HISTOLOGY OF THE NASAL EPITHELIUM OF YAK (BOS GRUNNIENS)

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ABSTRACT

The nasal mucosa of yak on epithelium and its colourization possessed the vestibular, the respiratory and the olfactory areas. The vestibular area located cranially in the nasal cavity revealed bluish white colourization and pigmented stratified squamous epithelium in its rostral part, while the caudal part had stratified cuboidal epithelium. The respiratory area showed reddish appearance and occupied the dorsal, middle and ventral nasal concha. The pseudo-stratified ciliated columnar epithelium showed increased number of goblet cells. The caudo-dorsal part of the nasal cavity had olfactory area, which revealed rosy mucosa having pseudo-stratified columnar epithelium and predominantly serous Bowman’s gland.

INTRODUCTION

Various authors described the nasal epithelium in Cat (Dawes and Prichard, 1953 and Sano, 1958), rat (Bojsen - Moller, 1964), pig (Moller, 1967), cattle (Pass et al., 1971), primates (Leo and Chin, 1974), camel (Badawi and Fath El-baby 1975; EL-Gohari et al., 1978; Zguigal et al., 1994), pig (Ghoshal and Khomas, 1986), goat (Kumar, 1991; Kumar et al., 1992 and 1993), dog (Kumar et al., 1994) and buffalo (Thippeswamy and Kakade, 1992; Gupta et al., 1994). However, the literature on the nasal epithelium including the nasal mucosa of yak is not available; hence this study was carried out.

MATERIAL AND METHODS

Six apparently healthy yaks were procured from Arunachal Pradesh. The animals were embalmed with 10% formalin. The tissues were collected from the different regions viz. cranial, middle and caudal parts of the vestibular, respiratory and olfactory areas of the nasal mucosa. The tissues were fixed in 10% buffered neutral formalin and processed (Luna, 1968). Then sections of 5 - 7 μm thickness were cut and stained with Mayer’s Haematoxyline and eosin for routine observations. The collagen, elastic and recticular fibres were demonstrated by the Mallory’s, Hart’s and Gomori’s method of stains, respectively.

RESULTS AND DISCUSSION

The cranial part of the nasal vestibular area appeared bluish white and possessed highly thick and pigmented keratinized stratified squamous epithelium, as reported by Zguigal et al. (1994) in camel. A few sweat and sebaceous glands along with the dense connective tissue and uniform distribution of lymphoid tissue in the lamina propria were observed. However, Sano (1958) observed stratified squamous non-keratinized in cat, Leo and Chin (1974) reported stratified squamous non-keratinized epithelium in primates and Kumar et al. (1993) reported stratified squamous epithelium in goat. The presence of sweat glands in the rostral vestibular part are contrary to the findings in camel, (Badawi and Fath El-Baby, 1975). The middle part of the vestibular region had a large number of sero-mucous glands and showed thick walled veins. The caudal part of the vestibular region had a transitional zone of stratified cuboidal epithelium (Fig. 1). The underlying lamina propria had sero-mucous glands, surrounded by thick and thin walled veins. (Fig. 1).

The respiratory area appeared reddish and possessed thick pseudo-stratified ciliated...
columnar epithelium with more goblet cells. This region occupied the middle part of the dorsal, middle and ventral nasal concha and the floor of the nasal cavity. The lamina propria had a mixed type of glands with less amount of collagen fibres. The presence of the pseudo-stratified columnar epithelium with more goblet cells is in accordance with the findings of Pass et al. (1971) in cattle and Badawi and EL-Baby (1975) in camel. The presence of more goblet cells and pseudo-stratified ciliated columnar epithelium in the respiratory region is in accordance with the findings in goat (Kumar et al. 1993) and in buffalo (Gupta et al., 1994). The goblet cells were reduced in number relatively in the cranial and caudal part of the respiratory region. The lamina propria revealed sero-mucous glands in the respiratory region. The presence of sero-mucous glands is contrary to the findings of Bacha and Wood (2000) in dog.

The nasal mucosa of the nasal septum revealed pseudo-stratified ciliated columnar epithelium and greater number of large thick and thin walled veins (Fig. 2) along with the sero-mucous glands.

The presence of large number of mixed type of glands with large veins in the nasal mucosa of the high Himalayan species as observed in the present study could probably be far maintaining the thermo-regulatory function at higher altitude climate zone for humidifying the inspired air. Similar observation was also reported in camel by Zguigal et al. (1994), while EL-Gohari et al. (1978) observed only serous type of glands in camel.

The olfactory region appeared rosy and showed pseudo-stratified columnar epithelium with the olfactory cells (Fig. 3). This region extended to the caudal-dorsal part of the nasal cavity. The olfactory region was located in the lateral wall of the ethmoidal and canal part of the nasal septum. The outer ethmoidal mucosa was more thicker than that of inner one. The Bowman’s gland were predominantly serous type (Fig. 3). The rosy appearance and the presence of pseudo-stratified columnar epithelium in the olfactory...
Fig. 2. Photomicrograph of nasal mucosa of septum, showing the pseudo-stratified ciliated columnar epithelium (a), thick walled vein (b), thin walled vein (c) and sero mucous gland (d) 
H & E x 100

Fig. 3. Photomicrograph of the olfactory mucosa, showing the olfactory epithelium (a), serous dominant Bowman's gland (b), venule in propria (c) and loose connective tissue (d) 
H & E x 100

area is in accordance with the findings of Raghavan (1964) in ox and Zguigal et al. (1994) in camel. The presence of serous "Bowman's glands" in the lamina propria of the olfactory region is in accordance with the findings, as reported in rat (Bojsen - Moller, 1964) and buffalo (Gupta et al., 1994). However, these findings are not in accordance with the findings of Zguigal et al. (1994) who reported sero-mucous "Bowman's" glands in camel.
ACKNOWLEDGEMENTS

The authors are thankful to the Indian Council of Agricultural Research, New Delhi for providing facilities to undertake the present investigation on yak of N.E. Region at the College of Veterinary Sciences, AAU, Guwahati.

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