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Review Article

Punarnava: Foliar, Anatomic Study, Phytochemical Screening, Antioxidant Activity

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ABSTRACT

Punarnava is the ancient medicinal plant belongs to the Nyctaginaceae family. It is available in three different species B.diffusa, B.verticillata, T.portulaca there roots are more effective than other parts of the plant. Use of the boerhavia mentioned in various books. The plant is used to treat various disease like anaemia, cough & cold, heart disorder, diuretic, urethritis, night blindness, laxative etc. In 1908 first anatomical study was performed on Punarnava, there are two different methods are developed to determine anatomy of the plant. B. diffusa contain many phytosome which are use to treat various disease. The phytosomes are sterols, alkaloids, amino acid, protin, tannins, flavonoids, sugar, glycoside, saponins etc. It also shows the antioxidant property which is determined by the performing the various types of assays. Antioxidant are usefull for the skin, prevetn cell damage, prevent damage caused by oxidation. It plays important role to controlle many disesase and makes human healthy.

INTRODUCTION

Punarnava is a contentious medication because its actual botanical identity is unknown and it is used to refer to a number of different taxa. It is a component of numerous traditional preparations with significant therapeutic value. Three distinct species are described in the Indian Ayurvedic Pharmacopoeia: Trianthema portulacastrum, Boerhaavia verticillata, and Boerhaavia diffusa

roots. This study examines the microscopic, macroscopic, and phytochemical analysis of these Punarnava species' roots in order to distinguish them and determine their quality standards.

Foliar:

Boerhavia diffusa L., also referred to as "Punarnava," is a member of the Nyctaginaceae family and has been utilized extensively in

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traditional medicine since forever. Within the pantropical taxonomic genus *Boerhavia* L., *B. diffusa* L. is distributed cosmopolitanly in both hemispheres.

Therapeutic Use of Drug Mentioned In Ancient Books:

THERA Although *B. diffusa* L. is botanically equivalent to the drug plant "Punarnava" because

it contains the major active constituents "Punarnavines" and "Boerhavinones," there have long been taxonomic disputes over the plant's identification. Despite the presence of distinct active principles, other species of *Boerhavia* L. are frequently used (adulterated) as "Punarnava" in various parts of India because there aren't many noticeable morphological differences.

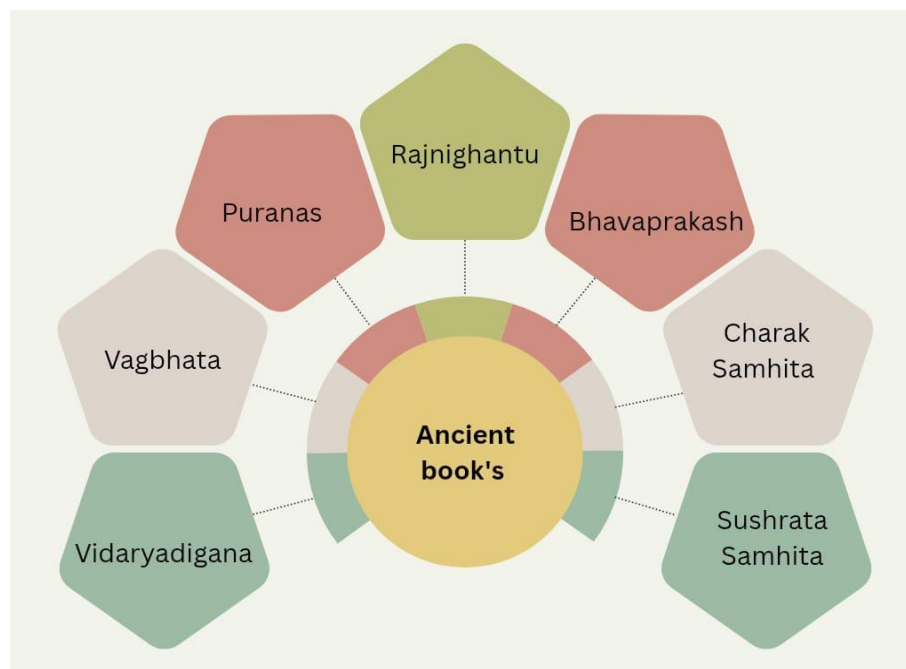


Fig:1

Use Of Drug Plant in Various Treatment:

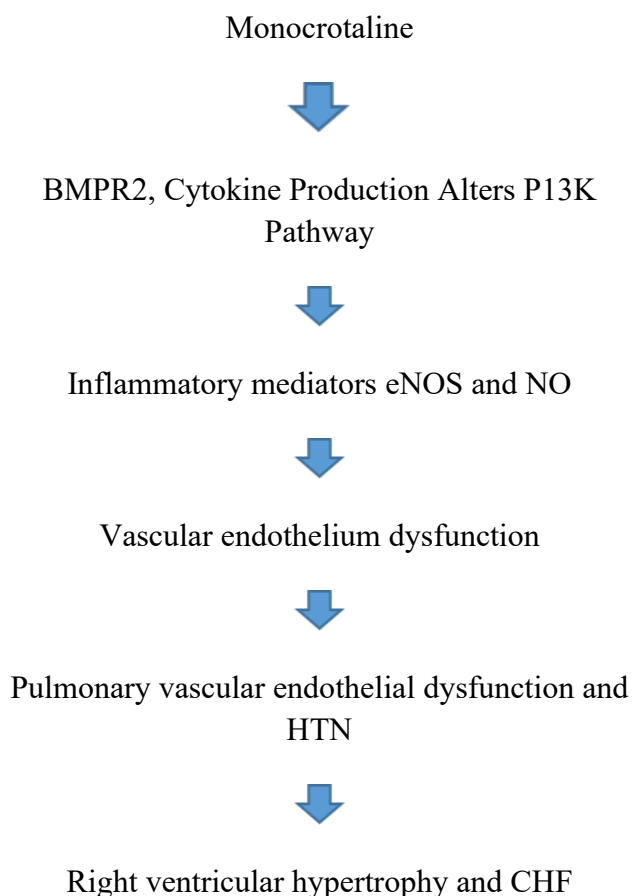
- Heart disease
- Anaemia
- Asthma
- Cough & cold
- Tumours
- Enlaargment of spleen of children
- Abdominal pain
- Dropsy
- Dyspepsia
- Sprains
- Diuretic
- Laxative

- Hepatitis
- Dropsical swelling
- Urethritis
- Night blindness
- Beri-Beri
- Epilepsy
- Fistula
- Elephantiasis
- Paralysis

Punarnava Used in Treatment of Hypertension:

One such consequence of the modern lifestyle is hypertension. Crucial The most prevalent

cardiovascular condition is now hypertension. It is a significant risk factor for stroke, chronic renal failure (CRF), ischemic heart disease (IHD), and congestive cardiac failure (CCF). [1–2] Over 1 billion people worldwide suffer from hypertension, and the condition is thought to be the cause of 7.1 million deaths annually. The most prevalent cardiovascular condition at the moment is essential hypertension. It is a significant risk factor for ischemic heart attacks and congestive heart failure (CCF). stroke, chronic renal failure (CRF), and illness (IHD). [1–2] Over 1 billion people worldwide suffer from hypertension, and the condition is thought to be the cause of 7.1 million deaths annually. The World Health Organization (WHO) research states that inadequate blood pressure (>115 mmHg of systolic blood pressure) accounts for 49% of IHD and 62% of cerebrovascular illness, with minimal variation by sex. In addition, the leading contributing risk factor for death worldwide is inadequate blood pressure.[3] EHTN has become a significant public health concern for emerging nations such as India.



Traditional Applications of Punarnava:

Graphical abstract

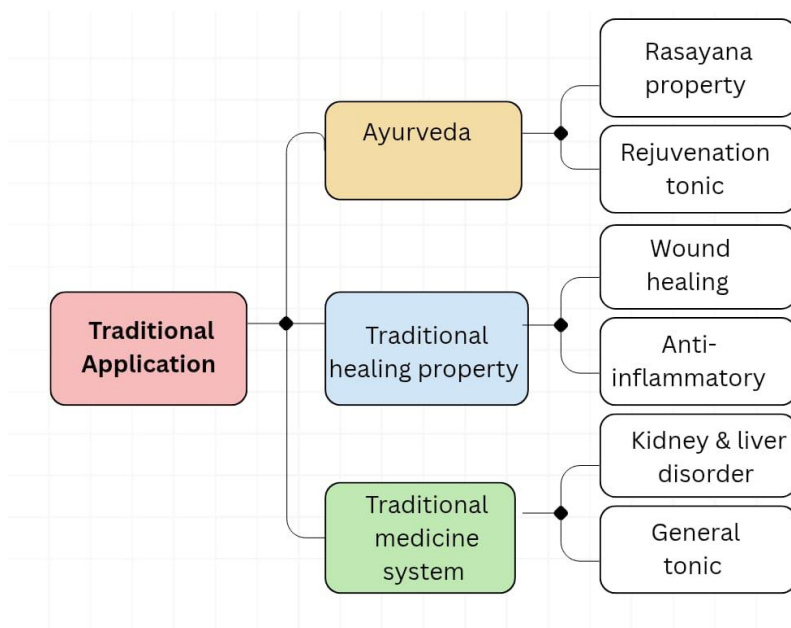


Fig:2

Anatomical Study:

Solereeder (1908) conducted the first anatomical research of the Nyctaginaceae family, followed by Metcalfe & Chalk (1950) who provided a general description of the anatomical traits. Very little research has been done on the node-petiole morphology and foliar-vasculature pattern of nyctaginaceous members. Melville (1969, 1976), Hickey (1973), and Dilcher (1974) have all highlighted the traits of foliar venation patterns and their significance for taxonomic research. The morphology of certain members of the Nyctaginaceae was studied by Nair & Nair (1961), with particular attention to the nodal *anatomical* characteristics of the genus *Boerhavia*. Additionally, L. Howard (1979) emphasized the significance of nodal and petiolar structural characteristics in resolving taxonomic disputes.

Morphology:

Boerhavia diffusa L. is a puberulous to glabrous herb with a fusiform root that can grow prostrate or spreading. It belongs to the Nyctaginaceae family. The ovate-lanceolate leaves have a green adaxial surface and a white abaxial surface. Petiolate, with crimson marginal glands. Together, flowers 1–12 form campanulate, pedicelled cymose panicles. Perianth can be white, pink, red, or mauve.

Types:

- Foliar-anatomical features
- Foliar-venation pattern

HPTLC Methods For Estimation:

- **Material:** Himalaya Tablet

- **Method:** CAMAG Linomat 5 system was used
- **Standard Preparation:** Measure accurately 750 milligram of extract of Punarnava. Add the Methanol and sonicate in the proportion of 5:10. Filter with the help of Anhydrous Sodium Sulphate. Collect the 10ml filtrate in volumetric flask. Wash it with 2ml Methanol and collect filtrate and make up the volume and used for the TLC spotting.
- **Sample Preparation:** Take the 20 tablet and triturate it and make the powder. Weight the powder which is equivalent to 250mg Punarnava extract and then add 5ml of methanol and sonicate for 10 min. filter through Anhydrous Sodium Sulphate. Collect 10 ml filtrate wash it with 2ml methanol. Make up the volume of filtrate and use for TLC. Scanning was done at 366nm.
- **Chromatography:** Ethyl acetate was utilized on a TLC aluminum pre-coated plate with silica gel 60 GF254 (20x10 cm²; 0.2 mm thick): As a mobile phase, use 5:0.5:0.5 v/v methanol:formic acid. Eupaitin-3-O-B-D-galactopyranoside and a methanolic extract of the material were put to a TLC plate utilizing The Linomat V applicator.

Pharmacogenetic Study:

The pharmacognostic study was divided into three types to study finished product.

- Organoleptic study.
- Microscopic study.
- Physico-chemical analysis.

Medicinal Properties:



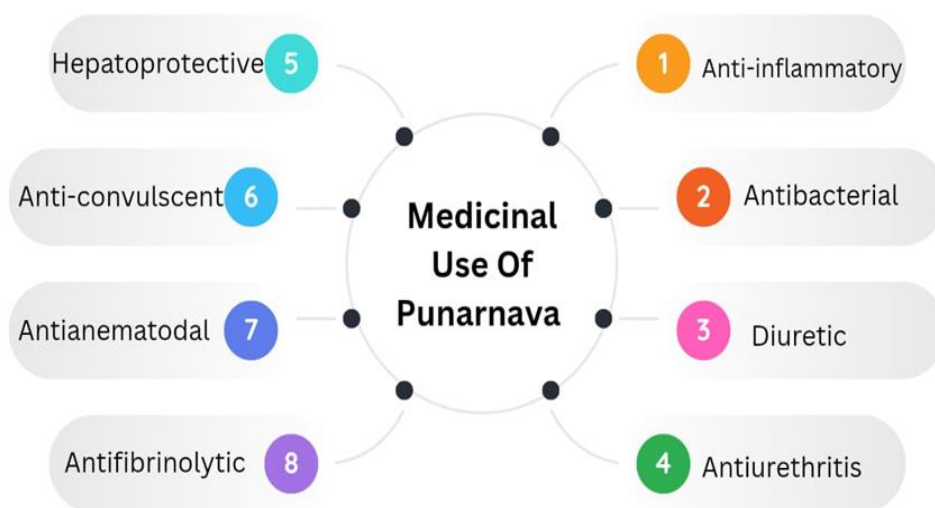


Fig no: 3

Phytochemical Screening:

