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ORIGINAL ARTICLE

Histomorphometric study of fungiform papillae and taste bud density across geriatric age group

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Abstract

Introduction: Taste buds are peripheral structures responsible for sensing taste compounds in food and drink. Each taste bud contains a number of specialized epithelial cells, including taste receptor cells for recognizing sweet, bitter, umami, sour, and salty compounds. Some of the subjective variability attributed to taste experience could be related to wide variations of taste bud density. The aim of the present study is to investigate histologic changes of taste buds in fungiform papillae of geriatric age groups by histo morphometric study in Mysore based population

Material and Method: Taste bud densities are quantified in this study using trinocular research microscope and reconstructed two regions of 30 human cadaver tongues. Specimens were collected from male and female cadavers representing geriatric adult age (65-80 years).

Results: Mean wall length of fungiform papillae was 0.09 ± 0.4 and 0.08 ± 0.2 in males and females respectively. Taste bud density (Mean/cm ±SD) was 102.2 ± 1.2 in males and 111.2 ± 2.3 in females.

Conclusion: Recent studies suggest that disruption or alteration of taste bud homeostasis may contribute to taste dysfunction associated with disease and aging. Differences in taste bud density that extend across adult age groups probably confound some inferences about the effects of aging on taste sensitivity that are derived from cross-sectional studies of human populations.

1 | INTRODUCTION

WHO has declared that 2.5% of the global population of those over 65 years is increasing and there will be expected marked shift in the age distribution of the population by 2050. In India, with its population of over one billion people, 6.18% of the total population constitute people older than 65yrs.1, 2 Nutrition among elderly is determined by multiple factors, including specific health problems and individual's level of physical activity, energy expenditure, calorie requirements and personal food preferences. Decreased nutrition due to taste loss in geriatric age group is often poorly

recognised and it may be associated with frailty, sarcopenia and poor health outcomes.3

It is reported that physiological decline in the density of taste buds and papillae is common among older people causing decreased or loss of taste as part of the normal aging process. Impaired gustatory function in elderly people is influenced by non-communicable diseases, upper respiratory infections, oral infections, dental problems, cognitive impairment, depression, radiotherapy, chemotherapy, polypharmacy etc.4Many clinical taste problems in the elderly population are likely to be undiagnosed and not many studies on geriatric population have been reported in India.

The four basic tastes which have been identified so far are sweet, salt, sour, and bitter. Taste buds present on fungiform papillae contains three types of taste cells which helps in taste perception.5 Researchers have reported 50% of total papillae is present on the anterior quarter, 28% on the next quarter and 22% on the posterior half of the tongue.6 The number of taste buds differ among fungiform papillae and there are large variations in the distributions of fungiform papillae and taste buds among subjects.7

The taste perception is complex with involvement of taste buds, taste cell receptors, peripheral nervous system and molecular mechanism of saliva, electrolytes, minerals and gastrointestinal hormones It has been reported earlier that number of fungiform papillae and localized losses on tongue in elderly subjects has higher prevalence compared to young subjects. Decreased salivary functions and changes in taste cell membranes involving altered function of ion channels and receptors may contribute for taste dysfunction in elderly. 8

The number of taste buds is reported to differ among fungiform papillae and there are large variations in the distributions of fungiform papillae and taste buds among subjects. Measurement of number or density of papillae therefore, can provide information about taste function of particular population.

2 | MATERIAL AND METHOD

Specimens were collected from 30 cadavers (18 Males and 12 females) representing geriatric adult age (65-80 yrs) in Department of Anatomy at JSS Medical College

The measurement of taste buds was done using trinocular research microscope supported by image processing software. The taste bud density was calculated by no of taste buds divided by length of fungiform papilla .Vertical sections of 4 microns thickness was stained by hematoxylin and eosin

Exclusion criteria Macroscopically and microscopically any pathological lesions of tongue was excluded from the study

Deceased subjects who were suffering from diabetes, cancer , renal failure and any other disorders was excluded from the study

3 | OBSERVATIONS

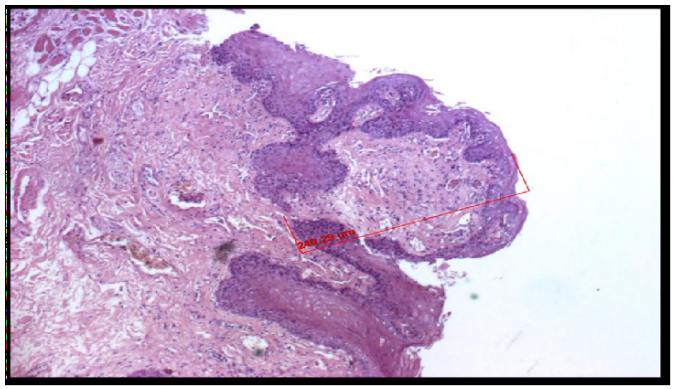

FIGURE 1:

Supplementary information The online version of this article (https://doi.org/10.15520/ijmhs.v10i07.3054) contains supplementary material, which is available to authorized users.

