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EVALUATION OF BRAZIL-NUT SHELLS EXTRACT AND FRACTIONS AS A SUSTAINABLE ANTIOXIDANT INGREDIENT FOR SUNSCREEN FORMULATIONS

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ABSTRACT

Residues of Amazonian fruits such as Brazil nut, with antioxidant potential may be used as a sustainable cosmetic active ingredient, since this material is frequently discarded. Antioxidant agents in sunscreens may protect against UV-induced free radicals production and damage and may potentiate action of UV filters. However, their efficacy and especially safety and photosafety should be guaranteed. This study evaluated Brazil nut shells extract and fractions for absorption spectrum, phototoxic potential and antioxidant activity *in vitro* as a potential new ingredient for sunscreens formulation. Brazil nut shells extract was obtained by maceration during 72h with ethanol: water (7:3). Then, a fractionation of this extract was performed with hexane, dichloromethane, ethyl acetate and butyl alcohol. The absorption spectrum of extract and fractions was analyzed by spectrophotometry. The phototoxicity was evaluated in fibroblasts (3t3) monolayer (OECD TG 432). Also antioxidant activity by DPPH method was performed. The extract and fractions presented absorption spectrum mostly in the UVB region at 320-400 nm. Dichloromethane fraction showed higher absorption than other fractions and was selected for the other assays. In the DPPH assay, Brazil nut shell extract and dichloromethane fraction presented high antioxidant potential ($IC_{50_{Extract}}: 18.75 \mu\text{g/mL}$; $IC_{50_{Fraction}}: 21.55 \mu\text{g/mL}$). For phototoxic assay Brazil nut shells extract and dichloromethane fraction presented phototoxic potential ($MPE > 0.15$). Thus future steps will involve tests in a 3D model of reconstituted human skin. Previous studies of our research group verified no phototoxicity for some substances in sunscreen formulations since their limited percutaneous absorption reduced its availability in the viable epidermis leading to a non-toxic potential.

Keyword: residues; Brazil nut shells; sunscreen; antioxidant.

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