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Preliminary Anti-Oxidant Profile of Selected Medicinal Plants of Pakistan

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Abstract: In present study we carried out a systematic record of the relative anti-oxidant studies of some selected medicinal plants of Pakistani. Crude ethanolic extracts and various fractions of five plants namely *Stellaria media, Trifolium repens, Pteridium aquilinum, Urtica dioica and Nasturtium officinale* were evaluated for their antioxidant potential using DPPH radical scavenging assay. The result of DPPH radical scavenging assay of all the crude extracts and various fractions revealed that ethanolic crude extract of *P. aquilinum* at 100µg/ml exhibits the most powerful antioxidant activity of (93.97%) among the entire plants. The current investigation, suggest that medicinal plants of Pakistan used as a folk medicine for the treatment of various diseases contain antioxidant compounds which needs to explore.

Key words: Pakistani medicinal plants · Antioxidant assay

INTRODUCTION

Plants are natural source of producing large number of compounds in a most efficient way and with precise selectivity. Since the middle of the 19th century, different class of bioactive phytoconstituents have been isolated and characterized. Many of these are used as the active ingredients of the modern medicine, or as the *lead compounds* for new drugs discovery. Several plant derived medicines, are rich in phenolic compounds, such as those used in protection against coronary heart diseases and carcinogenesis [1-2]. *Stellaria media Linn* belongs to family Caryophyllaceae. It is a small shrub tall (20-30 cm), found in northern area of Pakistan as well as India. *S. media* is used as a fold medicine an astringent, carminative, anti-asthmatic, demulcent, depurative, diuretic, expectorant, emmenagogue and galactogogue. *S. media* is also used for kidney complications, inflammation in rheumatic joints, wounds and ulcers. *S. media* is also used in treatment of skin diseases, bronchitis, rheumatic pains, arthritis and period pain [3].

Trifolium repens belong to family Leguminosae. This genus is represented with 103 species in Turkey. Trakya, with 67 Trifolium taxa, would seem to be a centre of diversity. In Turkish it is used as a folk for the treatment of expectorant, analgesic, antiseptic and tonic also *Trifolium repens* are important feeding material for sheep and cattle in the Mediterranean [4].

Pteridium aquilinum belong to family Dennstaedtiaceae. *Pteridium aquilinum* is found in tropical regions. *Pteridium aquilinum* grow readily in the dry season. Among them, Manihot is economically the most important, because it is the basic green vegetable for people in many parts of sub-Saharan Africa such as Nigeria, Cameroon, Gabon, Democratic Republic of Congo (DRC), Uganda, Angola, etc. *Pteridium aquilinum* has used as a folk medicine to alleviate fever, headache, rheumatism and hemorrhoids [5].

Urtica dioica L belong to family Urticaceaeis a medicanal plant used throughout world for treatment of inflammatory disorders. Its has used as a anti-inflammatory therapeutic potential. The root extracts of its have also been studied clinically for treatment of benign prostatic hyperplasia. Also its worth to mention that the bioactive compound(s) responsible for these reported activities remains poorly [6]. *Nasturtium officinale* belong to family Brassicaceae is the most abundant source of gluconasturtiin. One hundred grams of fresh watercress leaves contained 43 mg of vitamin C, 4700 IU of vitamin A and 34 mg of R-tocopherol, Isothiocyanate concentrations

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in radish were influenced by day length in rutabaga and by season of cultivation in turnip (*Brassica rapa* L.) cultivars [7]. The current studies showed the antioxidant potential of medical plants of Pakistan.

MATERIALS AND METHODS

Plants Materials: The plant materials were collected during the spring season from different parts of the Northern Province (Khyber Pakhthunkhwa) of Pakistan in March, 2010 and were confirmed by Prof Dr. Farrukh Hussain, Department of Botany, University of Peshawar.

Extraction: The plant materials were dried in shade and then ground in a mortar. The powder plants materials were soaked in ethanol for three days and were then filtered using Whatt man filter paper (No 1). The filtrate was concentrated on rotary evaporator under reduced pressure to obtain a greenish gummy residue. The residue was suspended in water and fractioned with solvent of gradually increasing polarity profile starting from n-hexane, chloroform and ethyl acetate respectively as earlier discuss [8-11] and subsequently concentrating these fractions on rotary in vacuum yielding *n*-hexane, chloroform, ethyl acetate respectively. The dry residue and various fractions obtained was weighed and examined for their antioxidant potential.

