

Comparative study of morphology and histology of human and buffalo tongue

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Abstract:

The present study was carried out to assess the comparative gross morphology and histology of mammalian tongues with buffalo tongue with special reference to the distribution of papillae. 10 cadaveric tongues of human and 10 from buffalo (with tissue from anti 2/3, sulcus terminalis, lateral area, post. 1/3 pharyngeal & at the root areas of the tongue were taken for histological studies. All the samples were fixed in Bouin's fluid. After paraffin-embedding, 5-7 micron thick were cut and mounted serially & stained with H & E stain.

In Buffalo, the anterior part of the tongue was longer. Inter-molar eminence was present in the tongue of Buffalo. The dorsum of human tongue was divided into an anterior (oral) part and a posterior (pharyngeal) part. The length of oral part was double than the pharyngeal part. The various papillae were noted in Human and Buffalo. All of the circumvallate, foliate papillae and most of the fungiform papillae bore taste buds.

Keywords: Human Tongue, Papillae, Inter-molar eminence, Sulcus terminalis, Bouin's fluid.

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Introduction:

The tongues of mammals share certain important characteristics, but there are also important differences. It varies in form and size and demonstrates morphological diversity that is greatly influenced by feeding habits (1). The dorsal surface of the oral part shows four types of papillae: filiform, fungiform, circumvallate and foliate papillae. Filiform, lenticular and conical papillae possess a protective and mechanical function. The fungiform, foliate and vallate papillae are related to taste perception. In man foliate papillae are rudimentary, but in many animals they are the site of localization of the main aggregation of taste receptor (2, 3). The taste buds are ellipsoid clusters of specialized epithelial cells embedded in the stratified squamous epithelium of fungiform, circumvallate and foliate papillae of tongue. Glands of the tongue can be divided into three main groups according to their structure and location (4).

Aims & Objectives:

To study the comparative gross morphology, characteristic features and the histological pattern of mammalian tongue, with special reference to the distribution of papillae.

Materials & Method:

After Institutional Ethical Committee approval, tongues of mammals were obtained from Nagpur Veterinary College while human cadaveric tongues were obtained from donated cadavers to Department of Anatomy, NKPSIMS&RC, Nagpur. All the specimens were collected within 2 to 6 hours after death of the animals. 10 cadaveric tongues of human and buffaloes were obtained. Tissue from anterior 2/3, sulcus terminalis, lateral area, posterior 1/3 pharyngeal & at the root areas of the tongue were taken for histological studies. All the samples were fixed in Bouin's fluid. After paraffin-embedding,

5-7 micron thick sections were cut and mounted serially & stained with H & E stain.

Observations:

Buffalo Tongue: Anterior oral part found to be four times longer than the posterior pharyngeal part. Filiform & fungiform papillae were observed anterior to torus linguae (Fig. 1)

Giant conical papillae on the torus linguae and simple conical papillae were on the sides of the giant conical papillae whereas circumvallate papillae found on the posterior limit of the torus linguae, 13-20 on either sides (Fig.2). Buffalo tongue showed mucous acini in pharyngeal part (Fig. 3). Dorsum of the pharyngeal part was smooth and unapillated. Ventral surface was unapillated & showed frenulum linguae.

Human Tongue: The dorsum of the tongue found to be divided into anterior (oral) part and a posterior (pharyngeal) part by a V-shaped sulcus terminalis. The length of oral part was two times the pharyngeal part. The dorsum of the oral part was covered by different types of lingual papillae. These included filiform, fungiform and circumvallate and foliate papillae (Fig. 4).

Filiform & fungiform papillae were present in anterior oral part and circumvallate papillae were observed on sulcus terminalis where as two foliate papillae found in front of the palatoglossal fold (Fig. 5). Human tongue showing mucous glands in pharyngeal part and apical lingual glands (glands of Nuhn) in anterior part (Fig. 6).

