Histomorphological investigation of tongue of Porcupine *Hystrix cristate*

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Summary

Anatomical and histological explorations of the tongue in ten adult male Porcupine (*Hystrix cristata*) collected from AL-Diwanyha city by the hunter, after porcupine prepared the tongue illustrious after that the position, shape dimensions were enrolled. The square-shape of body, thicken less steadily toward caudal part of tongue. Root was tends caudally in the direction of the epiglottis. Torus linguae found on the caudal part of the dorsal surface of the tongue. In the end of lateral surface of tongue have foliate papilla osculate the premolar teeth. The length, apex, body and root of the tongue were (7.6±0.66, 1.25±0.23, 4.95±0.2, and 1.4±0.26 cm), respectively. The width, apex, body, and root of the tongue were (1.80±0.77, 0.35±0.49, 1±0.22 and 0.45±0.14, respectively. In the dorsal and lateral surface have muscle fibers from skeletal type and loose connective tissue bounded by keratinized stratified squamous epithelium while in the ventral lingual surface were non-keratinized. In the dorsal surface of body there were filiform papillae, but less at the lateral surface of the body. While the shape of circumvallate papillae was similar to furrow, and there was taste buds on the both dorsal and lateral sides of the tongue. Fungiform papillae had wide curved keratinized surface, with taste buds on the dorsal surface. Lamina propria and submucosa was loose connective tissue with more of collagen fiber.

Keywords: Porcupine, Filiform papillae, Circumvallate, Fungiform, Foliate.

Introduction

Rodents include large and extra diverse mammals with more than 1700 different species. Rodentia (1 and 2) belongs to the Hystricidae circle of relatives, which constitutes a small organization of the device in spite of the severa morphological studies on the equipment (3-5). There has been no research, nor has there been anatomical histological study of the porcupine. In this we take a look at the structure of the porcupine (*Histriscus Cristata*) as examined in a macroscopic and microscopic (1-3). The tongue is a muscular organ that has 4 surfaces and two borders. Tongue is a quite cell muscular machine (1 and 4). The linguistic surface is characterised by way of a huge number of projections, which are referred to as lingual papillae, ranging in form and length (filiform, fungiform and circumvallate) in all animals (2 and 3). The tongue of the rabbit 4 types of papillae have been published at the linguistic surface: fileform, Foliate, fungiform and circumvallate (5). The filiform papillae were conical and confirmed special heights and thickness at extraordinary tiers. Fungal papillae are rounded and surrounded by strong fileform papillae. It could also be discovered on the ventral surface tip. They had flavor pores on their surfaces. The circumvallate papillae have been encircled with the aid of a basic groove and an annular ring. Pores have an open flavor in this groove (6). The fungiform, circumvallate and foliate papillae comprise flavor buds, and is thus referred to as taste papillae specialized in peripheral sensory organs concerned in the reputation of chemical stimuli and taste. Circumvalate is placed at the frontal dorsal floor of the tongue and circulatory jewelry are placed within the midline on the back because of the definition of the tongue in rodents (7 and 8). Histologically the epithelium of the tongue is a stratified squamous species with varying ranges of keratin. It's far thicker at the dorsal surface wherein it contains a thicker and thinner corneal layer on the ventral surface which could be non-keratin. Conical and lenticular papillae facilitate movement of meals within the oral cavity, even as fungus and papillae comprise flavor buds liable for flavor mediation, vary in form and are called

in step with their morphological characteristics (9).This work will offer aid for clinical and operational studies inside the future with reference to the physiology of the tongue.

Methods and Materials

Ten healthy mature male *Hystrix cristate*, were collected from local hunters in Diwanyiah. Animals were anaesthetized with Ketamine hydrochloride (35 mg/kg) and Xylazine hydrochloride (5 mg/kg) (10). Experimental design in the family pets was allocated into two categories; five porcupines for anatomical review, and other five for histological review. The morphological features and biometrical guidelines were registered by using vernier caliber threads, the full total tongue, apex, body root and width of tongue were measured. Five specimens of tongue were dissected away and cleaned with normal saline solution (0.9% Nacl), after the body organ was washed and segmented to four parts apex, body, and main, they were immersed in buffer formalin at room temp for 24 hrs. The histological processing was done routinely (11).

