Ciências Odontológicas: Desenvolvendo a Pesquisa Científica e a Inovação Tecnológica

Emanuela C. dos Santos
(Organizadora)

Atena Editora
Ano 2020

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2020 *by Atena Editora*

Editora Chefe: Profª Drª Antonella Carvalho de Oliveira
Diagramação: Natália Sandrini de Azevedo
Edição de Arte: Luiza Batista
Revisão: Os Autores

Atena Editora
Ano 2020

Atena Editora
Ano 2020

Dados Internacionais de Catalogação na Publicação (CIP)
(eDOC BRASIL, Belo Horizonte/MG)

C569 Ciências odontológicas [recurso eletrônico] : desenvolvendo a pesquisa científica e a inovação tecnológica / Organizadora Emanuela Carla dos Santos. – Ponta Grossa, PR: Atena, 2020.

Formato: PDF
Requisitos de sistema: Adobe Acrobat Reader
Modo de acesso: World Wide Web
Inclui bibliografia
ISBN 978-65-5706-126-8
DOI 10.22533/at.ed.268202506

1. Odontologia – Pesquisa – Brasil. I. Santos, Emanuela Carla dos.

CDD 617.6

Elaborado por Maurício Amormino Júnior – CRB6/2422

Atena Editora
Ponta Grossa – Paraná - Brasil
www.atenaeditora.com.br
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Atena Editora
Ano 2020

APRESENTAÇÃO

É notável o avanço da ciência e da tecnologia em nosso cotidiano. Grandes descobertas tornaram a vida mais prática e mais ágil. Porém algo novo e inesperado pode surgir e confrontar nossas certezas. O surgimento de situações inusitadas e desafiadoras nos faz perceber que nosso conhecimento ainda é ínfimo e que necessitamos de mais evolução sustentável.

As ciências odontológicas também se encontram neste quadro, onde muito já se alcançou, mas muito mais se faz necessário. Este e-book traz um compilado de artigos, entre pesquisas clínicas, *in vitro* e revisões que demonstram os avanços no desenvolvimento da pesquisa científica e a inovação tecnológica dentro da área, dando mais um grande passo rumo à evolução desta ciência tão refinada.

Que a leitura deste livro digital possa amplificar seu conhecimento, bem como despertar novas ideias para que, quem sabe você, tenha o insight para uma nova descoberta.

Ótima Leitura!

Emanuela C. dos Santos.

SUMÁRIO

CAPÍTULO 6

COMPARISON OF AN EXPERIMENTAL DENTIFRICE BASED AS *RICINUS COMMUNIS* WITH COMMERCIAL DENTIFRICE FOR BIOFILM REMOVAL

Data de aceite: 16/06/2020
Data de submissão: 03/03/2020

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Acknowledgments: This study was supported by the Coordination of Improvement of Higher Education Personnel (CAPES) and National Council for Scientific and Technological Development (CNPq) and Foundation for Research of Sao Paulo State (FAPESP 2010/50819-8).

ABSTRACT: Dentifrices with antimicrobial activity may facilitate hygiene steps and better patient compliance in daily care. This study evaluated an experimental dentifrice (*Ricinus communis* at 10%) and compared it with commercial dentifrices. The response variables were: organoleptic and physical-chemical characteristics; abrasiveness and roughness before (T0) and after (Tf) artificial brushing; antimicrobial activity against simple biofilm of bacteria and yeast. For organoleptic and physical-chemical testing, descriptive analyzes were used. The data of abrasiveness and antimicrobial action were submitted to ANOVA and Tukey test (p=0.05). The experimental dentifrice presented great aspect, odor and taste and showed the lowest density, consistency and viscosity when compared to commercial dentifrices. All of them showed alkaline pH. Experimental (17.325±2.302) and Colgate dentifrices (16.573±3.282) promoted

