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## ANTIOXIDANT AND RADICAL SCAVENGING PROPERTIES OF *Iris Germanica*

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The antioxidant activity of aqueous and ethanol extracts of iris (*Iris germanica L*., family *Iridaceae*) has been evaluated *in vitro* using various antioxidant assays, including reducing power, free radical scavenging, superoxide anion radical scavenging, hydrogen peroxide scavenging, and metal chelating activities. Both aqueous and ethanol extracts exhibit strong total antioxidant activity, showing 95.9, 88.4, 79.9% and 90.5, 78.0, 65.3% inhibition on peroxidation of linoleic acid emulsion in concentrations of 10, 30, and 50 μg/ml, respectively. Both extracts also possess effective reducing power and exhibit free radical scavenging, superoxide anion radical scavenging, hydrogen peroxide scavenging, and metal chelating activities in concentrations of 20, 40, and 60 μg/ml. The antioxidant properties were compared to those of reference antioxidants (BHA, BHT, and α-tocopherol). In addition, the total content of phenolic compounds in both aqueous and ethanol iris extracts has been determined as gallic acid equivalent. The results indicate that iris has *in vitro* antioxidant properties, which can be the major factor responsible for the inhibition of lipid peroxidation.

*Introduction*

Reactive oxygen species (ROS) such as superoxide radical ($O_2^{\bullet -}$), hydroxyl radical ($OH^{\bullet}$), and peroxy radicals ($ROO^{\bullet}$) are produced as a part of normal metabolic processes. The oxidative damages caused by ROS on lipids, proteins, and nucleic acids may trigger various chronic diseases, such as coronary heart disease, atherosclerosis, cancer, and aging [1].

Lipid peroxidation (LPO) and free radicals are known to be among the main causes for compromising the quality of food during processing and storage. Therefore, it is obvious that the prevention of LPO in the food is effective not only in the stability of nutritional content but also in the extension at the best-before date. In living systems, biomembranes are composed of lipids including unsaturated fatty acids that react easily to form lipid peroxides and free radicals. The accumulation of lipid peroxides in living systems induces functional anomalies and pathological changes [2 – 4]. Accordingly, much attention has been paid to antioxidants, which are expected to act effectively to prevent food and living systems from peroxidative damage. Though butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), which are strong artificial antioxidants, have been much used in the food industry, they are suspected to be toxic in the lung and carcinogenic [5, 6]. Hence, the importance of research aimed at finding natural antioxidants has greatly increased in recent years [7 – 9].

Genus *Iris* (family *Iridaceae*) is represented by 37 species in Turkey, of which 13 are endemic [10]. Most of the iris species are cultivated for ornamental purposes worldwide. In view of potential health benefits, there has been intensive research on natural antioxidants derived from plants. Recently, iris (*Iris germanica L*., family *Iridaceae*) has gained great attention from the cosmetic and perfume industries due to the their violet-like smell caused by irone-type compounds. Besides, *Iris germanica* was reported to have various biological properties, including potent antiulcer, anticancer, and piscicidal activities [11 – 13]. Aqueous extracts of *Iris germanica* decrease smooth muscle activity *in vivo*, produce a musculotropic spasmolytic effect on the duodenum *in vivo* and *in vitro*, stimulate respiration, show a central antiserotonin activity, and induce a transitory hypotension accompanied by a negative inotropic effect. The aqueous iris extract also showed toxicity and psychotropic activity in mice [14].

However, no information about the antioxidant activity of an aqueous extract of *Iris germanica L*. is available in the literature. The aim of our investigation was to describe the antioxidant effects of *Iris germanica* extracts and to compare their antioxidant properties to those of compounds commonly used as food antioxidants, including BHT, BHA, and α-tocopherol. At present, components responsible for the antioxidative ability of *Iris germanica L*., are unclear. Hence, it is suggested that further work should be performed on the isolation and identification of the antioxidant components of *Iris germanica L*.