Results and Discussion

Tongue of adult male porcupine (*Hystrix cristata*) occupies the superior part of oral cavity rollover into oropharynx, root set in hyoid bone, palatoglossal arch team up the soft palate with the tongue and its backstop by extrinsic lingual and hyoid muscles (Fig. 1). Type of food plays a very important role in all anatomical features of the tongue (8). The general guise of the tongue was homogenous pinky color; this outcome does not agree with (8 and 12), while it is in agreement with (13) in rabbit, it's averaged (7.6±0.66 cm) in length and (1.80±0.77 cm) width in the body region. This study was in disagreement with (8) in *Hystrix cristate* (Table, 1).

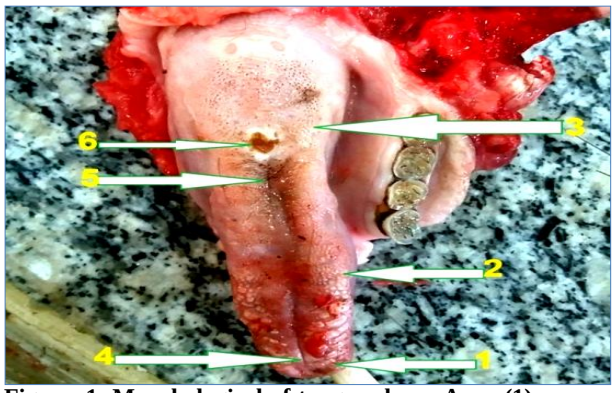
Table, 1: Dimension of the tongue of Porcupine (*Hystrix cristata*), (mean±SE).

	Total	apex	body	root
The length (cm)	7.6±0.66	1.25±0.23	4.95±0.2	1.4±0.26
The width (cm)	1.80±0.77	0.35±0.49	1±0.22	0.45±0.14

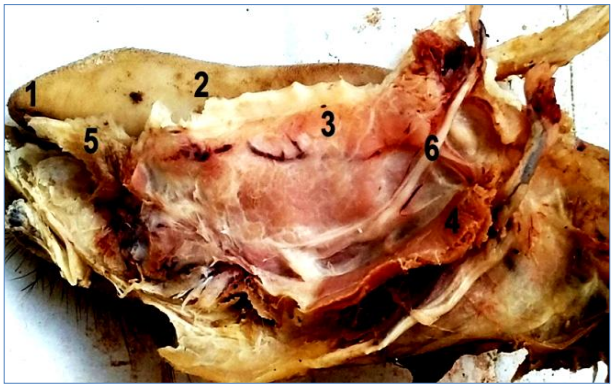
The median sulcus was deepest in the anterior third than the middle third of the tongue; the posterior third had a scarce median sulcus. The dorsal surface of the tongue was mantled with non-keratinised stratified squamous epithelium underscoring by lamina propria and amuscular layer. The tongue of the porcupine had a curvaceous anterior protrusion and the cape of the tongue was twirled. There was a bottomless fossa in the middle of dorsal surface of the tongue. The tongue was also supported by coupled mylohyoideus muscles that hoist it between the lowermost jaws.

The tongue can be alienated into a free apex, body and root. The apex of the tongue was almost rounded formed by encountering the dorsal and the ventral surfaces, had twirled lateral borders, and it decreased the width and increased the breadth of the apex gradually in the direction of the body. The apex characteristics of the tongue of the *hystrix cristate* in this study corresponded with (12) in rats, but uncoincided with (13 and 14) in rabbit. The tongue in apex region showed in the center and somewhat flattened in mice (15). The body of the tongue that square-shape, restricted between apex and root starts tapered, then thickening increase gradually toward root. The last part of the tongue was the root which precipiced ventrocaudally towards the bottom of the epiglottis. The dorsal surface of the tongue was characterized by eminent triangular mass in the caudal part of the body cranial to the root called torus linguae and lingual fossa. The prominent torus linguae of the posterior area of the body of the tongue, like other grass eating animals have well-developed torus linguae (14-20). But this is incompatible with the (21). Calculate the base of the tongue toward the apex and vice versa, in addition to the median longitudinal groove which divided this surface in to two equal halves that extend from apex of lingual fossa to the initial part of the apex of tongue (Fig. 1). In present study there are four types of lingual papillae. This finding was coordinated with (13) in the rabbits. But uncoordinated with (14, 19 and 20) which it is allocated on the tongue surface filiform, circumvallate, foliate and fungiform. The filiform papillae were bent, together with this large connective tissue core and were alienated by wide interpapillary zones covered by a thick epithelium. Most of filiform papillae had