greater roughness compared to DentuCreme (9.775±1.661) and Trihydral (7.089±3.980). The experimental dentifrice (43±3.2) induced mass loss (mg) similar to DentuCream (44±1.8) and Trihydral (40.3±2.2). The Colgate dentifrice (53.1±6.6) promoted greater mass loss. The antimicrobial action of the dentifrices was significant difference between them, highlighting: to *Enterococcus faecalis*: Experimental (3.66±0.56), Colgate (3.82±0.83), DentuCreme (2.84±0.81) and Trihydral (3.13±0.46) were similar; *Candida glabrata*: Experimental (3.96±0.54), Colgate (3.84±0.49) and Trihydral (3.35±0.59) were similar; *Staphylococcus aureus*: Experimental (4.99±0.53), Colgate (4.78±0.72) and control (4.86±0.43) were similar; *Candida albicans*: Experimental (3.98±0.57), Colgate (3.76±0.78), DentuCreme (3.23±0.23) and water (3.41±0.66) were similar. **Conclusions:** The experimental dentifrice can be implemented in routine daily care for biofilm control for dental, prostheses and mucosal structures, with presents a stable organoleptic and physic-chemical characteristic, and satisfactory antimicrobial activity.
KEYWORDS: Complete denture; Dentifrices; Castor Bean; Microbiology.

1 | INTRODUCTION

Studies show that until 2050 the elderly population number can reach two billion of individuals (22% of the global population) (HANNAH *et al*., 2017), and the edentulism is one of the most prevalent oral problem in these population, which is still mostly rehabilitated with complete dentures (REGIS *et al*., 2013), device oral subject to adhesion of different microorganisms (BADARÓ *et al*., 2013). Moreover, dental loss can be related to poor quality of life, risk of oral disease, and systemic diseases (FELTON, 2016), making this population more vulnerable. This reality can be even worse, for cognitively impaired people (VAN DER PUTTEN *et al*., 2015), which may have difficulty performing the daily hygiene of their dentures and other oral structures (Schwindling *et al*., 2018).

Biofilm control is a simple, low cost and effective strategy to maintain oral health and, mainly, can be accessible to a large number of patients. Researches show the necessity of biofilm control (PARANHOS *et al*., 2009; ARRUDA *et al*., 2017; BADARÓ *et al*., 2017) by mean of adequate hygiene methods that do not cause damages to the components of the prostheses (BADARÓ *et al*., 2017; NIKAWA *et al*., 1999).

The association between mechanical and chemical methods have been recommended and provenly effective for biofilm removal (PARANHOS *et al*., 2009). However, some denture wearers can consider a complex procedure because of the need for different steps (BABA *et al*., 2018). This can be bigger problem, mainly for cognitive impairment patients with difficult for understand, and can still make them more dependent of caregivers (VAN DER PUTTEN *et al*., 2014).

Thus, the mechanical and chemical method combination in one step, i.e. mechanical brushing with a dentifrice containing an antimicrobial agent, can facilitate the cleaning and sanitizing procedures of the dentures (BADARÓ *et al*., 2019) and oral cavity, and can improve satisfaction or quality of life of patients, which in turn, would enhance the motivation to clean

dentures properly and thoroughly (BABA *et al.*, 2018), besides strengthen the condition of performing oral hygiene independently.

Moreover, promote improve and equitable oral health for all, through making oral health care integral to a capacity people in self-care, providing protection against health risks are important points, recently, discussed by Watt *et al*, (2019). Developing a simple, low-cost, easy-to-use product targeted at this population can be a strategy easily applied by public health professionals and programs (BADARÓ *et al.*, 2019).

In previous studies, an experimental dentifrice based in *Ricinus communis* at 10% promoted good antimicrobial activity against different microorganism when evaluated (LEITE *et al.*, 2014; BADARÓ *et al.*, 2019) in acrylic resin and soft denture liners. However, there is a need to verify others characteristics of this experimental dentifrice for its clinical indication to the detriment of commercial dentifrices. Besides that, there is an increasing societal desire to rely on naturally occurring compounds for health care, including in dentistry (VERKAIK *et al.*, 2011). Therefore, more analysis the microbial activity and properties of this natural dentifrice should be performed for your promising clinical applicability.