The aim of the present study was to investigate the antioxidant properties of *Iris germanica L*. in order to evaluate its medicinal value and to point to an easily accessible source of natural antioxidants that could be used as a possible food supplement or in the pharmaceutical, cosmetic and perfume industries.

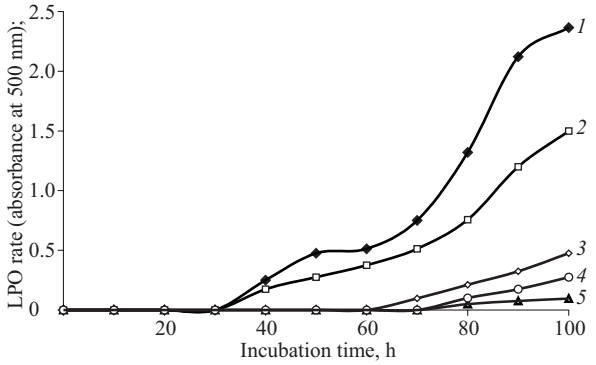


**Fig. 1.** Antioxidant activity of various concentrations of aqueous iris extract in comparison to α-tocopherol in linoleic acid emulsion: (*1*) antioxidant-free control; (*2*) 30 μg/ml α-tocopherol solution; (*3 – 5*) 15, 30, and 50 μg/ml aqueous iris extract solutions, respectively.

*Materials and methods*

**Chemicals**. Ammonium thiocyanate was purchased from E. Merck. Ferrous chloride, polyoxyethylenesorbitan monolaurate (Tween-20), α-tocopherol, 1,1-diphenyl-2-picryl-hydrazyl (DPPH•), 3-(2-pyridyl)-5,6-bis (4-phenyl-sulfonic acid)-1,2,4-triazine (ferrozine), nicotinamide adenine dinucleotide (NADH), BHA, BHT, and trichloracetic acid (TCA) were obtained from Sigma (Sigma-Aldrich GmbH, Sternheim, Germany). Muller Hinton agar was obtained from Oxoid Ltd. (Basingstoke, Hampshire, England, CM337). All other chemicals were of analytical grade and were obtained from Sigma (Sigma-Aldrich GmbH, Sternheim, USA).

**Plant material and extraction procedures**. Iris (*Iris germanica L.*, family Iridaceae) was collected at Tarsus/Mersin (Turkey). A voucher specimen was deposited at the Herbarium of the Faculty of Biology, Atatürk University. For aqueous extraction, a 25 g sample was comminuted into a fine powder in a mill, stirred with 500 ml boiling water on a magnetic stirrer for 15 min, and filtered through Whatman No. 1 paper. The filtrates were frozen and lyophilized at 5 μTorr pressure at –50°C (Labconco, Freezone 1L). For ethanol extraction, a 25 g sample was comminuted into a fine powder in a mill and stirred with 500 ml ethanol. The residue was re-extracted until extraction solvents became colorless. The obtained extracts were filtered over Whatman No. 1 paper, the filtrates were combined, and then ethanol was removed on a rotary evaporator (RE 100 Bibby, Stone, Staffordshire England, ST15 OSA) at 50°C to obtain dry iris extracts. Both extracts were placed in plastic bottles, and then stored at –20°C prior to use.

**Total antioxidant activity determination**. The antioxidant activity of iris extracts was determined according to the thiocyanate method [15]. For stock solutions, 10 mg of each iris extract was dissolved in 10 ml water. Then, the solutions containing various concentrations of dry extract (prepared from stock solutions) or reference compounds (10, 30, and 45 μg/ml) in 2.5 ml of potassium phosphate buffer (0.04 M, pH 7.0), were added to 2.5 ml of linoleic acid emulsion in potassium phosphate buffer (0.04 M, pH 7.0). Fifty millilitres of linoleic acid emulsion contained 175 μg Tween-20, 155 μl linoleic acid, and 0.04 M potassium phosphate buffer (pH 7.0). On the other hand, 5.0 ml control was composed of 2.5 ml linoleic acid emulsion and 2.5 ml of 0.04 M potassium phosphate buffer (pH 7.0). The mixed solutions (5 ml) were incubated at 37°C in glass flasks.

