Brief Report

Antioxidant activity of wild plants collected in Beni-Sueif governorate, Upper Egypt

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ABSTRACT: Antioxidant activity of a selection of commonly occurring wild plants growing in Beni-Sueif governorate, Upper Egypt, has been tested. The plants selected are *Tamarix nilotica, Ambrosia maritima, Zygophyllum coccenium, Conyza dioscoridis, Chenopodium ambrosioides*, and *Calotropis procera*. The *in vitro* antioxidant assays used in this study were 1,1-diphenyl-2-picryl hydrazyl (DPPH) radical scavenging activity, superoxide anion scavenging activity and iron chelating activity. Extracts prepared from the leaves and flowers of *Tamarix nilotica* have shown the highest antioxidant activity in the three kinds of assay.

Keywords: Screening, Wild plant, DPPH, Superoxide anion, Iron chelation, *Tamarix nilotica*

1. Introduction

Plants are a valuable source of natural products. These plant metabolites can be new sources of such economic materials as oils, gums or tannins, new therapeutic agents and precursors of synthesis of complex chemical substances. Of the several hundred thousand plant species present on earth, only small proportion has been studied both chemically and biologically. The combination of both chemical and biological screening will provide important information about plant natural products (*1*).

Beni-Sueif governorate occupies a land area of approximately 10,954 km^2 in north part of Upper Egypt, with a total inhabitancy of 1,369.41 km^2. It boasts a population of over 2,315,512. Three phytogeographical regions can be distinguished in Beni-Sueif; the desert on the western side of the Nile that is considered as extension of the African Sahara region, the desert of the eastern side of the Nile that extends with the official border of the governorate to Red sea and the fertile land on both sides of the Nile including canal banks distributed throughout the governorate. In our continued efforts for chemical and biological screening of wild plants growing in Beni-Sueif (*2*), antioxidant activity of extracts prepared from commonly occuring wild plants was tested.

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2. Materials and Methods

2.1. *Plant material*

The plant materials used in this study consisted of mature leaves, flowers and latex of different plants. The plants have been collected from the wild in Gerza village area, Beni-Sueif, Egypt, during flowering stage of each plant (2007). Voucher specimens were deposited in the Herbarium of Faculty of Pharmacy, Beni-Sueif University. The plant materials were rinsed with tap water and air dried in shade. Aqueous methanol extract (80%) of different plants was prepared by extracting the plant material twice. The extracts were stored in refrigerator at 4°C till use.

2.2. *DPPH radical scavenging activity*

The free radical scavenging activity (hydrogen donation) of plant extracts and *n*-propyl gallate was measured using 1,1-diphenyl-2-picryl-hydrazil (DPPH) radical. A solution of DPPH in methanol (0.08 mM) was prepared. Then, 1 mL of this solution was added to 0.3 mL of extracts or *n*-propyl gallate solutions at concentration of 500 µg/mL. The mixture was then shaken vigorously and allowed to stand at room temperature for 30 min, with the absorbance measured at 517 nm in a spectrophotometer against blank samples.

2.3. *Superoxide anion scavenging activity*

Superoxide radicals were generated in phenazine methosulphate (PMS)-nicotinamide adenine dinucleotide (NADH) systems by NADH oxidation and assayed by nitroblue tetrazolium (NBT) reduction. In this experiment, the superoxide radicals were generated in 3 mL of Tris-HCl buffer (16 mM, pH 8.0) containing 0.5 mL of NBT (300 µM) solution, 0.5 mL NADH (936 µM) solution, and 0.5 mL of plant extracts or *n*-propyl gallate solution at concentration of 500 µg/mL. The reaction was started by adding 0.5 mL of PMS solution (120 µM) to the mixtures. The reaction mixture was incubated at 25°C for 5 min, and the absorbance at 560 nm was measured against blank samples using a spectrophotometer.

2.4. *Iron chelating activity*

Plant extracts or EDTA solution (0.94 mL) at concentration of 500 µg/mL was added to a solution of 0.02 mL $FeCl_2$ (2 mM). The reaction was initiated by the addition of 0.04 mL ferrozine (5 mM), and then the mixture was shaken vigorously and left standing at room temperature for 10 min. After equilibrium had been reached, absorbance of the solution was measured spectrophotometrically at 562 nm.