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4 RESULTS

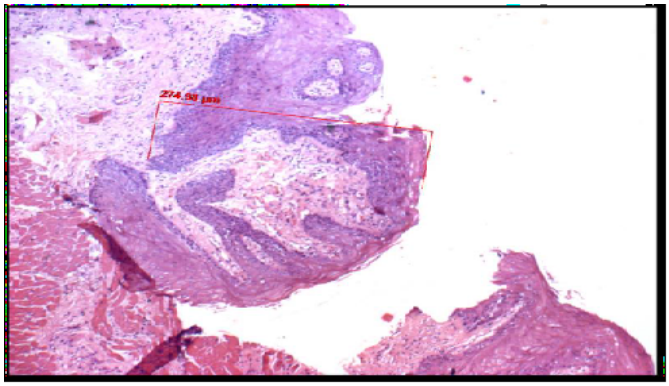

FIGURE 2:

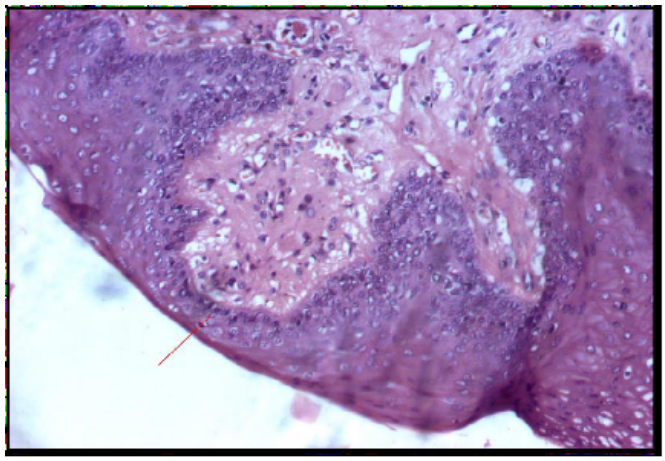

FIGURE 3:

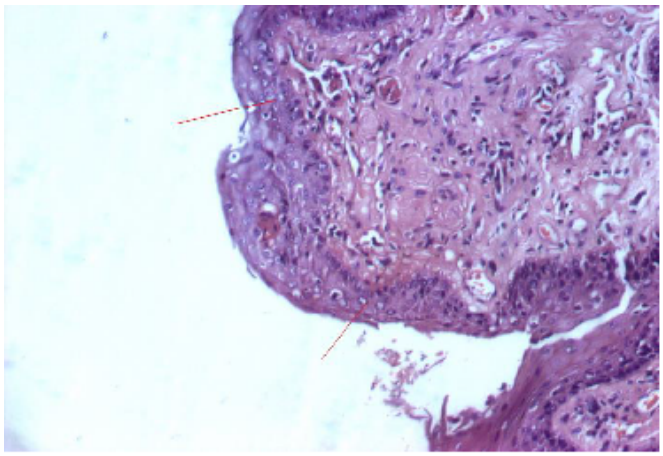

FIGURE 4:

5 DISCUSSION

Table 1:

Parameters	Males	Females
Mean Wall length (cm)	0.09 ± 0.4	0.08 ± 0.2
Taste bud no ± SE	92±2.3	0.08 ± 0.289±3.4
Taste bud density (Mean/cm ±SD)	102.2 ± 1.2	111.2 ± 2.3

Table 2:

Authors	Age	No. no of subjects of subjects	papillae density/sq cm
Moses et al	5-65	200	98-102
Miller 1986	22-80	10	122-120
Chagad Robinson 1987	17-92	26	171-253
Just et al 2002	7-71	32	132-142
Kulla-Mikkonen et al 2006	20-65	127	114-122
Present study	65-80	30	102.2 ± 1.2/111.2 ± 2.3

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