a cylindrical shape, but the rostral and central parts of the tongue contained a number of flat, comb-shaped papillae with cornfield tips (Fig. 2 and 3). Density and shape of filiform papillae impart a velvety feel and give the tongue a rough surface to assist in grooming, movement of the food toward the pharynx to provide additional protection for the tongue, this in agreement with (17 and 19-21), The foliate papillae were located on the postero-lateral borders of the tongue. Taste buds were located intraepithelial in the basal half of the papilla grooves (sulcus papillae). Foliate papillae in rabbit are well developed, whereas in the cats they were rudimentary, and in ruminants they were not present (13, 22 and 23). The fungi form papillae were Mushroom in form and enclosed squamous epithelium. They had surrounding or oval outlines. The fungi form papillae were scattered on the dorsal midline behind torus lingua; its absent in apex and lateral edges of the dorsal surface. However they were common on the posterior one-thirds of the tongue and its number was (7-8) circumvallate papillae; those are round and have a depression around the center, with tiny elevation from lingual surface, surrounded by papillary furrow at the dorsal surface of the root caudal of the base of the torus linguae number (1-2) (Fig. 4). In addition coarseness of the lingual surfaces depends on the type and degree of contact of food and cornified nature of these surfaces. This observation may be related to types and heavy distribution of the lingual papillae on the other hand; these were effectively increased on the surface areas and play the functional role of receiving the taste sense.

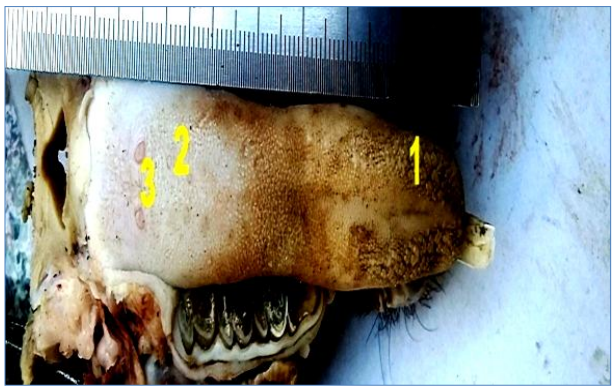


Figure, 1: Morphological of tongue show: Apex (1) corpus (2) root (3) midline sulcus (4) lingual fossa (5) tourus lingue (6).



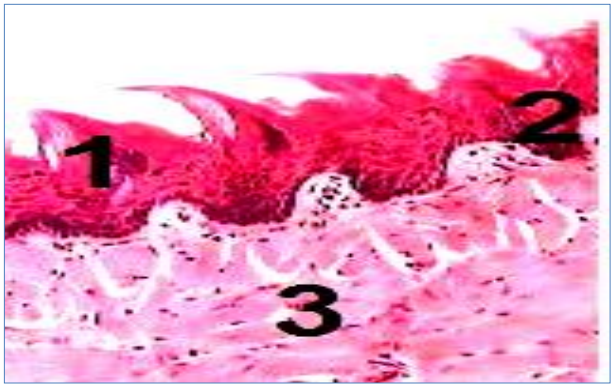
Figure, 2: Morphological view show: Apex (1) body (2) lingual salivary gland (3) myohyodius muscle (4) lingual frenulum (5) sublingual nerve (6).

Figure, 3: Muscles of tongue: Stylioglosses (1) hyoglosses (2) genioglosses (3) geniohyodius (4) styloglosses (5) foliate papillae (6).



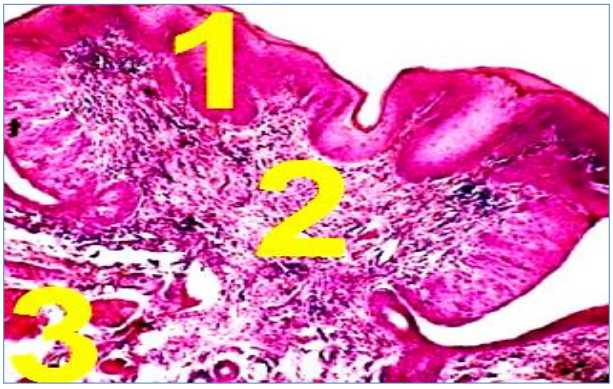
Figure, 4: Tongue papillae of *Hystrix crestat* showed: filiform (1) fungiform (2) circumvallate (3).

