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Incorporation of the microencapsulated antimicrobial agent phytoncide into denture base resin

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AUSTRALIAN DENTAL JOURNAL

Volume: 63 Issue: 3 Pages: 302-311

DOI: 10.1111/adj.12640

Published: SEP 2018

Document Type: Article

[View Journal Impact](#)

Abstract

% Background This study aimed to fabricate a denture base resin (DBR) containing phytoncide microcapsules (PTMCs) and determine the mechanical properties of the resin and antifungal activity.

Methods Fifty-four heat-cured rectangular DBR specimens (64 x 10 x 3.3 0.2 mm) containing nine concentrations of PTMC between 0 and 5% (wt/wt) were fabricated and subjected to a three-point bending test. A phytoncide release bioassay was developed using DBR containing 0% and 2.5% PTMCs (wt/wt) in a 24 well-plate assay with incubation of *Porphyromonas gingivalis* at 37 degrees C for 74 h. The antifungal activity of PTMCs against *Candida albicans*, in a pH 5.5 acidic environment was determined in a plate assay.

Results Flexural strength decreased with increasing PTMC concentration from 97.58 +/- 4.79 MPa for the DBR alone to 53.66 +/- 2.46 MPa for DBR containing 5.0 PTMC. No release of phytoncide from the PTMCs in the DBR was detected at pH 7.4. The PTMCs had a minimal inhibitory concentration of 2.6% (wt/vol) against *C. albicans* at pH 5.5.

Conclusions PTMCs can be added to DBR 2.5% (wt/wt) without adversely affecting flexural strength. PTMCs released the antimicrobial agent at pH 5.5 at concentrations sufficient to inhibit the growth of the *C. albicans*.

Keywords

Author Keywords: antimicrobial activity; denture base resin; mechanical property; microencapsulation; phytoncide
KeyWords Plus: ACRYLIC RESIN; STREPTOCOCCUS-MUTANS; PHYSICAL-PROPERTIES; BIOFILM FORMATION; CANDIDA-ALBICANS; MICROCAPSULES; NANOPARTICLES; METHACRYLATE; STOMATITIS; OIL

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Publisher

WILEY, 111 RIVER ST, HOBOKEN 07030-5774, NJ USA

Categories / Classification

Research Areas: Dentistry, Oral Surgery & Medicine

Web of Science Categories: Dentistry, Oral Surgery & Medicine

Citation Network

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