Journal of Community Pharmacy Practice
ISSN: 2799-1199
Vol : 02 , No. 03 , April-May 2022
http://journal.hmjournals.com/index.php/JCPP
DOI: https://doi.org/10.55529/jcpp.23.1.6

A Comparative Diagnostic account of the Roots of Boerhavia diffusa Linn. From Four Different Geographical Regions in India

Vijeta Gupta[1*], Dr. Tarun Virmani[2], Dr. Vijender Singh[3]

[1,2]School of Pharmaceutical Sciences, MVN University, Delhi-Agra Highway, NCR, Aurangabad, Palwal, Haryana 121105, India*
[3]Rakshpal Bahadur Pharmacy Institute, Greater Noida, 201310, Uttar Pradesh, India

Corresponding Email: [1]vijetavikasgupta@gmail.com*

Received: 01 February 2022 **Accepted:** 20 April 2022 **Published:** 27 May 2022

Abstract: Boerhavia diffusa Linn (B. diffusa) belongs to the family Nyctaginaceae, commonly referred to as Punarnava. It is a rasayana plant that has anti-aging, disease prevention and life-building activities. In this study, B. diffusa Linn's roots were collected from four different geographical locations in Indian territory i.e. Jhansi, Bangalore, Punjab and Delhi for comparative standardization. The study was carried out in accordance with WHO guidelines to determine the purity and correct identity of plant parts. It also helps detect adulterations, botanical verification, and physical and chemical parameters, and gives the notion of drug quality. In the present work, detailed comparative Pharmacognosy, morphology, anatomy and phytochemical studies of root of B.diffusa Linn from Four different geographical regions in India have been carried out. The results show that all four B.diffusa from different geographical regions revealed that all are very distinct. The anatomical parameters and physicochemical constants carried out in the present investigation serves as measures of a quality control for all the four plants i.e; Boerhavia diffusa Linn.(Jhansi, Bangalore, Pune and Delhi).

Keywords: Roots of Boerhavia Diffusa Linn, Phytoconstituents, Ayurveda, Standardization, Physicochemical.

1. INTRODUCTION

As the name affirmed Punarnava (Punar + Nava). Punar means –(reincarnation), nava means (new), really because of its multiple benefits and pharmacological actions, Punarnava proved itself as magical natural remedy by Ayurveda.[32] Boerhaavia diffusa is a medicinal plants used to treat large number of human ailments as mentioned in Ayurveda, Charake Samhita, and Sushrita. The plant (Roots and Aerial parts) have a so many medicinal and therapeutic propertiesand are used by tribal people in India. Various phyto-chemical, pharmacological (clinical investigation) and experimental investigation are done on Boerhaaviadiffusa by many researcher etc., [1-2]. It is now well known that the therapeutic activity of a medicinal

Journal of Community Pharmacy Practice
ISSN: 2799-1199
Vol : 02 , No. 03 , April-May 2022
http://journal.hmjournals.com/index.php/JCPP
DOI: https://doi.org/10.55529/jcpp.23.1.6

plant is due to the presence of certain biologically active chemical constituent which are or primary metabolites. [3-4] They may contain a single herb or combination of several herbs (different) believe to have compliment/or synergistic effect. The literate survey revealed that in the Punarnava obtained from four different geograhical regions (Jhansi, Pune, Bangalore and Delhi). The detailed comparative studies have not been worked out so far. In view of the medicinal importance, the controversy of related to identity of Punarnava, to identify adulteration, and to evolved parameters for quality control a detailed study of Boerhavia diffusa obtained from different geographical regions has been carried out.

