

## Preliminary *In Vitro* Evaluation of the Safety Profile of Nanoemulsions Containing Lemongrass Essential Oil and Resveratrol in Human Keratinocytes

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**INTRODUCTION:** With the rise of bacterial resistance and the adverse effects associated with traditional antibiotics, there is growing interest in the use of natural compounds as therapeutic alternatives. Products such as essential oils and resveratrol show significant potential, although they present limitations in terms of solubility and stability. In this context, nanotechnology emerges as an innovative approach capable of enhancing the bioavailability and therapeutic efficacy of these compounds. **OBJECTIVE:** This study aimed to evaluate the safety profile of nanoemulsions (NE) containing a combination of lemongrass essential oil and resveratrol in immortalized human keratinocytes (HaCaT cell line). **MATERIALS AND METHODS:** Cells were exposed to free bioactives in combination and to NE containing the bioactives at different concentrations (0.1–1.0 mg/mL), along with negative (culture medium) and positive controls (hydrogen peroxide 20 µM or sodium nitroprusside 10 µg/mL). Cell viability assay (neutral red – NR), dichlorofluorescein (DCFH-DA) assay, for quantifying intracellular reactive oxygen species (ROS), and Griess assay, to determine nitric oxide (NO) levels, were performed after 6 h and 24 h of incubation with treatments. All analyses were carried out in microplates with spectrophotometric readings. Data were analyzed using one-way ANOVA followed by Tukey's post hoc test. **RESULTS:** The NE demonstrated a better cell viability profile, with values above 80% even at higher concentrations, unlike the free bioactives, which significantly reduced viability. The NE induced greater NO production and a slight increase in ROS generation, more evident at concentrations between 0.4 mg/mL and 0.8 mg/mL, indicating cellular activation without marked toxicity. The free bioactives remained near baseline levels, showing no significant differences in either parameter. **CONCLUSION:** The NE exhibited a better safety profile compared to the free bioactives, with higher cell viability and no significant toxicity. Complementary studies are underway to further explore these findings.

**Keywords:** Nanotoxicology, Nanotechnology, Bioactives.

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