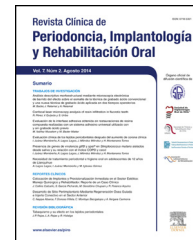




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TRABAJO DE INVESTIGACIÓN

Assessment of the amount of residual sodium hypochlorite after chemical disinfection of heat-polymerized resins



Iara Augusta Orsi^{a,*}, Vanessa Gomes Andrade^a, Zeki Naal^b,
Ramón Fuentes^c, Eduardo Borie^{a,c}

^a Department of Dental Materials and Prosthodontics, Dental School of Ribeirão Preto, University of São Paulo, Av. do Café w/n, Ribeirão Preto 14040-904, SP, Brazil

^b Department of Physics and Chemistry of Faculty of Pharmaceutics Sciences of Ribeirão Preto – University of São Paulo, Av. do Café w/n, Ribeirão Preto 14040-904, SP, Brazil

^c CICO Research Centre, Dental School, Universidad de La Frontera, Manuel Montt 112, Temuco 4781176, Chile

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KEYWORDS

Sodium hypochlorite;
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Acrylic resins;
Dentures;
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methods

Abstract

Aim: To evaluate the release of sodium hypochlorite from three different commercial brands of heat-polymerized acrylic resin immersed in water and submitted to mechanical or chemical polishing after disinfection with hypochlorite at different concentrations.

Material and methods: Fifty-four disk-shaped specimens ($n=18$) were made for each resin (Lucitone 550, QC-20, and Classico) and assigned to two groups according to the type of polishing. Specimens were divided in three sub-groups in relation to sodium hypochlorite concentration (1%, 2.5%, and 5.25%), and the groups were immersed for 10-min periods in each sodium hypochlorite concentration. The electrochemical method used for detecting the release of sodium hypochlorite in each specimen was the cyclic voltammetry.

Results: In the specimens of Clássico resin polished mechanically and immersed in 5.25% sodium hypochlorite, as well as Lucitone and QC-20 resins immersed in 2.5%, the amounts of disinfectant solution released in the four 15-min water exchanges were higher than the four 60-min exchanges.

Conclusion: There were differences in hypochlorite release from the three commercial brands of denture-base acrylic resins subjected to mechanical polishing. However, no hypochlorite release from the same resins was observed when they were subjected to chemical polishing.

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* Corresponding author.

E-mail addresses: iaraorsi@forp.usp.br, iara_orsi@yahoo.com (I.A. Orsi).

PALABRAS CLAVE

Hipoclorito de sodio;
Desinfección;
Resinas acrílicas;
Prótesis dentales;
Métodos de
desinfección de
prótesis

Evaluación de la cantidad de hipoclorito de sodio residual después de la desinfección química de resina termo-polimerizadas

Resumen

Objetivo: Evaluar la liberación de hipoclorito de sodio de 3 marcas comerciales diferentes de resinas termo-polimerizadas sumergidas en agua, y sometidas a pulido mecánico o químico después de la desinfección con hipoclorito a diferentes concentraciones.

Material y métodos: Cincuenta y cuatro especímenes en forma de disco ($n = 18$) fueron confeccionados para cada resina (Lucitone 550, QC-20 y Clásico) y asignados a 2 grupos de acuerdo con el tipo de pulido. Las muestras se dividieron en 3 subgrupos en relación con la concentración de hipoclorito de sodio (1, 2,5 y 5,25%), y los grupos se sumergieron durante períodos de 10 min en cada concentración de hipoclorito de sodio. El método electroquímico usado para la detección de la liberación de hipoclorito de sodio en cada espécimen fue a través de voltametría cíclica.

Resultados: En las muestras pulidas mecánicamente de resina Clásico inmerso en hipoclorito de sodio al 5,25%, así como en las resinas Lucitone y QC-20 inmersas a 2,5%, la cantidad de solución desinfectante liberada en los 4 intercambios de agua de 15 min fue superior a los 4 de 60 min.

Conclusión: Hubo diferencias en la liberación de hipoclorito de las 3 marcas comerciales de resinas acrílicas sometidas a pulido mecánico. Sin embargo, no se observó liberación de hipoclorito en las mismas resinas cuando se sometieron a pulido químico.

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Introduction

New dentures and especially those that need repair and adjustments may be contaminated with viruses, bacteria and fungi.¹ To prevent the transmission of disease and cross-infection, infection control procedures such as the disinfection of dental prostheses by immersion in a chemical solution must be performed before and after clinical procedures.² The most appropriate chemicals for disinfection by immersion of dentures are chlorine compounds, aldehydes and peracetic acid. It has been observed that 10 min of immersion in 1% sodium hypochlorite, or 2% glutaraldehyde has proved to be effective in reducing the number of microorganisms on the dentures.³ Soaking dentures in sodium hypochlorite is a widely used method of chemical disinfection.³

Hypochlorite has many advantages of the ideal disinfectant, as broad spectrum antimicrobial, rapid bactericidal action, solubility in water, among others. However is irritating to mucous membranes and present deleterious effects on metals¹ and moderate toxicity.⁴

The hypochlorite is considered to have a high antimicrobial activity due to oxidation of proteins in cells by hypochlorous acid; however, this mechanism has not yet been demonstrated experimentally.⁵ Besides the antimicrobial activity, its tissue-dissolving and detergent actions, and its capacity to neutralize toxic products is recognized.⁶ When sodium hypochlorite is used as a disinfectant must be carried out a pre-cleaning surfaces process, because the excess of organic material available reacts with chlorine and reduces the effectiveness of the disinfectant, so the prosthesis to be disinfected should be carefully washed before its use.⁷

Symptomatic inflammatory reactions in oral mucosa in contact with the prostheses are often observed in patients who wear dentures continuously. Several compounds including residual monomer, methyl methacrylate and additives such as hydroquinone, benzoyl peroxide, N,N-dimethyl-p-toluidine and formaldehyde are released from acrylic polymers, diffusing into saliva and when are in contact with the mucosa, causes redness and burning sensation in the adjacent areas.⁸ Besides these intrinsic components that causes some symptoms, exist the chemical disinfectants that may produce the same reaction. During the prostheses disinfection process, the resin may adsorb water in combination with the disinfectant solutions, which may be released later in the saliva.⁹ It should be noted that all chlorine products have some level of toxicity, which makes these effective microbicides.¹⁰ The potential of sodium hypochlorite in the skin and mucosa irritation may be due to hypochlorite ions (OCl^-), sodium hydroxyde (NaOH) or hypochlorous acid (HOCl), seeming to be this last the principal agent involved in causing the irritants effects.¹¹ Sodium hypochlorite may produce hypochlorous acid and chloramines, which are proved that may cause injury to some cells and tissue damage at low concentrations (10–20 μM), inducing cell lysis and damaging proteins of cell membranes.¹²

In the literature it is no proven the hypochlorite action over integral oral mucosa, but there is evidence about ocular, nasal and intestinal mucosa irritation.¹¹ Considering the toxicity and allergic reactions by contact in some patients with hypersensitivity to sodium hypochlorite, is important to consider the disinfection of items during procedures with prosthetic implants, such as direct fabrication on the interim implant restoration.¹³ In implant therapy, especially in cases of immediate load implants, prosthesis need to be

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