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Incorporation of the microencapsulated antimicrobial agent phytoncide into denture base resin (Article)

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Abstract

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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 × 10 × 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 °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. © 2018 Australian Dental Association

Author keywords

antimicrobial activity | denture base resin | mechanical property | microencapsulation | phytoncide

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