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The Juglans regia leaves as multifunctional cosmeceutical ingredients: hydroethanolic versus eutectic solvents extracts

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PURPOSE OF THE ABSTRACT

The leaves of Juglans regia L. (walnut tree) are a rich source of phenolic compounds [1], whose extracts have shown antioxidant, antimicrobial, anti-proliferative [2,3], antitumor [3,4] and anti-inflammatory [3] activities with potential application in the pharmaceutical or cosmetics areas. These compounds are usually extracted by conventional volatile organic solvents [5]. This work aims to design a more efficient and sustainable extraction process using aqueous solutions of eutectic solvents (ES) that can also be part of the formulation media in a cosmetic product [6,7].

The ES betaine + urea and betaine + 1,3-propanediol (1,3-PPD) were selected considering their potential application as formulation ingredients in the pharmaceuticals or cosmetics areas, eliminating the separation step of the extract from the solvent. Ethanol/water 50% (m/m) and pure water were used as reference solvents. An initial screening was carried out considering the aqueous solutions (25, 50 and 75%, water content) of the ES in the proportions 0:1, 1:1, 1:2, 2:1 and 1:0 of their individual components, at T = 50 °C, with an extraction time of 120 min and a solid/liquid ratio of 0.30 g/L., aiming to maximize the extraction yield of the main phenolic compounds present in the extract (2 phenolic acids and 2 flavonoids). The quantification was performed by HPLC-DAD, and a summary of the results is shown in Figure 1.

The reference solvent ethanol/water 50% (m/m) resulted in one of the highest extraction yields (3.5 ± 0.1 and 10.8 ± 1.2 mg/g dry plant for phenolic acids and flavonoids, respectively), in accordance to previous works [1,8]. Water also presented an excellent extraction yield for the phenolic acids (3.4 ± 0.01 mg/g dry plant), but the lowest extraction capacity for the flavonoids (1.8 ± 0.3 mg/g dry plant). Regarding the ES, the solutions with 50% water of betaine, 1,3-PPD, betaine:urea (1:2) and betaine:1,3-PPD (1:2) were selected for further studies, considering not only that their extraction yield was similar to the hydroethanolic reference solvent, but also their higher water

content, since the latter can be directly incorporated in cosmetic formulations. Thus, the bioactivity of these ?liquid extracts? was evaluated considering their antioxidant, anti-tyrosinase, and photostability dimensions. Finally, the liquid extract presenting the best combined bioactivity results was incorporated in a commercial base cream to evaluate the extract's physicochemical stability and antioxidant activity. Preliminary results showed a good physicochemical profile and antioxidant effect at different storage conditions [9]. The stability evaluation for up to 6 months is currently being carried out.

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FIGURES

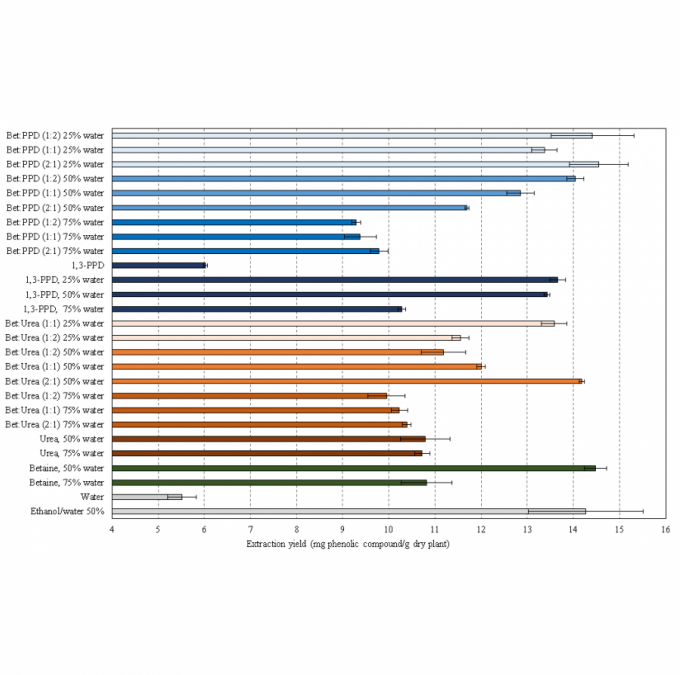

FIGURE 1

Total extraction yield

Total extraction yield of the phenolic compounds (flavonoids + phenolic acids) present in the extracts of walnut leaves.

FIGURE 2

KEYWORDS

Phenolic compounds | Cosmeceuticals | Bioactivity | Juglans regia L.

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