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Research

# The effect of water and sodium hypochlorite disinfection on alginate impressions

*Joana Correia-Sousa, Ana Margarida Tabaio, Andrea Silva, Tânia Pereira, Benedita Sampaio-Maia*, Mário Vasconcelos*

*Faculty of Dental Medicine, University of Porto, Oporto, Portugal*

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ABSTRACT

*Introduction:* The control of cross-infection is an imperative issue when dealing with dental impression materials in Dentistry and the lack of procedures for its control is currently a real problem. The aims of the present study consisted in evaluating the effectiveness of water washing and sodium hypochlorite disinfection in reducing the microbial load of alginate after mouth contact.

*Materials and methods:* Thirteen students voluntarily participated in the present study. The inclusion criteria were age between 21 and 24 years, inexistence of smoking habits and systemic and salivary gland pathologies, DMFT index (decay/missing/filled teeth) $\leq 5$ and tooth brushing with right hand. For each participant, one impression was taken in alginate from the mandibular arch. These samples were submitted to water wash and sodium hypochlorite disinfection and to subsequent microbiological analysis. Statistical analysis included the analysis of variance for multiple comparisons (one-way ANOVA) followed by Student's t-test.

*Results:* After mouth contact, alginate microbial count increased from $1.59 \pm 2.79$ to $2.68 \times 10^3 \pm 6.19 \times 10^2$ CFU/mm$^2$. It was verified that after water wash the microbial count decreased to 48.5% while after sodium hypochlorite disinfection microbial count decreased to 99.99%.

*Conclusion:* Dental impression materials can act as vectors transmitting a significant amount of microorganisms. Sodium hypochlorite disinfection is an efficient disinfection method for alginate impressions. Tap water rinsing reduces microbial load but does not eliminate the cross-infection potential of alginate.



## A eficácia da água e do hipoclorito de sódio na desinfeção de impressões em alginato

*Palavras-chave:*
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RESUMO

*Introdução:* O controlo da infeção cruzada dos materiais de impressão em Medicina Dentária é de extrema importância e a falta de procedimentos para o seu controlo constitui

* *Corresponding author.*
E-mail addresses: bmaia@fmd.up.pt, mbsm@med.up.pt (B. Sampaio-Maia).

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atualmente um problema real. Os objetivos do presente trabalho consistiram na avaliação da eficácia da lavagem com água e da desinfeção com hipoclorito de sódio na redução da carga microbiana do alginato após o contacto com a cavidade oral.

*Material e métodos:* Treze estudantes participaram voluntariamente no estudo. Os critérios de inclusão foram a idade entre 21-24 anos, ausência de hábitos tabágicos e de patologias sistémicas e das glândulas salivares, índice CPO (dentes cariados, perdidos e obturados) $\leq 5$ e escovagem com a mão direita. Uma impressão em alginato da arcada mandibular foi obtida de cada participante. As amostras foram submetidas aos métodos de lavagem/desinfeção e, posteriormente, à análise microbiológica. Os testes ANOVA para comparações múltiplas e o teste t de student foram utilizados como ferramentas para a análise estatística.

*Resultados:* O alginato após o contacto com a cavidade oral apresentou uma carga microbiana de $2{,}68 \times 10^3 \pm 6{,}19 \times 10^2$ CFU/mm$^2$. A simples passagem por água corrente diminui a carga microbiana em 48,5%, enquanto que a desinfeção com hipoclorito de sódio diminui a carga microbiana em 99,99%.

*Conclusão:* Os materiais de impressão podem ser veículos de transmissão de microrganismos. O hipoclorito de sódio é um método de desinfeção eficaz para as impressões em alginato. Apesar da lavagem com água corrente reduzir significativamente a carga microbiana, não elimina o potencial de infeção cruzada das impressões em alginato.



## Introduction

The control of cross-infection is an imperative issue when dealing with dental impression materials in Dentistry. Dental impressions are inevitably in contact with saliva, plaque, and blood, all of which containing potential pathogenic microorganisms. Therefore, dental care providers as well as dental assistants, staff and laboratory technicians are possible targets of contamination.[1–3]

Increasing concern over the transmission of infectious diseases in dental office occurred in the eighties with the outbreak of Acquired Immunodeficiency Syndrome (AIDS).[4] This prompted the adoption of preventive routine procedures for the disinfection of dental impressions. For that reason, the American Dental Association (ADA), Centers for Disease Control and Prevention (CDC) as well as the Australian Dental Association published guidelines for disinfection of dental impressions.[5–7] However, the majority of professionals who work in hospitals, private clinics, dental schools and prosthetic laboratories do not follow the published recommendations.[2,3,8–10]

In dentistry there are several impression materials that have as main features: accuracy, elastic recovery, dimensional stability, flow, flexibility, workability, hydrophilicity, a long shelf-life, patient comfort and economics.[11] Of all materials used for impressions, hydrocolloids and elastomers are the most important in this field. The hydrocolloids are subdivided in reversible and irreversible. Alginate is an example of irreversible hydrocolloid and is the most commonly used material in Dentistry since it is easy to manipulate, does not imply specialized equipment and is low-priced.[11,12] As irreversible hydrocolloids are composed of 80% of water they are subject to the phenomena of imbibition (absorption of water) and syneresis (evaporation of water).[11,13]

The selection of a disinfectant depends on the impression material chosen, given that it should be efficient and should not alter the material's properties.[14,15] According to the Guidelines previously mentioned, the products recommended for the disinfection of impression materials are chlorhexidine, sodium hypochlorite, glutaraldehyde and iodine agents.[5–7] Sodium hypochlorite is the elected disinfecting solution for alginate.[1] In addition, sodium hypochlorite is recommended by the Environmental Protection Agency (EPA) and is considered to be a good surface disinfectant, non-irritating and efficient against wide-spectrum microorganisms; however, it has an unpleasant odor and a relevant chemical instability.[16]

There are two disinfection techniques for impression materials: immersion and spraying. Disinfection by immersion allows the solution to contact with all surfaces of the impression.[10,17,18] Spraying has a lower probability of distortion than the other technique, but it may not reach all surfaces.[10,19] Yet, the antimicrobial activity of both techniques is considered similar.[19–21] Alginate impressions should not be immersed in the disinfectant solution for more than a few seconds because it could compromise the quality of the impression given its propensity for absorbing water.[2,10,21,22]

Before disinfection, a pre-wash of the material with running water is also recommended to remove all debris, blood and saliva.[5,7]

Given the above stated facts, the goal of the present study was to evaluate the efficiency of water wash and sodium hypochlorite disinfection of alginate impression. With that purpose we aimed to: (1) evaluate the microbial load of alginate without mouth contact; (2) evaluate the number of microorganisms transferred to the alginate after the dental impression; (3) evaluate the reduction of microbial load after water pre-wash and (4) evaluate the disinfecting efficiency of sodium hypochlorite.

## Materials and methods

Thirteen students, 6 men and 7 women from the 4th year of Bachelor plus Master degree of Faculty of Dental Medicine