2. MATERIALS AND METHODS

Plant material: Fresh plant material of Boerhavia diffusa collected from different geographical regions of India (Jhansi, Pune Bangalore and Delhi). The bulk quantity of material was collected rainy in season. The authentication of all the four samples was done by taxonomist. Hand sections of root plant material was used for anatomical and histochemical studies. The histochemial studies were carried out using standard methods(5&11).Root powered analysis was dried out as per the method described by following API.(6) Fluorescence analysis was carried out as per Quality Control of Herbal Drugs. The ash analysis done by API.(7-10)

3. RESULT AND DISCUSSION

Root:

A B C D

Fig 1. Images of **Boerhavia diffusa** Linn. A-Delhi B- Jhansi C- Pune D- Bangalore

Table no. 1. Comparative characteristic of Boerhavia diffusa root obtained from 4 geographical region:

Character	**B.diffusa(Jhansi)**	**B.diffusa(Bangalore)**	**B.diffusa (Pune)**	**B.diffusa(Delhi)**
Root type	Small , fusiform, thin, woody, few lateral roots	Large , fusiform, thick, woody, lateral roots	Large , fusiform, thick, brittle woody, no lateral roots	Small, cylindrical ,thin, brittle woody, extensive lateral root
Root	Yellowish brown	Greyish brown	Dark brown	Brown

Journal of Community Pharmacy Practice
ISSN: 2799-1199
Vol : 02 , No. 03 , April-May 2022
http://journal.hmjournals.com/index.php/JCPP
DOI: https://doi.org/10.55529/jcpp.23.1.6

colour				
Root diameter in cm	0.3-0.6cm	0.8-1.1 cm	0.8-1.4 cm	0.3-0.5 cm

Table No. 2. Organoleptic characteristic of Boerhavia diffusa root obtained from 4 geographical region:

Organoleptic characteristics	**B.diffusa(Jhansi)**	**B.diffusa(Bangalore)**	**B.diffusa (Pune)**	**B.diffusa(Delhi)**
Colour	Yellowish	Grey	Grey	Dull white
Odour	Not distinct	Not distinct	Aromatic	Not distinct
Taste	Slightly bitter	Slightly sweet	Slightly bitter	No specific taste
Texture	Course	Very fine	Slightly course	Course
Fracture	Incomplete fibrous, short	Incomplete fibrous, short	Long fibrous	Incomplete fibrous

Table No. 3. Starch grains of Boerhavia diffusa root obtained from 4 geographical region:

Features	**B.diffusa(Jhansi)**	**B.diffusa(Bangalore)**	**B.diffusa (Pune)**	**B.diffusa(Delhi)**
Types of starch grains	Compound and simple	Compound and simple	Compound and simple	Compound and simple
Shape(single)	Rounded, ovoid	Rounded, Subpherical	Ovoid	Ovoid, Polyhedral
Dimentions	5.85 µ in diameter	6.0 µ in diameter	6.5 µ in diameter	7.0 µ in diameter
Hilum	line	2-5 rayed fissure	2-5 rayed fissure	Line
Striations	Faintly marked	Very less compound	Faintly marked	Very less compound

Table No. 4. Anatomical peculiarities of Boerhavia diffusa root obtained from 4 geographical region:

Anatomical Features	**B.diffusa (Jhansi)**	**B.diffusa (Bangalore)**	**B.diffusa (Pune)**	**B.diffusa (Delhi)**
Cork	2-3 layered, cell large, uneven	5-10 layered, cells small, uneven	5-10 layered, cells small, uneven	2-3 layered, cell large, uneven
Cortex	8-10 layered with polygonal cells	5-6layered with polygonal cells	10-12 layered with polygonal cells	5-6layered with polygonal cells

Journal of Community Pharmacy Practice
ISSN: 2799-1199
Vol : 02 , No. 03 , April-May 2022
http://journal.hmjournals.com/index.php/JCPP
DOI: https://doi.org/10.55529/jcpp.23.1.6

Endodermis and pericycle	Not distinct	Not distinct	Not distinct	Not distinct
Phloem	Occurs hemispherical outside xylem vessels	Occurs crescent patches outside xylem vessels	Occurs crescent patches outside xylem vessels	Occurs narrow strips outside xylem vessels
Xylem	Composed of thin walled, rectangular in shape	Composed of thin walled, arranged in radial rows	Composed of thin walled, Radial, in central region	Composed of thin walled, in central region