The peroxide level was determined by measuring the absorbance at 500 nm in a Model 8500 II spectrophotometer (Bio-Crom Gmb, Zurich, Switzerland) after reaction with $FeCl_2$ and thiocyanate using samples taken upon various times of incubation. During the oxidation of linoleic acid, peroxides are formed, which oxidize $Fe^{2+}$ to $Fe^{3+}$. The latter ions form a complex with $SCN^-$ and this complex has a maximum absorbance at 500 nm. Therefore, high absorbance is indicative of a high degree of linoleic acid oxidation. The solutions without added extracts were used as blank samples. All data on the total antioxidant activity are the average of duplicate analyses. The percentage inhibition of lipid peroxidation was calculated as:

$$\text{Inhibition } [\%] = 100 - \frac{A_1}{A_0} \times 100,$$

where $A_0$ is the absorbance of the control reaction mixture and $A_1$ is the absorbance observed in the presence of a sample of iris extract [16].

**Reducing power**. The reducing power of iris extracts was determined using the method described in [17]. According to this, various concentrations of iris extracts (2.7 – 13.4 μg/ml) in 1 ml of distilled water were mixed with phosphate buffer (2.5 ml, 0.2 M, pH 6.6) and potassium ferricyanide [$K_3Fe(CN)_6$] (2.5 ml, 1%). The mixtures were incubated at 50°C for 20 min. Then, aliquots (2.5 ml) of trichloroacetic acid (10%) were added and the mixtures were centrifuged for 10 min at 1036×g (MSE Mistral 2000, UK). The upper layer of solution (2.5 ml) was mixed with distilled water (2.5 ml) and $FeCl_3$ (0.5 ml, 0.1%), and the absorbance was measured at 700 nm in a spectrophotometer. Increased absorbance of the reaction mixture is indicative of an increased reducing power.

**Superoxide anion scavenging activity**. Measurement of the superoxide anion scavenging activity of iris extracts was based on the method of Liu et al. [18] with slight modification. Superoxide radicals are generated in PMS – NADH systems by oxidation of NADH and assayed by the reduction of nitroblue tetrazolium (NBT). In this study, the superoxide radicals were generated in 3 ml of Tris-HCl buffer (16 mM, pH 8.0) containing 1 ml of NBT (50 μM) solution, 1 ml NADH (78 μM) solution, and a sample solution of an iris extract (from 12.5 to 62.5 μg/ml) in water. The reaction was started by adding 1 ml of phenazine methosulphate (PMS) solution (10 μM) to the mixture. The reaction mixture was incubated at 25°C for 5 min, after which the absorbance at 560 nm was measured against blank samples. L-Ascorbic acid was used as a control. Decreased absorbance of the reaction

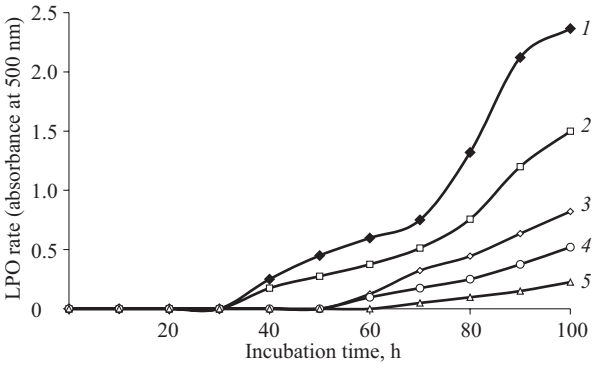


**Fig. 2.** Antioxidant activity of various concentrations of ethanol iris extract in comparison to α-tocopherol in linoleic acid emulsion: (*1* ) antioxidant-free control; (*2* ) 30 μg/ml α-tocopherol solution; (*3 – 5* ) 15, 30, and 50 μg/ml ethanol iris extract solutions, respectively.

