

The effect of water wash and immersion disinfection procedures on microbial load of alginate and silicone dental impressions

Inês Correia; Ana Assis; Diogo Ribeiro; Raquel Gonçalves; Ana Portela; Mário Vasconcelos; Benedita Sampaio-Maia*

*Faculdade Medicina Dentária Universidade do Porto; FMDUP / Dental Medicine of Porto University

Keywords: disinfection; alginate; silicone; sodium hypochlorite; glutaraldehyde; water.

Introduction

The control of cross-infection is an imperative issue when dealing with dental impression materials in Dentistry. Dental impressions that have been exposed to infected saliva and blood provide a significant source of cross-infection. Infectious microorganisms from the oral cavity can survive on the impression surface and be transferred to the stone casts. Handling of both impressions and stone casts can potentially transmit infectious diseases to dental staff and technicians. Although American and Australian Dental Associations' as well as CDC' guidelines for disinfection of dental impressions have undergone considerable changes over the years, no universally agreed disinfection protocol has yet been recognized. Moreover, published work from all over the world claim that the majority of professionals who work in dental offices and prosthetic laboratories do not follow the published recommendations. Also, almost half of laboratories inquired by Jagger *et al* (*Br Dent J.* 1995; 179:93-6) claim that had inadequate instructions regarding to disinfection techniques. So, the lack or inadequate procedures for the control of dental impressions' cross-infection is currently a real problem.

Objectives

The aims of the present study consisted in evaluating the effect of water washing and of 1% and 5.25% sodium hypochlorite, 2% glutaraldehyde and the commercial disinfectant MD520 containing 0.5% glutaraldehyde on the reduction of the microbial

Methods

Fourteen students voluntarily participated in the present study. Inclusion criteria were absence of systemic or salivary gland pathology, age between 22 and 25 years as well as participants with DMFT (decayed, missing and filled teeth) index ≤ 5 (after a clinical examination). The medical and dental histories were collected in order to characterize the population. For each participant, one alginate (Vival NF, Ivoclar Vivadent) impression and one addition-reaction silicone (Virtual 380, Ivoclar Vivadent) impression were performed in different days at the mandibular arch, under aseptic conditions and using sterilized materials. An impression was made simultaneously using artificial sterilized teeth (Frasaco) in order to evaluate the microbial load of both materials previous to mouth contact. The first and second right and left molars were the selected impression area to study. These selected teeth were divided in 3 parts and each sample was constituted by a pull of one third of each semi-arch in order to minimize the difference of microbial colonization between sides. Each pull was submitted to one of the following treatments: sample was left untreated, without any disinfection methodology; sample was washed with tap water during 30 s; sample was disinfected by immersion in 1% of sodium hypochlorite during 10 min; sample was disinfected by immersion in 5-25% of sodium hypochlorite during 10 min; sample was disinfected by immersion in 2% glutaraldehyde; sample was disinfected by immersion in MD520 (MD 520, Durr, Bietigheim Bissingen, Germany) during 5 min. Following the exposure to treatment regimes, the impressions were placed in 3ml of 0.9% NaCl and vortexed 5sec for 3 times for microorganisms release. The total aerobic microorganisms were determined by smearing in Brain Heart infusion (BHI) agar and incubated at 37°C for 3 days. The colonies were counted and the results expressed as colony-forming units per milliliter (CFU/ml). The statistical analysis was performed using Microsoft Excel.

Results

As expected, alginate and silicone without mouth, water or disinfectant contact, presented very low microbial load, 1.50 ± 1.29 CFU/ml and 0.60 ± 0.89 CFU/ml, respectively. After mouth contact, alginate and silicone microbial load increased significantly to $1.5E+05$ and $5.47E+03$ CFU/ml, respectively. Of notice, that after mouth contact, the microbial load of alginate was significantly higher than silicone ($p=0.005$). Afterwards, the tap water washing reduced the microbial load by 1.60% in alginate and by 14.7% in silicone. The immersion disinfection procedures decreased the microbial load of either alginate or silicone by more than 99.99% irrespective of the disinfectant used.

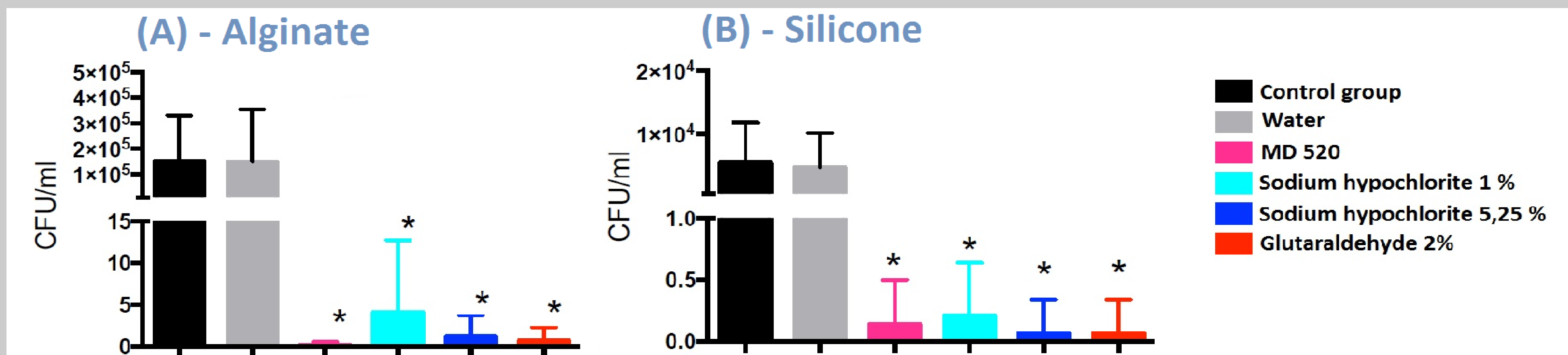


Figure 1: Effect of water washing and of 1% and 5.25% sodium hypochlorite, 2% glutaraldehyde and the commercial disinfectant MD520 containing 0.5% glutaraldehyde on the reduction of the microbial load of alginate (A) and addition-reaction silicone (B) after mouth contact.

Conclusion

Dental impression materials can act as a transmission vehicle for oral microorganisms. Alginate appears to absorb more microorganisms than silicone. Dental impression water wash alone is insufficient for reducing the risk of cross-infection. However, the immersion of dental impressions in sodium hypochlorite (1% or 5.25%), glutaraldehyde or MD520 is effective in reducing significantly the microbial load, so the immersion disinfection procedure should be mandatory.