

Gross Morphological Changes of Nasal Conchae in Pre and Postnatal Non-Descript Goats (*Capra hircus*)

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ABSTRACT

Studies on sequential gross morphological changes of nasal conchae were conducted in prenatal and post-natal goats (group I-VI). The dorsal and middle nasal concha were attached caudally to the cribriform plate of ethmoid bone and rostrally extended up to the level of the third transverse ruga of hard palate and 2nd molar tooth, respectively. The ventral nasal concha was fusiform in shape and extended from mid third molar tooth to alar fold rostrally. The dorsal nasal concha was shorter than ventral nasal concha in goats of prenatal groups and vice-versa in post-natal groups. In coronal sections, structures of the nasal conchae were similar in all age groups, and there was consistent increase in luminal diameter of conchal sinus from group I to VI.

Key words: Goat, Nasal conchae, Post-natal, Prenatal

The nasal cavity being initial segment of the respiratory tract is prone to various pathological conditions involving the lining mucosa of the conchae. The conchae are fragile and cribriform being covered by mucous membrane. They increase the surface area of the nasal cavity. The gross features of the conchae have been studied in adult ox (Sisson, 1975), adult sheep (Ganganaik *et al.*, 2004), adult buffalo (Dhingra and Kumar, 1978) and adult goat (Singh *et al.*, 1992). Paucity of available literature on the sequential morphological changes of nasal conchae in goat during prenatal and postnatal stages prompted this present study.

MATERIALS AND METHODS

The present study conducted on eighteen goat foetii and eighteen heads of apparently healthy post-natal goats were procured from small animal slaughter houses in Jabalpur. Specimens were categorized and placed into six groups. Foetii were grouped on the basis of their crown rump length (CRL) viz, group I (foetii up to 10 cm CRL i.e up to 53 days), group II (10-20 cm CRL<118 days) and group III (>20 cm CRL>118 days); group IV (neonatal goats; 0-7 days); group V (pre-pubertal< 8 months) and group VI (adult goats>12 months). Approximate age was calculated by following formula based on CRL (Soliman, 1975).

$$Y = 28.66 + 4.496 \times \text{CRL} (<20 \text{ cm})$$

$$Y = 73.544 + 2.256 \times \text{CRL} (>20 \text{ cm})$$

Where Y is age of fetus in days.

The heads of goats as well as foetus were fixed in 10% buffered formalin. Coronal sections were obtained at different fixed anatomical levels i.e (i) between 5th and 6th palatine rugae (ii) between 10th and 11th palatine rugae (iii) at the level of medial canthus of eye. The length and width (cranial, middle and caudal) of the nasal conchae were taken with the help of Vernier calipers on sagittal sections. Coronal sections were used to study number of scrolls and sinuses in nasal conchae at different fixed anatomical levels. The data collected was analyzed as per the standard method (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

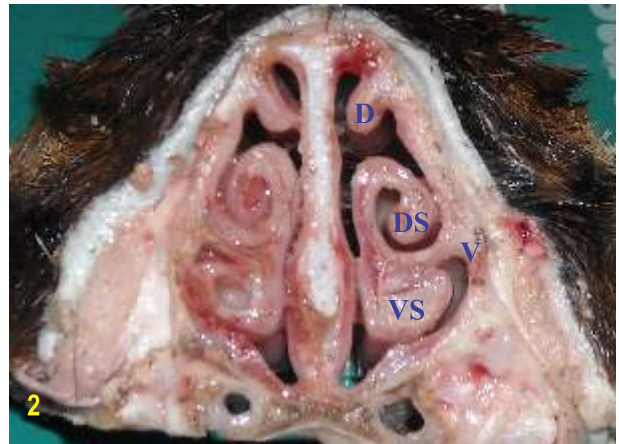
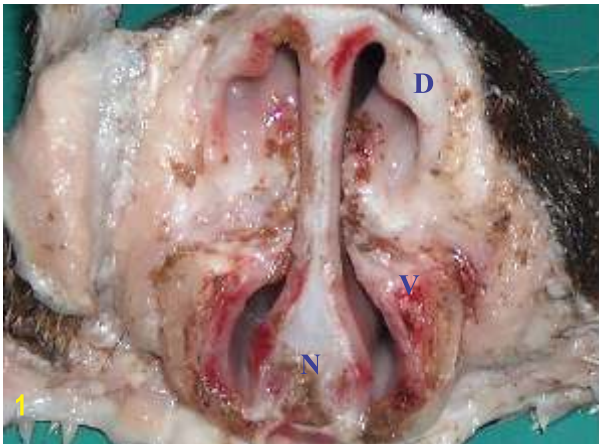
Dorsal nasal concha: The dorsal nasal concha was attached caudally to the cribriform plate of ethmoid bone and rostrally extended up to third transverse ruga of hard palate and prolonged towards the nostril by a narrow bar of cartilage. However, in buffalo it extended rostrally up to 4th transverse ruga (Dhingra and Kumar 1978) and in sheep up to 2nd palatine ruga (Ganganaik *et al.*, 2004). The dorsal nasal concha was coiled and covered with mucosa on its outer and inner surfaces. The topography of dorsal nasal concha observed in the present study was similar with the report of Singh *et al.* (1992) in goats.

