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COMPARATIVE EVALUATION OF ANTIOXIDANT POTENTIAL OF DIFFERENT PARTS OF *BARLERIA GIBSONI* DALZ

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ABSTRACT

We investigated the antioxidant activity of various parts (leaves, stem and root) of *Barleria gibsoni* by DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay. The activity of ethanolic and aqueous extracts of the leaves, stem and root were evaluated at concentrations of 200-1000 µg/ml using ascorbic acid as a standard. The antioxidant activity of all extracts was dose-dependent. Of the leaf extracts, the ethanolic extract had the greatest scavenging activity, with 85.79% inhibition at 1000 µg/ml, followed by the aqueous extract. Similarly, stem extracts also had good antioxidant activity, with the ethanolic extract showing the highest inhibition of 89.79% at 1000 µg/ml, higher than that of the leaf extracts. On the other hand, root extracts showed lower activity with a maximum inhibition of 71.26% for the ethanolic extract. In general, ethanolic extracts exhibited higher antioxidant activity than aqueous extracts in all plant parts, suggesting that ethanol is more effective in the extraction of active compounds. The results indicate that *Barleria gibsoni*, especially its stem and leaves, are a valuable source of antioxidant compounds and can be potentially used in nutraceutical and pharmaceutical products.

KEYWORDS: *Barleria gibsoni*, Acanthaceae, Antioxident, DPPH.

INTRODUCTION

Oxidative stress happens when theres an imbalance between radicals and antioxidants in our body. This imbalance is linked to chronic diseases like cancer, heart diseases, diabetes and neurodegenerative diseases.[1-3] Free radicals can damage our cells leading to disease. Antioxidants help neutralize these radicals and prevent damage. Antioxidants from plants are of interest because they are safe, effective and have low toxicity.[4-6]

These plant-derived antioxidants, such as flavonoids, phenolic acids, tannins and alkaloids play a role in the effectiveness of herbal medicines. We often use tests like the DPPH assay to check how well these antioxidants work.[7-11]

Barleria gibsoni, an herb has been used in traditional medicine for a long time. Some Barleria species have antiinflammatory, antimicrobial and antioxidant properties. However, there's research on the antioxidant activity of Barleria gibsonis different parts and the best solvents to use for extraction.[12-15]

This study aims to evaluate the potential of *Barleria gibsoni* is leaf, stem and root extracts using the DPPH radical scavenging method. We also compare the activity of ethanolic and aqueous extracts to find the best solvent for extracting antioxidant compounds. The goal is to discover natural antioxidant resources and explore *Barleria gibsoni* potential use, in nutraceuticals and pharmaceutical industries. This could lead to the development of products that promote health and wellness.

MATERIALS AND METHODS

Collection and Identification of plant material

Barleria gibsoni plant material was collected from appropriate natural habitats in and around Kolhapur district, Maharashtra, India, in the flowering season for identification. The disease-free parts of the plant such as

leaves, stems and roots were selected and washed thoroughly to remove dirt, dust, and other contaminants. The specimen was identified and authenticated by the Botanical Survey of India, Pune by comparing the morphological characters with the standard floristic literature. The voucher specimen of the plant was prepared, labeled and kept in the herbarium of the same institution for future reference (BSI/WRC/Tech/2013/FAT 01 dated 27th December 2013). Once authenticated, the plant materials were thoroughly washed with distilled water, shade dried at room temperature and powdered in a mechanical grinder. The powder was stored in airtight bottles under proper conditions, for further extraction and experimentation.

