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Comparative pharmacological evaluation of various parts of *Barleria prionitis* Linn. (Vajradanti): An indigenous Plant of India

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Abstract
Barleria prionitis Linn. Commonly known as Vajradanti in Hindi and Porcupine in English belongs to family Acanthaceae is native of Southern Asia, India and China. The plant or its specific parts (root, stem, leaf, bark, flower and seed) is used in the treatment of toothache, catarrhal affections, whooping cough, inflammations, glandular swellings, urinary infection, jaundice, fever, gastrointestinal disorders and as diuretic and tonic. The plant is popular in Indian traditional medicine and as such provides good to develop herbal drug preparation to be used as phyto medicine. International criteria for standardization of a herbal material as phyto medicine include morphological, microscopical and physic-co chemical examination of raw material to guarantee its authenticity. Thus, the present paper aims at setting the pharmacognostical evaluation of various parts to establish quality control parameter for the raw material. The data obtained in present study will serve as valuable tool for identification, authentication and detection of adulterants, standardization and quality control of the plant *Barleria prionitis* Linn.

Keywords: *Barleria prionitis* linn, pharacognosy, flowers, standardization parameters

Introduction
The systematic study of flora traditional uses has led to the identification of plant species with bioactive compounds that could eventually developed as new drugs. Among the quality control parameters of medicinal plants recommended by WHO the visual macroscopy and microscopic verification are very essential. Since the macroscopic verification of botanicalsare most subjective and substitutes or adulterant exit which closely related, therefore anatomical studies are important. The microscopic examination compares the diagnostic tools in correct identification of botanicals [1]. Herbal medicine is a triumph of popular therapeutic diversity. Almost in all traditional medicine, the medicinal plants play a major role and constitute the backbone for the same.[2] In order to make sure the safe use of these medicines, a necessary first step is the establishment of standards of quality, safety and efficacy [2-3]. *Barleria prionitis* is a perennial plant and is a shrub with yellow flowers and two flat seeds shielded with matted hairs, inhabit most parts of India. Various parts of the plant such as leaves, roots, aerial parts, flowers, and stems are used in the traditional system of medicine. Conventionally, various infusions are prepared using the plant parts and utilized for the treatment of different kinds of diseases. Owing to its incredible odontalgic property, it is extensively used in treating bleeding gums and toothache. From the pharmacological point, the plant has been effectively screened for antibacterial, antifungal, antiviral, anti-inflammatory, antifertility, antioxidant, enzyme inhibitory, hepatoprotective, antihypertensive, anticancer, and anticataract activities. Compounds such as tannins, saponins, glycosides, phenolic acids, phytosterols, and terpenes have been identified in the plant. The plant contains some specific compounds such as barlenoside, barlerine, acetylbarlerine, and balarenone and some common secondary metabolites such as lupeol, Î²-sitosterol, vanillic acid, and syringic acid. Keeping these facts in consideration the present work was undertaken to reveal the standardization parameters of various parts of *Barleria prionitis* Linn [4-7].

Morphology
The morphological features of various parts of *Barleria prionitis* Linn. are discussed as below: Flower: Solitary or in cymose clusters in the lower axils, subsessile; golden yellow-orange. Flowering from November-January. Fruit: An ovoid capsule, beaked; seeds 2, suborbicular, appressed hairy. Fruiting January onwards. Field tips: Bracts spine tipped; upper leaves almost sessile, with axillary spines.Leaf Arrangement: Opposite-decussate. Leaf Type: Simple. Leaf Shape: Ovate-obovate. Leaf Apex: Obtuse or acute. Leaf Base: Attenuate.Leaf Margin: Ciliat, Root: Tap root [8-10]

Material and Methods
Collection of herbs and their authentication
The root, stem, leaves and flowers of *Barleria prionitis* Linn. Were collected in the months of July-September 2020 from the various local sites of Malwa region of Madhya Pradesh and identified & authenticated by Dr. S. N. Dwivedi, Retd. Prof. and Head, Department of Botany, Janata PG College, A.P.S. University, Rewa, (M.P.) and was deposited in our Laboratory. Voucher specimen no. J/Bot/2020-BPRSLF-014, 015, 016 & 017 was allotted.

Pharmacognostical Evaluation [11-14]

Macroscopic studies

The macroscopy of different parts of the plant such as color, odor, size, shape, taste, surface characters and fractures were carried out.