Table no :2

Sr. No	Phytochemical	Test performed	Observation	Inference
1.	Sterol	<ul style="list-style-type: none"> Salkowski test Liebermann Buchard test 	<ul style="list-style-type: none"> Red colour in chloroform layer Red colour in chloroform layer 	<ul style="list-style-type: none"> Positive Positive
2.	Alkaloid	<ul style="list-style-type: none"> Dragendroff's reagent Wangers reagent 	<ul style="list-style-type: none"> Develop orange colour Brown flocculated ppt 	<ul style="list-style-type: none"> Positive Positive
3.	Amino acid	<ul style="list-style-type: none"> Ninhydrin test 	<ul style="list-style-type: none"> Violet colour developed 	<ul style="list-style-type: none"> Positive
4.	Protein	<ul style="list-style-type: none"> Biuret test Xanthoprotine test 	<ul style="list-style-type: none"> No violet pink colour White ppt formed 	<ul style="list-style-type: none"> Negative Positive
5.	Reducing sugar	<ul style="list-style-type: none"> Benedict's reagent Fehling reagent 	<ul style="list-style-type: none"> Brownish red ppt Red ppt formed 	<ul style="list-style-type: none"> Positiv Positive
6.	Glycosides	<ul style="list-style-type: none"> Benedict's reagent Fehling reagent 	<ul style="list-style-type: none"> No brownish ppt No reduction 	<ul style="list-style-type: none"> Negative NIgative
7.	Tannins	<ul style="list-style-type: none"> Lead Acetate Test Ferric Chloride Test 	<ul style="list-style-type: none"> Formation f ppt Green colouration 	<ul style="list-style-type: none"> Positive Positive

Antioxidant Activity:

The pharmacological characteristics of natural plant products, such as flavonoids, terpenoids, and

compounds derived from steroids, are varied and include antioxidant activity. According to Kataria (1997), an antioxidant is a substance that aids in preventing oxidation reactions brought on by free

radicals, such as singlet oxygen, superoxide, peroxy, hydroxyl, etc., to prevent or delay the formation of cells and cellular and tissue damage. Antioxidant compounds can also lessen the effects of free radicals and play a significant role in preserving health. This perennial climber is identified as *Boerhavia* (L.), a climber native to India. The name *Boerhavia* (L.) is derived from the Dutch physician Hermann Boerhaave of the 18th century.

Some Assays for Antioxidant Activity:

- 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay
- 2,2'-azino-bis- (3-ethyl benzothiazoline-6-sulphonic acid) (ABTS) assay
- Ferric reducing antioxidant power (FRAP) assay
- Reverse Phase-High Performance Liquid Chromatography-Photo Diode Array Detector (RP-HPLC-PDA)

CONCLUSION:

Punarnava is the effective medicinal plant. The roots are more effective and shows high therapeutic effect. The species of Punarnava is taxonomically significant, morphological significance at the species level is done by the polymorphic property of particular species. The phytochemical screening is important step to identify the presence of phytochemical which is determined by performing the different test which shows the colour indication and gives the positive and negative results. Evaluation of antioxidant activity was done by the performing various antioxidant assay. For the antioxidant assay root, leaf and stem extract are used. In various medicinal preparation most commonly roots and leaves are used to achieve specified activity and gives the

therapeutic effect. Various methods are used to determine active constituent by performing Chromatography like HPTLC, TLC, Column chromatography, paper chromatography, gas chromatography etc.

DISCUSSION:

The provided data helps resolve the taxonomic ambiguity of Punarnava by providing a scientific basis for differentiating its three species. The presence of alkaloids and tannins supports the plant's traditional uses for conditions like hypertension and inflammation. The developed HPTLC method is a crucial tool for quality control and preventing adulteration, ensuring the efficacy and safety of Punarnava products. This work validates traditional knowledge with modern scientific methods, providing a framework for standardization.

RESULT:

Punarnava's botanical identity is ambiguous, with three species used. This study confirmed the presence of sterols, alkaloids, and tannins in the plant. An HPTLC method was developed for quality control. The research links Punarnava's traditional uses for conditions like hypertension and inflammation to its phytochemicals and antioxidant properties, helping to standardize the plant for modern use.

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