

HISTOLOGY OF ESOPHAGUS OF BLACK BENGAL GOAT

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ABSTRACT

Detail histological features of esophagus of 12 Black Bengal goats were studied in the Department of Anatomy and Histology, BAU, Mymensingh-2202, Bangladesh during the period from July to December 2003. All specimens were collected from adult Black Bengal goats (over 6 months of age) irrespective of age and sex. The esophagus of Black Bengal goat was sampled at six areas- cranial cervical, middle cervical, caudal cervical, at the level of thoracic inlet, at the middle mediastinum and at the level of cardia. The histological layers of esophagus were- tunica mucosa (lamina epithelia, lamina propria and lamina muscularis mucosa), tunica submucosa, tunica muscularis and tunica serosa/adventitia.

Key words: Histology, esophagus, Black Bengal goat

INTRODUCTION

The esophagus is an important digestive organ in the body. It carries foodstuffs from mouth cavity to the stomach. Histology of the esophagus of man and different animals was found in the standard texts and literatures (Williams *et al.*, 1995; Bloom and Fawcett, 1968; Copenhaver *et al.*, 1975; Miller *et al.*, 1964; Getty, 1975; Dellmann and Eurell, 1998) but it was revealed that no such study has been performed on the esophagus of Black Bengal goat that is popularly known as "Poor man's cow" and considered as only the pure breed in Bangladesh. Thus, the present study was carried out to investigate the histological features of the esophagus of Black Bengal goat in Bangladesh.

MATERIALS AND METHODS

Irrespective of age and sex, 12 Black Bengal goats (over 6 months of age) were purchased from local markets and the histological study of esophagus was performed in the Department of Anatomy and Histology, Bangladesh Agricultural University, Mymensingh during the period from July to December 2003. Immediately after slaughtering the goats, samples were collected from six different areas of esophagus- cranial cervical, middle cervical, caudal cervical, at the level of thoracic inlet, at the middle mediastinum and at the level of cardia. The tissues were fixed in 10% neutral buffered formalin then dehydrated in graded alcohol, cleared in xylene, embedded in paraffin and finally the sections were cut at 6 μ thickness using rotary microtome. The sections were then stained with standard Hematoxylin and Eosin (H & E) stain. For quantitative estimation, the thickness of tunica mucosa, tunica submucosa and tunica muscularis were measured with the help of calibrated ocular micrometer in 10 random fields in each field in each slide. One small unit of calibrated ocular micrometer had the value of 14.5 μ m when the tissues were observed under 10 objectives. Detail histological study was completed by using medium and low power light microscopy (40X and 10X). Photographs were placed for better illustration of the result.

RESULTS AND DISCUSSION

The esophagus of Black Bengal goat was composed of the following four layers: tunica mucosa, tunica submucosa, tunica muscularis and tunica adventitia (tunica serosa). This observation was similar as described by Williams *et al.* (1995), Bloom and Fawcett (1968), Copenhaver *et al.* (1975) in human, Miller *et al.* (1964) in dog, Getty (1975) and Dellmann and Eurell (1998) in horse and ruminant.

Tunica mucosa

The tunica mucosa of esophagus of Black Bengal goat was characteristically thrown into longitudinal folds, composed of lamina epithelia, lamina propria, and lamina muscularis mucosa (Fig. 1). The thickness of the layer presented in Table 1.

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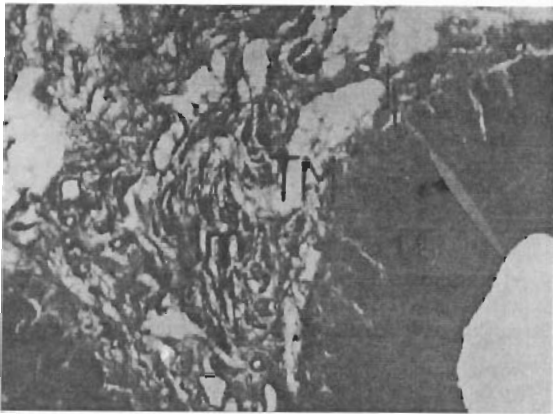


Fig. 1. Esophagus of Black Bengal goat showing tunica mucosa (TM), lamina epithelia (LE), lamina propria (Lp) and lamina muscularis (Lm) (H & E, 10X).

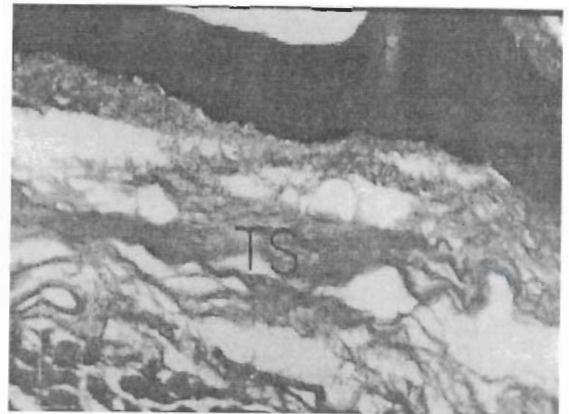


Fig. 2. Esophagus of Black Bengal goat showing tunica submucosal (TS) (H & E, 10X).

