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Antimicrobial properties of olive oil phenolic compounds and their regenerative capacity towards fibroblast cells

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Highlights

• Stimulated the proliferative capacity of fibroblasts, increasing migration and expression of the aforementioned genes.
• Treatment with luteolin, apigenin, ferulic, coumaric acid or caffeic acid compounds inhibited the growth of different microorgananisms.
• The phenolic compounds have a biostimulatory effect on regeneration, differentiation, and migration of fibroblasts and exert antibacterial activity.
• Phenolic compounds may have a strong therapeutic effect on wound recovery.

Abstract

Some micronutrients of vegetable origin are considered potentially useful as wound-healing agents because they can increase fibroblast proliferation and differentiation.

The aim of this study

was to evaluate the regenerative effects of selected olive oil phenolic compounds on cultured human fibroblasts and explore their antimicrobial properties.

Material and methods

The CCD-1064Sk fibroblast line was treated for 24 h with 10^{-6}M luteolin, apigenin, ferulic, coumaric acid or caffeic acid, evaluating the effects on cell proliferation by using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) spectrophotometric assay; the migratory capacity by the scratch assay and determining the expression of Fibroblast Growth Factor (FGF), Vascular Endothelial Growth Factor (VEGF), Transforming Growth Factor- β1 (TGFβ1), Platelet Derived Growth Factor (PDGF), and Collagen Type I (COL-I) genes by real-time polymerase chain reaction. The antimicrobial capacity of the polyphenols was evaluated by the disc diffusion method.

Results

All compounds except for ferulic acid significantly stimulated the proliferative capacity of fibroblasts, increasing their migration and their expression of the aforementioned genes. With respect to their antimicrobial properties, treatment with the studied compounds inhibited the growth of *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, *Proteus* spp., and *Candida Albicans*.

Conclusions

The phenolic compounds in olive oil have a biostimulatory effect on the regeneration capacity, differentiation, and migration of fibroblasts and exert major antibacterial activity. According to the present findings, these compounds may have a strong therapeutic effect on wound recovery.

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Keywords

Olive oil phenolic compounds
Fibroblasts
Proliferation
Antimicrobial and migratory capacity