Short Communication

Microanatomical studies of the trachea in pigeon

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ABSTRACT

Trachea was collected from two adult male and female pigeons of Tirunelveli district. The aim of the study was to find out the microanatomical details of trachea in granivore birds. Trachea was lined by a pseudostratified ciliated columnar epithelium. Lamina propria was made up of loose connective tissue and contained alveolar mucous glands. The submucosa contained elastic fibres and was found related to perichondrium of cartilaginous rings. The cartilaginous rings were flattened in cross section. Overlapping of cartilaginous rings was prominent. Thin tunica adventitia covered the cartilaginous rings. Trachealis muscle was absent.

Key words: Microanatomy, trachea, Partridge

Respiratory organs of birds differ from those of mammals in many features, which are associated partly with the requirements of flight and partly with voice production. Tracheal cartilages formed complete rings in birds, which overlapped and interlocked with adjacent rings (Dellmann and Eurell, 1998). Literature available on microanatomical studies on the trachea in pigeon is limited. To bridge this gap, the present study was under taken.

MATERIALS AND METHODS

The trachea was collected from two apparently healthy six weeks old adult male and female pigeons of Tirunelveli district and was studied for their histological details. The trachea was cut across into small pieces and was processed conventionally. Paraffin sections of 4 to 5 µm thickness were taken and stained using Haematoxylin and Eosin (Luna, 1968). Micrometrical parameters like height of the lining epithelium and width of the lamina propria, cartilaginous rings and tunica adventitia were recorded using image size recording system in digiscope with imaging system.

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RESULTS AND DISCUSSION

Histological section through the wall of the trachea showed the following layers from inner to the outer surface: the mucosa, submucosa with cartilage rings and adventitia.

The mucosa was lined by pseudo stratified ciliated columnar epithelium (Fig.

1). Similar observations were also reported in Japanese quails by Rajathi *et al.* (2009) and in male turkeys by Al-Mussawy *et al.* (2012). In contrast to the above findings, non ciliated cells were also found in the mucosal epithelium in Japanese quail (Pourlis *et al.,* 2018). The mean height of the pseudo stratified ciliated columnar epithelial cells ranged from 9.18 to 12.20 µm. The basal cells were smaller and had round nuclei, while the ciliated columnar cells showed oval or elongated nuclei.

The width of lamina propria was 220 to 316 µm. It showed loose connective tissue with mucous glands. The alveolar mucous glands were lined by elongated cells with wide basal part and slightly narrowed apical part. The nucleus of the mucous glands was oval and placed towards the basal part of the cells. (Fig 2). The apical part showed foamy cytoplasm. Lamina propria also contained collagen and elastic fibres, blood vessels and nerve fibres. Similar observations were made in chicken by Aughey and Fyre (2001) and in Japanese quail by Rajathi *et al.* (2009). Lamina propria also contained diffuse lymphocytes.

The cartilaginous rings were flattened in cross section with a mean width of 115 µm. Overlapping of the cartilaginous rings were found in many areas with separate perichondrium. Similar findings were observed in male turkey (Al-Mussawy *et al.,* 2012). The cartilaginous rings were made up of hyaline cartilage (Fig. 3) as reported by Dellmann and Eurell (1998) in chicken. The tracheal cartilage showed perichondrium with flattened nuclei, lacunae containing chondrocyte and clear intercellular matrix. The chondrocytes are oval in shape with dark flattened to round nucleus (Fig. 3). Externally there was thin adventitia of 4.19 to 11.32 µm width. It was made up of connective tissue with numerous blood vessels and some adipocytes. Trachealis muscle seen in the case of mammals was absent as reported by Dellmann and Eurell (1998).

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Figures

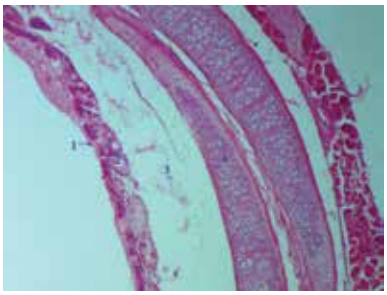

Fig. 1: Cross section of the trachea showing Mucosa

1. Pseudostratified columnar epithelium 2. Alveolar mucous gland
3. Submucosa containing blood vessel 4. Tracheal cartilage H & E x 100

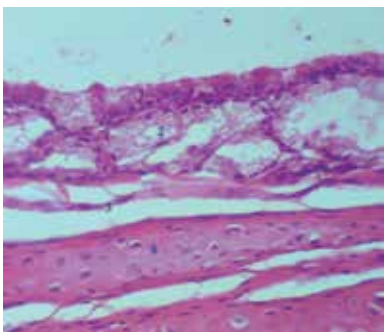

Fig. 2: Cross section of the trachea showing Submucosa

1. Pseudostratified columnar epithelium 2. Alveolar mucous gland
3. Submucosa with connective tissue 4. Tracheal cartilage H & E x 400

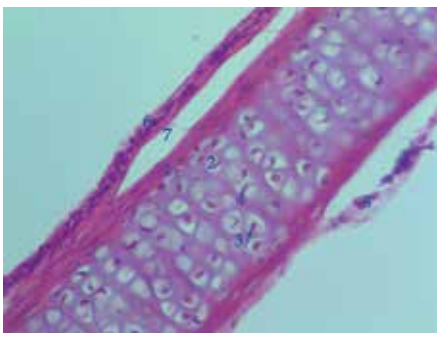

Fig. 3: Cross section of the tracheal cartilage

1. Perichondrium 2. Lacunae 3. Chondrocyte 4. Intercellular matrix
5.Adventitia 6. Mucosa 7. Submucosa H & E x 400