Antioxidant Profiling: Antioxidant activity of the extract was performed according to standard protocol as earlier discuss [12-16]. Dry crude extracts/fractions (25 mg) were taken and dissolved in distilled methanol, diluted it to prepare solution of various concentration by dilution method. 4 ml of each solution was taken and 1 ml of 0.001 M of DPPH was added. The Hydrogen atom or electron donation abilities of the consequent extracts/fractions and standards were measured from the bleaching of the purple-colored methanol solution of 2,2-diphenyl-1-picrylhydrazyl (DPPH). All these solutions were kept in dark for 30 minutes. Also 5 ml methanol was taken and 1ml of DPPH solution was added, for control solution. At the end of the incubation period the mixtures were examined for the antioxidant activity at a wavelength of 517nm. Free radical scavenging abilities of the crudes/fractions were determined by measuring the change in absorbance of DPPH at 517nm, using the formula:

% DPPH Activity = Control –Crude Absorbance / Control x 100

RESULTS AND DISCUSSION

The crude ethanolic extract and its various solvent fractions of ten selected medicinal plants were tested for their free radical scavenging effect. The crude methanolic extract along with its solvent fractions of *Pteridium aquilinum* is presented in Figure 1. Crude ethanolic extract at tested concentrations of 10, 20, 40, 60, 80 and 100 ppm, exhibited a concentration dependant antioxidant effect. The percent antioxidant action of crude was 18.55, 30.55, 40.43, 64.22, 70.88 and 93.97 at tested concentrations of 10, 20, 40, 60, 80 and 100 ppm respectively. The free radicals scavenging effect of the crude was maximum as compared to remaining tested samples. The methanolic fraction showed moderate antioxidant effect with %DPPH activity of 12.99, 15.74, 29.71, 30.05, 36.06 and 39.30 at tested doses of 10, 20, 40, 60, 80 and 100 ppm respectively. The antioxidant potential of remaining fractions was not significant.

The antioxidant effect of crude ethanolic extract and various solvent fractions of *Stellaria media* are presented in Figure 1. A low to moderate effect was demonstrated by crude extract followed by various fractions. In case of ethanolic extract the percent DPPH free radical scavenging action was 13.17, 15.55, 18.55, 20.55, 26.88 and 40.97 at the tested concentration of 10, 20, 40, 60, 80 and 100 ppm respectively. The minimum antioxidant effect was exhibited by n-hexane fraction, while free radical scavenging effect of remaining fractions was moderate.

When the crude ethanolic extract and its various solvent fractions of *Trifolium repens* tested for its antioxidant capacity a low to moderate effect was observed as shown in Figure 1. The maximum antioxidant effect was exhibited by methanolic fraction with %DPPH action of 12.93, 22.74, 29.71, 30.05, 36.06 and 39.30 at tested concentration of 10, 20, 40, 60, 80 and 100 ppm respectively.

The crude ethanolic extract and its various solvent fractions of *Urtica dioica* exhibited low to moderate antioxidant potentials as presented in Figure 1. The maximum antioxidant effect was observed with ethanolic extract with percent effect 9.99, 11.12, 17.55, 25.55, 30.33 and 37.48 at the tested concentrations of 10.20, 40, 60, 80 and 100 ppm respectively. The effect of ethyl acetate was better than rest of tested samples.

When *Nasturtium officinal* was tested for its antioxidant capacity, maximum antioxidant effect was observed with ethyl acetate fraction. The percent free radicals scavenging effect was 7.22, 10.30, 15.02, 20.40,

Table 1: List of medicinal plants tested for antioxidant activity

S.no	Plant name	Family	Folk uses
01	*S. media*	Caryophyllaceae	Astringent, carminative, anti-asthmatic, diuretic.
02	*T. repens*	Leguminosae	expectorant, analgesic, antiseptic
03	*P. aquilinum*	Dennstaedtiaceae	Fever, headache, rheumatism and hemorrhoids
04	*U. dioica*	Urticaceae	Anti-inflammatory, prostatic hyperplasia.
05	*N. officinale*	Brassicaceae	diuretic, an expectorant and a digestive aid