For this, aim of this study was to evaluate the organoleptic (visual, smell and taste tests) and physical-chemical characteristics (density; pH; consistency; rheological characteristics: hysteresis area, viscosity and thixotropic), the abrasiveness (gravimetric method and surface roughness) and antimicrobial action of the experimental dentifrice based *Ricinus communis* at 10% comparing it with commercial dentifrices. The null hypothesis tested was that the all characteristics evaluated would be similar independent of the dentifrice.

2 | MATERIALS AND METHODS

Organoleptic characteristics analysis

The organoleptic characteristics were evaluated in accordance with ANVISA (Brazil - ANVISA, 2007) guidelines immediately after the making of experimental dentifrice and 15, 30, 60 and 90 days, evaluate the maintenance or not of initial characteristics. The dentifrice aspect was examined visually by separation phase, precipitation and turbidity. The color analysis was performed visually under natural light. The odor and flavor analysis were performed by the smell and taste, respectively, comparing with flavoring used of menthol and eucalyptol.

Physico-chemical characteristics analysis

The density was measured by placed 5 mL of dentifrice in a container, and it mass was obtained in a precision electronic scale (Ohaus, Explore, USA). The density value was calculated in according to Leite et al, (2014). To determine the pH, a pHmeter (ATI Orion Research, USA) was calibrated and three readings were made to obtain an average value of 5 mL of dentifrice was suspended in 15 mL of distilled water. The consistency was measurement based on the sample flow (5 mL of dentifrice between two glass plates) under a constant load (300 g) and specified time (10 minutes). Then, the diameter of figure formed between the

glass plates was measurement with millimeter ruler. The rheology tests were performed by a rheometer (Rheotest 2.1 - VEB-MLW-DDR, Lamedid) with coaxial cylinders was used, on what; placed 25 mL of dentifrices and a velocity scale was activated. Initially, the sample was subjected to the increasing speed, whose intensity varied from 1 to 11 and, subsequently, the sample was subjected to decreasing speed and the speed readings were taken.

Abrasiveness evaluation

Thirty five specimens prefabricated acrylic plates (Plex Glass, polymethylmethacrylate Day SA Brazil, Ribeirão Preto, SP, Brazil) with standard size (90x30x4 mm) (OLICEIRA et al., 2007) were randomly distributed in five distinct groups (n=7) (PISANI *et al.*, 2010) for brushing with distilled water (control) and dentifrices studied (Experimental, DentuCream, Calcium Colgate, and Trihydral) (ISO, 2001) Suspensions for brushing were prepared using 60 g of dentifrice and 60 mL of distilled water at room temperature, mixing until a suspension homogeneous.

The specimens were brushed, in brushing machine, with toothbrush (Tek, Johnson & Johnson Industrial Ltda., São José dos Campos, SP, Brazil) in a speed of 356 rpm, with course covered by the brush corresponds to 3.8 cm and the load of the 200 g. The brushing test was performed for 300 minutes (106.8 cycles) calculated to correspond to 6 years of normal brushing by a healthy patient.[19] Brushes were replaced at 100-minutes intervals and suspensions were replaced at 50-minutes intervals. After brushing, the specimens were removed from the suspension, washed and dried with a paper tissue.

The roughness values were obtained with aid of the rugosimeter (Surftest SJ-201P, Mitutoyo Corp., Japan) with resolution of the 0.01 µm, cut-off length of 0.8 mm and a transverse length of 4.8 mm perpendicular to the brushing grooves. The stylus speed was 0.5 mm/s. Three measurements were performed, one in the central area of each specimen, and another two at 5.0 mm for right and left the center. One average of the three values was obtained before (T0) and after (Tf) brushing and the roughness variation (Tf-T0) were used in data analysis.

