

Histopathological study of lingual circumvallate papillae and associated tissues in Brazilian smoker and non-smoker individuals

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Abstract

The circumvallate papillae differ from other gustatory structures in the number of taste buds and the presence of a secretory apparatus associated with specialized serous glands, the Von-Ebner's glands. This study evaluated the histopathological alterations in these structures and their associated tissues in relation to the smoking habit. Thirty-two tongues, from a previously selected sample of 45 were studied, of which 16 belonged to smokers and 16 to non-smoker individuals. They were obtained at necropsies from the morgue of the Death Verification Service of UFPE, in agreement with the Secretary of Health of Pernambuco in Recife. A total of 94 circumvallate papillae were studied. The samples were classified in two groups: smokers (S) and non-smokers (NS). Three main alterations - inflammation, hyperplasia, and hyperkeratosis - were more frequently observed in the analyzed samples. Many of these alterations can also be the result of other external factors rather than cigarette smoking.

Keywords: lingual circumvallate papillae, smokers, histopathology.

1 Introduction

The tongue (from the Latin *lingua*, Greek *glossa*), the muscular organ located on the floor of the mouth, is attached by muscles to the hyoid muscle, the mandible, the styloid process and the pharynx. The tongue is important for the gustatory sense, deglutition and speech. The lingual papillae are projections of the lamina propria or mucous membrane chorion covered by the epithelium. There are four main types: a) Filiform Papillae, b) Fungiform Papillae, tongue, c) Vallate or Circumvallate Papillae, the largest ones, vary in number from three to fourteen and arranged in a V beyond the terminal sulcus. Each vallate papilla is shaped like a round castle surrounded by a deep moat, limited at the border by a wall or vallum. The ducts of the serous glands open up at the sulcus and the calyculus gustatorius or taste buds, are found in the papillae and the vallum; and d) Foliate papillae, consist of irregular sulci and crests located close to the posterior border of the tongue (GARDNER, GRAY, O'RAHILLY et al., 1975).

The circumvallate papillae differs from other gustatory structures, such as the fungiform papilla, in the number of taste buds and the presence of a secretory apparatus associated with specialized serous glands, the Von-Ebner's glands (SBARBATI, CRESCIMANNO, BERNARDI et al., 2000).

Among the alterations caused by the habit of smoking, the inflammatory process and its ultimate consequences are noteworthy, as well as the processes that result in structural and numerical alterations in the cells that comprise the oral mucosa.

According to Montenegro and Franco (2004), inflammation is a local reaction of tissues in the presence of aggression. It occurs as an unspecific response, characterized by a series of alterations that tends to limit the effects of the aggression. The same authors mentioned that hypertrophy is the increase in the volume of cells, which consequently leads to increased organ volume as a whole.

The increase in cell volume is the result of a higher rate of protein synthesis, with the consequent production of a higher number of structural components. The concept of hypertrophy is opposed to that of hyperplasia, in which there is an increase in the number of cells. In general, the two processes occur simultaneously (MONTENEGRO and FRANCO, 2004).

Focal hyperkeratosis consists in the thickening of a layer of keratin on the surface of the epithelium that lines the mucosa, due to local low-intensity friction, for a relatively long period of time (NEVILLE, DAMM, ALLEN et. al, 1998; NEVILLE and DAY, 2002; REGEZI and SCIUBBA, 2000).

For Oliveira (2004), the morphology of the vallate papillae in humans, considering the habit of smoking and alcohol intake, did not present significant structural alterations.

Considering that the literature has few references on the histological alterations of vallate papillae in the presence of the smoking habit, the present study aimed at carrying out a pathological study of the circumvallate papillae and their adjacent tissues in smokers, in order to verify possible alterations in these structures at their epithelial level.

2 Material and methods

Thirty-two tongues, from a previously selected sample of 45 were obtained from necropsies at the Death Verification Service of UFPE, in agreement with the Secretary of Health of the State of Pernambuco in the city of Recife, Brazil. A total of 94 circumvallate papillae were studied.

The material had been previously fixed in a buffered formaldehyde solution at 10%. The circumvallate papillae were randomly selected for the histological study. A method of microscopic study was employed, which followed routine microscopy procedures for slide preparation. The slides were stained by hematoxylin-eosin to allow the visualization of the tissue structure, which permitted the study of epithelial, muscle and conjunctive tissue.

The classification used in the study consisted of only two groups, as all samples from individuals that had had any contact with cigarettes were considered as belonging to smokers, regardless of the number of cigarettes smoked daily. Thus, the sample was divided in two groups: smokers (S) and non-smokers (NS).

