

**Short communication**

**MORPHOLOGY OF ESOPHAGUS OF BLACK BENGAL GOAT**

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**ABSTRACT**

The morphology of esophagus of Black Bengal goat was studied 6 Black Bengal goats of over six months of age of both sex in the Department of Anatomy and Histology, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh using. The topography, shape, size, esophageal length including cervical and thoracic parts were measured. The esophagus was sampled at six sites – cranial cervical, middle cervical, caudal cervical, at the level of thoracic inlet, at the middle mediastinum and at the level of cardia. The esophagus was 45-50 cm long. The cervical part of esophagus was 13-15 cm long and the thoracic part was 32-30 cm long. The highest and lowest diameter was found 5.1 cm and 3.2 cm at the cardia and at the cranial cervical part of the esophagus respectively.

**Key words:** Morphology, esophagus, Black Bengal goat

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**INTRODUCTION**

Esophagus is an important organ of the digestive system, which helps in digestion by transportation of foodstuff from mouth to stomach, by expelling gases by the process of eructation and also helping regurgitation of the bolus for rumination in ruminants including Black Bengal goat. There are many clinical problems of esophagus of Black Bengal goat like faulty administration of drugs through stomach tube, choke, esophagitis, tracheoesophageal fistula and stricture etc are frequently encountered in field level. Many researchers on various aspects of esophagus studied but there is no information is available on the morphology of esophagus of Black Bengal goat yet in Bangladesh. Thus, it is expected that the present study will carry valuable information for anatomists, veterinary practitioners and goat researchers as well.

**MATERIALS AND METHODS**

A total of six Black Bengal goats over 6 months of age of both sex were sacrificed to study the morphology of esophagus in the Department of Anatomy and Histology, Bangladesh Agricultural University (BAU), Mymensingh. The animals were purchased from local market, near the BAU, Mymensingh. Prior to killing, the animals were weighed after fasting for 12 hours. The animals were bled to death by dissecting the left common carotid artery, through which the fixing solution containing 10% formalin, 1% phenol and 0.05% glycerin was injected for fixation. Following dissection, length and diameter of esophagus at different level was measured and recorded.

**RESULTS AND DISCUSSION**

The esophagus of Black Bengal goat was consisted of two parts – cervical and thoracic parts. This observation was similar to Getty (1975). On the other hand, according to Miller *et al.* (1964) the esophagus of dog was divided into three parts- cervical, thoracic, abdominal parts. Williams *et al.* (1995) stated that the esophagus of human is divided into three parts cervical, thoracic, abdominal parts. In Black Bengal goat cranial cervical part of the esophagus laid dorsally to the trachea. At the third cervical vertebra the esophagus was inclined to the left surface of the trachea. It maintained its relation until it reached the sixth cervical vertebra where it went to the dorsal surface of the trachea at the thoracic inlet.

The cervical part of the esophagus was related to the carotid sheath, the recurrent laryngeal nerve, thymus and the deep cervical lymphnode. The lateral surface was covered by the omohyoideus, sternomastoides, cleidomastoides and sclaneus muscles. At the junction of the neck and thorax the esophagus went a slight curvature, convex ventrally and present only when the head was held higher than the thoracic inlet. At the first rib the esophagus was in contact with the cervicothoracic ganglion, the costo-cervical trunk and the thoracic duct. Coursing the mediastinum the esophagus passed dorsally over the base of the heart and bifurcation of the trachea forming the second curvature, which was convex dorsally. It crossed the right face of the aortic arch, and then passed straight back in the caudal mediastinum, ventral to the aorta, through the esophageal hiatus in the plane of the eighth intercostal space. In the caudal mediastinum the esophagus was accompanied by the dorsal and ventral trunks of the vagus nerve and was related dorsally to the large caudal mediastinum lymphnodes. These observations were similar to Getty (1975), Lahunta and Habel (1986) in ruminants.

In horse, it began in the median plane dorsal to the rostral border of the cricoid of the larynges (Getty, 1975). At the fourth cervical vertebra it has passed to the left surface of the trachea and usually reached the median plane ventral to the trachea at the caudal end of the 6<sup>th</sup> cervical vertebra. Then it passed dorsally and caudally through the thoracic inlet between the left face of the trachea and first rib. Then it reached the dorsal surface of the trachea at the 3<sup>rd</sup> thoracic vertebra and passed caudally, crossed the aortic arch by which it was pushed over to the right of the median plane. Here it continued in the mediastinum between the lungs. Then it reached to the esophageal hiatus of the diaphragm and finally terminated at once at the cardiac orifice of the stomach.