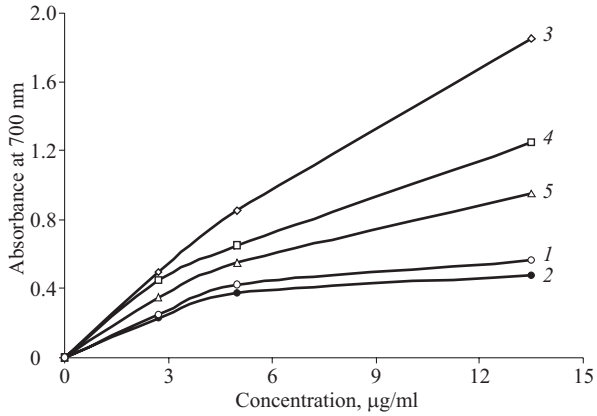


**Fig. 3.** Reducing power of the (*1* ) aqueous and (*2* ) ethanol iris extracts in comparison to (*3* ) BHA, (*4* ) BHT, and (*5* ) α-tocopherol, as monitored by means of spectrophotometric detection of the $Fe^{3+} – Fe^{2+}$ transformation.

mixture indicates increased superoxide anion scavenging activity.

The percentage inhibition of superoxide anion generation was calculated as

$$\text{Inhibition } [\%] = \frac{A_0 - A_1}{A_0} \times 100,$$

where $A_0$ is the absorbance of the control sample and $A_1$ is the absorbance of an iris extract or a reference sample [19].

**Free radical scavenging activity**. The free radical scavenging activity of iris extracts was measured using the DPPH• technique method proposed by Blois [20]. Briefly, 0.1 mM of DPPH• solution in ethanol was prepared and 1 ml of this solution was added to 3 ml of iris extract solutions in water with various concentrations (12.5 – 62.5 μg/ml), the mixture was allowed to stand for 30 min, and the absorbance was measured at 517 nm. Lower absorbance of the reaction mixture indicates higher free-radical-scavenging activity. The DPPH• concentration in the reaction medium was determined using a calibration curve determined by linear regression ($R^2 = 0.9545$):

$$\text{Absorbance} = 0.0036 \times [\text{DPPH}^\bullet].$$

The ability to scavenge DPPH• radicals was calculated using the following equation:

$$\text{DPPH}^\bullet \text{ Scavenging Effect } [\%] = \frac{A_0 - A_1}{A_0} \times 100,$$

where $A_0$ is the absorbance of the control mixture and $A_1$ is the absorbance in the presence of a sample of iris extract.

**Metal chelating activity**. The chelating of ferrous ions by iris extracts and reference compounds was estimated using the method of Dinis et al. [21]. Briefly, extracts (12.5 – 62.5 μg/ml) were added to a solution of 2 mM $FeCl_2$ (0.05 ml). The reaction was initiated by the addition of 5 mM ferrozine (0.2 ml), after which the mixture was vigorously shaken, allowed to stand at room temperature for 10 min, and characterized by the absorbance at 562 nm. All tests and analyses were run in triplicate and averaged. The percentage inhibition of the reaction of ferrozine – $Fe^{2+}$ complex formation was calculated as

$$\text{Inhibition}[\%] = \frac{A_0 - A_1}{A_0} \times 100,$$

where $A_0$ is the absorbance of a control mixture and $A_1$ is the absorbance in the presence of iris extracts or reference compounds. The control does not contain $FeCl_2$ and ferrozine (complex-forming molecules).