Mass measurements were carried out daily using an analytic electronic balance accurate to 0.1 mg and capacity of 210 g (Ohaus, Explorer, Pine Brook, NJ) until a stable mass was obtained. Prior to weighing, the specimens were rinsed thoroughly and blot dried with soft absorbent paper. The data were obtained by difference between mass (mg) at before and after mechanical brushing (FREITAS-PONTES et al. 2009).

Antimicrobial action

Four hundred and fifty five specimens, disk-shaped (18X3 mm), were obtained with heat-cured acrylic resin (CLASSIC, Classic Dental Article São Paulo, SP, Brazil) by pressing method, according to the manufacturer's instructions. The heat polymerization method was in water at 73ºC for 90 minutes, followed by water at 94ºC for 30 minutes. The specimens were immersed in distilled water at 37±1ºC for 50±2 h for residual monomer elimination. The excess

resin was trimmed with a tungsten steel bur (Maxi-Cut; Malleifer SA, Ballaigues, Switzerland). The surfaces was polished in a horizontal polisher (DP 9; Struers, Copenhagen, Denmark) with grit abrasive papers (numbers: 150, 220, 400, 600, 1200, 2000; Norton Brazilian Ind., São Paulo, Brazil) and wet rag wheel with calcium carbonate (Orlando Antonio Bussioli ME, Rio Claro, Brazil). The specimens were washed with water and after sterilized using ethylene oxide (SERCON MP300 with camera model HG belonging to Ribeirão Preto Medical School Hospital das Clinics at University of São Paulo) according to Leite et al, (2014).

The specimens were randomly distributed into 5 groups (n=10) for each microorganism tested according to table 1: sterile distilled water; experimental dentifrice; DentuCream (specific denture dentifrice); Calcium Colgate; Trihydral (conventional dentifrices). One group with five specimens without contamination and hygiene was formed to prove the sterilization of the specimens and another group with contaminated specimens and without hygiene was used to prove the biofilm formation (n=5). These two groups were used only to control the experiment.

The specimens were distributed in pre-sterilized 12 wells cell culture plates in laminar flow hood (Pachane, Pa 400-ECO, Piracicaba, Sao Paulo, Brazil) that received 2 mL of inoculated culture medium. The plates were incubated (37°C/90 minutes) under agitation (75 rpm) in bacteriological incubator (Incubator Shaker, Mod - EC-320, Cienlab, Campinas, SP, Brazil) for adhesion of microorganisms to specimens. After this period, each specimen and well was washed with PBS (phosphate buffered saline). After this, 2 mL of freshly sterile culture medium was added to each well. Plates were incubated (37°C/48 hours/75 rpm) for biofilm maturity.

The antimicrobial action of the dentifrices was tested by manually and standardized brushing.[7] Brushing was performed always by same blind researchers, with sterile toothbrush (soft bristle; Tek, Johnson & Johnson Brazil's Industry and Commerce Health Products Ltda., SJ dos Campos, Brazil), and water or dentifrice (5 mm), for 60 seconds (20 seconds/face) into a laminar flow hood. After this, the specimens were placed in test tubes containing 10 mL of Letheen Broth medium (Difco, Detroit, USA).

The whole test tube/specimen was taken to ultrasound to sonication (frequence: 40 KHz; Altsonic, Clean 9CA, Ribeirão Preto, Sao Paulo, Brazil) for 20 minutes. This solution was serially diluted (10^{-1} to 10^{-3}) and seeded in specific culture media in Petri plates (Table 1). They were incubated at 37ºC for 24 hours in a bacteriological stove. *S. mutans* and *E. faecalis* have been incubated in microaerophilic. After the samples were incubated, the turbidity was evaluated and compared for the microorganism growth presence or absence.

