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Histological studies of trachea in black Bengal goat and garole sheep

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Abstract

A study was conducted on histological studies on the trachea of black Bengal goat and garole sheep. Total ten samples were collected in each species from local slaughter house. In trachea the lamina epithelial was made up of pseudostratified ciliated columnar epithelium and cells were rested on distinct basement membrane. Goblet cells were predominant and variable numbers of migratory cells were observed within the epithelial layer. Lamina propria was found to be formed by loose connective tissue fiber. In case of sheep in between the lamina propria and submucosa a large bundle of muscle fibers was found towards the point of contact of two ends of the tracheal cartilage. The muscle bundle gradually diminish after traveling a certain distance from points of origin there after scanty muscle fibers was found all along the residual length of trachea and again towards the terminal portion of the tracheal ring gradually the width of the muscular layer is increased and width was highest at the point of tracheal cartilage. The numbers of the tubuloacinar glands were less as compare to goat.

Keywords: Histology, trachea, black Bengal goat, gasrole sheep

Introduction

Intake of oxygen and removal of carbon dioxide are the primary functions of the respiratory system, it plays other important roles in the body. The respiratory system helps regulate the balance of acid and base in tissues, a process crucial for the normal functioning of cells. It protects the body against disease-causing organisms and toxic substances inhaled with air. The respiratory system also houses the cells that detect smell, and assists in the production of sounds for speech. The trachea is a tubular structure that begins at the cricoids cartilage of the larynx and ends when it bifurcates to form the principle bronchi, composed of series of incomplete rings that were incomplete dorsally present between of them longitudinal folds. Tracheal length is about (65 cm) in ox and cow, about (25 cm) in sheep and goat, the entire trachea must be flexible to allow the movement of head, neck and larynx (Al- Umeri, 2015) ^[1]. The aim the present study to provide details information about the histology of trachea in Black Bengal goat and Garole sheep.

Materials and Method

The tracheal tissue samples were fixed in 10% neutral buffer formalin (NBF) and then it was washed under slow tap water for 12 hours. After that passed through ascending grades of alcohol (one hour each) for dehydration. Afterwards, the tissues were kept in Xylene for 20 to 30 minutes till the tissues were semi-transparent. The tissue was kept in melted paraffin at a temperature of 58-60 °C. Afterwards paraffin blocks were prepared by standard procedure. The section were cut with the help of rotary microtome and stained. The sections (horizontal & Vertical) of 5 μ thickness were obtained and stained with routine haematoxylin and eosin (Luna, 1968) ^[10]. 10% N.B.F. fixed sections were treated for staining collagen fibers as per standard technique of Masson, 1929. The collagen fibers stained blue colour and cytoplasm, muscle fibres and inter cellular fibres stained red. The nuclei took black stain. Standard technique of Mallory (1961) ^[11] for staining elastic fibres. The fibres stained black and collagen stained pink colour. Formalin fixed sections were stained for polysaccharides as per standard technique of McManus 1946 ^[13]. Glycogens and other per iodate-reactive carbohydrates took magenta colour.

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Result and Discussion

On histological examination of trachea of both the species, it was revealed that histologically trachea of both the species was similar with few exceptions.

The lamina epithelialise was made up of pseudostratified ciliated columnar epithelium and cells were rested on distinct basement membrane (Fig 1 & 2). Goblet cells were predominant and variable numbers of migratory cells were observed with in the epithelial layer. Lamina propria was found to be formed by loose connective tissue fiber. In case of sheep in between the lamina propria and submucosa a large bundle of muscle fibers was found towards the point of contact of two ends of the tracheal cartilage. The muscle bundle gradually diminish after traveling a certain distance from points of origin there after scanty muscle fibers was found all along the residual length of trachea and again towards the terminal portion of the tracheal ring gradually the width of the muscular layer is increased and width was highest at the point of tracheal cartilage. The numbers of the tubuloacinar glands were less as compare to goat. Few adipose tissues were scatteredly distributed with in the propria which was not found in case of goat. Bacha (1990) [2] stated that the trachea was lined by a ciliated, pseudostratified columnar epithelial with goblet cells. A lamina propria and submucosa lied below the epithelium, but were not clearly demarcated from one another. Glands, mostly mixed, occurred in the deeper layers of the lamina propria and within the submucosa. A layer of smooth muscle was located dorsally in the trachea. An adventitia of connective tissue completed the wall of the trachea.