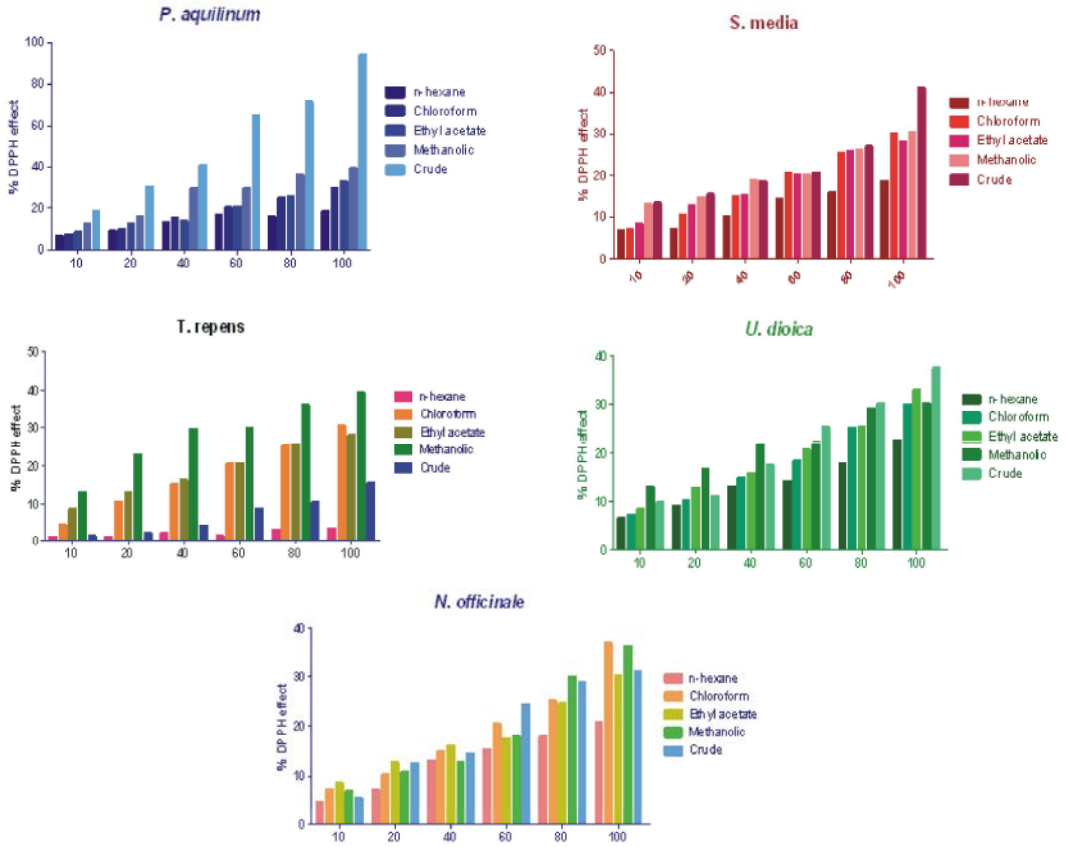

Fig. 1: Antioxidant activity of various plants at various concentrations

25.29 and 37.05 at the tested concentrations of 10.20, 40, 60, 80 and 100 ppm respectively. The effect of methanolic fraction was similar to ethyl fraction and rest of the samples were proved moderate antioxidant as presented I Figure 1.

It means that the DPPH radical scavenging property of 100 ppm solution of *Peridium aquilinum* (crude ethanol extract) is 93.975, which is a significant value and show the highest scavenging capacity. The DPPH radical scavenging assay of *Pterium aquilinum* revealed that it can decrease the harmful effects of the increased production of Reactive Oxygen Specie (ROS). It can prevent the oxidation of oxidizable substrates. Oxidizable substrate includes DNA, lipids, proteins and carbohydrates, which are essential building blocks of a biological system.

CONCLUSIONS

S. media, T. repens and P. aquilinum are rich source of antioxidant molecules, while rest of the plants are moderate source of antioxidant agents. It is strongly recommended through this research work that these tested plants should be used as antioxidant alone or in combination. The isolation of secondary metabolites from these natural medicines would be helpful in finding the mechanism underlying antioxidant.

Conflict of Interest Statement: We declare that we have no conflict of interest.

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