

Correlative Histological and Umami Taste Assessment Study of Gustatory Papillae on the Dorsal Lingual Mucosa in Different Animal Species

Mona Fathy, Fatma Adel Saad; Rehab Abdel Moneim

Abstract

Background: A correlative characterization of oral mucosa was carried out in common animal species. Objective: This work aimed to correlate the histological structure of lingual gustatory papillae as well as the immunohistochemical reactivity to a particular umami receptor among different animal species to categorize the best experimental animal models for research. Methods: The dorsal lingual mucosal specimens were obtained from four species (orders) including; chicken (Galliformes), frogs (Anura), camels (Artiodactyla) and rabbits (Lagomorpha). They were processed for routine histological examination; histochemical staining using periodic acid Schiff (PAS) and Masson's trichrome in addition to immunohistochemical localization of umami metabotropic glutamate receptor-4 (mGluR4) antibody. Results: Chicken, camels and rabbits exhibited keratinized stratified epithelium on the dorsal lingual mucosa with statistically greatest thickness in anterior lingual epithelium of chicken. For frogs, filiform and fungiform papillary walls were formed of mucous secreting columnar monolayer epithelium with a subjacent spindle cell layer. Insignificant differences in PAS staining intensity of dorsal lingual epithelium were noted between chicken anteriorly and rabbits as well as between chicken posteriorly and camels with the greatest significant intensity in frogs reflecting the highest content of glycogen and mucin. Likewise, the density of lamina propria and degree of collagen fibers bundling detected by Masson's trichrome were significantly different among species greatest in chicken and least in frogs. Intraepithelial taste buds were found in chicken while frogs displayed on top of fungiform papillae the largest gustatory disc among vertebrates. Camels and rabbits presented conventional papillary taste buds with the absence of foliate papillae in camels. Chicken and camel were negatively immunoreacted to mGluR4; frogs and rabbits were positively immunoreacted with the strongest reaction in rabbits. Conclusion: It was concluded that the direct association between histological variations of masticatory lingual mucosa and diverse environmental factors would reflect the adaptation capability of the lingual tissue.

The Egyptian Journal of Histology 2020, March