Extract preparation

The Leaves, stems and Roots of *Barleria gibsoni* were cleaned with tap water to remove any dirt and then air dried at room temperature (35-40°C) for 3-4 weeks. The sample was powdered in a powdering machine. The drug powder was then extracted successively with water and ethanol in Soxhlet apparatus.[16-18]

Methods

DPPH radical scavenging activity

The antioxidant activity of *Barleria gibsoni* extracts was determined using the DPPH assay with some modifications of the method described by Varahalarao Vadlapudi et al. (2009). We prepared a 0.1 mM solution of DPPH in methanol, and stored the solution in a dark place to avoid its degradation. We then prepared varying concentrations (10-100 µg/mL) of the extracts in methanol. A 1.0 mL solution of DPPH was mixed with 1.0 mL of the sample, vortexed thoroughly and left to stand in dark at room temperature (25 ± 2°C) for 30 min (the control was DPPH solution mixed with methanol). The absorbance was measured at 517 nm on a UV-Visible spectrophotometer with methanol as blank, and the decrease in absorbance was determined as the percentage of DPPH radicals scavenged by the extracts.[19]

RESULTS

The DPPH free radical scavenging activity of the leaves, stem and root extracts of *Barleria gibsoni* is shown in Tables 1-3 and Figures 1-3. The percentage inhibition of all extracts increased with increasing concentrations (200-1000 µg/ml), indicating potent free radical scavenging activity. The study showed considerable antioxidant activity of various parts of *Barleria gibsoni* as determined by DPPH free radical scavenging assay.

Table 1: Antioxidant activity of leaves extract of *Barleria gibsoni* by DPPH activity.

Sr. No	Conc.(µg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanolic leaves extract	Aqueous leaves extract
1.	200	47.03 ± 0.98	52.89 ± 0.93	41.65 ± 0.91
2.	400	60.28 ± 0.90	66.66 ± 0.99	52.36 ± 0.94
3.	600	63.24 ± 0.98	74.76 ± 1.03	53.25 ± 0.94
4.	800	68.32 ± 1.02	81.28 ± 1.10	61.15 ± 0.96
5.	1000	71.33 ± 0.98	85.79 ± 1.10	66.34 ± 0.98

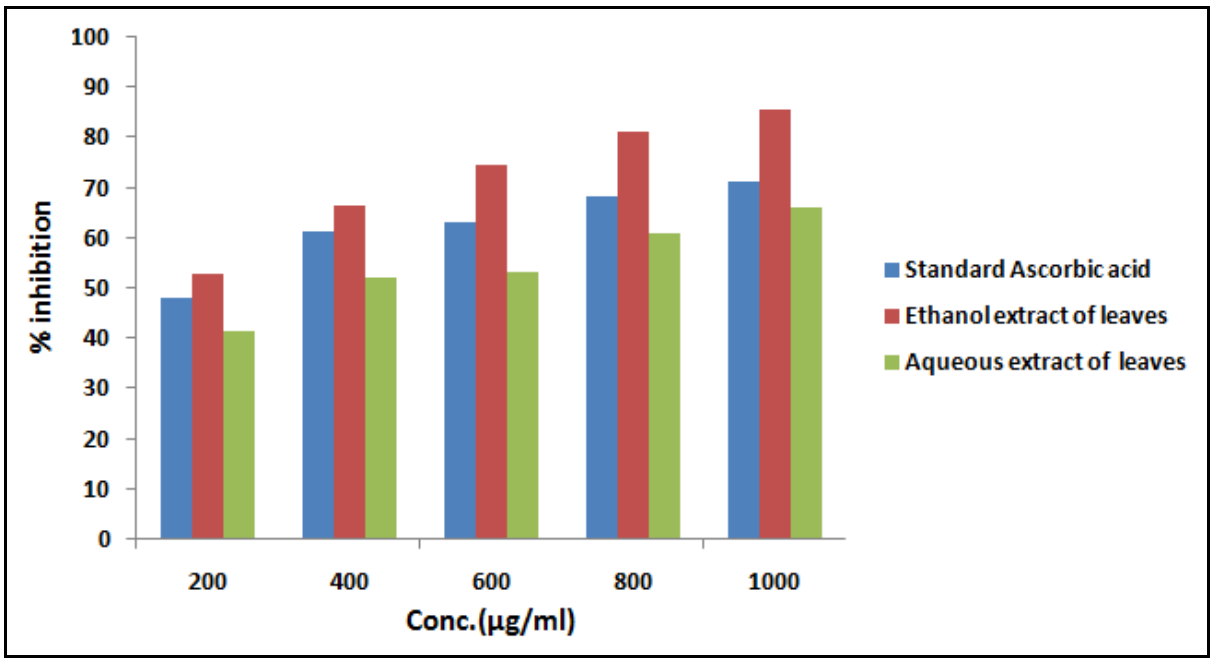

Figure 1: DPPH radical scavenging activity of leaves extract of *Barleria gibsoni.*

Table 2: Antioxidant activity of stem extract of *Barleria gibsoni* by DPPH activity.