**Scavenging of hydrogen peroxide**. The ability of iris extracts to scavenge hydrogen peroxide was determined according to the method of Ruch et al. [22]. According to this, a solution of hydrogen peroxide (40 mM) was prepared in phosphate buffer (pH 7.4). Hydrogen peroxide concentration was determined spectrophotometrically, by measuring the absorption and using an extinction coefficient of 81 $M^{-1}cm^{-1}$ for $H_2O_2$. The iris extracts solutions (12.5 – 62.5 μg/ml) in distilled water were added to a hydrogen peroxide solution (0.6 ml, 40 mM) and the absorbance of hydrogen peroxide at 230 nm was measured 10 min later against a blank solution containing phosphate buffer without hydrogen peroxide. The percentage hydrogen peroxide scavenging by both iris extracts and reference compounds was calculated as

$$\text{Scavenging } [H_2O_2] [\%] = \frac{A_0 - A_1}{A_0} \times 100,$$

where $A_0$ is the absorbance of a control sample and $A_1$ is the absorbance in the presence of iris extracts or reference compounds.

**Determination of total phenolic compounds**. The total content of soluble phenolic compounds in iris extracts was determined with Folin – Ciocalteau reagent according to the method described in [23], using gallic acid as a reference phenolic compound. Briefly, 1.0 ml of an extract solution containing 1.0 g of extract in a volumetric flask was diluted with distilled water (46 ml). Then, 1 ml of the Folin – Ciocalteau reagent was added and the content of the flask was thoroughly mixed. Three minutes later, 3 ml of

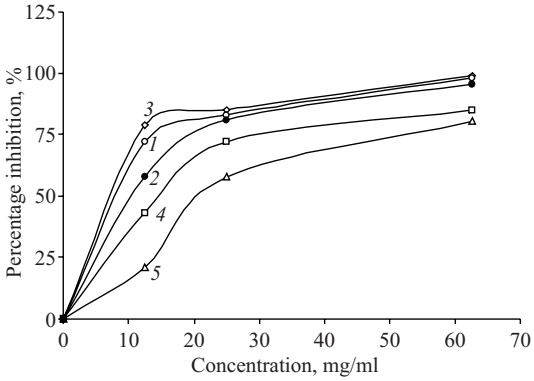


**Fig. 4.** Superoxide anion radical scavenging activity of the (*1*) aqueous and (*2*) ethanol iris extracts in comparison to (*3*) BHA, (*4*) BHT, and (*5*) α-tocopherol, as studied using the PMS – NADH – NBT method.

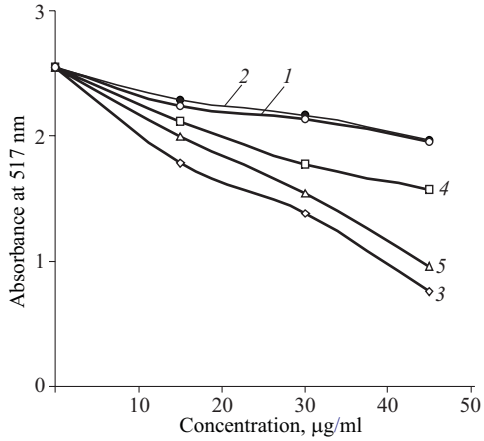


**Fig. 5.** Free radical scavenging activity of the (*1*) aqueous and (*2*) ethanol iris extracts in comparison to (*3*) BHA, (*4*) BHT, and (*5*) α-tocopherol as studied using the DPPH• inhibition method.

$Na_2CO_3$ (2%) was added and the mixture was allowed to stand for 2 h with intermittent shaking. The absorbance was measured at 760 nm. The concentration of total phenolic compounds in the iris extracts was determined and expressed in micrograms of gallic acid equivalent using an equation obtained from the standard gallic acid graph:

$$\text{Absorbance} = 0.0008 \times \text{Gallic acid [μg]}.$$

**Statistical analysis**. Experimental results are presented as mean ± S.D. of three parallel measurements; *P* values below < 0.05 were regarded as significant, and *P* values below < 0.01, as very significant.

