HISTOLOGICAL DEVELOPMENT OF CONICAL AND LENTICULAR PAPILLAE IN THE TONGUE OF GOAT FOETII (CAPRA HIRCUS)

DAR, Y. M., SARMA, K., SURI, S., AND DEVI, J.1

Division of Veterinary Anatomy, 1Division of Veterinary Physiology FVSc and AH, Sher-e-Kashmir University of Agricultural Sciences & Technology Kashmir, Jammue 181102
E. mail: yousufdar8@gmail.com, Cell: 09018591539

Received: September 19, 2015; Accepted: October 15, 2015

Abstract: The present study was conducted on the tongue of 18 goat foetii divided into three prenatal age groups to study the sequential events in regard to histological development of conical and lenticular papillae of the same in goat foetii. The primitive conical papillae were seen over the torus linguae in 62 days old goat foetus (CRL = 10.10 cm), which further differentiated at 80 days of gestation (CRL = 15.30 cm), to become fully developed at 146 days of gestation (CRL = 35.50 cm). The primitive lenticular papillae were seen distributed over the lingual epithelium at torus linguae from 62 days of gestational age (CRL = 10.10 cm). These papillae had a broad shape and lined by a basal layer of cuboidal cells with a superficial layer of 6-7 cells. The height and diameter of these papillae were found to be 41.03 ± 2.33 μ and 43.22 ± 4.12 μ in group I and 78.45± 4.83 μ and 98.67± 5.93 μ in goat foetii of group II, respectively. In group III, the mean values for height and diameter of the conical papillae were recorded to be 211.78 ± 9.73 μ and 298.34 ± 22.13 μ, respectively. The same values in regard to the lenticular papillae were found to be 201.67 μ ± 8.91 and 324.11± 29.73 μ, respectively.

Key words: Conical and lenticular papillae, Foetuss goat tongue

INTRODUCTION

The dorsum of tongue is provided with projections of mucous membrane called papillae, disseminated on the lingual surface. These have two specific functions – gustatory and masticatory. The bulk of tongue is skeletal muscle, arranged in three layers all at right angles to each other [1,2] giving it a degree of flexibility for prehension and mastication of food [3,4]. Majority of tongue muscles are somatic in origin [5]. The presence of prominent torus linguae with a crescentic depression – fossa linguae was reported in the tongue of ox and sheep [6], goat [7] and buffalo [8,9]. The torus linguae probably compensates for the deficient masticatory mechanism caused by absence of incisors in the upper jaw [10].

Development of different papillae occurs prenataally and in a very specific spatial and temporal pattern. Although each type is morphologically distinct, the initial events in the development in all mammals are histologically similar [11] and later on there must be progressive differentiation to acquire the papillary epithelial taste progenitor cell and finally taste cell within the papillary apex [12].

MATERIALS AND METHODS

The present study was conducted on the tongue of 18 goat foetii which were collected from the slaughter houses in and around Jammu city. These foetii were ranged from early pregnancy to near full term. Immediately after collection, the umbilical cords of these foetii were ligated properly and were
cleaned with cotton soaked with water to remove the amniotic fluid. The weight of each foetii was recorded with the help of analytical balance. The approximate age of the foetii were calculated by putting the body weight values in the formula \[13\].

**Formula for estimation of foetal age in goat:** \( W^{1/3} = 0.096 (t-30) \). Where, \( W \) = body weight of foetus in gm, \( t \) = age of the foetus in days.

The collected foetii were then divided into three groups based on their estimated ages viz.- Group I (below 50 days of gestation), Group II (between 50-100 days of gestation) and Group III (above 100 days of gestation to up to full term) containing 6 number of foetii in each group.

After estimation of age, the tongues were dissected out from the foetii. Tissue pieces from the tip, body, torus linguae and root of the tongue were fixed in 10% neutral buffered formalin solution and processed for paraffin block preparation by alcohol-benzene schedule. Tissue sections of 5-6 µm were obtained from these blocks on clean glass slides with the help of rotary microtome \[14\] and stained with haematoxline and eosine.

### RESULTS AND DISCUSSION

The conical papillae were found to be distributed over the torus linguae. Their connective tissue core did not extend beyond the lingual epithelium. The primitive conical papillae were seen over the torus linguae in 62 days old goat foetus (CRL= 10.10 cm) (Fig.1), which further differentiated at 80 days of gestation (CRL= 15.30 cm), to become fully developed at 146 days of gestation (CRL= 35.50 cm) (Fig.2). In the present study, two types of conical papillae were observed, viz., straight conical and curved conical papillae (Figs. 2,3) as also reported in buffalo foetii \[15\]. Iwasaki et al. \[16\] reported in mouse at E15 that the mucosal eminence which were like irregularly shaped filiform papillae were destined to develop into the large conical papillae of the mature adult.