Sr. No	Conc.(µg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanolic stem extract	Aqueous stem extract
1.	200	47.03 ± 0.98	53.89 ± 0.91	40.29 ± 1.23
2.	400	60.28 ± 0.90	61.66 ± 0.94	41.26 ± 1.24
3.	600	63.24 ± 0.98	77.76 ± 0.96	51.27 ± 1.11
4.	800	68.32 ± 1.02	82.28± 0.98	55.29 ± 0.96
5.	1000	71.33 ± 0.98	89.79 ± 0.99	63.29 ± 0.98

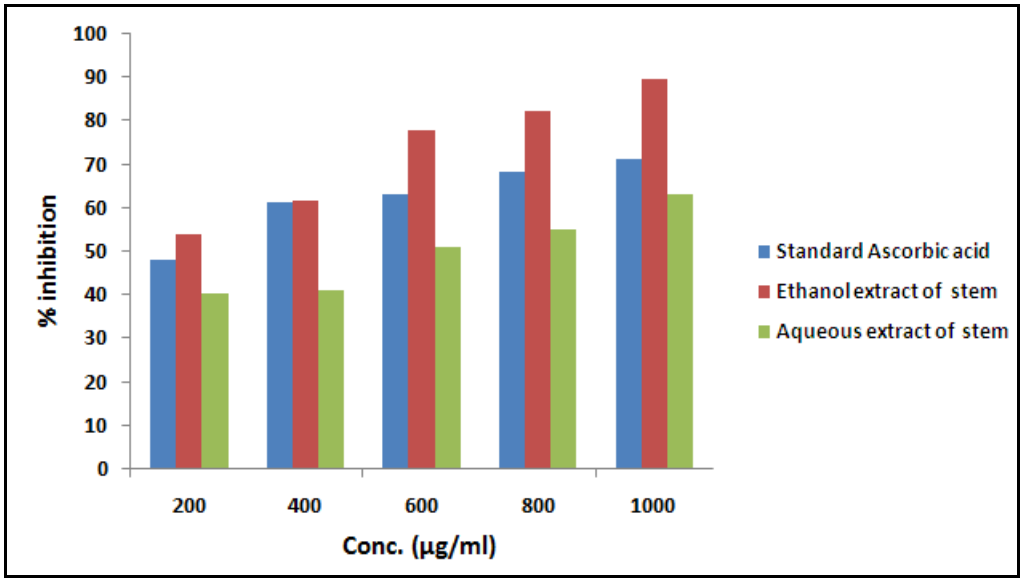

Figure 2: DPPH radical scavenging activity of stem extract of *Barleria gibsoni.*

Table 3: Antioxidant activity of root extract of *Barleria gibsoni* by DPPH activity.

Sr. No.	Conc.(µg/ml)	% inhibition		
		Standard Ascorbic acid	Ethanolic root extract	aqueous root extract
1.	200	47.03 ± 0.98	42.59 ± 0.65	45.68 ± 0.51
2.	400	60.28 ± 0.90	52.59 ± 0.53	48.48 ± 0.61
3.	600	63.24 ± 0.98	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

