VALORIZATION OF SOUR CHERRY KERNELS: EXTRACTION OF POLYPHENOLS USING NATURAL DEEP EUTECTIC SOLVENTS (NADES)

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Abstract

Cherry (*Prunus cerasus*) is a tree species belonging to the *Rosaceae* family. It is native to Europe and Asia. Cherry is most often consumed fresh, as a dessert fruit. It can also be used to process cherries, such as: juices, marmalades, jams. In order to use by-products, different parts of the cherry, such as seeds, kernels, pomace, are used to isolate bioactive components. The aim of this study was to determine the total phenols yield and the antioxidant activity of the extract from cherry kernels. For extraction, traditional extraction methods (Solid-liquid extraction - SLE) and an innovative extraction method (Natural deep eutectic solvents extraction - NADES) were used. SLE extraction was performed using different concentrations of ethanol (0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 96%). The extraction was performed at room temperature for 24 h, with a shaking speed of 150 rpm. NADES extraction was carried out using 10 NADES solvents, of which 5 were polar and 5 non-polar. All NADES solvents in this work were prepared from organic acids (malonic, citric, lactic, octanic, lauric, decanic) as hidrogen bond donors (HBD) and betaine, choline chloride, glucose as hidrogen bond acceptors (HBA). The NADES extraction was performed with stirring in a heated water bath at 50 °C placed on a magnetic stirrer, for 60 min. Statistical significance ($p < 0.05$) of extraction solvents used such as ethanol in different concentrations, polar and non-polar NADES was determined by analysis of variance (ANOVA). Total phenols in the obtained extracts were determined by the Folin-Ciocalte method, and antioxidant activity determined by the following tests: DPPH, ABTS and FRAP. In the case of SLE extraction, the amount of total phenols ranged from 1.94-3.87 mg GAE/g DW. While in the case of NADES extraction, total phenols ranged from 1.13-2.54 mg GAE/g DW. Regarding DPPH, ABTS and FRAP tests, the extract obtained from SLE using 50% ethanol showed the highest antioxidant activity (5.71 μM TE/g, 9.45 μM TE/g, 25.98 μM Fe^{2+}/g, respectively). Regards to NADES extraction, NADES 1, which based on Choline chloride:Malonic acid in molar ratio 1:1 shown the strongest antioxidant value in case of DPPH test (35.26 μM TE/g) and ABTS test (34.55 μM TE/g). While, extract obtained by NADES 4 (Lactic acid:Glucose=5:1) showed the highest reducing power, and value was 37.05 μM Fe^{2+}/g.

Keywords: hydrophilic NADES; hydrophobic NADES; polyphenols, antioxidant activity

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