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Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) Spectroscopy Coupled with Principal Component Analysis and Polymerase Chain Reaction (PCR) Assay for the Detection of Porcine and Bovine Gelatins in Dental Materials (2022) *Tropical Life Sciences Research*, 33 (2), pp. 133-153. Cited 2 times.

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Abstract

Muslims are prohibited from consuming products that contain pig products and their derivatives, including porcine gelatin. Medical and dental products are not exempt from the use of gelatin in their formulation. This study employs attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR) coupled with principal component analysis (PCA) to detect and distinguish between porcine and bovine gelatins in dental materials. The results were further verified by polymerase chain reaction (PCR) assay. Species-specific primers targeting the 212 bp porcine cytochrome b and 271 bp bovine cytochrome b genes were used to amplify DNA in nine dental material samples. Detection and distinction of gelatin standards (bovine and porcine) against gelatin present in the dental materials was achieved using ATR-FTIR combined with PCA within wavenumber 1756 cm⁻¹–1584 cm⁻¹ (Amide I and Amide II). The detection limit for DNA was 0.001 ng/μL and 0.0001 ng/μL for bovine and porcine gelatins, respectively. Using PCR, one sample, BDM 01, was found to contain both porcine and bovine DNA, while one sample (BDM 14) was found to be positive for bovine DNA. The findings suggest that ATR-FTIR combined with PCA and conventional PCR are applicable for the identification of porcine and bovine gelatin in dental materials. © Penerbit Universiti Sains Malaysia, 2022.

Author Keywords

ATR-FTIR; Bovine Gelatin; Dental Material; PCR; Porcine Gelatin

Index Keywords

animal product, bioassay, FTIR spectroscopy, polymerase chain reaction, principal component analysis, tooth

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