

Antioxidant activity of some traditionally medicinal plants from Turkey

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Abstract

Ten plants (*Salvia sclarea*, *Achillea millefolium*, *Nigella sativa*, *Linum usitatissimum*, *Origanum onites*, *Salvia officinalis*, *Mentha piperita*, *Lavandula officinalis*, *Melissa officinalis* and *Rosmarinus officinalis*) were tested for their antioxidant activity by their interaction with 2,2-diphenyl-1-picrylhydrazyl (DPPH) and total phenol. Methanolic leaf extracts of Sage and mint (DPPH scavenging activities) showed more stronger activities. These antioxidant properties depended on concentration of sample. The lowest and highest antioxidant values of *Salvia sclarea* and *Salvia officinalis* extracts were found as 82.14% and 84.98 %” respectively. While the lowest total phenol was established in *Nigella sativa* (1.059 mg Gallic Acid Equivalent/100 ml), the highest level was found in *Melissa officinalis* (3.609 mg Gallic Acid Equivalent/100 ml).

Keywords: medicinal plant, extract, antioxidant activity, total phenol, DPPH

1. Introduction

The antioxidant action of herbs used in Turkey for treating various ailments was evaluated *in vitro*. Fruits, vegetables and herbs are recommended at present as optimal sources of chemical constituents with antioxidant activity and supplementation of human diet with plants containing high amounts of compounds capable of deactivating free radicals may have beneficial effects [1,2]. Antioxidants are compounds that can delay or inhibit the oxidation of lipid or other molecules by inhibiting the initiation or propagation of oxidizing chain reactions [1]. They can scavenge free radicals and increase shelf life by retarding the process of lipid peroxidation, which is one of the major reasons for deterioration of food and pharmaceutical products

during processing and storage [3]. Recently, the use of spices and herbs as antioxidants agents in foods is becoming of increasing importance. Generally, the extent of the antioxidant and antimicrobial effects of the extracts could be attributed to their phenolic compositions [4,5]. The aim of present work is to investigate their antioxidant properties and total phenol contents of some plants cultivated in Konya (Çumra) province in Turkey.

2. Material and methods

2.1. Plant materials

Salvia sclarea, *Achillea millefolium*, *Nigella sativa*, *Linum usitatissimum*, *Origanum onites*, *Salvia officinalis*, *Mentha piperita*, *Lavandula officinalis*, *Melissa officinalis* and *Rosmarinus officinalis* were obtained from Department of Medicinal and Aromatic Plant, High Vocational College, Çumra in

Konya. A voucher specimen is kept in the herbarium of the Department of Medicinal and Aromatic Plant, High Vocational College, and identified by Dr.Bagcı. Voucher specimen numbers are MAP-032, MAP-043, MAP -035, MAP -022, MAP -011, MAP-017, MAP-021, MAP-037, MAP-34 and MAP -042 for Misk sage , civanperçemi, black cumin, linseed, İzmir thyme, sage, mint, lavande, Melis, rosemary Plants are stored in a dry, dark and cool room, and were grounded before used.

2.2. Method

The spices were dried, grounded and extracted in 90 % methanol + 9 % water + 1 % acetic acid mix. The extraction duration were 24 hour. After filtration, the filtrate were evaporated under vacuum, less than 45°C. Folin-Ciocalteu colorimetric method were applied and the results were expressed as mg GAE/L extract [6]. Antioxidant activities in the samples were determined *in vitro* via scavenging of the “ABTS (2,2%-azino-bis-3-ethyl-benzthiazoin-6-sulphuric acid)” radical, generated by a metmyoglobin:hydrogen peroxide system, as described previously [7]. Samples were diluted 1/6 with the extraction solvent. Free radical scavenging activity were determined by DPPH method and the results were expressed as IC₅₀ (mg/ml), minimum extract required to inhibit the 50 % percent of 1,1-diphenyl-2-picrylhydrazyl [8].

2.3. Statistical analyses

Results of the research were analysed for statistical significance by analysis of variance [9].

3. Results and Discussion

DPPH, as a partially organic radical, is used to determine antioxidant activities of many plant extracts and compounds [10]. This method is based on decrease in alcoholic DPPH solution in presence of H binding antioxidant ($DPPH^+ + AH \rightarrow DPPH - H + A^{\cdot}$). DPPH solution is dark violet colored and has a strong absorption range at 517 nm. The decrease in the absorption shows the cytochrometric decrease in DPPH. Antioxidant properties and total phenol contents of some plants cultivated in Konya (Çumra) province in Turkey were presented in Table 1. The lowest and highest antioxidant values of *Salvia sclarea* and *Salvia officinalis* extracts were found as 82.14% and 84.98 %” respectively. While the lowest total phenol was established in *Nigella sativa* (1.059 mg GAE/100 ml), the highest level was found in *Melissa officinalis* (3.609 mg GAE/100 ml) (Table 1). In the study carried out by Exarchou et al. [11], two different types of solvent extractions, ethanol and acetone are used and antioxidant activity was compared using DPPH method. It is found that the ethanol extract of acetone is higher than the exact of ethanol.

Table 1. Antioxidant activity and total phenol contents of some aromatic plants (dry weight)

Samples	Antioxidant activity (%)	Total phenol (mg Gallic Acid Equivalent /100ml)
Misk Sage	82.14±1.13*	2.535±0.56
Yarrov	83.87±2.37	1.950±0.98
Black cumin	83.37±3.18	1.059±0.58
Linseed	80.05±1.68	1.069±0.88
Oregano	83.74±2.09	1.965±0.76
Sage	84.98±3.69	2.728±0.92
Mint	84.85±2.74	2.347±0.81
Lavanta	83.99±4.18	2.480±0.65
Melis	85.35±4.79	3.609±1.07
Rosemary	83.49±1.84	2.228±1.13

*mean±standard deviation

While the highest total phenol was established in *Salvia tomentosa* Mil. (13.316 mg GAE/100 ml), the lowest level was found in *Salvia halophila* Hedge (6.168 mg GAE/100 ml) [12]. Miliauskas et al. [13] found the total phenol content of *S. officinalis* (dişotu), *S. clarea*, *S. glutinosa* ve *S. pratensis* in methanol extracts as 0.6, 0.7, 0.9 and 0.5 mg RE/g. Results shows that the differences are related to the different cultivation time, species difference, the ecology, the extraction method used and solvents. Mensor et al. [14] declared that the antioxidant capacity varies according to the solvents used that this also supports our findings. Miliauskas et al. [13] has determined the total phenolic substance amount (mg GAE/g extract) of metanol extracts in *S. pratensis* samples as 22.6, 24.0, 17.1 and 9.7.

4. Conclusion

Methanolic leaf extracts of Sage and mint (DPPH scavenging activities) showed more stronger activities. These antioxidant properties depended on concentration of sample. The lowest and highest antioxidant values of *Salvia sclarea* and *Salvia officinalis* extracts were found as 82.14% and 84.98 %” respectively. It is believed that detection of natural antioxidant sources and proper consumption of them in daily diet or use of isolated compounds in clinical practices would be beneficial for healthy life.

Compliance with Ethics Requirements. Authors declare that they respect the journal’s ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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