SAFETY PROFILE OF A NANOEMULSION CONTAINING LEMONGRASS ESSENTIAL OIL AND RESVERATROL IN PRIMARY CULTURE OF APICAL CELLS

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INTRODUCTION: The growing resistance to antibiotics and their adverse effects encourage the use of natural compounds for the treatment of oral diseases. Essential oils and compounds such as resveratrol exhibit therapeutic properties but face limitations that can be overcome through nanotechnology, which enhances their stability and bioavailability. OBJECTIVE: To evaluate the safety profile of nanoemulsions (NE) containing a combination of lemongrass essential oil and resveratrol in cells from the apical papilla of permanent teeth with incomplete root formation. MATERIALS AND METHODS: Cell collection was performed after tooth extraction at the Dental Practice Clinic of UFN (Ethics Committee Approval No. 6.739.615). Pulp and apical papilla tissues were obtained by explant. The following assays were conducted: cell viability (neutral red – NR), nitric oxide (NO) levels using the Griess assay, intracellular reactive oxygen species (ROS) using dichlorofluorescein (DCFH-DA), and dsDNA release using PicoGreen®. The negative control was culture medium, and the positive control was hydrogen peroxide (20 µM); for NO specifically, sodium nitroprusside (10 µg/mL) was used. Free bioactives (lemongrass essential oil and resveratrol) and the NE were tested at concentrations ranging from 0.1 to 1.0 mg/mL. Analyses were performed in microplates with spectrophotometric readings. Statistical analysis was carried out using ANOVA followed by Tukey's post hoc test. RESULTS: Cells from three different patients' teeth (L3, L4, and L6) were evaluated after 24 hours of treatment. NE significantly reduced cell viability in L3, but not in L4 and L6, suggesting variable cellular responses possibly due to sample heterogeneity. In the NO assay, NE at higher concentrations (0.6–1.0 mg/mL) significantly increased NO levels in L3, L4, and L6, while free bioactives did not show significant increases. ROS levels remained low across all conditions, even lower than the negative control, suggesting a potential antioxidant effect at moderate concentrations. PicoGreen® indicated increased dsDNA release in L3 and L4, especially at 0.4 mg/mL NE, suggesting cell damage. CONCLUSION: Although NE demonstrates cytoprotective potential, its use requires dosage optimization, as higher concentrations can be induce toxic and pro-inflammatory effects. Further studies involving additional assays and cell lines are underway to expand this evaluation.

Keywords: Primary Cell Culture, Nanotechnology, Dentistry.

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