Inflammatory Papillary Hyperplasia of the Palate: Quantitative Analysis of *Candida albicans* and its Negative Correlation with Microscopic and Demographic Aspects

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Inflammatory papillary hyperplasia of the palate (IPHP) is a tissue-reactive overgrowth characterized by hyperemic mucosa with nodular or papillary appearance in the palate. The exact pathogenesis is still unclear. In this study, the presence of *Candida albicans* in the epithelial lining was evaluated using the indirect immunofluorescence staining technique. Strongly stained *C albicans* was observed only in the lesions of the IPHP group. Therefore, the detection of *C albicans* in almost all samples from IPHP tissue enabled a suggestion as to the microbial etiology of the disease, since the use of dental prostheses was reported. *Int J Prosthodont 2011;24:235–237.*

Inflammatory papillary hyperplasia of the palate (IPHP) is a benign epithelial proliferation that develops in patients who wear acrylic maxillary complete dentures.[1] These dentures are often old, ill-fitting, badly cleaned, and worn continuously.

The most frequently reported species of fungus involved with IPHP is *Candida albicans.*[2] It is generally reported that the presence of this opportunist pathogen in denture plaque is considered an important factor in the development of inflammation.[3]

No study has confirmed that the presence of yeasts on the oral mucosa and dentures is directly responsible for IPHP. Thus, the purposes of this study were to analyze biopsies obtained from patients who wore acrylic maxillary complete dentures to evaluate the presence of *C albicans* in the epithelial lining and to correlate the quantitative values obtained with the demographic and microscopic characteristics.

Materials and Methods

The files at the Department of Stomatology (Oral Pathology) of Bauru Dental School, University of São Paulo, Brazil, were searched to retrieve 27 specimens of microscopically diagnosed IPHP in maxillary complete denture–wearing patients (20 women, 7 men) from 2000 through 2007. All control group samples (n = 7) were obtained from non–denture-wearing patients. Samples consisted of select areas of the palatal mucosa with a normal microscopic appearance and were taken from the healthy margins of seven microscopic sections of pleomorphic adenomas and mucoepidermoid carcinomas. Demographic data were collected from the respective patients' clinical records.

Each block was cut and routinely stained with hematoxylin-eosin, periodic acid-Schiff, and Grocott methanamine silver nitrate stains.

Ten consecutive microscopic fields of the epithelial lining of each specimen were captured with a 40× objective to evaluate the epithelium and subepithelial inflammatory infiltrate, considering the following variables: thickness, keratinization, elongated ridges, pseudoepitheliomatous hyperplasia, exocytosis, and Munro keratin pearl-like microabscesses. The epithelial lining was considered hyperplastic (> 10 layers), atrophic (≤ 4 layers), or normal (4 to 10 layers). The type of keratinization (ortho- or parakeratinized) was considered, as well as its absence and thickness (normal or hyperkeratinized, ie, more than 5 layers). The presence of elongated crystals, pseudoepitheliomatous hyperplasia, and exocytosis was classified according to the following scores: 1 = compromising up to one third of the epithelial lining, 2 = compromising up to two thirds of the epithelial lining, and 3 = compromising the entire or almost all of the epithelial lining. Munro microabscesses and cornealike pearls were categorized as either present or absent. The inflammatory infiltrate was identified as chronic, acute, or mixed, and the intensity of the predominant infiltrate was classified as absent (0), mild (1), moderate (2), or intense (3). Mean scores for the IPHP and control groups were calculated.

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Table 1 Statistical Comparative Analysis Between Mean Scores of *Candida albicans*, Sex, and Race*

Variables	Mean	SD	*P*
Sex			.6963
Women	13.50	10.78	
Men	15.37	10.54	
Race			.6666
White	13.09	8.11	
Black	11.20	5.54	

SD = standard deviation.
*Student *t* test.

Table 2 Mean (± Standard Deviation) Scores of Inflammatory Infiltrate for IPHP and Control Patients

	Mononuclear infiltrate	Polymorphic infiltrate
IPHP	2.33 ± 0.88	1.22 ± 0.50
Control	0.75 ± 0.71	0.00 ± 0.00

C albicans presence was counted by two examiners with no prior knowledge of which group the samples belonged to. The number of fluorescent fungi per square millimeter was calculated in each sample by dividing the total number of fungi by the total area of epithelium analyzed. To obtain the total area in each sample, the area of a microscopic field (0.0939921 mm^2) was multiplied by the number of fields examined in the sample. The mean number of immunomarked fungi/mm^2 obtained in the two groups analyzed was compared statistically.

Immunofluorescence

Tissue samples were analyzed using an indirect immunofluorescence staining technique. They were incubated with the primary rabbit polyclonal antibody anti–*C albicans* (B65411R, Biodesign International, Meridian Life Science) diluted in phosphate-buffered saline (PBS) (1:1,200) and with anti–rabbit IgG antibody conjugated with fluorescein isothiocyanate fluorochrome (W99095F, Biodesign International, Meridian Life Science) diluted in PBS (1:150). Negative control slides were made by replacing the primary antibody with PBS. Positive control material consisted of sections of *C albicans*–infected intestine tissue.

This study was approved by the research ethics committee of the University of São Paulo–Bauru Dental School (no. 060/2008).

Results

The results of this study showed that samples of IPHP were prevalent in the elderly, with a mean age of 59 years. Statistical analyses between the number of *Candida* and demographic characteristics such as sex and race were performed using the Student *t* test (Table 1).