The lamina propria and submucosa were distributed by collagen and elastic fiber. The elastic fiber was predominant towards the tracheal cartilage (Fig 3, 4 & 6). In support our finding. Eroschenko (1994) [8] stated that the elastic fiber from a longitudinal elastic membrane in the loose connective tissue in the submucosa.

Banks (1993) [3] also stated similar observation and he narrated that the lamina propria, tunica submucosa, areolar connective tissue and elastic fibers were predominant and believed to replace the lamina muscularis mucosae in the deeper layers. Dellmann Brown (2006) [7] stated similar findings regarding the lining epithelium, propria, submucosa and hyaline cartilage which is in agreement with our present findings. The orientation of the muscular fiber which we have found in case of sheep is supported by the statement of Dellmann (2006) [7] where he depicted that the dorsal free ends of the cartilages were brides by the trachealis muscle, a band of smooth muscle. In most species the muscle attached to the perichondrium on the internal side of the cartilage. Banks (1993) [3] also narrated that the tunica muscularis was reduced to transversely oriented mass of smooth muscle that extended between the open ends of the horse shoe shaped cartilage. The actual attachment of the muscle to the cartilage was species variable. The free end of the tracheal cartilage was occupied by smooth muscle which was imbedded in the fibroelastic membrane in both the species. In our present finding the migratory cells were found in the lamina epithelialis which was supported by Jeffery *et al* (1975) [9] who observed similar migratory cells in case of rat.

In case of female hamster Becci (1978) [4] reported five morphological cell type in trachea. Tracheal glands mostly mucous containing gland was characterized by PAS positive granules. Similar observation was recorded in the present study in case of both the species (Fig. 5). Daniel (2005) [6]

reported that the nasal respiratory epithelium of the mouse has been studied at the microstructural level. The tissue was found to be a rather typical pseudostratified columnar ciliated epithelium, superficially different but respects to that of other mammals.

Four cell types were distinguished ciliated columnar, secretory basically similar to tracheal and bronchial epithelium in the same species, and clearly similar in most (goblet), intermediate, and basal cell. Pack *et al.* (1980) [14] experimented tracheal epithelium of the mouse with PAS reaction and found few mucous containing cell. Pastor *et al.* (1987) [15] reported three cell types mucous, ciliated and basal in the tracheal epithelium of *Testudo graeca* and *Pseudemys scripta elegans* which was in accordance in our present findings. Plopper *et al.* (1988) [16] reported in case of sheep and rabbit that four cell types like ciliated, mucous goblet, mucous granule and basal cell. The tallest epithelium lined the trachea, the shortest the respiratory bronchiole but in present investigation in case of the sheep we could not find small mucous granule cells. Telada (2004) [18] conducted PAS alcian blue reaction in the tracheal tissue. In case of buffalo and cattle the goblet cells reacted PAS positively. The numerous mucous glands also stained positively with PAS.

The presence of tracheal gland in case of sheep and goat in our presence study was supported by the findings of Choy and Fink (2000) [5] reported similar observation. William (1990) [19] reported presence of elastic fiber with in the loose connective tissue of lamina propria and submucosal layer in the trachea of goat and cat. This is in agreement in with the findings. Similar histological orientation in the trachea of the camel was reported by Raji and Naserpour (2007) [17].

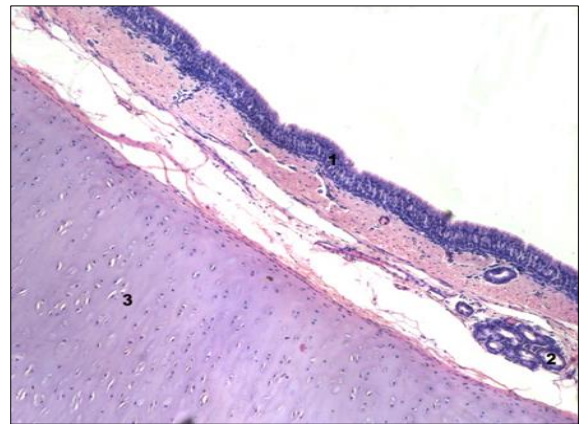


Fig 1: Photomicrograph showing Trachea of goat Epithelium (1) gland (2) cartilage (3) H&E, X 100