*Results and discussion*

**Total antioxidant activity determination in linoleic acid emulsion**. The total antioxidant activity of iris extracts was determined by the thiocyanate method. Both aqueous and ethanol iris extracts exhibited significant antioxidant activity at all concentrations studied. Figures 1 and 2 show the effects of aqueous and ethanol iris extracts in various concentrations (from 15 to 50 μg/ml) on the peroxidation of linoleic acid emulsion. The antioxidant activity of iris extracts increases with the concentration. Both aqueous and ethanol extracts at various concentrations (15, 30 and 50 μg/ml) showed a higher antioxidant activity than that of 30 μg/ml α-tocopherol solution. The percentage inhibition of LPO in linoleic acid system by aqueous and ethanol iris extracts with these concentrations was 95.9, 88.4, 79.9% and 90.5, 78.0, 65.3%, respectively, and in all cases exceeded the effect of a 30 μg/ml α-tocopherol solution (36.6%).

**Reducing power**. Figure 3 shows the reductive abilities of iris extracts in comparison to BHA, BHT and α-tocopherol. In order to evaluate the reductive ability, we monitored the $Fe^{3+} – Fe^{2+}$ transformation in the presence of iris extracts using the method of Oyaizu [17]. The reducing capacity of a compound may serve as a significant indicator of its potential antioxidant activity [24]. The antioxidant activity of putative antioxidants have been attributed to various mechanisms, including the prevention of chain initiation, binding of transition metal ion catalysts, decomposition of peroxides, prevention of continued hydrogen abstraction, reductive capacity, and radical scavenging [25, 26]. Like the total antioxidant activity, the reducing power of iris extract solutions increases with the concentration. All amounts of both aqueous and ethanol extracts showed higher activities than the control mixture and these differences were statistically significant ($P < 0.01$). The reducing power of aqueous and ethanol iris extracts and reference compounds is rated in the following order:

BHA > BHT > α-tocopherol >

> aqueous iris extract > ethanol iris extract.

**Superoxide anion scavenging activity**. In the PMS–NADH–NBT system, superoxide anions derived from dissolved oxygen species by the PMS–NADH coupling reaction reduce NBT. A decrease in the absorbance at 560 nm in the presence of antioxidants is indicative of the consumption of superoxide anions in the reaction mixture. Figure 4 shows the percentage inhibition of superoxide radical generation by 12.5, 25, and 62.5 μg/ml solutions of aqueous and ethanol iris extracts in comparison to the same concentrations of BHA, BHT, and α-tocopherol. Both iris extracts exhibited strong superoxide radical scavenging activity, which exceeded the activity of BHT and α-tocopherol. The differences were found statistically significant ($P < 0.05$). As can be seen from Fig. 4, the percentage inhibition of superoxide generation by 62.5 μg/ml solutions of BHA and the aqueous and ethanol iris extracts was 98.9, 98.8 and 95.2%, respectively, that was greater than the inhibition produced by the same concentrations of BHT and α-tocopherol (85.0 and 80.5%, respectively). With respect to the superoxide radical scavenging activity, these compounds can be arranged in the following order: BHA > aqueous iris extract > ethanol iris extract > BHT > α-tocopherol.

**Free radical scavenging activity**. As is known, DPPH• is a stable free radical that can accept an electron or a hydrogen radical to become a stable diamagnetic molecule [27]. The inhibition of the reduction ability of DPPH• ra-

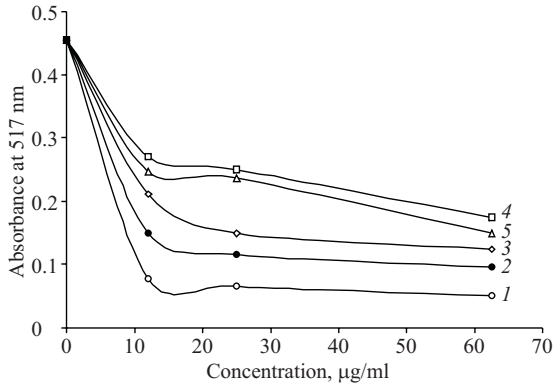


**Fig. 6.** Metal chelating effect of the (*1*) aqueous and (*2*) ethanol iris extracts, (*3*) BHA, (*4*) BHT, and (*5*) α-tocopherol 1,1-diphenyl-2-picrylhydrazyl, as studied using the inhibition of $Fe^{2+}$ – ferrozine complex formation.