3. Results and Discussion

Free radicals are involved in a number of pathological conditions such as inflammatory diseases, atherosclerosis, cerebral ischemia, AIDS, and cancer (*3*). The free radicals are induced in the human body due to environmental pollutants, chemicals, physical stress, radiations, *etc*. Catalase and hydroperoxidase enzymes are among the most important antioxidants produced by the immune system. Consumption of antioxidants or free radical scavengers is necessary to compensate depletion of antioxidants of the immune system.

There is an increasing interest in the use of medicinal plants as antioxidants. Silymarin and wheat germ oil are well-known plant extracts used as antioxidants in the pharmaceutical market. In the present study, plant extracts prepared from commonly occurring wild plants in Beni-Sueif governorate, have been screened for their *in vitro* antioxidant activity. The reported medicinal properties of these plants are described in Table 1.

The antioxidant activity of aqueous methanol (80%) extracts tested is listed in Table 2. In the DPPH radical scavenging assay, only extracts of leaves and flowers of *Tamarix nilotica* showed significant activity. In superoxide anion scavenging activity the same extracts and that of *Conyza dioscoridis* have shown significant activity. In iron chelating activity extracts of leaves and flowers of *T. nilotica* and that of *Calotropis procera* leaves have shown the highest activity. Extracts prepared from *T. nilotica* flowers have shown the highest antioxidant activities in the three used assays. Extracts of *T. nilotica* have been used in traditional Egyptian medicine as antiseptic agents. The polyphenolic and flavonoids of *T. nilotica* have been previously investigated (*4-7*). The methanol extract of

Table 1. Plants tested for their antioxidant activity in this study

Plant name	Family	Parts used	Reported medicinal values
Tamarix nilotica	Tamaricaceae	Leaves and flowers	Antiseptic in traditional Egyptian medicine (*4*)
Ambrosia maritima	Asteraceae	Leaves	Hepatoprotective (*8*), Molluscicidal (*9*)
Zygophyllum coccenium	Zygophyllaceae	Leaves	Anidiarrheal (*10*), Antidiabetic (*11*)
Conyza dioscoridis	Asteraceae	Leaves and flowers	–
Chenopodium ambrosioides	Chenopodiaceae	Leaves and flowers	Trypanocidal (*12*), Antileishmania (*13*)
Calotropis procera	Asclepiadaceae	Leaves	Protection against acetaminophen induced liver damage (*14*)
Calotropis procera		Latex	Contractions of gastrointestinal smooth muscle (*15*)

Table 2. Antioxidant activity of aqueous methanol (80%) extracts[a] of different plants

Plant name (Plant part)	Type of assay		
	DPPH radical[b]	Superoxide anion[b]	Fe^{3+} chelation[c]
Tamarix nilotica (leaves)	73.13 ± 1.15	96.34 ± 0.83	79.30 ± 4.49
Tamarix nilotica (flowers)	89.34 ± 0.82	92.82 ± 3.88	79.56 ± 2.94
Ambrosia maritima (leaves)	–[d]	21.87 ± 1.52	60.24 ± 1.81
Zygophyllum coccenium (leaves)	–[d]	33.79 ± 2.19	22.63 ± 3.16
Conyza dioscoridis (leaves and flowers)	28.01 ± 0.69	93.98 ± 3.17	40.99 ± 3.19
Chenopodium ambrosioides (leaves and flowers)	–[d]	55.78 ± 1.10	73.73 ± 1.57
Calotropis procera (leaves)	–[d]	23.07 ± 7.59	84.13 ± 1.05
Calotropis procera (latex)	–[d]	–[d]	22.42 ± 3.33
n-propyl gallate	90.31 ± 0.24	91.2 ± 0.21	
EDTA			98.46

[a] Extract concentration used was 500 µg/mL. [b] Percent of radical scavenging activity. [c] Percent inhibition. [d] Insignificant results (< 20%).

T. nilotica have shown higher DPPH radical scavenging activity (51.5 ± 8.14%) than that of silymarin (40.4 ± 2.05%). Further work is underway to characterize the active principles acting as antioxidants in these promising plant extracts.

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