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Antioxidant properties of the methanolic extract of the shell root of Amygdalus eburnean

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Abstract : Many aromatic and medicinal plants have chemical components that show antioxidant activity.
The present study aims to evaluate the antioxidant properties of *Amygdalus eburnean* methanolic extract. Antioxidative activity of *A. eburnean* methanolic extract was determined by the DPPH scavenging test. In this test, radical inhibition occurred at greater power with increasing the concentration of the extract. The IC_{50} value for *A. eburnean* methanolic extract and BHT was 28.7 and 31.5 µg/ml. Our findings revealed considerable antioxidative activity of the *A. eburnean* extract which was directly related to the increase in the concentration of the used extract.
Keywords: Antioxidant; *Amygdalus eburnean*; DPPH; Extract.

Introduction

Studies have shown that free radicals because of having one or more unpaired electrons are produced in normal or pathological cell metabolism. Reactive oxygen species (ROS) react simply with free radicals to become radicals themselves. ROS are different types of activated oxygen, which comprise free radicals such as superoxide anion radicals (O2 .-) and hydroxyl radicals (OH.), as well as non-free radical species (H2O2) and the singled oxygen (1O2) [1-4]. Moreover, extreme generation of ROS, induced by different stimuli and which surpass the antioxidant capacity of the organism, caused a variety of pathophysiological processes such as inflammation, diabetes, genotoxicity, and cancer[5-8].

Accordingly, more interest paying attention on the use of antioxidants, particularly natural antioxidants to restrain lipid peroxidation and to protect from damage due to free radicals [9-11]. Many aromatic and medicinal plants have chemical components that show antioxidant activity. Reviews have reported that sources of natural antioxidants are mostly, plant phenolics that can happen in all parts of plants such as fruits, vegetables, nuts, seeds, leaves, roots and barks [12-15]. One of these interesting plants is *Amygdalus eburnea* Spach. (called "Ghosk" in Persian) from family of Rosaceae as a type of almond which is naturally grown and distributed in Iran [16] In folk Iranian medicine *A. eburnea* has been used as laxative and anti-worm. Moreover, brew of dermal tissue are used for cough, respiratory distress and paregoric[17, 18]. The present study aims to evaluate the antioxidant properties of *A. eburnean* methanolic extract.

Materials and Methods

Collection of plant materials

The shell root of *A. eburnean* was collected from rural regions of from Baft district, south east of Iran, in April 2013. They were identified by a botanist of the Botany Department of Shahid Bahonar University, Kerman, Iran[19]. A voucher specimen of the plant materials was deposited at the Herbarium of Department of Pharmacognosy of School of Pharmacy, Kerman University of Medical Science, Iran.

Preparing of extracts

One hundred gram of powdered plant material was separately extracted by percolation method with methanol (80%) and water successively for 72 h. in room temperature. The extracts were passed through filter paper (Whatman No.3, Sigma, Germany) to remove plant debris. The extracts were finally concentrated in vacuum at 50°C using a rotary evaporator (Heidolph, Germany) and stored at -20°C, until testing [20-22].

Antioxidant activity

To determine the antioxidant activity of *A. eburnean*, 0.3 ml with different concentrations of solutions containing extract and butyl hydroxy tuloene standard (BHT) anti-oxidant were separately poured into the tubes and 2.7 ml of 2,2-diphenyl-1,1-picrylhydrazyl (DPPH) methanol solution (6×10^{-5}M) was added to each tube. The resulting solution was stirred in a continuous shaker device for 60 minutes under darkness. Then, using a spectrophotometer, the absorptivity of the solution was measured at 517 nm. The free radical scavenging activity of DPPH was calculated according to the following equation[23-25].

$$RSA(\%) = 100 \times \left(\frac{A_{blank} - A_{sample}}{A_{blank}} \right)$$

Then, a concentration that inhibited 50% of the free radicals (IC_{50}) was calculated. It is clear that the smaller is the resulting number, the higher would be the anti-oxidative capacity or free-radicals inhibiting property.

Statistical analysis

Data analysis was done using SPSS statistical package, version 16.0 (SPSS Inc., Chicago, IL, USA). To assess the interaction of time and the experimental group, repeated measures analysis test was used. Differences were significant when the *p*-value was lower than 0.05 [26].

Results and Discussion

The antioxidant properties of *A. eburnean* extract to inhibit the free radicals were assessed by DPPH test. In this test, radical inhibition occurred at greater power with increasing the concentration of the extract. Comparison of extract IC_{50} with BHT was reported in Table 1.

Table 1: Antioxidant activity of *A. eburnean* extract

IC_{50}(µg/ml)	RSA(%)	Concentration(µg/ml)	Sample
28.7	31.27 ± 0.01	10	*A. eburnean*
	42.55±0.17	20	
	55.79±0.15	40	
	68.46±0.16	80	
	75.59±0.13	160	
	81.61±0.04	320	
	88.38±0.01	640	
31.5	**32.2**±0.13	10	BHT
	38.76±0.32	20	
	54.51±0.19	40	
	66.94±0.14	80	
	79.46±0.01	160	
	82.30±0.09	320	
	91.08±0.00	640	

Previously it has been proven that natural antioxidants are mainly, plant phenolics that can happen in all parts of plants such as fruits, vegetables, nuts, seeds, leaves, roots and barks [27, 28]. Our findings revealed considerable antioxidative activity of the *A. eburnean* extract which was directly related to the increase in the concentration of the used extract. It is well-known that in plants, antioxidant activity is directly related to the level of phenol and flavonoids compound. The key role of phenol compounds as the eliminator of free radicals has been reported by several studies [29-31]. Therefore, it can be concluded that the antioxidative activity of the *A. eburnean* extract is resulted from the presence of phenol and flavonoids compounds in this plant.

Moreover, many medicinal plants have large amounts of antioxidants such as polyphenols. Many of these phytochemicals possess significant antioxidant capacities that are associated with lower occurrence and lower mortality rates of several human diseases [32-35]. The results strongly suggest that phenolics are important components of this plant, and some of its pharmacological effects could be attributed to the presence of these valuable constituents.

Declaration of Interest

The author declares that there is no conflict of interest in this study.

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