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Effect of solvents extraction on phenolic content and antioxidant activity of the byproduct of eggplant

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ABSTRACT

Eggplant is one of most common vegetables consumed all around the world. This study has assayed antioxidants from the byproduct (peel) of eggplant (*Solanum melongena*), using three extraction solvents: 70% methanol, 70% ethanol and 70% acetone. For each solvent, content of total phenolics, flavonoids, tannins, and total anthocyanins were quantified. Antioxidant activity of different extracts were screened using the ferric reducing power, 1,1-diphenyl-2-picryl hydrazyl (DPPH•) radical scavenging, hydrogen peroxide (H_2O_2) scavenging and metal chelating activities. The results showed that 70% methanol is the best solvent for the extraction of anthocyanins (82.83 ± 1.07 mg DGE/100 g DP), whereas, 70% acetone is the best solvent for the extraction of total phenolics, flavonoids and tannins (29.3 ± 1.23 mg GAE/100 g DE; 18.5 ± 0.07 mg QE/100 g DE and 5.37 ± 0.22 mg TAE/100 g DE, respectively). Anthocyanic extracts have exhibited the higher reducing power (39 ± 2.5 mg QE/100 g DE) and scavenging activity (IC_{50} = 2.88 ± 0.02 mg/mL), whereas the phenolic extracts have shown the highest metal chelating activity (18.53 ± 0.4%).

1. Introduction

Antioxidant components are microconstituents present in the diet that can delay or inhibit lipid oxidation, by inhibiting the initiation or propagation of oxidizing chain reactions, and are also involved in scavenging free radicals (Othman et al., 2007). Epidemiological studies have shown that high fruit and vegetable consumption has health benefits in the prevention of chronic diseases (Cheel et al., 2007). These foods are reported to contain a wide variety of antioxidant components, including phenolic compound (Arancibia-Avila et al., 2008). Phenolics are antioxidants with redox properties, which allow them to act as reducing agents, hydrogen donators, and singlet oxygen quenchers. They have also metal chelation properties (Proestos et al., 2006). The oxygen consumption inherent in cell growth leads to generation of a series of reactive oxygen species (ROS), these ROS are molecules such as superoxide anion radicals ($O^{\bullet}_2$) and hydroxyl radicals ($OH^{\bullet}$). However, non free radical species such as hydrogen peroxide (H_2O_2) and singlet oxygen ($^1O_2$) are formed *in vivo* also. Both oxygen species play a positive role in energy production, phagocytosis, regulation of cell growth intercellular signaling, and synthesis of biologically important compounds (Gülçin et al., 2005). However during oxidative stress, large amounts of these ROS can be products and may be dangerous because of their ability to attack numerous molecules, including proteins, lipids (Halliwell et al., 1992) and DNA (Gülçin et al., 2005).

Eggplant, *Solanum melongena*, is a common and popular vegetable crop grown in the subtropics and tropics (Sarker et al., 2006). Eggplant is native to southeastern Asia and great proportion of world production is produced in Asia and Mediterranean basin. The most cultivated variety in Algeria is the elongated ovoid in a dark purple skin. Its fruit is primarily used as a cooking vegetable for the various dishes all over the world (Demir et al., 2002; Hanson et al., 2006). It contains ascorbic acid and phenolics, both of which are powerful antioxidants (Vinson et al., 1998). Studies have shown that eggplant extracts suppress the development of blood vessels required for tumor growth and metastasis (Matsubara et al., 2005), and inhibit inflammation that can lead to atherosclerosis (Han et al., 2003).

Different solvent systems have been used for the extraction of polyphenols from plant material. The yield and antioxidant activity of natural extracts is dependent on the solvent used for extraction. Several procedures have been proposed (Pokorny and Korczak, 2001): extraction using fats and oils, organic solvents, aqueous alkaline solutions and supercritical carbon dioxide.

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