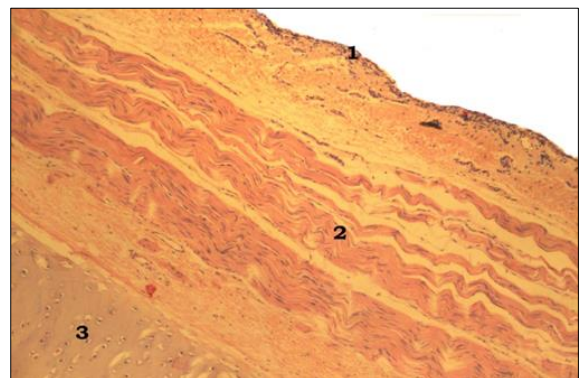


Fig 1: Photomicrograph showing trachea of sheep, Epithelium (1) Tracheal muscle (2) Cartilage (3) H&E, X 100

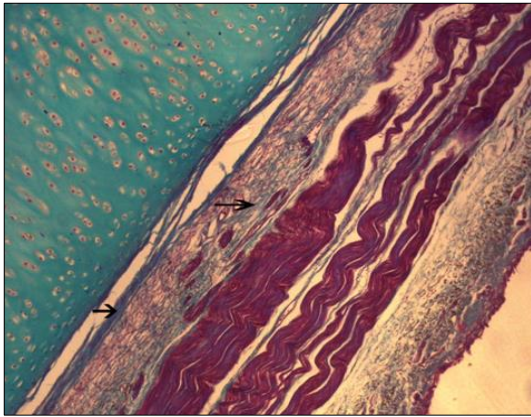


Fig 2: Photomicrograph showing (arrow) collagen fibers in trachea of sheep. M&T X100

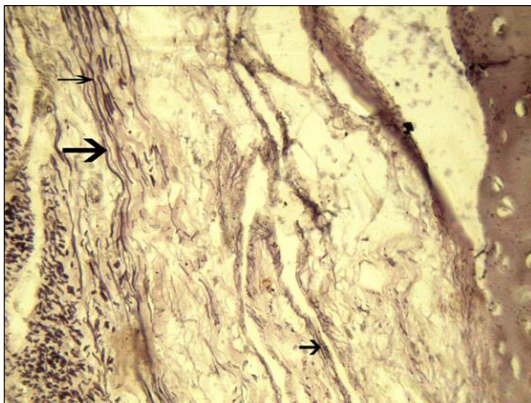


Fig 3: Photomicrograph showing (arrow) elastic fibers in trachea of sheep. WR&F X 400

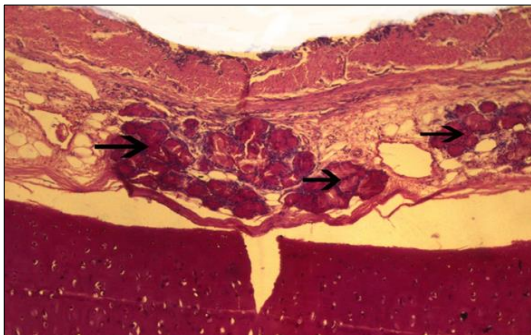


Fig 4: Photomicrograph showing (arrow) PAS positive in trachea of sheep X 100

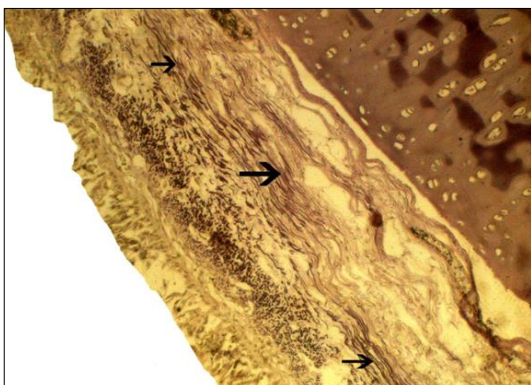


Fig 5: Photomicrograph showing (arrow) elastic fibers in trachea of goat WR&F X 200

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