Table No. 5. Histochemical tests of Boerhavia diffusa root obtained from 4 geographical region:

Phytochemicals	**B.diffusa(Jhansi)**	**B.diffusa(Bangalore)**	**B.diffusa (Pune)**	**B.diffusa(Delhi)**
Cellulose	Cor ,Ck, P, Md	Cor,Ck, P, Md	Cor,Ck, P, Md	Cor,Ck, P, Md
Glycoside	Epi, Xyl.Par	Epi, Xyl.Par	Epi, Xyl.Par	Epi, Xyl.Par
Lipids	Cor	Cor	Cor	Cor
Lignin	Cut,P.Xyl, S.Xyl	Cut,P.Xyl, S.Xyl	Cut,P.Xyl, S.Xyl	Cut,P.Xyl, S.Xyl
Saponins	Epi	Epi	Epi	Epi
Starch	Cor, P, Hypo	Cor, P, Hypo	Cor, P, Hypo	Cor, P, Hypo
Tannins	-	-	-	-
Steroids	-	-	-	-

Epi-epidermis; **Cor-** cotex**; Ck-** cork; **Hyp-** hypodermis; **Md;** medullary rays; **P-** pith; **Xyl.Par-** xylem parenchyma; **S.Xyl-** secondary parenchyma; **Cut-** cuticle.

Microscopic analysis of root: Cork cell are large-sized and maximum in number. Broken fragments of vessels and pieces of lignified, long, cylindrical fibres with tapering ends; Simple and compound starch grains and calcium oxalate were observed.

Table no. 6. Fluorescence analysis of Boerhavia diffusa root obtained from 4 geographical region:

Drug + chemicals	**B.diffusa(Jhansi)**	**B.diffusa(Bangalore)**	**B.diffusa (Pune)**	**B.diffusa(Delhi)**
Dry Powder	Light yellow	Light brown	Yellowish brown	Greyish brown

Journal of Community Pharmacy Practice
ISSN: 2799-1199
Vol : 02 , No. 03 , April-May 2022
http://journal.hmjournals.com/index.php/JCPP
DOI: https://doi.org/10.55529/jcpp.23.1.6

Powder treated with 1-N NaOH in water	Brown	Brown	Brown	Brown
Powder treated with 1-N NaOH in methanol	Light Brown	Light Brown	Light Brown	Light Brown
Powder treated with 50% H2SO4	Brown	Brown	Green Brown	Green Brown
Powder treated with 50% HNO3	Yellow Brown	Yellow Brown	Yellow Brown	Yellow Brown
Alcoholic Extract	Yellowish brown	Light brown	Light brown	Light brown
Pet. Ether Extract	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown
Chloroform Extract	Greyish brown	Light brown	Light brown	Yellowish brown
Methanol Extract	Light brown	Light brown	Light brown	Light brown

Fluorescence analysis was used for quick identification of powered. However, it has limited applications in drug evaluation, and it can be used as an additional parameter for the differentiation of closely related species.

Ash Analysis: Physical evaluation of drugs is an important parameter in detecting adulteration or improper handling of drugs. The total ash is particularly important in the evaluation, for the purity of the drugs, that is, to identify the presence or absence of foreign inorganic matter like metallic salts and silica. Ash analysis values are recorded in **Table no.8.**

Table no. 7: Ash analysis of Boerhavia diffusa root obtained from 4 geographical region:

Ash values	**B.diffusa(Jhansi) (Avg %)**	**B.diffusa(Bangalore) (Avg %)**	**B.diffusa (Pune) (Avg %)**	**B.diffusa(Delhi) (Avg %)**
Total Ash	(8.0,8.0,8.1)=8.03	(8.4,8.4,8.2)=8.33	(8.5,8.5,8.2)=8.4	(9.0,9.1,9.2)=9.1
Acid insoluble	(1.8 ,1.9,1.8)=1.83	(1.25 ,1.25, 1.15)=1.21	(1.25 ,1.25, 1.15)=1.21	(2.0 ,2.0, 1.9)=1.96
Water soluble	(2.5,2.5, 2.5)=2.5	(2.8,2.8, 2.5)=2.7	(2.5,2.5, 2.2)=2.4	(2.7,2.7, 2.0)=2.46