In dog, the esophagus began opposite the middle of the axis, dorsally and the caudal border of the cricoid cartilage ventrally (Miller et al., 1964). Getty (1975) stated that the cervical part was at first medial and dorsal to the trachea. The thoracic part of the esophagus extended from the thoracic inlet to the esophageal hiatus of the diaphragm. At first, it usually lay to the trachea. It obliquely crossed the left face of the trachea to gain its dorsal surface of trachea and bifurcates into the bronchi, ventral to the 5<sup>th</sup> and 6<sup>th</sup> thoracic vertebra. In reaching this level it crossed the right face of the aortic arch. Continuing caudally between the lungs it usually inclined slightly to the left and passes through the hiatus. The abdominal portion of the esophagus is wedge shaped (Miller et al., 1964). Dorsally the esophagus joins the stomach and ventrally it notches the thin dorsal border of the caudate lobe of the liver.

In human, Williams et al. (1995) stated that the esophagus began in the neck, level with the lower border of the cricoid cartilage. They also stated that the cervical part was the posterior to the trachea and the recurrent laryngeal nerve ascends on each side between the trachea and esophagus. Posterior side was related to the vertebral column, longus colli muscle and deep fascia. Lateral on each side were the common carotid artery and thyroid gland. In the lower neck, where esophagus deviated left, it was closer to the left carotid sheath and thyroid gland. The thoracic art of the esophagus at first situated a little to the left in the superior mediastinum between the trachea and vertebral column. Then passed behind and to the right of the aortic arch to descend in the posterior mediastinum along the right side of the descending thoracic aorta. Below, as it inclined left, it crossed anterior to the aorta to enter the abdomen through the diaphragm at the level of the 10<sup>th</sup> thoracic vertebra. Pansky (1975) stated that the abdominal part emerged from the right diaphragmatic crus, slightly left to the midline and at the level of the tenth thoracic vertebra. It formed a truncated cone about 1 cm high long, curving sharply left, its base was continuous with the cardiac orifice of the stomach; its right side continued smoothly into the lesser curvature, while the left was separated from the gastric fundus by the cardiac notch.

The esophagus of Black Bengal goat was 45-50 cm long. The cervical part of esophagus was 13-15 cm long and the thoracic part of esophagus was 32-30 cm long. On the other hand, Getty (1975) stated that in bovine the length of esophagus was 90-105 cm long. The length of the cervical esophagus was 42-49 cm and the thoracic esophagus was 48-56 cm in bovine (Getty, 1975; Ghosh, 1998). In sheep, the length of esophagus was 45 cm long and diameter at the pharynx was 1.8 cm and 2.5 cm at the cardia (Getty, 1975). The length of esophagus was 125-150 cm long in horse (Getty, 1975). The cervical part was 75 cm, the thoracic part was 63 cm and abdominal part was 2 cm in horse (Ghosh, 1998). The length of esophagus was about 30 cm and 2 cm in diameter in dog (Miller et al., 1964). The esophagus of human was 25 cm long and 2.54 cm wide (Russell, 1974). The diameter of esophagus in different animals of Black Bengal goat ranges from 3.2 to 5.1 mm (Table 1).

*Morphology of esophagus of Black Bengal goat*

Table 1. Diameter of esophagus in different areas of Black Bengal goat

Animal No.	Cranial cervical (mm)	Middle cervical (mm)	Caudal cervical (mm)	Thoracic inlet (mm)	Middle mediastinum (mm)	Cardia (mm)
1	3.2	3.6	3.8	4.0	4.1	5.1
2	3.2	3.6	3.8	4.0	4.0	5.2
3	3.1	3.5	3.7	3.9	4.0	5.2
4	3.2	3.4	3.7	4.0	4.2	5.2
5	3.3	3.6	3.6	3.9	4.1	5.1
6	3.3	3.5	3.7	4.0	4.1	5.1
Mean	3.2	3.5	3.7	3.9	4.0	5.1

**REFERENCES**

1. Getty R (1975). *Sisson and Grossman's The Anatomy of the Domestic Animals*. Vol. 1 & 2, 5<sup>th</sup> edn., WB Saunders Company, Philadelphia. pp. 881-884, 1547.
2. Ghosh RK (1998). *Primary Veterinary Anatomy*. 2<sup>nd</sup> edn., Current Books International, India. pp. 123-124.
3. Lahunta AD and Habel RE (1986). *Applied Veterinary Anatomy*. WB Saunders Company, Philadelphia. pp. 187-189.
4. Miller ME, Christensen GC and Evans HW (1964). *Anatomy of the Dog*. WB Saunders Company, Philadelphia, London. pp. 664-667.
5. Pansky B (1975). *Dynamic Anatomy and Physiology*. Macmillan Publisher, New York.
6. Russell MD (1974). *The Human Organisms*. 4<sup>th</sup> edn., McGraw-Hill Book Company.
7. Williams PL, Bannister LH, Berry MM, Collins P, Dayson M and Dussek JE (1995). *Gray's Anatomy*. 38<sup>th</sup> edn., Pearson Professional Limited, Livingstone Churchill. pp. 1751-1753.