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Equine lingual papillae during prenatal life: A scanning electron microscopic study

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Mechanical and gustatory lingual papillae plays an important role in prehension and perception of the taste. The scanning electron microscopic studies on lingual papillae of the horse were reported by Chamorro *et al*.(1986), Paz Cabello *et al*. (1988), Kobayashi *et al*. (2005) and Kumar and Timoney (2006) during postnatal life but no reports are available during fetal life. So the present study was conducted with the aim to elucidate the morphological characteristics of the lingual papillae of horses during late fetal life.

The study was conducted on 4 equine fetuses of 8–11 months obtained from Veterinary Clinics, GADVASU, Ludhiana. The tissues were collected from dorsal, ventral and lateral sides of apex, body and root of tongue and rinsed in 0.1 M phosphate buffer (pH 7.4) and processed for scanning electron microscopy. The samples were fixed in Karnovsky's fixative (2.5% glutaraldehyde and 2% para formaldehyde solution in 0.1M phosphate buffer) for 2 h. The secondary fixation was done in 2% OsO_4. The tissues were rewashed thrice with 0.1 M phosphate buffer, dehydrated in ascending grade of acetone, critical point dried and sputter coated before examination in scanning electron microscope (Leo-435 VP).

The scanning electron microscopic study revealed that all the papillae (filiform, fungiform, vallate, foliate) characteristics to the equine family had been differentiated and developed by the end of fetal life.

The filiform papillae originated from the lingual surface with bulb like root being covered by many scales (Fig.1) and were thin, small, conical in shape and projected caudally. They were small on the anterior part and larger on posterior part whereas Pfeiffer *et al*. (2000) reported that most of filiform papillae were conical even differing in form in different individuals and did not show any regional variations. The free tips of the papillae presented a single projection as reported by Kumar and Timoney (2006) in adult horse but in contrasts with an earlier study by Pfeiffer *et al.* (2000) who reported pointed, stubby and multiple bifurcated ends of the papillae. The papillary surface presented serrated borders due to exfoliated epithelial cells and well developed microplicae.

The dorsum of tongue at the root presented very short, robust but pointed special type of papillae (Fig.5). These papillae were densely packed, unique in appearance and their surface was not highly scaly. Earlier, such type of papillae have only be reported by Kobayashi *et al.* (2005) in horses and has been named as special papillae.

The fungiform papillae were well developed, larger, round, convex and were distributed among the filiform papillae

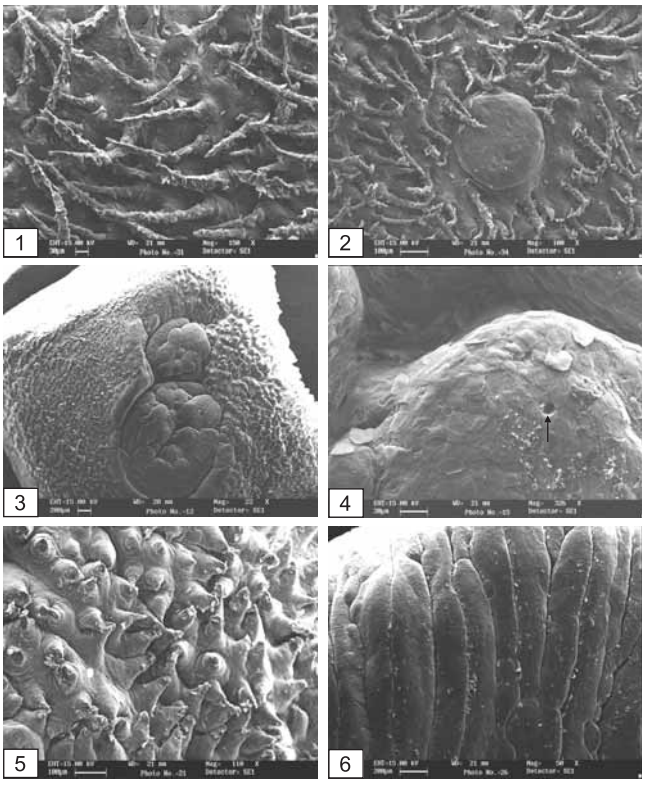

Fig. 1. 1. Filiform papillae, 2. Fungiform papilla surrounded by filiform papillae, 3. Large and small circumvallate papillae, 4. Taste pore on the surface of circumvallate papilla, 5. Special type of papillae present on the root of tongue, 6. Foliate papillae

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(Fig.2). Taste pores were evident on the surface of these papillae as reported by Paz Cabello *et al.* (1988) and Kumar and Timoney (2006). The papillae were surrounded by a groove and were not lobulated whereas lobulation of the papillae was observed in donkeys (Abd-Elnaeim *et al.* 2002).

The vallate papillae were 2–3 in number and their size varied, being one larger and other smaller (Fig. 3). The primary vallate papilla was divided into several papillae by the secondary papillae groove as reported earlier in donkeys (Abd-Elnaeim *et al.* 2002) and Kumar and Timoney (2006) in adult horses. The vallate papillae contained many taste buds with taste pores (Fig.4). Each papilla was having a wide circular groove around the central bulbous projection. A distinct annular pad was absent. Well defined taste pores in the form of tunnels were observed as observed by Kumar and Timoney (2006) in adult horses.

The foliate papillae were arranged in the form of numerous leaves separated by deep, variably wide grooves and contained a very large number of taste buds (Fig 6). The longitudinally and transversely oriented fissures gave the surface a wrinkled appearance as reported earlier by Chamorro *et al*. (1986), Pfeiffer *et al*. (2000) and Kumar and Timoney (2006) in adult horses. The surface was having the compact and densely arranged microplicae. The taste pores could be observed at places on the surface of papillae. It was concluded that all the lingual papillae were fully developed by the end of fetal life in the equines.

SUMMARY

The study was conducted on 4 equine foeti of 8–11 months age. Scanning electron microscopy revealed that all the lingual papillae were differentiated and fully developed by the end of fetal life in the equines. The lingual prominence presented some special type of papillae resembling in between filiform and conical. The existence of well developed foliate papillae in horses may substitute the comparatively few vallate papillae in this species.

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