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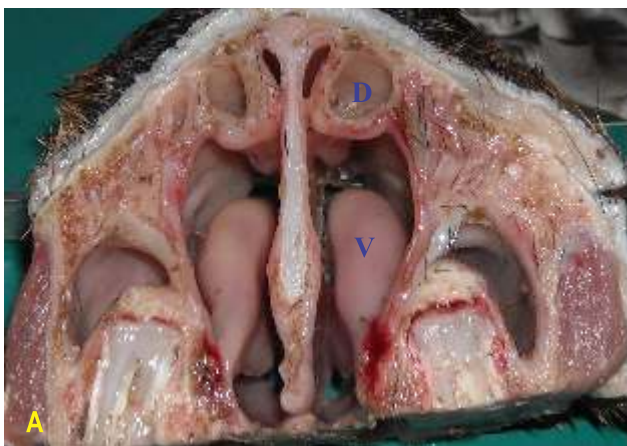
The mean length of dorsal nasal concha in group I, II, III, IV, V and VI was 0.72 cm, 1.84 cm, 2.63 cm, 3.17 cm, 6.37 cm and 9.22 cm, respectively with an increase of 155.56% from group I to II, 20.53% from III to IV and 44.74% from group V to VI. The mean width at middle in group I was not measurable. In group II, III, IV, V and VI, the values were recorded as 0.22 cm, 0.38 cm, 0.53 cm, 0.57 cm, and 1.20 cm, respectively. Minimum change in width (7.55%) was observed from group II to III and maximum (110.53%) from group V to VI. The dorsal nasal concha was shorter than ventral nasal concha in prenatal goats and vice-versa in postnatal goats. Growth spurt also showed slow growth rate of dorsal nasal concha in comparison to ventral nasal concha from group I to II and faster growth of dorsal nasal concha than ventral nasal concha from group IV to V. In cross sections, no scroll and sinus was visible in all six groups between 5th and 6th palatine rugae (Fig. 1). At the level

of 10th and 11th palatine rugae, the morphology was similar as above in all the groups except that the width was increased (Fig. 2). At the level of medial canthus of eye, one complete scroll was visible enclosing a sinus whose diameter was not measurable in prenatal groups while in postnatal groups IV, V and VI, the mean diameter was 0.40 ± 0.02 cm, 0.60 ± 0.02 cm and 0.85 ± 0.03 cm, respectively (Fig. 3A).

Middle nasal concha: The middle nasal concha was triangular with apex sandwiched between dorsal and ventral nasal conchae. It was attached caudally to the cribriform plate of ethmoid bone and extended up to 2nd molar tooth rostrally. It extended upto 1st molar tooth in sheep. The mean length in group I, II, III, IV, V and VI was recorded as 0.13 cm, 0.65 cm, 0.92 cm, 1.53 cm, 2.72 cm and 3.63 cm, respectively. The maximum growth rate in length (400%) was observed from group I to II, and minimum (33.46%) from V to VI group. At the level



Figs. 1-2. Cross section of nasal cavity. **1.** Between 5th and 6th palatine rugae. **2.** Between 10th and 11th palatine rugae. Note dorsal nasal concha (D), ventral nasal concha (V), dorsal scroll (DS), ventral scroll (VS) and nasal septum (N).



Figs. 3 (A, B). Cross section of the nasal cavity at medial canthus of eye showing dorsal nasal concha (D), ventral nasal concha (V) and middle nasal concha (M).

between 5th and 6th palatine ruga and between 10th and 11th palatine ruga, the middle nasal concha was not observed because of its location behind the 10th and 11th palatine ruga. At the level of medial canthus of eye, it enclosed a sinus whose diameter was not measurable in prenatal groups while in postnatal groups IV, V and VI, the mean diameter was 0.4 ± 0.01 cm, 0.58 ± 0.02 cm and 0.82 ± 0.04 cm, respectively (Fig. 3B).

Ventral nasal concha: The ventral nasal concha was fusiform in shape and extended from mid third of molar tooth to alar fold rostrally while in sheep it extended from 2nd molar tooth to third palatine ruga (Ganganaik *et al.*, 2004). It was attached to the turbinate crest of the maxilla by a plate of bone which divided it into two parts. Its mean length in group I, II, III, IV, V and VI was 0.72 cm, 1.97 cm, 2.83 cm, 3.24 cm, 5.65 cm, and 8.5 cm, respectively. Maximum increase of 173.61% was recorded from group I to II, suggesting faster growth in early prenatal life. In prenatal stages, the ventral nasal concha, had greater length than the dorsal nasal concha whereas, it was opposite in post-natal groups. The cross section between 5th and 6th palatine rugae showed upward coma shaped elevation directed medially (Fig. 1). At the level between 10th and 11th palatine rugae, the concha divided

into a dorsal (proximal) and ventral (distal) parts. The dorsal part had one and a half scroll enclosing a sinus and the ventral part had one complete scroll and it also enclosed conchal sinus (Fig. 2). The cross section of nasal cavity at the level of medial canthus of eye showed the termination of ventral nasal concha (Fig. 3A). Findings of all the three nasal conchae at cross section of nasal cavity between 10th and 11th palatine rugae were in line of report of Singh *et al.* (1992) in goat.

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