3 Results

Figure 1 shows a photomicrograph of the circumvallate papillae and their associated tissues in smokers. The first image discloses the main alterations found in the sample tissues: inflammation, hyperkeratosis and hyperplasia.

Figure 2 shows a photomicrograph of the circumvallate papillae and their associated tissues in non-smokers. It can be observed that the images from the control group (NS) shows similarities with the characteristics observed in the photomicrograph of the first group (S). In addition to the aforementioned more relevant findings, others such as desquamation, epithelial crests, scarring, intense fibrosis, etc., can also be observed.

4 Discussion

Tobacco use results in diverse damage to the oral tissues and among them, cancer of the oral cavity (BARTAL, 2001; WINN, 2001; NEVILLE, DAMM, ALLEN et al., 2002),

periodontal disease (SHAM, CHEUNG, JIN et al., 2003; TAYBOS, 2003) and alterations in gustatory thresholds (HENRIQUES, FURTADO, VARGAS et al., 2000).

One of the reactions of the oral mucosa to tobacco use are hyperplastic alterations, characterized by acanthosis and hyperkeratosis (SQUIER, 1991), which can be induced by chemical irritants such as tobacco and its smoke (RENSTRUP, 1958).

Hence, the present study verified that the most significant alterations found in the microscopic analysis of the papillary tissue studied were the inflammatory, hyperplastic and hyperkeratotic processes.

It is worth mentioning that other alterations, rather than the aforementioned ones, were also detected in the present study. Therefore, alterations such as de-epithelization of the papillary surface, scarring, tissue resolution, conjunctival epithelial thickening, fibroblastic proliferation and gland atrophy, among others, were observed in a significant number of the samples, but only as a consequence of the three main abovementioned factors.

A more detailed analysis regarding the most relevant factors showed that 25% of the alterations associated with inflammation are linked to the habit of smoking. However, they could have been caused by other external factors, rather than smoking.

Similar percentages, related to the cases of hyperplasia and hyperkeratosis, were not statistically significant to explain the harmful consequences inherent to the habit of smoking, considering that the manifestation of these pathologies can also be the result of other exogenous factors, rather than cigarette smoking.

This statement is supported by the fact that some samples from non-smokers showed the same pathology profile found in smokers.

5 Conclusion

In conclusion, the histopathological study of 94 circumvallate papillae from smokers and non-smokers showed that many others factors, that not the cigarette smoking, can to cause alterations in the tongue tissue.

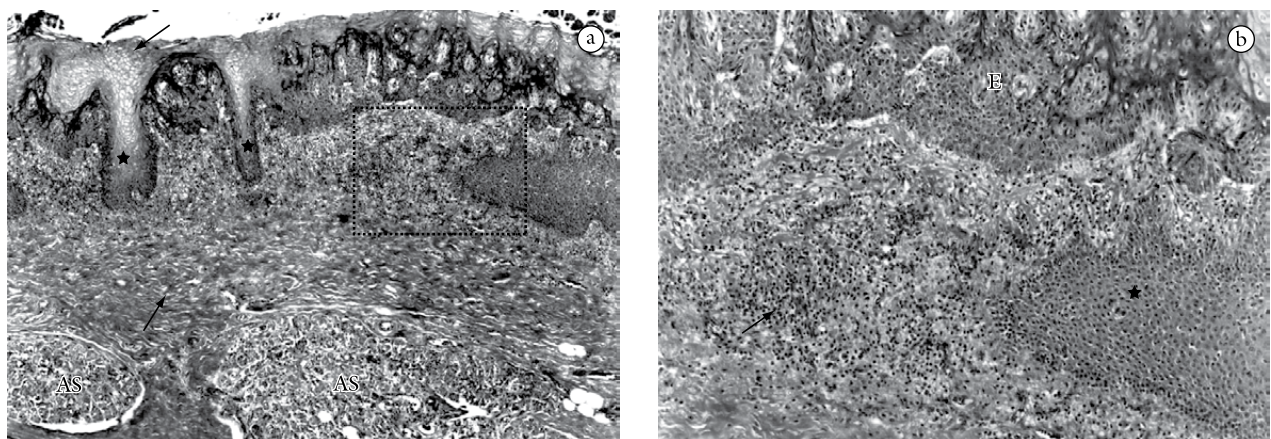


Figure 1. Photomicrographs of circumvallate papillae from smokers' tongues. a) Observe areas of hyperplastic epithelium and hyperkeratosis (upper arrow), epithelial crests projected from the *lamina propria* (star). Note mucosal thickening (lower arrow). Note dotted area indicating moderate inflammatory infiltrate. Serous Acini (SA) (40×). b) Detail of the dotted area from the previous image. Note intense inflammatory infiltrate in the lamina propria and the crest-shaped epithelial projection towards the lamina propria (star) (100×).