Physicochemical Evaluation

The dried parts were subjected to standard procedure for the determination of various physicochemical parameters.

Determination of foreign organic matter (FOM)

Accurately weighed 100 g of the drug sample and spread it out in a thin layer. The foreign matter should be detected by inspection with the unaided eye or by the use of a lens (6X). Separate and weigh it and the percentage present was calculate. The results are given in Table no. 15.

Determination of moisture content (LOD)

Place about 10 g of drug (without preliminary drying) after accurately weighing in a tared evaporating dish and kept in oven at 105^0 C for 5 hours and weigh. The percentage loss on drying with reference to the air dried drug was calculated.

Determination of ash value

The determination of ash values is meant for detecting low-grade products, exhausted drugs and sandy or earthy matter. It can also be utilized as a mean of detecting the chemical constituents by making use of water-soluble ash and acid insoluble ash.

Total ash

Accurately about 3 gms of air dried powder was weighed in a tared silica crucible and incinerated at a temperature not exceeding 450^0C until free from carbon, cooled and weighed and then the percentage of total ash with reference to the air dried powdered drug was calculated. The percentage of total ash with reference to the air-dried drug was calculated.

Acid insoluble ash

The ash obtained in the above method was boiled for 5 minutes with 25ml of dilute HCl. The residue was collected on ash less filter paper and washed with hot water, ignited and weighed. The percentage of acid insoluble ash was calculated with reference to the air dried drug.

Water soluble ash

The ash obtained in total ash was boiled for 5 minutes with 25 ml of water. The insoluble matter was collected on an ash less filter paper, washed with hot water and ignited to constant weight at a low temperature. The weight of insoluble matter was subtracted from the weight of the ash. The difference in weights represents the water soluble ash. The percentage of water soluble ash with reference to the air dried drug was calculated.

Determination of swelling index

Swelling index is determined for the presence of mucilage in the seeds. Accurately weigh 1 g of the seed and placed in 150 ml measuring cylinder, add 50 ml of distilled water and kept aside for 24 hours with occasional shaking. The volume occupied by the seeds after 24 hours of wetting was measured.

Determination of extractive value

This method determines the amount of active constituents extracted with solvents from a given amount of medicinal plant material. It is employed for materials for which as yet no suitable chemical or biological assay exists.

Cold Maceration

Place about 4.0g of coarsely powdered air-dried material, accurately weighed, in a glass-stoppered conical flask. Macerate with 100ml of the solvent specified for the plant material concerned for 6 hours, shaking frequently, then allow to stand for 18 hours. Filter rapidly taking care not to lose any solvent, transfer 25 ml of the filtrate to a tared flat-bottomed dish and evaporate to dryness on a water bath. Dry at 105°C for 6 hours, cool in a desiccator for 30 minutes and weigh without delay. Calculate the content of extractable matter in mg per g of air dried material. For ethanol-soluble extractable matter, use the concentration of solvent specified in the test procedure for the plant material concerned; for water-soluble extractable matter, use water as the solvent.

Successive Extraction of selected herbs

Sample were shattered and screened with 40 mesh. The shade dried coarsely powdered plant material (250gms) were loaded in Soxhlet apparatus and was extracted with petroleum ether (60-62°C), Chloroform, ethanol and water until the extraction was completed. After completion of extraction, the solvent was removed by distillation. The extracts were dried using rotator evaporator. The residue was then stored in dessicator and percentage yield were determined.

Preliminary phytochemical screening of extracts

The various extract obtained after extraction were subjected for phytochemical screening to determine the presence of various phytochemical present in the extracts. The standard procedures were adopted to perform the study.

Tests for carbohydrates

Molisch's test

To the Sample 2-3 drops of 1% alcoholic - napthol solution and 2 ml of conc. sulphuric acid was added along the sides of the test tube. Appearance of purple to violet ring at the junction of two liquids shows the presence of carbohydrates.

Fehling test

To the sample add fehling reagent, appearance of brick red precipitate shows presence of carbohydrates.

Test for glycosides

Legal's test

To the sample add 1 ml of pyridine and few drops of sodium nitropruside solutions and then it was made alkaline with sodium hydroxide solution. Appearance of pink to red colour shows the presence of glycosides.

Borntrager's test

Sample was treated with chloroform and then the chloroform layer was separated. To this equal quantity of dilute ammonia

solution was added. Ammonia layer acquires pink color, showing the presence of glycosides.

