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Anil Deka
 Assistant Professor
 Department of Anatomy & Histology, C. V. Sc, AAU, Khanapara, Guwahati, Assam, India

Kabita Sarma
 Professor & I/c Head
 Department of Anatomy & Histology, C.V.Sc, AAU, Khanapara, Guwahati, Assam, India

Jiten Rajkhowa
 Assistant Professor
 Department of Anatomy & Histology, C.V.Sc, AAU, Khanapara, Guwahati, Assam, India

Mihir Sarma
 Junior Scientist (Poultry Science), LRS, AAU, Mandira, Kamrup, Assam, India.

Jahan Ahmed
 M.V.Sc Scholar, Department of Anatomy & Histology, C.V.Sc, AAU, Khanapara, Guwahati, Assam, India

Correspondence
Anil Deka
 Assistant Professor
 Department of Anatomy & Histology, C. V. Sc, AAU, Khanapara, Guwahati, Assam, India

Macro and Micro anatomical studies on Oesophagus, Proventriculus and Gizzard of Pati Duck (*Anas platyrhynchos domesticus*) of Assam

Anil Deka, Kabita Sarma, Jiten Rajkhowa, Mihir Sarma and Jahan Ahmed

Abstract

The Pati duck population constitutes a major indigenous non-descript duck variety in the state of Assam. The annual egg production per Pati duck is 70-95 eggs. In the present investigation, six numbers of Pati ducks were utilized. The oesophagus, proventriculus and gizzard were collected immediately after death and anatomical studies were made on it. Grossly, the wall of the oesophagus contained some longitudinal folds which contributed to the distensibility of the oesophageal wall. The inner layer of proventriculus contained numerous glands. The inner layer of gizzard was covered by thick cuticle. Histologically, the lamina epithelialis mucosae of oesophagus were consisted of stratified squamous epithelium. Lamina propria-submucosa was composed of numbers of oesophageal gland as well as connective tissue fibers. The tunica mucosa of proventriculus of Pati duck was lined by simple columnar epithelium. Tunica submucosa was composed of connective tissue and proventricular gland which were pear or conical shaped. The tunica mucosa of gizzard of Pati duck was folded and lined by simple columnar epithelium. Lamina propria contained numerous tubular glands and connective tissue. Tunica muscularis of gizzard were composed of smooth muscles. The tunica serosa of oesophagus, proventriculus and gizzard were consisted of loose connective tissue and blood vessels.

Keywords: Anatomy, Oesophagus, Proventriculus, Gizzard, Pati, Duck

1. Introduction

The Pati duck population constitutes a major indigenous non-descript duck variety in the state of Assam. The annual egg production per Pati duck is 70-95 eggs. The stomach of avian consists of proventriculus and Gizzard. Both the parts of stomach of avian had great morphological and functional variability within and among the species. It depends on the amount and kind of food changing at different season. (Starck, 1999) [10].

2. Materials and Methods

In the present investigation, six number of Pati ducks were utilized at 42 weeks of age. The Pati ducks were procured from Pathsala, Barpeta district. The oesophagus, proventriculus and gizzard were collected immediately after sacrifice as per the standard method of Gracy (1968) [3] and gross studies were made on it. After slaughter, the organs were taken out from the body of birds. For histological studies tissue of oesophagus, proventriculus and gizzard were collected from Pati ducks. The tissue samples were fixed in 10% neutral buffered formalin. Then tissues were processed for Paraffin embedding method. Paraffin sections were cut in five micron thickness and stained with routine method for histomorphological study as per standard methods of Luna (1968) [7]. After staining, histological characteristics of oesophagus, proventriculus and gizzard were recorded.

3. Results and Discussions

In present investigation, it is revealed that the oesophagus of Pati duck was quite long, wide and highly distensible organ. The inner wall of the oesophagus contained longitudinal folds which contributed to the distensibility of the oesophageal wall for accommodation of large amounts of food. These folds were large and extensive (Hamdi *et al.*, 2013) [4]. The proventriculus of Pati duck was large and fusiform-shaped. The wall of the proventriculus was thick and it contained numerous glands. There was a distinct demarcation between the proventriculus and oesophagus cranially and the gizzard caudally. Similar finding

was reported by Pesek (1999)^[6] and Konish (2001)^[6]. The Gizzard was the second most compartment of stomach which was large, thick muscular wall, flatten shaped and covered by thin fatty tissue. The inner layer of gizzard was covered by thick cuticle. These findings were corroborated with the findings of Saffar and Al-Samawy, 2015^[1] in Mallard duck. Histologically, the wall of oesophagus consists of four layers namely; tunica mucosa, tunica submucosa, tunica musculosa and the tunica serosa. The lamina epithelialis mucosae of oesophagus were consisted of stratified squamous epithelium. Lamina propria-submucoase was composed of numbers of oesophageal gland as well as connective tissue fibers. These glands were abundant in the lamina propria mucosae. The lamina muscularis mucosae layer was distinct which separates the lamina propria mucosae from the underlying tunica submucosa. The tunica muscosaris layer was relatively thick and composed of two smooth muscle layers viz., an inner longitudinal layer and an outer circular layer. This layer is surrounded by the tunica adventitia at the cervical region of the oesophagus and by the tunica serosa at the thoracic region (Hamdi *et al.*, 2013)^[4].

