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Free Radical Scavenging Activity of *Barleria gibsoni* Dalz Stem Extracts

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ABSTRACT

Barleria gibsoni Dalz medicinal plant belonging to the family Acanthaceae is a well-known traditional medicinal plant used in various indigenous systems of medicine. It is widely distributed throughout India. The present study provides Free radical scavenging activity and antioxidative potential of aqueous and ethanolic stem extracts of *Barleria gibsoni* Dalz was carried out by 2, 2'-diphenyl-1-picrylhydrazyl (DPPH) , Nitrous oxide and Hydrogen peroxide radical scavenging assay methods.

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INTRODUCTION:

Free radicals or reactive oxygen species (ROS) generated from various sources in the environment as well as from cellular processes in the body are of serious health challenges. Overwhelming levels of these free radicals disrupt the antioxidant defense system in the body thereby damaging cell membranes and cellular macromolecules such as proteins, lipids and nucleic acids leading to cell death or causing mutations leading to uncontrolled cell division.[1-3]

Once the cellular antioxidant system is disrupted and becomes deficient, oxidative stress emerges thereby promoting several diseases such as diabetes, atherosclerosis, cancer, cardiovascular diseases, etc. Better management of oxidative stress requires antioxidants from external sources to supplement the body's antioxidant defense system. Because of their natural origin and therapeutic benefits, plants have been considered as a major source of antioxidants.[4-6]

Many plants contain phytochemicals such as, bioflavonoids polyphenols, carotenoids, glutathione hydroxycinnamates and vitamins have shown to possess antioxidant properties *in-vitro* and *in-vivo*. These plant phytochemicals are now been used in the prevention and management of oxidative stress-related diseases. [7-10]

Barleria gibsoni Dalz (common name: Neel-koranti; synonyms: Barleri; Marathi: Gura; belongs to the family Acanthaceae. It is Grows on hill top and open places. The herb has been traditionally used for the treatment of cataracts, ulcer, and fever. The dried bark is used in cough treatment and the leaves chewed to relieve toothache. [11-14]

In the present study, Free radical scavenging activity and antioxidative potential of aqueous and ethanolic stem extracts of *Barleria gibsoni* Dalz is reported.

MATERIALS AND METHODS:

Collection and Identification of plant material

*B. gibsoni*plants were collected during the month of May-June when full of flowering, from Satara region, Maharashtra, India. The plant was authenticated by Botanical survey of India, Pune, Maharashtra, India. A voucher specimen (BSI/WRC/Tech/2013/FAT 01 dated 27th December, 2013) has been deposited at the herbarium of same place for further reference.

Extract preparation

The collected stem of *B. gibsoni* was washed with tap water, air-dried at room temperature for 3-4 weeks at 35-40ºC and then reduced to coarse powder subjected for aqueous and ethanol extraction using Soxhlet apparatus.[15]

METHODS:

1) DPPH radical scavenging activity

The ability of *Barleria gibsoni* extracts to scavenge DPPH radical was assessed using VarahalaraoVadlapudiet al.,2009 method with modification.[16]

2) Nitric oxide free radical scavenging activity

Nitric oxide radical scavenging was carried out as per the method of KR. Nagulendran et al., 2007.[17]

3) Hydrogen peroxide radical scavenging activity

Hydrogen peroxide radical scavenging was carried out as per the method of Yu, et al., 2007. [18]

RESULTS AND DISCUSSION:

RESULTS:

Table No. 1: *In-vitro* free radical scavenging activity of aqueous and ethanolic stem extracts of *Barleria gibsoni* by DPPH method

Sr. No	Conc.(µg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanol extract of stem	aqueous extract of stem
1.	200	48.03 ± 0.99	53.89 ± 0.91	40.29 ± 1.23
2.	400	61.28 ± 0.91	61.66 ± 0.94	41.26 ± 1.24
3.	600	63.24 ± 0.99	77.76 ± 0.96	51.27 ± 1.11
4.	800	68.32 ± 1.02	82.28± 0.98	55.29 ± 0.96
5.	1000	89.79 ± 0.99	71.33 ± 0.98	63.29 ± 0.98