Microrganism	ATCC	Morphotinctorial Characteristics	Culture Media
S. aureus	25923	Gram-positive cocci	*Mueller Hinton Broth*[1] *Mueller Hinton Agar*[1]
E. coli	25922	Gram-negative bacilli	
S. mutans	25175	Gram-positive cocci	Modified SB 20 (15g of casitone[1]; 5g of yeast extract[1]; 0,2g of cysteine[2]; 0,1g of sodium sulfite[3]; 20g of sodium acetate[4]; 200g of sucrose[4]; 1000 mL of distilled water) *Mitis Salivarius Agar Base*[1]
E. faecalis	29212	Gram-positive cocci	*Tryptone Soya Broth*[1] *Tryptone Soya Agar*[1]
B. subtilis	6633	Gram-positive	
C. albicans	10231	Yeasts	*Sabouraud Dextrose Broth*[5] *Sabouraud Dextrose Agar*[5]
C. glabrata	2001	Yeasts	

ATCC, American Type Culture Collection. 1. HiMedia, Mumbai, India; 2. Vetec, Rio de Janeiro, Brazil; 4. Chemco, Hortolândia, Brazil; 5. Dinâmica, Diadema, Brazil; 5. Difco, Sparks, MD, USA

Table 1 - Standard microorganisms selected for the experiment.

To calculate the CFU/specimen (10 mL) was considered the dilution in which the number of CFU varied between 30 and 300 colonies according to the following formula: CFU/10 mL=(colonies number x 10n/q) x 10, which n equals the dilution absolute value (0, 1, 2 or 3) and q is the amount in mL (0.05), pipetted to each dilution when seeding in the plates. The final result was multiplied by 10 to obtain the CFU number of the total volume.

Statistical treatment

The organoleptic characteristics were made by descriptive analysis. The physical-chemical and rheological characteristics results are presented in tables (2 and 3) and figure 1. The antimicrobial activity results were expressed in CFU/10 mL and transformed in log10 (table 4). After verification of normal and homogeneous distribution of data, were applied One-Way ANOVA and Tukey's HSD test ($P<.05$) for both variables: antimicrobial activity and abrasiveness tests. The dentifrices were considered variation factor. Statistical tests were performed by statistician blinded using the SPSS 17.0 program (SPSS Inc., Chicago, USA) with 0.05 of significance level.

3 I RESULTS

Organoleptic, Physico-chemical and Rheological characteristics

The experimental dentifrice showed color changes only after 90 days. The odor and taste did not change during this period. Table 2 shows that the experimental dentifrice had the lowest density followed by DentuCream, Trihydral and Colgate, which obtained the highest value. Regarding the consistency, it was found higher values for Trihydral and DentuCream, while Colgate and experimental dentifrice, obtained the lowest. All dentifrices showed

alkaline pH. The rheology test indicated that the experimental dentifrice showed the lowest viscosity, followed by Colgate, Trihydal and DentuCream. Trihydral presented the largest area of hysteresis, while Colgate, the smallest. Experimental dentifrice and DentuCream show intermediate values between Trihydral and Colgate.

Variables	Tests	Experimental	Dentu crème	Colgate	Trihydral
Physico-chemical	Density (g/mL)	0.103	1.282	1.408	1.318
	Ph	7.73	8.06	9.59	9.17
	Consistency (mm)	60	78	61.67	94.5
Rheological	Viscosity (cps) [1]	11502.05761* 9201.64609**	52909.46502* 49458.84774**	32205.76132* 21853.90947**	44858.02469* 40257.20165**
	Hysteresis area (cm²)	5.6	3.3	2.75	9.7

Legend: [1]Velocity 7 (7.5 rpm), 25°C, bIIC – S1. * Ascendant curve viscosity ** Descendent curve viscosity, cps: centipoise.

Table 2 - Physico-chemical and rheological characteristics of the dentifrices.

