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In Vitro Cytotoxicity Analysis of Bioceramic Root Canal Sealers on Human Gingival Fibroblast Cells
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Abstract

This study evaluated the cytotoxicity of four bioceramic root canal sealers (bioceramic sealers): GuttaFlow Bioseal (GB), MTA Fillapex, CeraSeal Bioceramic root canal sealer (CS), and iRoot SP root canal sealer (iRSP). The viability of human gingival fibroblast (HGF) cells was used to evaluate the cytotoxicity of these bioceramic sealers. HGF cells were cultured and exposed to bioceramic sealer extracts for 24 hours, 48 hours and 72 hours at 37°C in an incubator humidified with 5% CO₂. The 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide or MTT assay was conducted to determine cell viability at each incubation period and compared among all bioceramic sealers. The Kruskal-Wallis test revealed statistically significant differences between the positive control group and MTA Fillapex, MTA Fillapex and GB, and between GB and iRSP with $p < 0.05$. However, no statistical differences were found in cell viability for each material across all the incubation periods. GB was the least cytotoxic bioceramic sealer with cell viability exceeding 90% throughout the 72-hour incubation followed by CS, iRSP, and MTA Fillapex with non-cytotoxicity after 72-hour incubation, mild cytotoxicity after 72-hour incubation, and mild cytotoxicity after 72-hour incubation, respectively. However, iRSP showed moderate cytotoxicity, and MTA Fillapex was severely cytotoxic ($< 30\%$ cell viability) after 24-hour incubation. © Penerbit Universiti Sains Malaysia. 2022 This work is licensed under the terms of the Creative Commons Attribution (CC BY) (<http://creativecommons.org/licenses/by/4.0/>). All Rights Reserved.

Author Keywords

Bioceramic root canal sealers; Cell viability; Cytotoxicity; Endodontics; Human gingival fibroblast cells

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