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Comparative antioxidative potential of aqueous and ethanolic *Barleria Gibsoni* dalz root extracts

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ABSTRACT

The medicinal plant Barleria gibsoni Dalz, family Apocynaceae, is a well-known traditional medicinal plant used in various system of medicines. It is spread all over India. The present study provides antioxidant capacity of aqueous and ethanolic root extracts of Barleria gibsoni Dalz, 2,2'-diphenyl-1-picrylhydrazyl (DPPH), nitrous oxide and hydrogen peroxide scavenger assays were used.

1. Introduction

Serious health risks are posed by free radicals, which are produced by a variety of cellular processes in the body and different sources in the environment. High concentrations of these free radicals compromise the body's antioxidant defense mechanism, destroying cellular macromolecules including proteins, lipids, and nucleic acids and either causing death of cells or mutations that result in out of control mobileular proliferation.[1–3] Oxidative stress develops once the cellular antioxidant system is compromised and becomes insufficient, causing a number of diseases. Antioxidants from outside sources are needed to supplement the body's own antioxidant defense system for better control of oxidative stress. Plants have been regarded as a key source of antioxidants due to their natural origins and therapeutic advantages.[4–6] Numerous plant phytochemicals have demonstrated antioxidant effects both in vitro and in vivo, including bioflavonoids, polyphenols, carotenoids, glutathione hydroxycinnamates, and vitamins. Today, oxidative stress-related disorders can be prevented and treated using these plant phytochemicals.[7–10]

Barleria gibsoni Dalz., (family Acanthaceae), about its 30 species have been found in India, many of which are known for their ornamental and/or medicinal uses. Herbs have traditionally been used to treat cataracts, ulcers, and fevers. The dried bark is used as a cough suppressant and the leaves are chewed to relieve toothache. Root paste is used to disperse boils and swollen glands.[11–14]

In the Current study, comparative antioxidant study of aqueous and ethanolic root extracts of *Barleria gibsoni* Dalz were reported.

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2. Materials and Methods

2.1. Collection and identification of plant material

B. gibsoni plants were collected from the Satara region of Maharashtra, India during May-June in full bloom. This plant was certified by Botanical Survey of India, Pune, Maharashtra, India. A copy of the specimen (BSI/WRC/Tech/2013/FAT 01 of 27 December 2013) is kept at the same institution's herbarium for further reference.

2.2. Extract preparation

The *B. gibsoni* roots were washed with tap water, air-dried at 35-40°C for 3-4 weeks at room temperature, ground to a coarse powder, and extracted with water and ethanol by soxhlet apparatus.[15]

2.3. Methods

2.3.1. DPPH Method

The ability of *B. gibsoni* extract to scavenge DPPH radicals was evaluated using a modification of the method of VarahalaraoVadlapudie et al., 2009[16]. Briefly, 200–1000 μg/mL aliquots of the extract were mixed with 3.0 mL DPPH (0.5 mmol/L in methanol). , the resulting absorbance was recorded at 517 nm after 30 min. Incubate at 37°C. A standard drug, ascorbic acid, was used.

2.3.2. Nitric oxide method

Nitric oxide radical scavenging was performed according to the method of KR. Nagulendran et al., 2007.[17] Sodium nitroprusside in aqueous solution at physiological pH spontaneously produces nitric oxide, which interacts with oxygen to produce nitrite ions. This can be determined using the Griess-Illosvoy reaction. 2 ml of 10 mM sodium nitroprusside in 0.5 ml phosphate buffered saline (pH 7.4) was mixed with 0.5 ml of various concentrations of extract and the mixture was incubated at 25° C. for 150 min. From the incubated mixture, 0.5 ml was removed and placed in 1.0 ml of sulfanilic acid reagent (33% in 20% glacial acetic acid) and incubated at room temperature. Finally, 1.0 ml of naphthylethylenediamine dihydrochloride (0.1% w/v) was mixed and incubated at room temperature for 30 minutes before measuring the absorbance at 540 nm with a spectrophotometer.

2.3.3. Hydrogen peroxide method[18]

Using ethanolic and aqueous extract of B. gibsoni roots, aliquots of 200–1000 g/mL of hydrogen peroxide (40 mM) were added to a 0.6 mL hydrogen peroxide solution with the already made phosphate buffer to measure the hydrogen peroxide radical scavenging activity (pH 7.4). The reaction mixtures were incubated for 10 minutes at room temperature. The reaction mixture was read at 230 nm against the blank solution using phosphate buffer after incubation (pH 7.4). Based on the following formula, the percentage of inhibition was calculated:

(A1-A2)/A1 x 100 = percentage of inhibition

Where A1 is the H2O2's absorbance

The reaction mixture's A2 is absorbance with extract

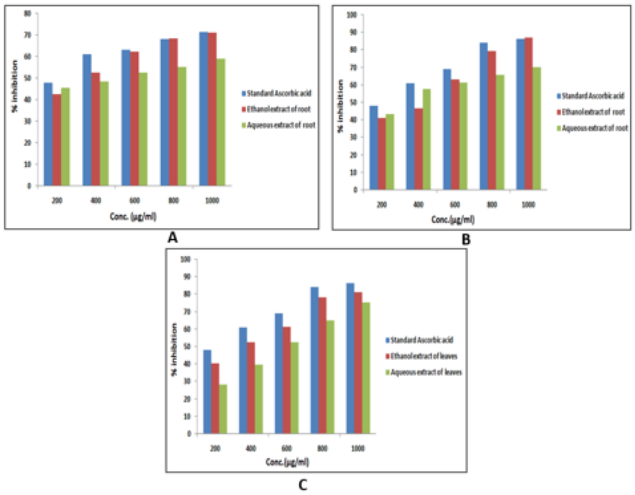

Fig. 1: Graphical comparative antioxidative potential, A: Antioxidant activity of root extract of *B. gibsoni* by DPPH, B: Antioxidant activity of root extract of *B. gibsoni* by Nitric oxide, C: Antioxidant activity of root extract of *B. gibsoni* by H_2O_2

3. Results and Discussion

Antioxidant activity was analyzed by various in vitro assays. DPPH radicals were used as substrates to evaluate the radical-scavenging activity of ethanol and aqueous extracts. Table 1 shows the significant reduction in DPPH radical concentration due to the scavenging capacity of *Barleria gibsoni* extract. Ascorbic acid was used as standard. The DPPH radical scavenging effect of *Barleria gibsoni* ethanol extract was 71.26% at a concentration of 1000 μg/ml. Table 2 shows the percent inhibition of nitric oxide production by ethanolic and aqueous *Barleria gibsoni* root extracts. Ascorbic acid was used as a reference compound. Table 3 shows the H_2O_2 scavenging activity of 1000 μg/ml ethanolic extract of *Barleria gibsoni* extract compared to 1000 μg/ml ascorbic acid. The percentage of H2O2 scavenging activity of roots and ascorbic acid was found to be 87.29 and 86.33, respectively. These results indicated that the extract had a marked effect on the scavenging of free radicals. Shows significant antioxidant activity. This antioxidant activity may be due to phenolic compounds in the root extract of *Barleria gibsoni.*

4. Conclusion

The antioxidant activities of *Barleria gibsoni* root extracts and standard compounds were compared using specific

Table 1: Antioxidant study by DPPH method

Sr. No	Conc.(μg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanol extract of root	Aqueous extract of root
1.	200	48.03 ± 0.99	42.59 ± 0.65	45.68 ± 0.51
2.	400	61.28 ± 0.91	52.59 ± 0.53	48.48 ± 0.61
3.	600	63.24 ± 0.99	62.26 ± 0.62	52.57 ± 0.58
4.	800	68.32 ± 1.02	68.58 ± 0.66	55.26 ± 0.54
5.	1000	71.33 ± 0.98	71.26 ± 0.56	59.25 ± 0.51

Table 2: Antioxidant study by nitric oxide scavenging method

Sr. No.	Conc.(μg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanol extract of root	Aqueous extract of root
1.	200	42.06 ± 0.99	38.37 ± 0.62	61.28 ± 0.58
2.	400	59.24 ± 0.91	42.26 ± 0.61	67.59 ± 0.60
3.	600	68.26 ± 0.99	56.58 ± 0.64	70.24 ± 0.62
4.	800	74.36 ± 1.02	65.01 ± 0.68	73.59 ± 0.64
5.	1000	76.35 ± 0.98	69.19 ± 0.78	74.26 ± 0.68

Table 3: Antioxidant study by hydroxyl radical scavenging method

Sr. No.	Conc.(μg/ml)	% Inhibition		
		Standard Ascorbic acid	Ethanol extract of root	Aqueous extract of root
1.	200	48.05 ± 0.99	41.29 ± 0.64	43.2 ± 0.45
2.	400	61.21 ± 0.91	46.57 ± 0.48	57.89 ± 0.47
3.	600	69.25 ± 0.99	63.28 ± 0.43	61.25 ± 0.48
4.	800	84.34 ± 1.02	79.26 ± 0.40	65.64 ± 0.43
5.	1000	86.33 ± 0.98	87.29 ± 0.34	70.26 ± 0.44

in vitro methods, namely DPPH, nitric oxide, and H_2O_2 activities. The results showed a better rate of inhibition of *Barleria gibsoni* antioxidant activity by ethanol compared to *Barleria gibsoni* aqueous extract.

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6. Conflicts of interest

The authors declare no conflicts of interest.

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