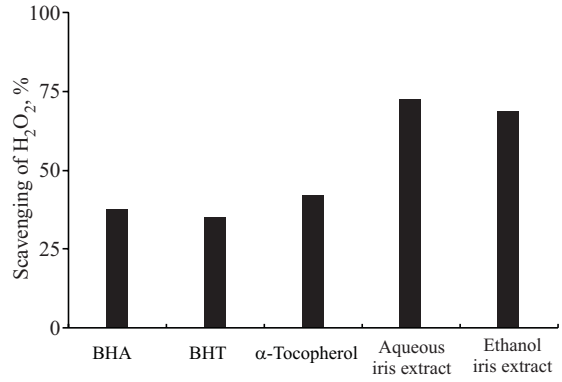


**Fig. 7.** Hydrogen peroxide scavenging activities of water and ethanol iris extracts in comparison to BHA, BHT, and α-tocopherol.

dicals was evaluated by a decrease in the absorbance at 517 nm in the presence of antioxidants. DPPH• is often used as a substrate to evaluate the antioxidant activity [16]. Figure 5 illustrates a significant ($P < 0.05$) decrease in the concentration of DPPH• radical due to the scavenging ability of both iris extracts and reference compounds (BHA, BHT, and α-tocopherol). The scavenging effect of the aqueous and ethanol iris extracts and the reference compounds on the DPPH• radical decreases in the following order:

BHA > α-tocopherol > BHT > aqueous iris extract > ethanol iris extract.

The DPPH• activity inhibition by these substances in a concentration of 45μg/ml amounted to 70.3, 62.4, 38.4, 22.6, and 22.2%, respectively. These results indicate that both iris extracts produce a noticeable scavenging of free radical. Free radical scavenging activity also increases with the concentration of iris extracts.

**Metal chelating activity**. The chelating of ferrous ions by the iris extracts was estimated using the method of Dinis et al. [21]. According to this, ferrozine quantitatively forms complexes with Fe2+, whereas the presence of chelating agents hinders the complexation process, which results in a decrease in the red color intensity of the solution. Therefore, measurement of the color intensity reduction allows the metal chelating activity of the coexisting agent to be evaluated [28]. In this assay, both iris extracts and the reference compounds interfered with the formation of ferrous ferrozine complex, suggesting that they have chelating activity and are able to capture ferrous ion in competition with ferrozine.

Figure 6 shows that the formation of a $Fe^{2+}$ – ferrozine complex is not complete in the presence of aqueous and ethanol iris extracts, thus indicating that both iris extracts form chelates with iron. The absorbance of $Fe^{2+}$ – ferrozine complex exhibited a dose-dependent linear decrease (for 12.5, 25, and 62.5 μg/ml). The differences between both iris extracts and the control were statistically significant ($P < 0.05$). The percentage metal scavenging capacity of aqueous and ethanol iris extracts, BHA, BHT and α-tocopherol in a 62.5 μg/ml concentration were 88.98, 79.1, 72.5, 61.5, and 66.96%, respectively. The metal scavenging effect of both iris extracts and the reference compounds decreases in the following order:

Aqueous iris extract > ethanol iris extract > BHA > α-tocopherol > BHT.

The metal chelating capacity was significant, since it reduced the concentration of a catalytic transition metal during LPO [16]. It was reported that chelating agents, which form σ bonds with a metal, are effective as secondary antioxidants because they decrease educe the redox potential, thereby stabilizing the oxidized form of the metal ion [29]. The data presented in Fig. 6 show that both iris extracts demonstrate a marked capacity for iron binding, suggesting that their action as peroxidation protectors may be related to the iron binding capacity.