Only few researchers have studied fluorescence analysis with 1 N NaOH in methanol and Aq. NaOH differs from the fluorescence studies, phytochemical analysis, and acid ash valves recorded. The ash values recorded by earlier research workers are quite high than the presently recorded ash values. The results are depicted in present research work is for the

Journal of Community Pharmacy Practice
ISSN: 2799-1199
Vol : 02 , No. 03 , April-May 2022
http://journal.hmjournals.com/index.php/JCPP
DOI: https://doi.org/10.55529/jcpp.23.1.6

identification, authentication and detection of adulteration, as also for the compilation of quality control standards for crude drugs.

4. CONCLUSION:

The present work is on the pharmacognostic standardization and the physicochemical evaluation of Boerhavia diffuse Linn obtained from four geographical regions will be useful to supplement the information about its identification parameters, which are assumed significant for the acceptability of herbal drugs in the present scenario.

Acknowledgment: The author is grateful to Sharda University, School of Pharmacy, Greater Noida, for providing all the facilities required to carry out the present work.

5. REFERENCES:

1. Patil KS, Bhalsing SR., "Ethnomedicinaluses, Phytochemistry and pharmacological properties of the genus Boerhavia*", J Ethnopharmacol*, vol.182, 2016, pp.200-20.
2. Pooja, Lal V. K and Verma A. "GC-MS and phytopharmacological analysis of aqueous
a. distillate of Boerhaviadiffusa roots" , Int. J. Pharm. Pharm. Res.", vol10, 2017 , pp. 374-391.
3. Guha Bakshi. DN. ., Sensarma,1999. A Lexiconof medicinal plants in India.Vol.1.nayaprokash 206,Bidhan Sarni,Calcutta.
4. Gadrre, G.K. 1956.:Sartha Vagbhatta." Fourth ed;.G.K.Gadrre, Aryabhushan Mudranalaya, Pune.
5. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products, European Agency for the Evaluation of Medicinal Products (EMEA), London, Review EMEA/CVMP/81400, 2005
6. **]** The Ayurvedic Pharmacopoeia of India, 1989, Government of India, Ministry of Health and Family Welfare, New Delhi, vol-2, pp. 65-,165.
7. Kriti Juneja, Rutusmita Mishra, Samrat Chauhan, Sumet gupta, Partha Roy, Debabrata Sircar, " Metabolite profiling and wound –healing activity on Boerhaavia diffusa leaf extracts using invitro and invivo models*", Journal of Traditional and complementary medicine*, vol. 10, no.1, 2020, pp.52-59.
8. Singh Arjun, Hhimanshu Ssharma, Ravinder Singh, Narauanam Srikanth, " High-performance thin layer chromatography estimation of Boeravinone –B in Boerhaavia diffusa Linn. And its poly herbal dosage form (Capsule)", *Pharmacognosy Research*, vol. 11, no. 3, 2019, pp.267-272.
9. Parmar D, Jain N. K, and Tomar V. "Anti-arthritic evaluation of ddifferent extracts of Boerhaaviadiffusa Linn. in FCA induced arthritis in rats." *J. Drug Deliv. Ther.*, vol. 8, no. 5, 2018, pp.388-393. http://dx.doi.org/10.22270/jddt.v8i5-s.1922
10. Chaudhary G, and Dantu P. K. "Analysis of some important genes from the trichomes of Boerhaavia diffusa L." *Euro. J. Exp. Bio.*,vol. 8, no. 25, 2018, pp.112-119.
11. WHO guidelines, Quality control methods for medicinal plant materials, A.I.T.B.S publishers and distributors, New Delhi, 2002, pp.6-84.