

Comparative study of the clinical and anti-microbial efficacy of tongue cleaners

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Abstract

Candida species have frequently been isolated from the oral cavities of a variety of patients, such as elderly people, dentures users, immunocompromised and health patients. Yeasts may be associated with immune response and local factors such as poor oral hygiene. It was evaluated effectiveness of tongue cleaner showing which types would be preferred by patients, changes in tongue coating and in saliva yeasts counting. Thirty patients were selected and randomly distributed into three groups. This crossover blind study evaluated the effect of tongue cleaning using: a plastic and a steel tongue scraper and a nylon soft-bristle toothbrush. All patients were instructed to use the cleaners twice a day for one week (fifteen-day wash-out period). Saliva and tongue coating samples were collected from each patient from each test period, the yeasts were counted by colony forming units per mL (CFU/mL) and the species were identified. The patients were questioned about cleaner preference. An increase in the percentage of patients with no tongue coating after scraping was observed. A reduction in the mean number of *Candida* species in tongue coating was observed only after nylon soft-bristle toothbrush cleaner. *Candida albicans* was the prevalent species. Volunteers preferred to the steel tongue scraper (60%). Tongue cleaners reduced the tongue coating and the mean number of saliva's yeasts. Degree of tongue coating favors the *Candida* species colonization.

Key Words:

Candida species, tongue cleaners, tongue coating, oral hygiene

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Introduction

Oral candidosis is caused by an overgrowth in the oral cavity by a yeast-like fungus, *Candida*¹⁻² and it is the most common human fungal infection, particularly in elderly people³⁻⁴.

About 65% of elderly people wearing dentures are prone to infection by *Candida* species⁵. Wearing of dentures produces a microenvironment favorable to the growth of *Candida* species. This fact promotes a low pH and an anaerobic environment and may be responsible for the enhanced adherence of yeasts to acrylic of the dentures^{1,6-7}. The adherence of *Candida* species to denture-base materials may cause local microscopic breaches in the oral mucosa, thus allowing access to the microorganism.

The degree of tongue coating also plays a significant role in mouth infection of *Candida* spp. Tongue coating is composed by blood components, other nutrients and desquamated epithelial cells that can, in turn, cause the development or perpetuation of infections and halitosis formation⁸⁻¹².

To prevent infection and the development of other pathologies in the oral cavity, tongue cleaning has been advocated to reduce the amount of coating and the microorganism loading in the mouth¹³⁻¹⁵.

Brushing the teeth and the tongue is the form more widely used and socially accepted of oral hygiene and was for much time, one of the basic components of programs of prevention of the oral diseases. Tonzetich¹⁶ and Rosenberg¹⁷, affirm that the optimum way for treatment of the oral pathologies is to motivate the patient for a practical of oral hygiene and that a soft cleaners of the tongue must be effective and it have to become part of the daily routine of hygiene.

The main used mechanical methods in the cleaning of the tongue well dental brush, gauze and currently, scrapers. The removal of tongue coating can be made by the simple brushing of the tongue or, when the patient has much sensitivity, an appropriate tongue cleaner may be used for this end^{6,10}.

Scrapers had been evolving under certain requirements of functionality^{10,12}. However, only recently, was given attention to the drawing and to the materials, acquiring knowledge the professionals and the manufacturers of the advantages and disadvantages of kind of different scrapers.

The aim of this study was to evaluate effectiveness of three tongue cleaners about changes amount of in tongue coating; changes in counting of *Candida* species from saliva and coat and patients preference.