Values were expressed as mean ± SD Table 1 indicates at concentration 200-1000 µg/ml was effective in inhibiting DPPH as dose-dependant manner. The maximum inhibition 71.33 % at the conc. of 1000 µg/ml was observed from ethanolic extract of *Barleria gibsoni.*

Table No. 2: *In-vitro* free radical scavenging activity of aqueous and ethanolic leaves extracts of *Barleria gibsoni* by Nitric oxide scavenging method

Sr. No.	Conc.(µg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanol extract of stem	aqueous extract of stem
1.	200	42.06 ± 0.99	48.92 ± 0.91	46.25 ± 0.89
2.	400	59.24 ± 0.91	56.23 ± 0.92	59.28 ± 0.94
3.	600	68.26 ± 0.99	62.76 ± 0.94	66.25 ± 0.91
4.	800	74.36 ± 1.02	66.19 ± 0.94	71.29 ± 0.93
5.	1000	76.35 ± 0.98	70.19 ± 0.91	76.29 ± 0.91

Values were expressed as mean ± SD Table 3 indicates at concentration 200-1000 µg/ml was effective in inhibiting Nitric oxideas dose-dependant manner. The maximum inhibition 76.29 % at the conc. of 1000 µg/ml was observed from aqueous extract of *Barleria gibsoni.*

Table No. 3: *In-vitro* free radical scavenging activity of aqueous and ethanolic leaves extracts of *Barleria gibsoni* by Hydroxyl radical scavenging method

Sr. No.	Conc.(µg/ml)	% Inhibition		
		Standard Ascorbic acid	Ethanol extract of stem	Aqueous extract of stem
1.	200	48.05 ± 0.99	26.59 ± 0.91	30.25 ± 0.97
2.	400	61.21 ± 0.91	33.69 ± 0.99	32.40 ± 0.98
3.	600	69.25 ± 0.99	45.59 ± 0.98	36.58 ± 0.99
4.	800	84.34 ± 1.02	53.65 ± 0.99	48.58 ± 1.01
5.	1000	86.33 ± 0.98	65.26 ± 0.99	61.59 ± 1.08

Values were expressed as mean ± SD Table 2 indicates at concentration 200-1000 µg/ml was effective in inhibiting H_2O_2as dose-dependant manner. The maximum inhibition 65.26 % at the conc. of 1000 µg/ml was observed from ethanolic extract of *Barleria gibsoni.*

DISCUSSION:

The antioxidant activity of *Barleria gibsoni stem* extract and standard compounds were compared by using specific *in vitro* methods (Table 1-3).

The antioxidant activity wasanalyzed by various *in vitro* assays. DPPH radical was used as a substrate to evaluate free radical scavenging activities of ethanol and aqueous extract. Table 1 illustrates a significant decrease in the concentration of DPPH radical due to the scavenging ability of extracts of *Barleria gibsoni.* Ascorbic acid was used as standard. The scavenging effect of ethanol extract of *Barleria gibsoni* on the DPPH radical was 71.33%, at a concentration of 1000 µg/ml. Table 2 illustrates the percentage inhibition of nitric oxide generation by ethanol and aqueous stem extract of *Barleria gibsoni*. Ascorbic acid was used as a reference compound.

Table 3 shows the H_2O_2 scavenging activity by 1000 µg/ml of ethanol extract of *Barleria gibsoni* extract and comparison with 1000 µg/ml of ascorbic acid. The percentage of H_2O_2 scavenging activity of stem and ascorbic acid was found as 65.26 and 86.33 respectively. These results indicated that extract has a noticeable effect on scavenging the free radicals. On the basis of the results of this study, ethanol extract has significant antioxidant activity compared to aqueous extract in vitro by DPPH assay. This antioxidant activity may be due to phenolic compounds present in stem extract of *Barleria gibsoni*.

CONCLUSION:

The antioxidant activity of stem extract of *Barleria gibsoni* and standard compounds were compared by using specific *in-vitro* methods viz, DPPH, nitric oxide and H_2O_2 activity. Results showed the percentage inhibition of antioxidant activity by ethanol of *Barleria gibsoni* were good compared to and aqueous stem extract of *Barleria gibsoni*. Ascorbic acid was used as a reference compound.

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