In the present study, primitive lenticular papillae were seen distributed over the lingual epithelium at torus linguae from 62 days of gestational age (CRL= 10.10 cm). These papillae had a broad shape and lined by a basal layer of cuboidal cells with a superficial layer of 6-7 cells (Fig. 4). Similar observations were reported earlier in goat \[17\] and buffalo \[15,18\] foetii. The papillary core was composed of mesenchymal cells, fibroblasts, fine collagenous along with reticular fibres and blood vessels. These conical papillae might provide additional masticatory capacity to tongue in ruminants \[19\]. Fully differentiated lenticular papillae were observed on the dorsum linguae of goat foetus at 134 days of gestation (CRL= 32.00 cm) (Fig. 5).

The shapes of the conical and lenticular papillae could not be differentiated in the goat foetii of groups I and II. Therefore, their height and diameters were recorded commonly. The height and diameter of these papillae were found to be 41.03 ± 2.33 µ and 43.22 ± 4.12 µ in group I and 78.45± 4.83 µ and 98.67± 5.93 µ in goat foetii of group II, respectively. In group III, the mean values for height and diameter of the conical papillae were recorded to be 211.78 ± 9.73 µ and 298.34 ± 22.13 µ, respectively. The same values in regard to the lenticular papillae were found to be 201.67 ± 8.91 µ and 324.11± 29.73 µ, respectively (Table 1). Verma \[15\] reported that the height and diameter of the conical papillae ranged between 149.93 ± 29.59 µ to 676.63 ± 64.10 µ and 152.76 ± 5.93 µ to 533.55 ± 5.93 µ in goat foetii of group II, respectively. Again, Singh \[20\] reported the height and diameter of the conical and lenticular papillae to be 281.30 ± 34.40 µ & 140.00 ± 21.3 µ and 120.60 ± 19.90 µ and 723.00 ± 102.00 µ respectively in neonatal buffalo. Also, the height and diameter of the conical and lenticular papillae in goat was recorded ranging from 0.90 to

<table>
<thead>
<tr>
<th>Group</th>
<th>Conical papillae</th>
<th>Lenticular papillae</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Height 41.03 ± 2.33*</td>
<td>Diameter 43.22 ± 4.12*</td>
</tr>
<tr>
<td>II</td>
<td>Height 78.45 ± 4.83*</td>
<td>Diameter 98.67 ± 5.93*</td>
</tr>
<tr>
<td>III</td>
<td>Height 211.78 ± 9.73</td>
<td>Diameter 298.34 ± 22.13</td>
</tr>
</tbody>
</table>

Table 1: Micrometrical observations of height and diameter (Mean ± S.E in µ) of various lingual papillae of the tongue in goat foetii at different age groups. * Not fully differentiated so height and diameter of dome shaped primitive papillae were recorded. Mean with common super script do not differ (P<0.05) significantly.
Fig.1 Photomicrograph of tongue in 62 days old goat foetus showing primitive conical papillae (arrows), H&E, 100X.

Fig.2. Photomicrograph of tongue in 146 days old goat foetus showing a fully developed straight conical papilla (arrow), H&E, 100X.

Fig.3. Photomicrograph of tongue in 146 days old goat foetus showing fully developed bent conical papillae, H&E, 100X.

Fig.4: Photomicrograph of tongue in 96 days old goat foetus showing lenticular papillae lined by basal layer of cuboidal cells (arrow), H&E, 100X.

Fig.5. Photomicrograph of tongue in 134 days old goat foetus showing a fully differentiated lenticular papilla (arrow), H&E, 100X.
1.2 mm and 0.40 to 0.50 mm and 0.50 to 0.70 mm and 0.90 to 1.00 mm, respectively [17]. Similarly, Verma [15] recorded the mean height and diameter of the lenticular papillae in buffalo foetii (CVR = above 40 cm) to be 525.91 ± 38.95 μ and 748.15 ± 16.53 μ, respectively.

ACKNOWLEDGEMENTS

Authors are highly thankful to Director Research Sher-e-Kashmir University of Agricultural Sciences & Technology Kashmir (SKUAST-K) and Dean Faculty of Veterinary Sciences SKUAST–K for providing the necessary facilities.

REFERENCES