Baljet's test
To the sample add picric acid, orange color shows presence of glycosides.

Test for alkaloids
A small portion of the sample was stirred separately with few drops of dilute hydrochloric acid and was tested with various reagents for the presence of alkaloids. The reagents are

- Dragendroff's reagent - Reddish brown precipitates
- Wagner;s reagent - Reddish brown precipitates
- Mayer's reagent - Cream color precipitates
- Hager's reagent - Yellow color precipitate

Test for proteins and free amino acids
Small quantities of the sample was dissolved in few ml of water and treated with following reagents.

- Million's reagent: Appearance of red color shows the Presence of protein and free amino acid.
- Ninhydrin reagent: Appearance of purple color shows the Presence of Proteins and free amino acids.
- Biuret's test: Equal volumes of 5% sodium hydroxide solution & 1% copper sulphate solution was added. Appearance of pink or purple color shows the presence of proteins and amino acids.

Test for tannins and phenolic compounds
A small quantity of the sample was taken separately in water and test for the presence of phenol compounds and tannins was carried out with the following reagents.

- Dilute Ferric chloride solution (5%) - Blue color or green color
- 10% lead acetate solution - White precipitates

Test for flavonoids
Alkaline reagent test
To the test solution add few drops of magnesium hydroxide solution, intense yellow colour is formed which turns to colourless on addition of few drops of dilute acid indicates presence of flavonoids.

Shinoda's test
Small quantities of the sample was dissolved in alcohol, to them piece of magnesium followed by conc. hydrochloric acid drop wise added and heated. Appearance of pink, crimson red, green to blue color shows the presence of flavonoids**.**

Tests for fixed oils and fats
Spot test
A small quantity of sample was separately pressed between two filter papers. Appearance of oil stain on the paper indicates the presence of fixed oil.

Saponification test
Few drops of 0.5 N alcoholic potassium hydroxide were added to a small quantity of sample along with a drop of phenolpthlein, the mixture was heated on a water bath for 1-2 hours, formation of soap or partial neutralization of alkali indicates the presence of fixed oils and fats.

Tests for steroids and triterpenoids
Libermann-burchard test
Treat the sample with few drops of acetic anhydride, boil and cool. Then add con. sulphuric acid from the side of test tube, brown ring is formed at the junction two layers and upper layer turns green which shows presence of steroids and formation of deep red colour indicates presence of triterpenoid.

Salkowski test
Treat the sample with few drop of conc. sulphuric acid, red colour at lower layer indicates presence of steroids and formation of yellow coloured lower layer indicates presence of triterpenoids.

Test for mucilage and gums

- Small quantities of sample was added separately to 25 ml of absolute alcohol with constant stirring and filtered. The precipitates was dried in oil and examined for its swelling property for the presence of gum and mucilage.
- To the sample add ruthenium red solution, pink color shows presence of mucilage.

Test for waxes
To the test solution add alcoholic alkali solution, waxes get saponified.

Results and Discussion
The root, stem, leaves and flowers of *Barleria prionitis* Linn. Were collected from local sites of Malwa region of Madhya Pradesh, India and identified morphologically and compared with standard pharmacopoeial monograph. The collected plant material was dried and the powdered plant material was used further to reveal various parameters. The dried plant part of *Barleria prionitis* Linn.were subjected to standard procedure for the determination of various physicochemical parameters. The results were presented in table 1. The shade dried coarsely powdered plant materials of *Barleria prionitis* Linn. Were extracted with petroleum ether, Chloroform, ethanol and water. The extracts obtained were evaluated for pH, color and % yield. The results are presented in table 2.

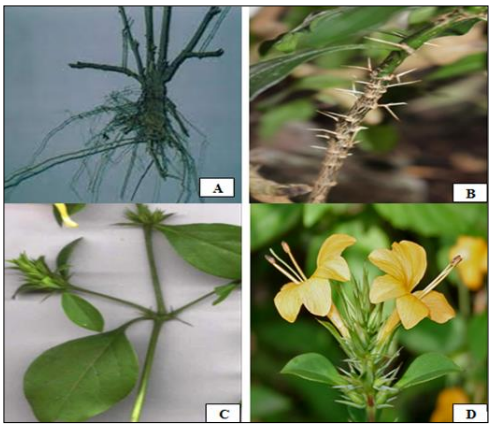

Fig 1: *Barleria prionitis* Linn. A= Root; B=Stem; C=Leaves; D=Flowers

Table 1: Physicochemical Evaluation of *Barleria prionitis* Linn.