Abrasiveness analysis

The experimental and Colgate dentifrices caused highest roughness variation between initial and final measurement. Water was responsible for the lower roughness values variation. The brushing with DentuCream and Trihydral promoted roughness variation with intermediate results when compared with water and Experimental or Colgate dentifrices (Table 3) ($P<.001$). The lowest mass loss variation (mg) was promoted by brushing with water. The mass loss variation was similar between experimental, DentuCream and Trihydral; Colgate dentifrice promoted greater mass loss variation (Figure 1) ($P<.001$).

	Roughness (Ra)			Mass loss
	T0	Tf	Δ(Tf-T0)	(mg)
Water	0.02	0.02	0.00A	3.0A
	0.00	0.01	0.01	0.1
Colgate	0.02	16.59	16.57B	53B
	0.00	3.28	3.28	6.6
Experimental	0.01	17.34	17.33B	43C
	0.00	2.30	2.30	3.3
DentuCream	0.02	9.80	9.77AB	44C
	0.01	1,67	1.66	1.8
Trihydral	0.02	7.11	7.09AB	40C
	0.00	3.98	3.98	2.2

Same letters represent statistical equality between dentifrices.

Table 3 – Means and standard deviations of roughness values before (T0) and after (Tf) brushing and variation of the values (D(Tf-T0), and mass loss.

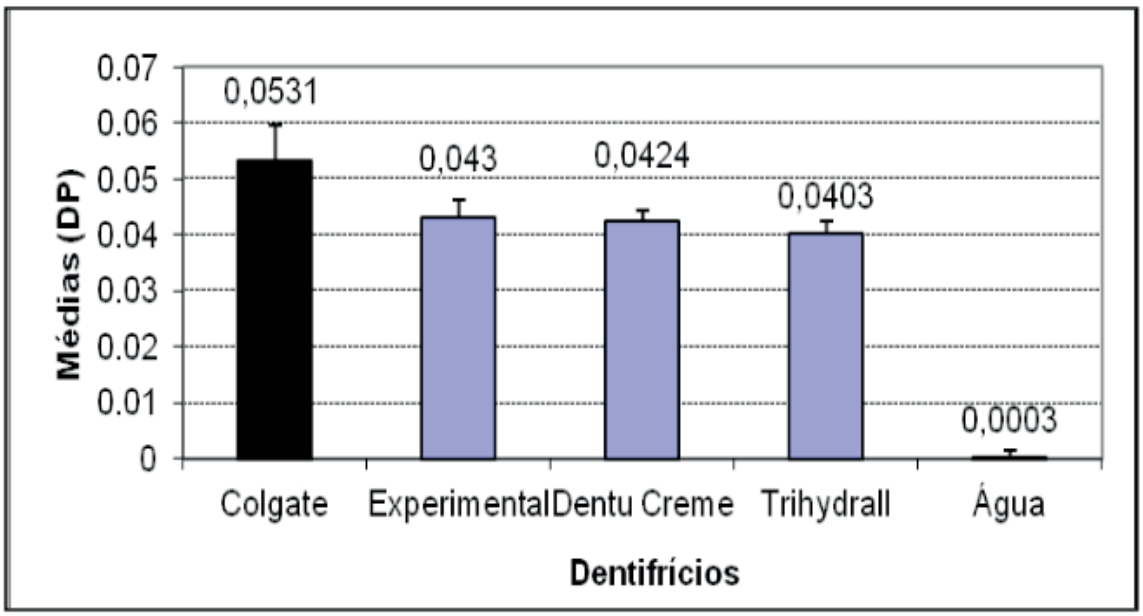

Figure 1 - Comparison of means (SD) variation of weight loss (g) promoted by brushing with toothpaste and water. Same colors indicate statistical equality (P<.001).

