

EXTRACTION OF PROTOCATECHUIC ACID USING DEEP EUTECTIC SOLVENT

A Major Project Report

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ABSTRACT

Phenolic compounds displayed notable antioxidant and antimicrobial properties, indicating their potential for various applications in the food, pharmaceutical, and cosmetic sectors. Protocatechuic acid is a natural phenolic acid, which widely exists in our daily diet and herbs. It is also one of the main metabolites of complex polyphenols, such as anthocyanins and proanthocyanins. Protocatechuic acid has a wide range of pharmacological activities including antioxidant, anti-inflammatory, neuroprotective, antibacterial, antiviral, anticancer, antiosteoporotic, analgesia, antiaging activities, protection from metabolic syndrome, and preservation of liver, kidneys, and reproductive functions. Pharmacokinetic studies showed that the absorption and elimination rate of protocatechuic acid are faster, with glucuronidation and sulfation being the major metabolic pathways. However, protocatechuic acid displays a dual-directional regulatory effect on some pharmacological activities. When the concentration is very high, it can inhibit cell proliferation and reduce survival rate.

This study investigates the use of a deep eutectic solvent (DES) for effectively extracting these valuable compounds from protocatechuic. To create the DES, thymol and menthol were blended in a 1:1, 3:2 and 2 molar ratio. The experimental method was designed using response surface methodology; the extracted sample was analysed and confirmed from a gas chromatograph mass spectrometer the phenolic compounds presence in the extracted phase. The sample was further analysed in a UV-visible photo spectrometer to obtain the concentration of different phenolic compounds. Several parametric effects were studied, such as thymol and menthol ratio, protocatechuic acid quantity, and water: DES ratio to obtain better extraction efficiency and distribution coefficient.