The tongue of porcupine was made up of brads bundles of skeletal muscle fibers and loose connective tissue bounded by stratified keratinized squamous epithelium at the dorsal and lateral lingual surfaces, non-keratinized at the ventral lingual surface. Dermal papillae at the apex were longer than other parts of the tongue (Fig. 5).



Figure, 5: Filiform papillae: Stratified squeamus epithelial tissue (1) lamina propria (2) skeletal muscles (3) (H and E) stain 100X.

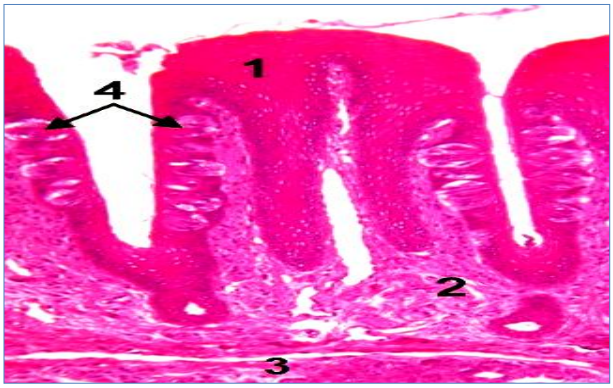
Figure (6) shows limited propria of the submucosa, in which at the apex were more than the later and at the corpse more than the later (Fig.7), while at the lateral surface connected with foliate papillae it was more than the later (Fig. 8).



Figure, 6: Circumvaliat papillae: Stratified squeamus epithelial tissue (1) lamina propria (2) skeletal muscles (3) (H and E) stain 400X.

The dorsal surface of the tongue was appear bristlier than the other, and non keratinized of the ventral surface of the tongue, these observation were disagree with (22-24) whom reported that the epithelial surfaces of the tongue were thicker than the lateral and lower ones in porcupine variety of filiform papillae in this study incongruity with (25) who explained filiform papillae in the anterior part were numerous, conical shaped with vertical orientation, and a depression on the posterior part; but in front of the torus they were relatively tighter and taller than the papillae in the anterior part. These variations depend upon the degrees of food contact and animal usage of the tongue in the daily uses.

Figure, 7: Fungiform papillae of tongue *Hystrix crestate* (H and E) stain 100X.



Figure, 8: Foliatepapillae of tongue *Hystrix crestate* show: mucosa (1) submucosa (2) muscular layer (3) taste bud (4) (H and E) stain 400 X.

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دراسة شكلية ونسجية للسان الدعلج *Hystrix cristata*

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الخلاصة

الوصف العياني والنسجي للسان لعشرة من ذكور الدعلج البالغة والتي جمعها الصيادون في محافظة الديوانية. بعد تحضير الدعلج أخذ اللسان ثم سجلت قياسات وأبعاد وشكل اللسان. قمة اللسان مدورة الشكل تقريبا الجسم مربع الشكل وسمكة يقل تدريجيا كلما اتجهنا إلى الخلف .جذر اللسان ينحدر بطنيا خلفيا باتجاه لسان المزمار.المرتفع اللساني يقع في الجزء الخلفي للسطح الظهري للسان. يحتوي السطح الجانبي من اللسان على الحليمات الورقية والتي تقابل الطواحن وكان معدل طول اللسان الكلي والقمة والجسم والجذر (0.66±7.6و0.23±1.25 و4.95±0.2 و1.4±0.26 سم) بالترتيب. وكان عرض اللسان الكلي والقمة والجسم والجذر (1.80±0.77 و0.35±0.49 و1±0.22 و0.45±0.14 سم) بالترتيب. كما أن الدراسة النسجية أظهرت بأن ألياف العضلات للسطح الظهري والجانبي من نوع الهيكل العظمي والنسيج الضام الرخو تحدها الظهارة الحرشفية الطبقية الكيراتينية بينما السطح البطني للسان غير متقرن. في السطح الظهري من الجسم وجدت الحليمات الفطرية، ولكنها قليلة في القمة والسطح الجانبي لجسم.اللسان. وأما الحليمات الكأسية ذات شكل دائري على غرار ثلم، وتوجد براعم الذوق على كلا الجانبين الظهرية والجانبية للسان. الحليمات الفطرية لها سطح كيراتيني مقوس واسع، مع براعم الذوق على السطح الظهري. الصفيحة بروبريا والطبقة التحت المخاطية تحتوي على النسيج الضام الغني بألياف الكولاجين.

الكلمات المفتاحية: الدعلج، الحليمات الخيطية، الكاسية، الفطرية، الورقية.