Histologic examination of all lesions revealed papillary projections, and the majority were covered with parakeratotic stratified squamous epithelium. The epithelium was hyperplastic and often demonstrated pseudoepitheliomatous hyperplasia. The connective tissue was well vascularized and infiltrated by numerous chronic inflammatory cells.

Table 2 shows the inflammatory infiltrate scores, which were significantly higher in IPHP than in control patients ($P < .05$). *Candida* organisms were not identified in any IPHP or control patients by means of periodic acid-Schiff or Grocott methanamine silver nitrate stains.

Immunofluorescence

Immunostained cells were considered to be *C albicans* and were only observed on the surface of the epithelium of IPHP samples, without epithelial invasion (Fig 1). The mean number of cells seen was 14.

The number of fungal cells/mm^2 compared with epithelial and connective tissue characteristics showed no statistically significant correlations, as shown in Table 3. The variables thickness, parakeratinized epithelium, and mononuclear inflammatory infiltrate demonstrated a slight tendency to increase when the quantity of *C albicans* increased. However, it was not possible to affirm that this was true.

Discussion

The fungus *Candida* has been found in IPHP lesions, and denture surfaces favor the presence and growth of this fungus.[4,5]

The results of the present study demonstrated *C albicans* on the surface of the epithelium of IPHP samples. It is possible that the papillary projections of the IPHP mucosa worked as a niche for fungal growth

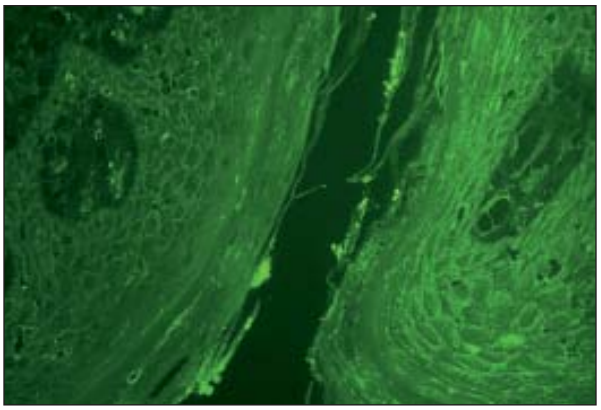

Fig 1 Specific immunostaining of *C albicans* in IPHP lesions using the indirect immunofluorescence staining technique.

Table 3 Comparative Statistical Analysis Between Mean Number of *Candida albicans* and the Variables of the Epithelial Lining and Inflammatory Infiltrate*

Variables	Correlation	*P* (bicaudal)
Candida vs thickness	0.13	.53
Candida vs elongated ridges	–0.15	.48
Candida vs parakeratinized epithelium	0.25	.22
Candida vs orthokeratinized epithelium	0.02	.90
Candida vs mononuclear infiltrate	0.17	.42
Candida vs polymorphonuclear infiltrate	0.04	.86

*Spearman rank correlation test.

and accommodation. Although no fungal elements were observed within the epithelium of these lesions, the possibility cannot be ruled out that the fungus activates other intracellular pathways in mesenchymal or epithelial cells, resulting in the production of growth factors involved in proliferation and epithelial hyperplasia. However, further studies are necessary for a better understanding of this.

Conclusion

Although *C albicans* was observed in the lesions of only IPHP patients, there was no relationship between this and the underlying inflammatory infiltrate or the demographic data. Therefore, the detection of *C albicans* in almost all IPHP samples is in agreement with the fact that the denture surface allows the presence and growth of this fungus, collaborating with the pathogenesis of IPHP.

References

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Literature Abstract

Peri-implant bone level around implants with platform-switched abutments

The purpose of this clinical trial was to evaluate whether crestal bone height around dental implants could be influenced by the use of a platform switching protocol. Eighty-nine dental implants were evaluated in 36 patients. The following groups were created: *(1)* wide-diameter implants (Osseotite Certain, 5 mm, Biomet 3i) placed subcrestally with regular-diameter (4.1 mm) cover screws (75 implants), and *(2)* regular-diameter implants (Osseotite Certain, 5 mm, Biomet 3i) placed at the crest and with regular-diameter cover screws (14 implants). Standardized radiographs were obtained after insertion of the definitive prostheses (at 3 months) and after 1 year. An image analysis program was used to perform the calibration and measurements. The average value of the mean mesial and distal values was calculated and analyzed. The results demonstrated that the implants with a platform-switched configuration (n = 75) exhibited statistically significantly less bone loss at the time of insertion of the definitive prosthesis (0.30 ± 0.07 mm vs 0.68 ± 0.17 mm, $P < .05$) and at 1 year (0.39 ± 0.07 mm vs 1.00 ± 0.22 mm, $P < .01$) when compared to non–platform switched implants (n = 14). The authors concluded that platform-switched implants seem to limit crestal bone remodeling, although the exact mechanism and long-term stability remains to be proven.

Fickl S, Zuhr O, Stein JM, Hürzeler MB. *Int J Oral and Maxillofac Implants* 2010;25:577–581. **References:** 32. **Reprints:** Dr Stefan Fickl, Department of Periodontology, Julius-Maximilians-University, Würzburg, Pleicherwall 2, 97070 Würzburg, Germany. Email: fickl_s@klinik.uni-wuerzburg.de—*Tee-Khin Neo, Singapore*