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RESEARCH ARTICLE

Biological activity of pumpkin pulp extracts: cytoprotection, anti-inflammatory effects, and photoprotection in human skin cells

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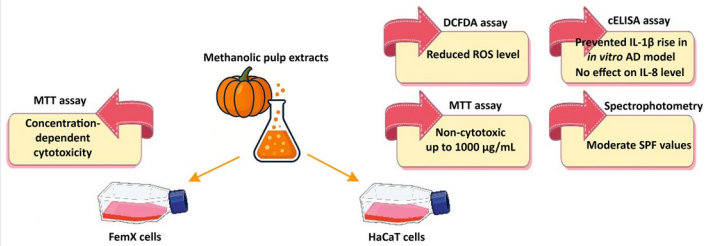
ABSTRACT

Background: Pumpkin extracts are rich in vitamins and bioactive compounds, offering antioxidative, anti-inflammatory, and wound-healing properties, making them valuable in dermatology and cosmetics, however pumpkin pulp extracts have not been evaluated before for their cutaneous biological activities.

Methods and results: This study evaluated the biological activity of methanolic pumpkin pulp extracts from six Serbian accessions of *Cucurbita (C.) maxima* and *C. moschata* on normal keratinocytes (HaCaT) and melanoma (FemX) cells. The extracts showed no cytotoxicity to normal cells up to 1000 µg/mL and exhibited concentration-dependent cytotoxicity to melanoma cells (determined by MTT assay). They also demonstrated antioxidative effects against H_2O_2-induced oxidative stress in H_2DCFDA assay, and reduced tumor necrosis factor -α/interferon-gamma-γ-induced expression of pro-inflammatory cytokine interleukine-1β in HaCaT cells, as shown in the cell-based ELISA assay. Sun protection factor (SPF) calculations for all six accessions confirmed the photoprotective potential of the extracts, with noticeable differences in SPF values between species and varieties. The highest SPF value was observed in the *C. moschata* variety.

Conclusion: Significant variations in biological activities among the examined accessions were noted, with *C. maxima* extracts showing pronounced antioxidant and antiinflammatory properties while *C. moschata* extract showed the highest SPF values. These findings represent the first report on the skin-beneficial effects of pumpkin pulp extracts, identifying them as sustainable sources of safe, bioactive compounds with antioxidant, anti-inflammatory, and photoprotective properties for dermatological or cosmetic applications.

GRAPHICAL ABSTRACT



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Pumpkin pulp; keratinocytes; cytotoxicity; oxidative stress; pro-inflammatory cytokines

1. Introduction

Pumpkins and derived products, in addition to its nutritional value and widespread culinary use, provide a broad spectrum of nutrients that support overall well-being and enhance various bodily functions, including immune defense, skin regeneration, cognitive and digestive health, and cardiovascular function,

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This article has been corrected with minor changes. These changes do not impact the academic content of the article.