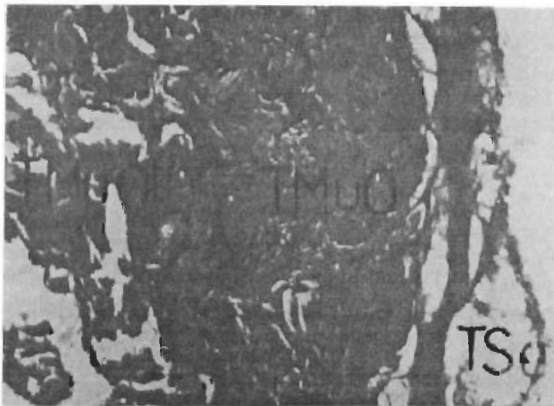


Fig. 3. Esophagus of Black Bengal goat showing inner circular layer of tunica muscularis (TMuOi), outer longitudinal layer of tunica muscularis (TMuO) (H & E, 10X).

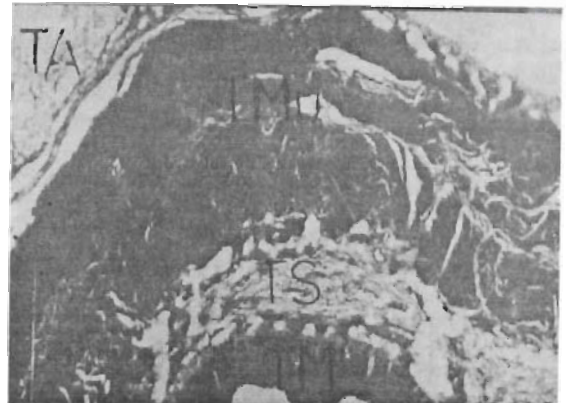


Fig. 4. Middle cervical esophagus of Black Bengal goat showing tunica mucosa (TM), submucosal (TS), tunica muscularis (TMu) and tunica adventitia (H & E, 10X).

Lamina epithelia were composed of nonkeratinized stratified squamous epithelium in Black Bengal goat. Lamina propria was composed of dense irregular connective tissue. In loose connective tissue solitary lymphatic nodules were present. Lamina muscularis mucosa was composed of spirally arranged smooth muscle. This layer was present from cranial cervical esophagus to the cardia of esophagus. Although lamina muscularis mucosa was present throughout the length of the esophagus, it was incomplete and composed of spirally arranged smooth muscle bundles.

Tunica submucosa

In Black Bengal goat, tunica submucosa (Fig. 2) consisted of loose connective tissue with many elastic fibers, collagen fibers, blood vessels and nerves. Esophageal glands were found only in cranial cervical region of the esophagus. The thickness of this layer was shown in Table 1.

Table 1. Thickness of tunica mucosa, lamina muscularis mucosa, tunica submucosa and tunica muscularis in different areas of esophagus in Black Bengal goat

Layers	Thickness (μm), (n = 6)					
	Cranial cervical	Middle cervical	Caudal cervical	Thoracic inlet	Middle mediastinum	Cardia
Tunica mucosa	232-261 a 246.33 b	425-462 446.5	455-475 464.5	507.5-551 531.9	570-600 589.83	725-780 749.16
Lamina muscularis mucosa	25-36 30.5	143-170 153	40-43.5 42.9	52-59 56	214-259 232.5	128-165 148.16
Tunica submucosa	725-752 741.83	156-178 169.66	258-315 291.5	261-365 326.16	369-412 388.55	499-540 516.5
Tunica muscularis	1886.6-2014 1938.08	1063-1224 1152.08	693-798 746.33	769-874 824.5	1025-1184 1101.25	1496-1625 1575.66

n = Number of goats, a = Range, b = Mean.

Tunica muscularis

The muscular tunic consisted of inner circular and outer longitudinal layers (Fig. 3). Both layers were actually spirally arranged. The highest thickness of tunica muscularis was measured 1938.08 μm in the cranial cervical part of the esophagus and the lowest thickness was measured 746.33 μm in the caudal cervical part of esophagus.

The tunica muscularis consisted of striated muscle throughout the length of the esophagus, whereas Getty (1975) and Dellmann and Eurell (1998) stated that cranial and caudal end of esophagus in ruminant composed of smooth muscle.

Tunica adventitia (tunica serosa)

The outer layer of the cervical part of esophagus was termed tunica adventitia. In the thorax, the esophagus was covered by the mediastinal pleura, which formed the tunica serosa. In Black Bengal goats, tunica adventitia was consisted of loose connective tissue with many elastic fibers and had mesothelial lining (Fig. 4).

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