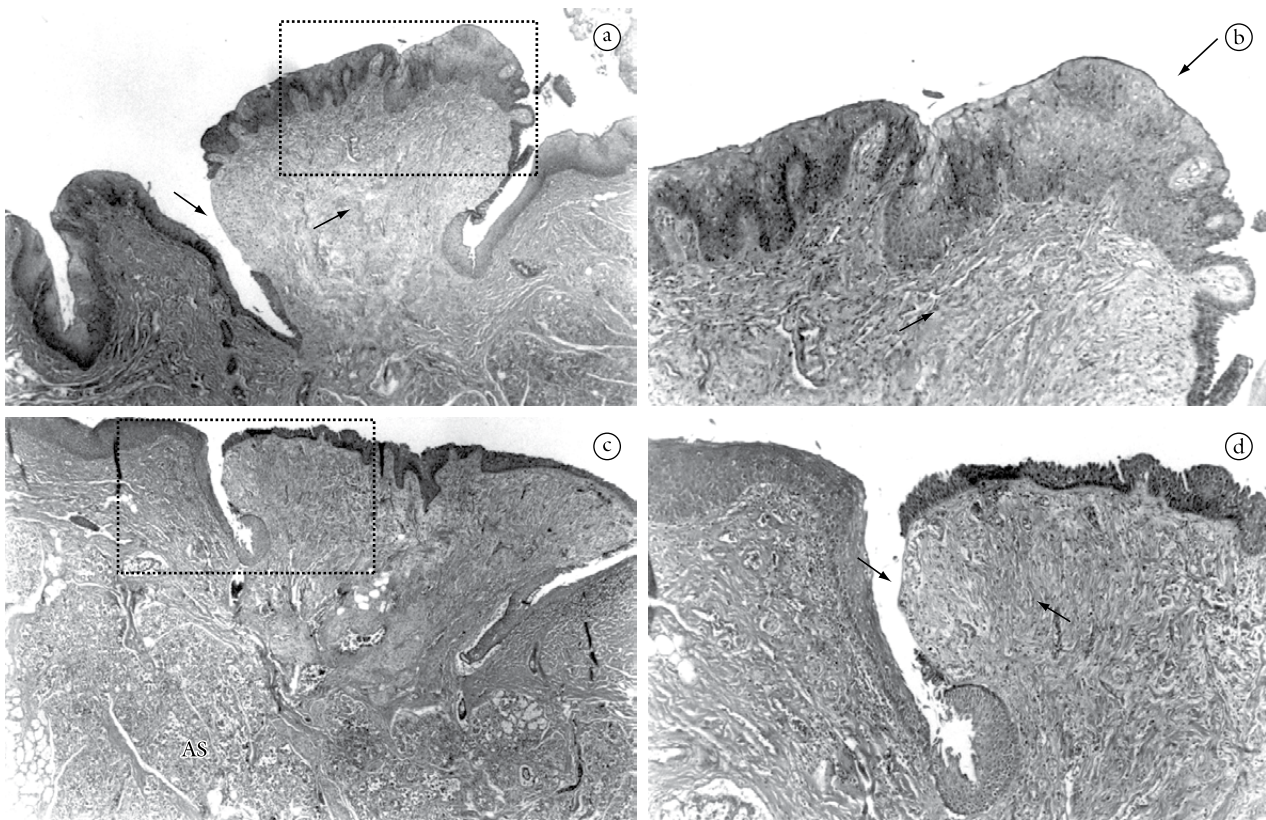


Figure 2. Photomicrographs of the circumvallate papillae from non-smokers' tongues. a) Observe the vallate papilla epithelium showing moderate hyperplasia and hyperkeratosis, areas with de-epithelization (arrow to the left), diffuse inflammatory infiltrate along the lamina propria and granulation tissue formation (arrow to the right) (40×). b) Detail of the dotted area from the previous image. Note hyperplasia (upper arrow) and diffuse inflammatory infiltrate along the entire lamina propria (lower arrow) (100×). c) Vallate papilla showing de-epithelization process, congested vessels, diffuse inflammatory infiltrate along the entire lamina propria and granulation tissue formation. Serous Acini (SA) (40×). d) Detail of the dotted area from the previous image. Note the de-epithelization process (arrow to the left), congested vessels and granulation tissue formation (arrow to the right) (100×).

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