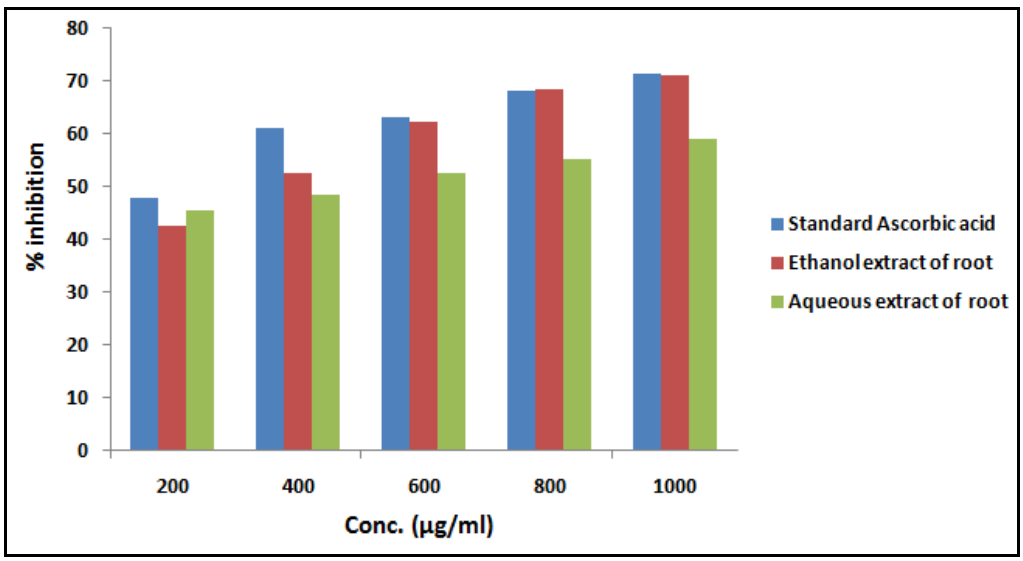

Figure 3: DPPH radical scavenging activity of root extract of *Barleria gibsoni.*

DISCUSSION

The findings demonstrate a concentration-dependent increase in percentage inhibition (200-1000 µg/ml) in all the extracts, which is a key characteristic of compounds that are able to donate hydrogen atoms or electrons to free radicals. The extracts made with ethanol showed antioxidant activity than those made with water. This means ethanol is better at pulling out helpful plant compounds like flavonoids, phenolic acids and tannins that fight antioxidants. These compounds dissolve easily in ethanol which might explain why ethanol extracts work better. When looking at parts of the plant the stem extract worked the best (it stopped 89.79% of oxidation at 1000 µg/ml) followed by the leaves (85.79%) and then the roots (71.26%). This could be because the stem and leaves have more of the compounds that help fight stress. The root extract did not work well possibly because it has fewer of these helpful compounds. The extracts worked well though not well as ascorbic acid, which shows that Barleria gibsoni has a lot of natural antioxidants. The fact that the activity increases with the dose also confirms that the test is valid and that the plant has potential. In conclusion Barleria gibsoni, its stem and leaves is a good source of natural antioxidants. This suggests it could be used to make preparations, nutraceuticals or even pharmaceutical drugs to fight diseases caused by oxidative stress. More research is needed to find out what the active compounds are and to test the plants effects, in living organisms.

CONCLUSION

The results of the present study confirm that *Barleria gibsoni* has potent antioxidant activity, as shown by the antioxidant assay based on free radical scavenging activity of DPPH. A dose-dependent free radical scavenging was observed in all the extracts, suggesting good hydrogen-donating ability. The ethanolic extracts were found to be more active than the aqueous extracts, indicating that ethanol was more effective in extracting active phytoconstituents. The stem showed the highest activity followed by leaves and roots. This effect was maximum at the concentration of 1000 µg/ml, with the stem extract being the most potent. This suggests that the antioxidant activity of *Barleria gibsoni* depends on the part of the plant and solvent used for extraction. In conclusion, the findings indicate that *Barleria gibsoni*, especially the stem and leaves, can be a potential source of antioxidants. This suggests it can be used in the preparation of nutraceuticals and herbal products for the treatment of oxidative stress-related diseases. Isolation of active compounds and in vivo assessment need to be carried out to establish its efficacy as a therapeutic agent.

Source of Funding

None.

Conflict of Interest

None.

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