S/No.	Parameters	BPR	BPS	BPL	BPF
1.	FOM	0.93±0.21	Nil	Nil	0.25±0.02
2.	LOD	6.32±0.12	4.28±0.21	3.21±0.01	1.93±0.02
3.	TA	12.95±1.15	8.35±1.45	8.32±0.02	8.10±0.03
4.	AIS	1.23±0.02	0.98±0.01	0.89±0.03	0.62±0.02
5.	WSA	8.32±0.12	4.37±1.01	2.28±0.04	1.98±0.54
6.	SI	1.23±0.02	1.20±0.01	1.98±0.11	2.01±0.32
7.	WSEV	32.32±1.28	28.46±0.16	18.34±0.17	13.78±1.18
8	ESEV	27.43±1.92	17.28±1.11	12.39±.1.14	8.32±0.02

NOTE: ALL VALUES ARE EXPRESSED AS MEAN±SEM, N=3;
ABBR.: BPR= *BARLERIA PRIONITIS* LINN. ROOT; BPS= *BARLERIA PRIONITIS* LINN. STEM; BPL= *BARLERIA PRIONITIS* LINN. LEAVES, BPF= *BARLERIA PRIONITIS* LINN. FLOWERS

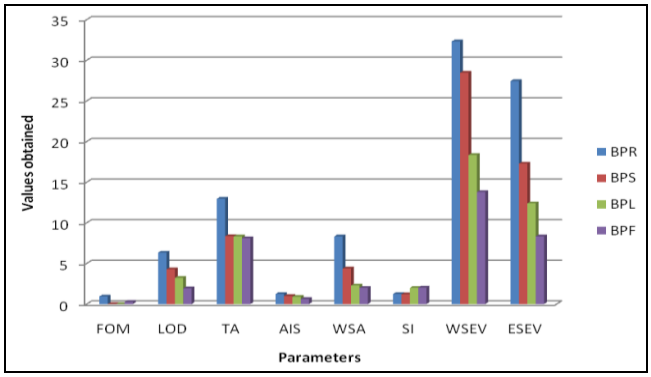

Fig 2: Physicochemical Evaluation of *Barleria prionitis* Linn.

Table 2: Estimation of % yield of various extract of *Barleria prionitis* Linn.

S/No.	Extract	Parameters			
		Nature of Extract	Color	pH	% Yield (w/w)
1.	PEEBPR	Semi Solid	Brown	7.2	1.37
2.	CEBPR	Semi solid	Brown	7.1	1.45
3.	EEBPR	Solid Powder	Blackish brown	7.1	6.12
4.	AEBPR	Solid Powder	Dark brown	6.9	8.34
5.	PEEBPS	Semi Solid	Blackish green	7.2	1.12
6.	CEBPS	Semi solid	Dark green	7.2	1.24
7.	EEBPS	Semi solid	Green bron	6.8	5.64
8.	AEBPS	Solid Powder	Greenish brown	6.9	7.39
9.	PEEBPL	Semi Solid	Green	6.8	0.98
10.	CEBPL	Semi solid	Green	6.9	0.90
11.	EEBPL	Solid Powder	Dark green	6.8	4.32
12.	AEBPL	Solid Powder	Dark green	7.0	6.21
13.	PEEBPF	Semi Solid	Light brown	6.8	0.90
14.	CEBPF	Semi solid	Yellowish brown	6.8	0.85
15.	EEBPF	Sticky Solid	Yellowish brown	6.8	4.31
16.	AEBPF	Sticky Solid	Yellowish brown	7.1	5.38

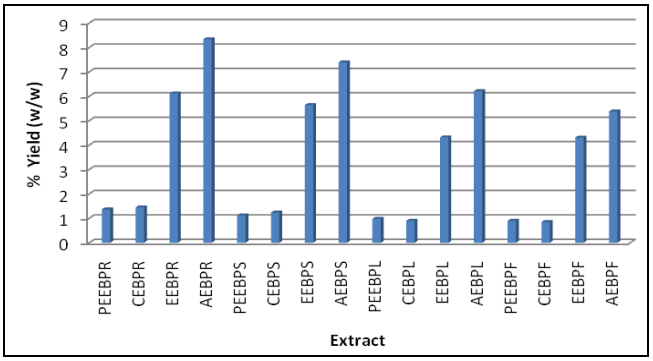

Fig 3: % yield of extract *Barleria prionitis* Linn.

