds were divided into four age groups of 0 day, 7 days, 28 days and 112 days with 6 birds in each group. The birds were sacrificed and the proventriculus length, transverse diameter, wall thickness and weight of proventriculus were recorded by using digital Vernier calipers and digital weighing balance (Sartorius, TE 214S). Volume of the organ was measured with the help of measuring cylinder by using Archimedes principle. Cross sectional area of proventriculus was calculated by dipping the cross section of proventriculus in the inkpad and followed by impression on graph paper.

Results and Discussion

Proventriculus was elongated, small, spindle shaped organ and its wall was thicker than that of the oesophagus. It was situated slightly towards the left of the median plane with its long axis sloping left to right. Ventrolaterally it related with the liver, posteriordorsally to the spleen, left abdominal airsac, ileum and caecum and anteriodorsally related to cranial thoracic airsac. These observations are in agreement with Das et al. (2013) in Kadaknath fowl while proventriculus was relatively small in the chicken and pigeon but it might be quite large in certain fish eating birds like storks and gulls (Sturkie, 1993).

The long axis of the proventriculus was sloped from left to right of the median plane. This might be due to the location of other organs like liver, heart and spleen as reported by Venkatesan et al. (2005) in Japanese quail, Das et al. (2013) in Kadaknath fowl and Nasrin et al. (2012) in broilers.

The lumen of proventriculus was narrow at both the ends, it continued anteriorly with oesophagus and posteriorly with gizzard as recorded by Das et al. (2013) and Nasrin et al. (2012) in Kadaknath fowl and broilers, respectively. At the junction of the proventriculus and gizzard there was a small constricted area referred as isthmus (Fig. 1) as reported by Das et al. (2013) in Kadaknath fowl. The mucosa was whitish in colour containing numerous low wide, rounded grossly visible papillae. This is in accordance with observations of Dahekar et al. (2014) in Japanese quail and Hodges (1974) in chickens. As observed by Lambate and Mamde (2008a) in broilers, these visible papillae were arranged in close contact with the adjacent papillae towards cranial and caudal part of the proventriculus, while the papillae in the middle part were free from each other (Fig. 2).

The average weight of the proventriculus in 0, 7, 28 and 112 day old birds was 0.27±0.03 g, 0.57±0.02 g, 2.16±0.22 g, 4.56±0.19 g, respectively. In Kadaknath fowl (Das, 2010) the weight of the proventriculus in 0, 7, 28 and 112 days old birds was 0.333±0.01 g, 0.526±0.013 g, 3.939 ± 0.074 g and 9.891±0.08 g, respectively. Thus the weight of proventriculus is higher in Kadaknath fowl at 28 and 112 days old birds than that in Uttara fowl.

The average volume of the proventriculus in 0, 7, 28 and 112 days old birds was 0.40±0.04 cc, 0.63±0.08 cc, 2.25±0.25 cc and 4.00±0.05 cc, respectively. In broilers, Lambate and Mamde (2008b) reported that the average volume of proventriculus in 2, 4, 6 weeks old broiler birds were 3.02±0.12 cc, 5.56±0.24 cc and 6.70±0.12 cc, respectively which was much higher than the present findings. In Kadaknath fowl (Das, 2010) the average volume of the proventriculus in 0, 7, 28 and

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112 days old birds was 0.746±0.015 cc, 1.18±0.106 cc, 2.1±0.07 cc and 3.68±0.106 cc, respectively. This indicates that volume of proventriculus in Kadaknath fowl is higher at 0 and 7 day old birds while it is lower in 28 and 112 day old birds as compared to Uttara fowl.

The average cross sectional area of proventriculus in 0, 7, 28 and 112 day old birds was 42.83±0.94 mm², 55.83±1.86 mm², 160.83±3.00 mm², 218.33±2.78 mm², respectively. In Kadaknath fowl, the average cross sectional area of proventriculus in 0, 7, 28 and 112 day old birds was 11.5±0.651 mm², 24.3±0.902 mm², 177.1±2.531 mm² and 255.00±3.535 mm², respectively (Das, 2010). Thus the average cross sectional area of proventriculus of Uttara fowl is higher in 0 and 7 day old birds and lower in 28 and 112 day old birds as compared to Kadaknath fowl.

The average longitudinal length of the proventriculus in 0, 7, 28 and 112 day old birds was 12.52±0.87 mm, 15.65±0.46 mm, 27.59±1.22 mm, 38.22±1.25 mm, respectively. This finding is similar to that of Nasrin et al. (2012) in broilers, who have claimed that the average length of proventriculus was 1.23±0.110 cm, 2.83±0.118 cm and 3.70±0.122 cm, at D1, D14 and D28, respectively.

The average diameter of the proventriculus at the mid-length level in 0, 7, 28 and 112 day old birds was 6.42±0.20 mm, 7.77±0.40 mm, 10.98±0.53 mm, 12.80±0.20 mm. These are in accordance with Das et al. (2013) in Kadaknath fowl, who stated that the average diameter of the proventriculus at the mid-length level in 0, 7, 28 and 112 day old birds was 6.69±0.266 mm, 8.08±0.5023 mm, 10.93±0.229 mm, 14.11±0.180 mm, respectively.

The average thickness of proventriculus wall in 0, 7, 28 and 112 days old birds was 1.90±0.02 mm, 3.01±0.03 mm, 4.04±0.05 mm, 6.34±0.33 mm, respectively. In Kadaknath fowl (Das, 2010) the average thickness of the wall of proventriculus in 0, 7, 28 and 112 days old birds was 2.41±0.078 mm, 2.73±0.095 mm, 4.46±0.044 mm, 5.35±0.127 mm, respectively. These findings are on similar lines to those of present study.

Summary

The proventriculus was an elongated, small, spindle shaped, thick walled organ, extended from fifth thoracic to the third lumbo sacral vertebrae. The isthmus was a small constricted area at the junction between the proventriculus and gizzard. Its mucosa consisted of the numerous, wide, rounded, grossly visible papillae. The morphometrical observation of the proventriculus for weight, volume, diameter at the middle, wall thickness, cross sectional area and longitudinal length showed corresponding increase with the advancing of age.

References


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