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Salivary biofilm complex model to evaluate bacterial activity in dental materials.

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Keywords

Dental Materials, Salivary Acquired Pellicle, Microcosms, Polymers.

Abstract

Introduction

Microcosms in dentistry mimic the original environment's complexity, allowing variable manipulation and bacterial dynamics replication, diverging from single-species inoculation such as *Streptococcus mutans*. Therefore, the aim of this study was to compare bacterial activity between a hydrophilic and a hydrophobic material in the presence or absence of acquired salivary pellicle using a microcosm biofilm model from an inoculum derived from saliva. Open the Styles Pane to get easy access to all the styles defined in this template for formatting the text of your abstract.

Methodology

BisEMA and PEGDMA (hydrophobic and hydrophilic materials, respectively) were mixed with 0.1wt% DMPA. Discs (10mm x 0.8mm) were photoactivated, then sanded to standardize the roughness value between 0.4-0.7 μm . Four groups were analyzed: PEGDMA and BisEMA with or without acquired pellicle (n=2). Saliva from 8 healthy donors (ages 20-45, both genders) was centrifuged and used to incubate discs for 2 hours at room temperature. After forming the acquired pellicle, samples were placed on sterile 24-well plates with a solution of McBain and saliva with glycerol. Biofilm formation occurred over 48 hours at 37°C and 5% CO₂. CFU/mL was counted and converted to log₁₀ CFU/mL for analysis using one-way ANOVA/Tukey's test (alpha=5%). Various agar media were used for CFU counting: BHI agar (total microorganisms), MSA (*Streptococcus* spp), SB-20 (*Streptococcus mutans*), and MRS (*Lactobacillus* spp) (n=4).

Results

Preliminary results indicated no statistical difference in total microorganisms (p=0.364). *Lactobacillus* showed the highest growth with BisEMA in saliva ($1.48 \times 10^3 \pm 2.81 \times 10^2$) CFU/mL (p<0.001). BisEMA also exhibited elevated levels of *Streptococcus* and *Streptococcus mutans* ($1.2 \times 10^3 \pm 2.07 \times 10^2$) CFU/mL (p=0.004), while MSA revealed the

lowest growth of Streptococcus spp with PEGDMA in water ($6 \times 10^2 \pm 1.93 \times 10^2$) CFU/mL ($p=0.030$).

Conclusion

Samples with saliva instead of water exhibited higher growth of total microorganisms, Lactobacillus, Streptococcus, and Streptococcus mutans. These results imply that culture medium and material characteristics can impact bacterial growth. Thus, the biofilm model proves useful for assessing bacterial activity on dental materials.

Support

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