Material and Methods

The Ethical Committee of Dentistry School of Araraquara – UNESP, approved this crossover study. The study population consisted of 30 subjects (both genders), no-smoking denture wearers for a long time. The extension of the tongue coating was scored using an index by Gómez et al.⁶ modify for this study in which the coat was quantify about its thickness, by

two examiners trained and calibrated. These examiners were blind about which type of tongue cleaner the volunteers were using. Thirty patients were distributed randomized into three groups of ten patients in each: Group I) first week: plastic tongue scraper[#]; second week: steel tongue scraper[#]; third week: nylon soft-bristle toothbrush[;]; group II) first week: steel tongue scraper; second week: plastic tongue scraper; third week: nylon soft-bristle toothbrush; group III) first week: nylon soft-bristle toothbrush; second second week: plastic tongue scraper; third week: steel tongue scraper, with a fifteen-day wash-out period among the analysed period. The volunteers received in each period a new nylon soft-bristle toothbrush and new plastic tongue scraper. Only steel tongue scraper was sterilized. The cleaners were given by a single and experienced examiner that throughout the study instructed the volunteers to use the cleaners in the morning and at night, making three movements with directions from the dorsum-posterior to the dorsum-anterior region of the tongue. Saliva and tongue coating samples were collected from each patient before and 7 days after each test period. The tubes with the saliva and tongue coating were submitted to 1 minute of vibration to obtain a uniform suspension. After this procedure, the samples were diluted in decimal series in sterile saline solution. For the cultivation of yeasts, aliquots of each dilution were inoculated in Sabouraud dextrose agar medium and incubated at 37° C for 48 hours. The counting of CFU/mL was carried out after the growth of characteristic yeast colonies. Colonies representing all morphological types of *Candida* spp. for each subject were then isolated and the species were presumptively identified by Chromagar® *Candida*¹⁸ and confirmed by biochemical methods¹⁸⁻¹⁹.

Results

The patients were asked about their tongue cleaner preferences and their answers are demonstrated in Figure 1. Whilst this evaluation was a subjective evaluation of devices, 60% (18 of the 30 volunteers) expressed a preference for the steel tongue scraper.

At baseline, a relatively high number of patients with tongue coating were noted. In all the periods tested, a reduction in the percentage of patient demonstrating heavy-thick and light-thin coating was observed. Moreover, an increase in the percentage of patients with no coating tongue was observed, however there were no significant differences regarding the efficiency ($p < 0.01$) of the three tongue cleaner types (Figure 2).

The number of *Candida* species (CFU/mL) in saliva and in the tongue coating was evaluated before and after the use of the different tongue cleaners types (Table 1). It was observed a reduction of yeast (CFU/ mL) from tongue coating with the nylon soft-bristle toothbrush, but without statistical differences ($p < 0.05$).

Table 1 - Mean number of *Candida* species in saliva and tongue coating by (CFU/mL)

Tongue cleaning	<i>Candida</i> spp (CFU/mL)			
	Saliva		Tongue coating	
	Before	After	Before	After
Steel tongue scraper (n=30)	14.4 x 10 ²	11.5 x 10 ²	1.6 x 10 ²	1.6 x 10 ²
Toothbrush (n=30)	14.7 x 10 ²	9.3 x 10 ²	2.0 x 10 ²	0.77 x 10 ²
Plastic tongue scraper (n=30)	14.8 x 10 ²	11.8 x 10 ²	1.6 x 10 ²	2.0 x 10 ²

^a Symbols signify that there are statistical differences between periods and among groups (ANOVA – Tukey, p-value > 0.05).

Table 2 - Relative frequency* of patients with *Candida* species isolated from the saliva and tongue coating before and after tongue cleaning.

<i>Candida</i> species	Tongue cleaning					
	Steel tongue scraper		Nylon soft-bristle Toothbrush		Plastic tongue scraper	
	Before	After	Before	After	Before	After
<i>albicans</i>	13	11	15	9	12	13
<i>tropicalis</i>	4	3	3	5	1	0
<i>guilliermondii</i>	2	0	2	0	0	1
<i>parapsilosis</i>	1	2	1	4	5	1
Total	20	16	21	18	18	16