Antimicrobial activity analysis

Statistical analyses for antimicrobial action showed significant differences between the dentifrices selected. All dentifrices were effective against the tested microorganisms but to varying degree, except against to *B. subtilis*. Comparing the microbial load reduction in all groups, the control group and the DentuCream group presented the worst and the best results, respectively. The experimental dentifrice showed antimicrobial action with a significant reduction in the CFU count of *E. faecalis* (3.66±0.56), *E. coli* (2.0±1.8), *S. mutans* (7.26±0.67), and *C. glabrata* (3.96±0.54); and a lower effectiveness against *S. aureus* (4.99±0.53) and *Candida albicans* (3.98±0.57) (Table 4).

Grupos	*S. aureus*	*E. coli*	*B. subtilis*	*S. mutans*	*E. faecalis*	*C. albicans*	*C. glabrata*
Water	4.86^{A} ± 0.43	2.34^{A} ± 1.68	1.52^{A} ± 1.11	7.58^{A} ± 0.24	3.85^{A} ± 0.70	3.41^{B} ±0.66	5.28^{A} ± 0.56
Colgate	4.78^{A} ± 0.72	2.00^{B} ± 1.79	1.87^{A} ± 1.44	5.29^{B} ± 0.79	3.82^{A} ± 0.83	3.76^{AB} ±0.78	3.84^{B} ± 0.49
Experimental	4.99^{A} ± 0.53	1.53^{B} ± 1.63	1.56^{A} ± 1.73	7.26^{AB} ± 0.67	3.66^{AB} ± 0.56	3.98^{A} ± 0.57	3.96^{B} ± 0.54
DentuCream	3.51^{B} ± 0.57	1.04^{B} ± 1.15	1.25^{A} ± 1.14	4.57^{B} ± 0.65	2.84^{C} ± 0.81	3.23^{B} ±0.23	2.94^{C} ± 0.35
Trihydral	3.83^{B} ± 0.86	1.47^{B} ± 0.64	1.50^{A} ± 0.94	5.33^{B} ± 1.33	3.13B^{C} ± 0.46	3.8^{A} ± 0.70	3.35B^{C} ± 0.59

Same letters represent statistical equality between groups for the same microorganism.

Table 4 - Mean Comparison (SD) of CFU / specimen (in log10) between groups after brushing.

4 I DISCUSSION

The null hypothesis was rejected to the antimicrobial activity, because dentifrices tested were effective into varying degree between them, and shows no effectiveness for *B. subtilis.* However, for other variables, was found similarity between experimental and commercial dentifrices.

The dentifrices were selected based on the antimicrobial action presented in previous studies (LEITE et al., 2014). The addition of an agent with antimicrobial and detergent action in dentifrice composition, become the mechanical action of brushing more efficient to control of biofilm and microorganisms (BADARÓ et al., 2019). In addition, it may be advantageous when mechanical oral hygiene measures are not fully effective,[22] as is the case for patients with cognitive impairment. Promoting oral health education and the use of simplified hygiene techniques improves and maintains the oral health of complete or partial dependent patients (Schwindling *et al.*, 2018).

In this study, the experimental dentifrice showed color changes after 90 days, changing from white to a yellow-brown, similar to the color of the oil of *Ricinus communis*. When natural products are used, this type of change is expected and does not indicate material deterioration and this can be confirmed by maintenance the original flavor and odor, after 90 days (ANVISA, 2004).

The experimental dentifrice showed pH similar of others dentifrices evaluated (7.73, variation between 8.6 until 9.59, respectively) and inside the safety range recommended by the international rules (ISO, 2017). This can be indicated that the components of the experimental dentifrice shows acceptable concentration (BADARÓ et al., 2019), with lower risk for adverse reactions when in contact with the oral cavity. Important aspect mainly in elderly, that may present local and systemic alterations (SUMI et al., 2003), thus making any change in pH more harmful. In these conditions, the experimental dentifrice evaluated can be indicated for brushing remnants teeth, prostheses, as well as for mucosal hygiene.