Discussion:

Division of the tongue into anterior and posterior parts seems to vary from one species to another. According to Labh and Mitra (5) the anterior (oral) part is longer than the posterior (pharyngeal) part in various species of mammals. In

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Fig 1- Dorsal surface of Buffalo tongue

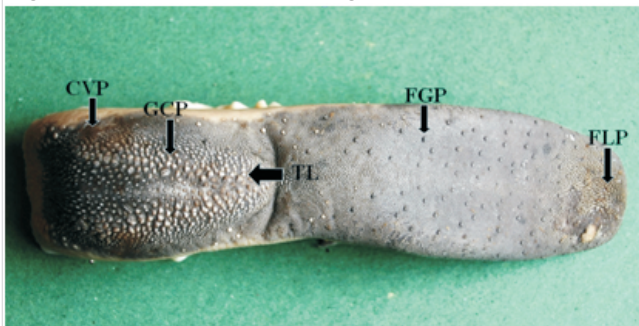


Fig 2. Photomicrographs of buffalo tongue showing lingual papilla (H&E stain) . (a) Papilla Filiformis (b) Fungiform (c) Circumvallate Papilla (d) Simple Conical (e) Giant conical (f) Circumvallate Papilla trench

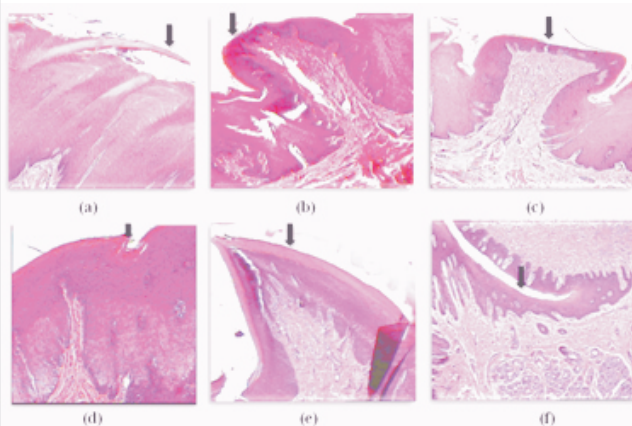
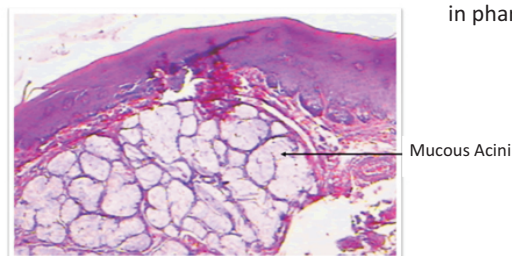


Fig 3. Photomicrograph of buffalo tongue showing mucous acini in pharyngeal part. X10 (H&E)



buffalo it is 4:1. The same is observed here. The larger proportion of the oral part in the animal series might be due to greater mobility required for grasping of food (5, 6).

In human being this ratio is 2: 1, which is similar with the other workers' studies (7-10). In all the samples of human tongue, the sulcus terminalis is well defined forming a V-shaped line, arms of which are directed antero-laterally as described by Bloom and Fawcett. In buffalo, it was not found in any of the samples, which is similar to the findings of Labh and Mitra (5).

Intermolar eminence was found on the posterior aspect of the oral part of tongue in buffalo described that the

Fig 4- Dorsal surface of Human tongue

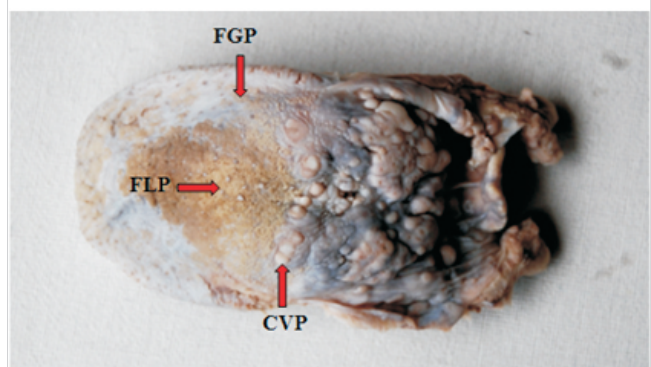


Fig 5- Photomicrographs Of Human Tongue Showing Lingual Papilla X10 (H &E)