The tunica mucosa of proventriculus of Pati duck composed of longitudinal branched folds which were lined by simple columnar epithelium. Simple tubular glands were founded in the lamina propria layer. These glands were more pronounced and separated by smooth muscle fibers of muscularis mucosa. These finding were in accordance with the findings of chicken (Hodge, 1974; Toner, 1963)^[5, 8]. Tunica Sub mucosa layer contain pear or conical shape glands which occupying the most part of proventriculus wall and surrounded by capsule. These glands contain abundant secretory tubules and each tubule continued by one duct opened into the main collecting duct which opened into luminal surface. The tunica muscularis composed of inner thin longitudinal and outer thick circular layer. The tunica serosa layer was covered by mesothelium as well as blood vessels (Batah *et al.* 2012)^[2]. The tunica mucous of the gizzard is thrown into well-developed narrow and deep folds which were covered by a thin tough keratin-like layer known as cuticle. The lamina propria mucosae contained simple tubular glands (Toner, 1964)^[9]. The tunica sub mucosa is a thin layer of loose connective tissue and it contains numerous of blood vessels. Tunica Musculosaris consists of inner thick circular muscle layer and the outer thin longitudinal smooth muscle layer. Similar findings were reported by Hamdi *et al.*, 2013^[4] in Avian Species.

4. Summary and Conclusion

Grossly, the oesophagus of Pati duck was quite long, wide and highly distensible organ. The proventriculus of Pati duck was large and fusiform-shaped. The shape of gizzard was flatten. Histologically, the lamina epithelialis mucosae of oesophagus were consisted of stratified squamous epithelium. Tunica Sub mucosa layer of proventriculus contain pear or conical shape glands which occupying the most part of proventriculus wall and surrounded by capsule. The tunica mucous of the gizzard is thrown into well-developed narrow and deep folds which were covered by a thin tough keratin-like layer known as cuticle. These will help physiologist, pathologist and poultry scientists for effective disease control regime.



Fig 1: Photograph showing the longitudinal folds of oesophagus of Pati duck.



Fig 2: Photograph showing the proventriculus and gizzard of Pati duck.



Fig 3: Photograph showing the opening of glands of proventriculus and cuticle of gizzard.

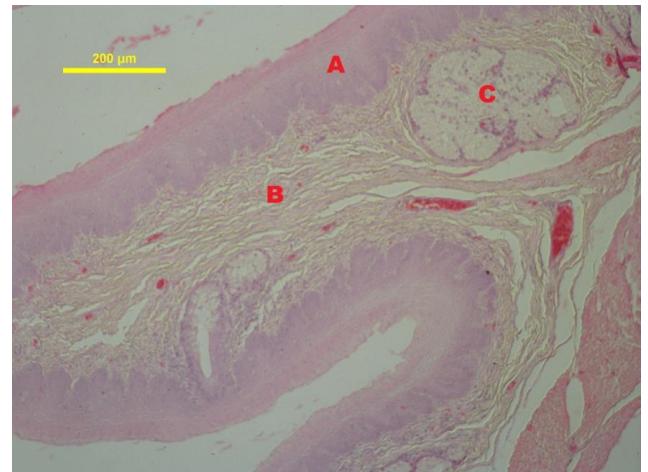


Fig 4: Photomicrograph showing the keratinized stratified squamus epithelium (A), lamina propria (B) and Oesophageal glands (C) of Pati duck.

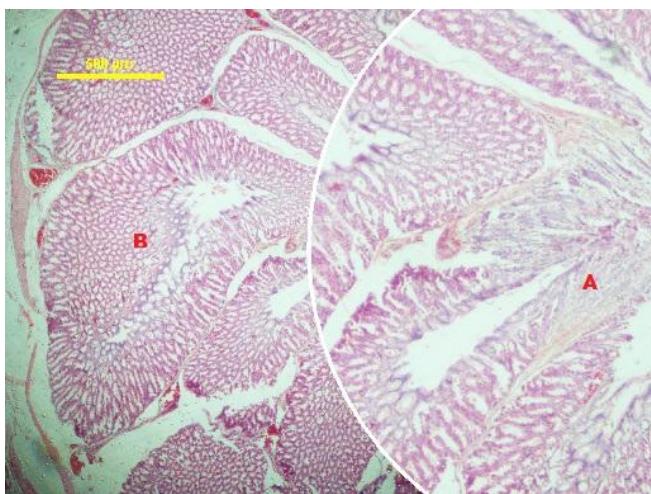


Fig 4: Photomicrograph showing the simple columnar epithelium (A) and pear shaped glands (B) of tunica submucosa layers of proventriculus of Pati duck.

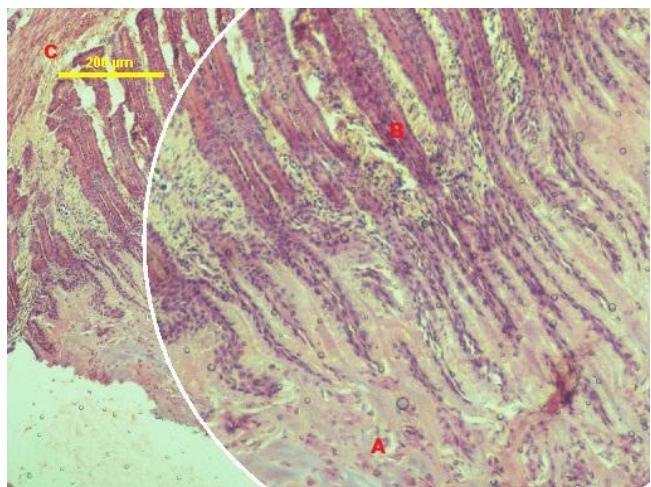


Fig 5: Photomicrograph showing the cuticle (A), simple tubular glands (B) and tunica muscularis (C) of gizzard of Pati duck.

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