**Scavenging of hydrogen peroxide radicals**. The ability of both iris extracts to scavenge hydrogen peroxide was determined using to the method of Ruch et al. [22]. Figure 7 shows the hydrogen peroxide scavenging ability of aqueous and ethanol iris extracts in comparison to of BHA, BHT and α-tocopherol. The iris extracts are capable of scavenging hydrogen peroxide in a concentration-dependent manner. Aqueous and ethanol iris extracts in a concentration of 62.5 μg/ml exhibit 44.3, and 31.5% scavenging activity with respect to hydrogen peroxide, respectively. On the other hand, BHA, BHT, and α-tocopherol in the same dose exhibited 37.5, 86, and 57% hydrogen peroxide scavenging, respectively. These results showed that both aqueous and ethanol iris extracts produce strong hydrogen peroxide scavenging, which is close to that of BHA, but lower than that of BHT and α-tocopherol. There was statically significant correlation between those values and control ($P < 0.05$). The hydrogen peroxide scavenging effect of both iris extracts and reference compounds in a concentration of 62.5 μg/ml decreases in the following order:

aqueous iris extract > ethanol iris extract >

> α-tocopherol > BHA > BHT.

Hydrogen peroxide itself is not very reactive, but it can sometimes be cytotoxic by giving rise to hydroxy radicals in the cells. Thus, removing $H_2O_2$ as well as $O_2^{\bullet -}$ is very important for the protection of food systems.

**Determining the total content of phenolic compounds**. Phenols are very important biologically active plant

components because of their radical scavenging ability, which is due to their hydroxy groups [30]. In 1-mg aliquots of aqueous and ethanol iris extracts, phenols were detected on a level of 42.0 and 68.8 μg in gallic acid equivalent. There was no correlation between the total content of phenols and the total antioxidant activity in iris extracts. Velioglu et al. [31] studied 28 plant products and established that, in many cases, a high antioxidant activity was not correlated with the content of phenols; probably some other factors played major roles as antioxidants. Nevertheless, phenolic compounds can directly contribute to the antioxidant action [16]. It was suggested that polyphenols produce an inhibitory action on mutagenesis and carcinogenesis in humans, when daily ingested in a dose of up to 1.0 g from a diet rich in fruits and vegetables [32].

### *Conclusions*

Both aqueous and ethanol iris extracts showed strong antioxidant activity, reducing power, and the ability of DPPH radical and superoxide anion scavenging, hydrogen peroxide scavenging, and metal chelating in comparison to reference compounds such as BHA, BHT, and α-tocopherol. The results of this study show that the iris extracts can be used as readily accessible source of natural antioxidants, a possible food supplement, and in pharmaceutical and cosmetic industry.

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## АНТИОКСИДАНТНЫЕ И АНТИРАДИКАЛЬНЫЕ СВОЙСТВА ЭКСТРАКТА ИЗ *Iris Germanica*


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Антиоксидантные свойства водного и спиртового экстрактов ириса (*Iris Germanica* L., сем. *Iridaceae*) исследованы *in vitro* с использованием различных тестов на восстановительную способность, антирадикальную активность (в отношении свободных, перекисных, и супероксидных радикалов) и хелатообразование. Оба экстракта показали высокую антиоксидантную активность, ингибируя модельную реакцию перекисного окисления в суспензии линолеиновой кислоты на 95.9, 88.4 и 79.9% (водный) и 90.5, 78.0 и 65.3% (спиртовой) при концентрации в растворе 10, 30 и 50 мкг/мл соответственно. Эффективное подавление радикальных процессов и образование хелата железа наблюдалось при концентрации растворов 20, 40 и 60 мкг/мл. Антиоксидантные свойства водного и спиртового экстрактов ириса в модельных реакциях были сравнимы со свойствами ряда стандартных препаратов, включая α-токоферол, бутилгидроксианизол и бутилгидрокситолуол. Определено суммарное содержание фенольных веществ в экстрактах ириса (в пересчете на галловую кислоту). Высказано предположение, что антиоксидантные свойства, проявленные экстрактами ириса *in vitro*, могут объяснять их способность к ингибированию перекисного окисления липидов.