(a) filiform papilla (b) Fungiform papilla (c) Circumvallate papilla

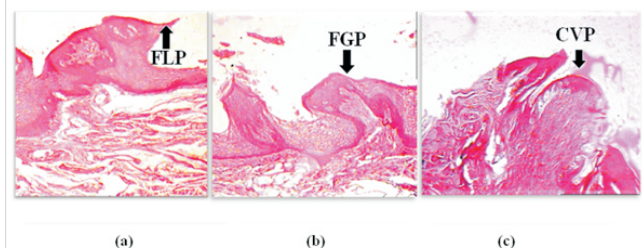
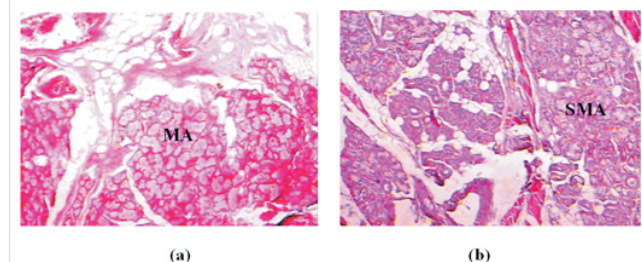


Fig 6. Photomicrographs of human tongue showing lingual glands x10 (H & E)

(a) Mucous glands in pharyngeal part (b) Apical lingual glands (glands of nuhn)



oral part of the dorsum is marked posteriorly by a raised intermolar eminence or torus linguae (11). Kutuzov and Sicher (12) and Labh and Mitra (5) believed that this specialized prominence probably compensates for the deficient masticatory mechanism caused by incomplete dental formula (12, 5). Thus it may help to rub the food against hard palate. Human do not possess this eminence. In human samples the dorsum of the oral part is densely beset with the thread like narrow, conical filiform papillae. These findings are similar with the Gray (10).

Filiform papillae have been classified in three subtypes by differing structure and distribution on the

dorsum. These are simple conical, giant conical and true filiform papillae. Prakash et al (11) described them in buffalo tongue as lenticular papillae on the torus linguae. The fungiform papillae are scattered on the dorsum of the tongue, but are found to be aggregated at the tip and cranial margins of buffalo tongue. Prakash et al (11) described them in buffalo tongue that they are more numerous around the tip and on the lateral cranial margin. They also scattered on the rest of the dorsum including torus linguae.

The fungiform papillae in human tongue are scattered among the filiform papillae, which are more numerous at the tip and margins (7,8,10). In this study similar findings are obtained as mentioned by these workers.

The number of circumvallate papillae varies from species to species. In buffalo, we observed 13-22 circumvallate papillae on each side and are arranged in a v-shaped pattern on the caudo-lateral part of torus linguae with the apices of the v directed towards the root of the tongue. The numbers of circumvallate papillae in human tongue are variable. They are about 7 to 12; 6 to 12; 8 to 12 and form a V-shaped row immediately in front of the sulcus terminalis (7, 9 & 10).

In the present study, the circumvallate papillae show great variations in their number and distribution. In human 8 to 10 circumvallate papillae are arranged in v-shaped pattern with the apex directed posteriorly.

Conclusion:

From the given observation we can conclude that the anterior part of the tongue is longer than posterior, in Buffalo it is found to be 4:1 and in Human it is 2:1. Intermolar eminence is present in the tongue of Buffalo while it is absent in Human.

Three subtypes of filiform papillae have been noted in Buffalo tongue. These are simple conical, giant conical and true filiform papillae. Circumvallate papillae in Buffalo tongue

form row on the posterolateral part of the intermolar eminence. Foliate papillae are rudimentary in human, absent in buffalo tongue. All of the circumvallate, foliate papillae (except humans) and fungiform papillae bear taste buds. Serous glands are present in the oral part of the tongue, while mucous glands are present in the pharyngeal part. Apical lingual gland is present in human tongue.

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