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The use of mushroom extracts as bioactive ingredients in the development of cosmeceutical formulations

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The cosmetic industry is in a constant search for natural compounds, or extracts, with relevant bioactive properties to act as active ingredients. Among the possibilities, mushrooms can play an important role. They are rich sources of bioactive metabolites, known since long for their nutritional and medicinal properties, but underexploited as cosmeceutical ingredients [1].

In the present work, ethanolic extracts obtained from *Agaricus bisporus* L., *Pleurotus ostreatus* (Jacq. ex Fr.) P.Kumm. and *Lentinula edodes* (Berk.) Pegler, purchased in a local supermarket in the Northeast of Portugal, were analysed for their anti-inflammatory activity by quantification of NO production in RAW 264.7 macrophages cells, tyrosinase inhibition assay using L-DOPA as substrate, antioxidant activity by DPPH radical-scavenging and ferricyanide/Prussian blue reducing power assays, and also for their antibacterial activity by determining the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) using the microdilution method. The extracts were chemically characterised in terms of phenolic acids and ergosterol content by HPLC-PDA and HPLC-UV, respectively. The extract samples were further incorporated in a base cosmetic cream considering the EC₅₀ and MIC values previously determined resulting in a scale of 100 mg of extract per gram of base cream. The final formulation was mixed properly to attain sample homogeneity and then evaluated for the same bioactive purposes.

In terms of chemical composition, ergosterol and cinnamic, *p*-hydroxybenzoic, *p*-coumaric and protocatechuic acids were found in the characterized mushrooms. The mushroom extracts, as well as the final cosmeceutical formulations, were found to display antioxidant, anti-inflammatory, antibacterial and anti-tyrosinase activities. Furthermore, the final cosmeceutical formulations revealed the presence of 85-100% of the phenolic acids and ergosterol levels detected initially in the mushroom extracts.

In conclusion, the results suggest that mushroom extracts can be interesting multifunctional cosmeceutical ingredients for topical application to combat skin aging, inflammation and as preservative and hyperpigmentation correcting ingredients.

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