Regarding to consistency and viscosity, we do not find a standard value to follow, but consistency is directly related to customer acceptance in using the product. The experimental dentifrice at 10% showed low consistency and low viscosity and these characteristics may favoring its application in denture, since its spread on the surface would be facilitated, that can be a advantages for a cognitive impairment patients. In contrast, the DentuCream and Trihydral show high viscosity and consistency. This difference can be justified by the addition of the therapeutic agent to the experimental dentifrice (BAAKILINI et al., 1996), however, even with this change, maintained a use condition.

For the hysteresis area of rheology test, the experimental dentifrice at 10% showed an area smaller than that of Trihydral and larger than that of all other dentifrices. However, correlating this result with the antimicrobial activity, DentuCream, in general, showed the greatest reductions of CFU, indicating that the release of the product is also related to the interaction between the components of the formulation.

Regarding abrasiveness tests results, Colgate dentifrice promoted greater mass loss

while the other dentifrices (Experimental, Trihydral, and DentuCream) promoted similar results. However, in superficial roughness test the Experimental dentifrice was similar to Colgate, which promoted the highest roughness. This result was not expected since the silica used as abrasive could cause mass loss, but without increasing the roughness because it has small and water soluble particles, acting as a polishing agent (PISANI et al., 2010). Colgate and Trihydral dentifrices have calcium carbonate abrasive system, and DentuCream has calcium carbonate and dicalcium phosphate dehydrate abrasives, which present crystals shape and variations in size and density of the particles. The abrasiveness degree is dependent on the abrasive concentration and hardness, shape and size of the particles (FREITAS-PONTES et al., 2009). The silica abrasive (Sident 8) and silica thickener (Sident 22S) combination employed in the experimental dentifrice can has promoted abrasive capacity similar to calcium carbonate present in Colgate.3 According to Oliveira et al, (2007) (OLIVEIRA et al., 2007), the roughness considered to limit for the microorganisms retention is 0.2 micrometers. That is, it can be said that all dentifrices caused a superficial roughness enough to permit the bacterial retention, except the control group (water) (Table 3). According to the recommendations the ISO nº 8627 (1987) (BAAKILINI et al., 2019), the dentifrices evaluated can be classified in high abrasiveness degree (more to 41 mg), as observed in Figure 1.

Regarding the abrasiveness, the results could be overestimated for all dentifrices, since the brushing machine performs the brushing process more intensely when compared to manual brushing; however, the results of this study could be tested by clinical trials with partial and total edentulous patients, as well as by patients with cognitive problems, which present a lower handgrip strength (TOMÁS et al., 2018), to verify if may promote a lower abrasiveness. Thus, further studies need to be performed to identify the proper proportion between the abrasive and the other formulation components, as well as randomized clinical trials to drive future guidelines and to determine possible clinical applications.

Regarding antimicrobial action, experimental dentifrice at 10% was effective in the reducing microbial of *E.faecalis, C.glabrata*, and *E. coli*, when compared to water (control). It also showed a reduction of the CFU count of *S. mutans* with intermediate values between water and other dentifrices. These results were similar to those found by Leite *et al*, (2014) and Badaró et al, (2019). This is justified because the dentifrices may have interfered with the adhesion of bacteria to the substrate and in the organization of a polysaccharide matrix; moreover, the presence of surfactants in formulation of dentifrices can interfere in the surface tension of the substrate, as well as agents with antibiofilm activity (SALERMO et al., 2011).

Among the limitations of this study, can be verify the lack of analysis in adhesion of microorganisms by microscopy and also for not using mixed biofilms that due to its complexity, not utilized in this moment. However, future studies should consider these aspects.

5 I CONCLUSION

Within the limitations of this in vitro study, the use of experimental dentifrice could be indicated for biofilm control for partial and complete edentulous patients, as well as for their dental structures, prostheses and mucosa, that can be decrease of the hygiene steps performed by patients. Moreover, was found satisfactory antimicrobial activity against E. faecalis, *C. glabrata, S. mutans*, and *E. coli.*

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