The various extract obtained after extraction were subjected for phytochemical screening to determine the presence of Various phytochemical present in the extracts. The standard procedure was adopted to perform the study. The results are presented in table 3.

Conclusion

Pharmacognostical evaluation of the medicinal plants needs to be investigated and revealed for correct identification of the same. There are several herbs used in traditional system of medicine, but due to lack of standardization parameters correct identification of the plant is lacking, therefore development of QC parameters is of great interest. The present work was undertaken to revel the pharmacognostical studies of root, stem, leaves and flowers of *Barleria prionitis* Linn. In this study morphological, physicochemical, extraction and preliminary phytochemical screening of the selected plant material was reported.

Table 3: Preliminary phytochemical screening *Leonotis nepetaefolia* (L) R.Br. Flowers

S/No.	Constituents	BPR				BPS				BPL				BPF			
		PEE	CE	EE	AE	PEE	CE	EE	AE	PEE	CE	EE	AE	PEE	CE	EE	AE
1.	Carbohydrates	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+	+
2.	Glycosides	-	-	+	+	-	+	+	+	-	-	+	+	-	-	+	+
3.	Alkaloids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	Protein & Amino acid	+	+	+	+	+	+	-	-	+	+	-	-	+	+	+	+
5.	Tannins & Phenolic compounds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	Flavonoids	-	-	-	+	-	-	+	+	+	+	+	+	+	+	+	+

7.	Fixed oil and Fats	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8.	Steriods & Triterpenoids	-	-	+	+	+	+	+	+	-	-	+	+	+	+	+	+
9.	Waxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	Mucilage & Gums	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbr.: +=Present; -=Absent

References

1. Sandoval E, Bye RA, Rios G, Aguilar MI. Microscopic analysis and histological observations of the medicinal root of *Iostephane heterophylla* (Cav.) Benth. Ex Hemsl. (Asteraceae). *Bol. Soc.Bot. Mex*,2005:77:65-73.
2. Dwivedi Sumeet. Status survey of medicinal plants wealth of Malwa region of Madhya Pradesh with special reference to conservation of vulnerable and endangered species, *J. Econ. Taxon. Bot*,2009:33(2):443-452.
3. Dwivedi Sumeet, Dubey Raghvendra. QC of Herbals with special reference to standardization parameters: An overview; Abstract in National Seminar on *Technological and Regulatory aspects of Herbal Drugs Analysis*, 7-Oct.,2009, Mandsaur, M.P, 2009.
4. Banerjee D, Maji A, Banerji P. Barleria prionitis Linn: A review of its traditional uses, phytochemistry, pharmacology and toxicity. Res J Phytochem,2012:6:31-41.
5. Vasoya U. Pharmacognostical and physicochemical studies on the leaves of Barleria prionitis (L). Int J Pharm Sci Res,2012:3(7):2291.
6. Sharma P, Shrivastava B, Sharma GN, Jadhav HR. Phytochemical and ethenomedicinal values of Barleria prionitis L: An overview. J Harmonized Res Pharm,2013:2(3):190-9.
7. Jain S, Jain R, Singh R. Ethnobotanical survey of Sariska and Siliserh regions from Alwar district of Rajasthan, India. Ethnobot Leafl,2009:1:21.
8. Khare CP. Indian Medicinal Plants: An Illustrated Dictionary. 1st ed. New York: Springer Sciences, 2007, 82-3.
9. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plants. New Delhi: CSIR, 1956, 33-4.
10. Ambasta SP. The Useful Plants of India. New Delhi: CSIR, 1986.
11. Kokate CK. "Practical Pharmacognosy.; 4th ed. Vallabh Prakashan,2005:18:112-121.
12. Khandelwal KR. Practical Pharmacognosy, Thirteenth edition Nirali Prakashan, Pune, 2005, 149-156.
13. The Ayurvedic Pharmacopoeia of India. Part-I. Vol.-III. 1st Ed. New Delhi: published by Gov. of India ministry of health and family welfare department of Homoeopathy, 1999, 225.
14. Quality control method for medicinal plant material, 1st edition, published by World Health Organisation Geneva, Delhi, 2002.