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Cytotoxicity, antioxidant, anti-inflammatory, and sun protection potential of spray-dried *Punica granatum* peel extract

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INTRODUCTION & AIM

Punica granatum (pomegranate) possesses strong antibacterial, antiviral, antioxidant, and anti-inflammatory activity due to the presence of various organic acids, alkaloids, phenolic acids, tannins, flavonoids, anthocyanins, sugars, fatty acids, and vitamins. Thus, in the present study, spray-dried pomegranate peel extract was examined regarding cytotoxicity, antioxidant, anti-inflammatory, and sun protection potential.

METHOD

- Cytotoxicity was evaluated in HaCaT human keratinocyte cells (25-100 µg/mL) using MTT assay
- The production of intracellular reactive oxygen species in HaCaT cells was measured using the H2DCFDA assay
- The levels of interleukin-1β (IL-1β) and macrophage inhibitory factor (MIF) was evaluated using cell-based ELISA
- Sun protection factor (SPF) was examined spectrophotometrically

RESULTS & DISCUSSION

- The extract showed a concentration-dependent effect on keratinocyte viability: 25 µg/mL did not significantly reduce cell viability (12% reduction) and concentrations of 50 and 100 µg/mL showed a more profound effect (23% and 27% reduction)
- In cells exposed to extract alone, without H_2O_2, there was no significant change in reactive oxygen species (ROS) levels compared to non-treated control
- Keratinocytes pre-incubated with peel extract in different concentrations (25, 50, and 100 µg/mL) showed significantly decreased levels of ROS compared to the ones treated with H_2O_2 alone and all tested concentrations showed a similar decrease in ROS levels
- In the cell line treated with spray-dried peel extract without lipopolysaccharide (LPS), there was no significant change in the IL-1β and MIF expression, indicating the absence of any pro-inflammatory effects
- In the LPS-treated cells, the extract significantly reduced IL-1β and MIF expression compared to LPS alone, confirming the anti-inflammatory potential of the extract against LPS challenge
- The extract provided a SPF of 11.33±0.33 (at 100 µg/mL), and significantly lower SPF values, 3.11±0.05 and 5.97±0.21 at 25 and 50 µg/mL

CONCLUSION

Regarding the results related to antioxidant and anti-inflammatory properties, as well as sun protection potential, findings suggest that spray-dried pomegranate peel extract represents a promising source of bioactives with potential application in pharmaceutical, cosmetic, or dermo-cosmetic formulations.

FUTURE WORK

- Development of cosmetic or pharmaceutical formulations
- *In vitro* and *in vivo* testing
- Stability study
- Dermatological study
- Technology transfer