* For a total number of 30 patients

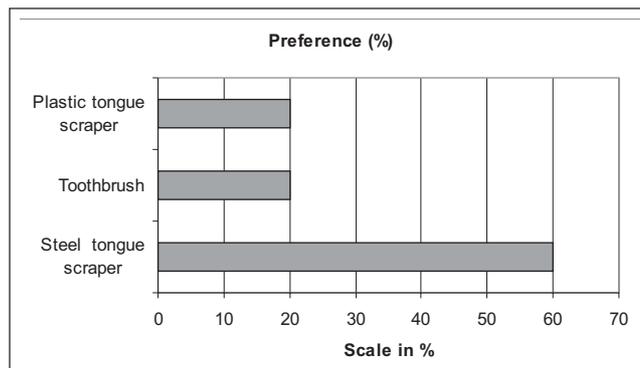


Fig. 1 - Subject preferences for tongue cleaning

About *Candida* species colonization, it's worth to mention that a reduction in the number of patients with presence of *Candida* species. *Candida albicans* were the most frequent specie occurring from saliva and tongue coat in the patients before and after tongue cleaning. A diversity of species of

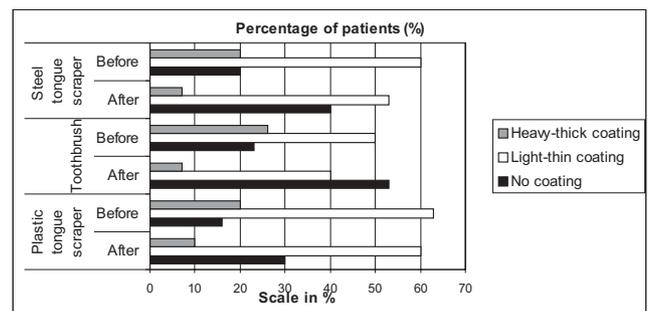


Fig. 2 - Effect of the different tongue cleaning methods on tongue coating by (CFU/mL)

Candida was identified in the coat (Table 2).

Discussion

A subjective questionnaire evaluated the preference of patients among the three types of tongue cleaners used and it was observed a high number of patients that preferred the steel scraper for cleaning the tongue. This fact may be hypothetical, justified by the reduced gagging reflex in comparison with the toothbrush, confirming observations of Rowly et al.¹⁵ and Quirynen et al.¹⁰. In addition, according to patients, the steel scraper had a more polished and soft surface than the others tested cleaners.

The data from this study indicate that all cleaner types used had reduced the degree of coating without statistical differences among the three types. Our data are in agreement with those of Pedrazzi et al.¹⁴ and Quirynen et al.¹⁰ who also reported a significant reduction in tongue coating using a tongue cleaner such as a brush or a scraper.

There is wide agreement that denture wearing patients present colonization in the oral cavity by *Candida* species and other microorganisms⁶. The findings of our study (table 1) are in agreement with those reports that have shown that tongue cleaning, whilst reducing the degree of coating, does not significantly reduce the *Candida* species²⁰⁻²¹. Our data are also in agreement with Menon and Coykendall²² and Quirynen et al.⁹ who reported small changes in bacterial load after tongue scraping.

The difficulty in reducing the bacterial load on the tongue is

not surprising, considering the surface characteristics of the tongue dorsum. Quirynen et al.²³ related that the tongue has innumerable depressions in the surface which are considered ideal niches for bacterial adhesion and growth, sheltered from cleaning actions. Another theory is that patients may re-contaminate the oral cavity by the use of infected cleaners. Another hypothetical theory is the denture state that in our study showed bad conditions of maintenance. These factors may justify the low reduction of saliva and tongue coat *Candida* species after tongue cleaning.

Candida albicans was the most frequent species colonizing the oral cavity before and after tongue scraping, similarly to the results of Farah et al.²⁴ and Manfredi et al.²⁵.

The steel tongue scraper was preferred by volunteers. In summary, the three tongue cleaners evaluated were efficient in reducing the tongue coating, but not showed a significant alteration in the number and species of *Candida* from saliva and tongue coating. Health programs should be developed to instruct the patients about oral hygiene, good conservation of dentures and tongue cleaning to prevent re-infection.

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