



# A CONCEPTUAL STUDY ON PUNARNAVA (*Boerhaavia diffusa*) MEDICINAL PLANT & ITS PHARMACOLOGICAL ACTIVITY

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## Abstract

In this investigation, the phytochemical and pharmacological properties of *Boerhaavia diffusa*, a member of the Nyctaginaceae family and also known as "Punarnava," are confirmed in great detail. It is a heuristic medicinal phytochemical reservoir and has a long history of ethnomedical use. One of the first eastern treatments mentioned by Ayurveda as a potential treatment for a number of illnesses is this one. The plant is rich in glycosides, steroids, flavonoids, and many polyphenolic chemicals. Numerous pharmaceutical studies have demonstrated its potential to be advantageous for common uses as anti-oxidants, ophthalmic, anti-inflammatory, semen, aphrodisiacs, immunostimulants, and antiasthmatics. In this review paper, we have centred our attention on phytochemistry, plant chemical registration, those responsible for medicinal principles, widespread uses, and their reported pharmacological qualities.

**Keywords-** Punarnava, *Boerhaavia diffusa*, pharmacological properties, etc.

## Introduction-

Traditional medical systems from several ethnic groups have used therapeutic herbs for many millennia. Based on the expertise of thousands of doctors and indigenous medical practises from diverse ethnic communities, medicinal plants have been utilised to cure numerous disorders. The Indian system of medicine (Ayurveda), which uses a variety of plant-based treatments, is essential for managing a wide range of medical

conditions. The time has come to catalogue and research phytochemicals that have therapeutic effects and provide scientific support for folkloric assertions about their presence in medicinal plants. The identification of a unique biomolecule will also lead to the reversal of problematic medical disorders.<sup>1</sup>

We select Punarnava to expand its medicinal wealth (*Boerhaavia diffusa*). A perennial herb known as "Punarnava" in Indian medicine, *Boerhaavia diffusa* L. (Nyctaginaceae) is found throughout the Indian wastelands.<sup>2</sup>

The plant has gained a lot of attention due to its uses in Indian traditional medicine. For the treatment of cancer, jaundice, dyspepsia, inflammation, ophthalmic illness, spleen development, and stomach discomfort, the various plant components are utilised as an anti-stress agent.<sup>3</sup>

## Methodology

Materials pertaining to Punarnava (*Boerhaavia diffusa*) have been gathered from a variety of periodicals, books, Ayurvedic and modern textbooks, reputable articles, acclaimed reviews literature, manuscripts, etc.

## Geographical distribution

*Boerhaavia* is a genus of 40 species that thrive in warm climates and are found in tropical and subtropical areas. It crosses Ceylon, Australia, Sudan, and the Malay Peninsula in addition to China, Africa, the Americas, and Pacific islands.<sup>4</sup>

*B. diffusa*, *B. rependa*, *B. chinensis*, *B. hirsut*, and *B. rubicunda* are among the six species that may be found in India. 40 different *Boerhaavia* species. *Boerhaavia diffusa* is a plant that may be found in India in the warmer regions and up to 2000 metres above sea level in the Himalayan environment. It is a persistent, ubiquitous hogweed that grows mostly after rain in waste areas, ditches, and marshy areas. The plant is also extensively cultivated in West Bengal. The plant is plentiful throughout the wet season, and ripe seeds are produced in October and November. Due to the plant's stickiness, both human garments and animal legs became caught<sup>5</sup>.

The sheets are quite diverse in shape; they are smooth above and ovate, crimson or dark at the base. The leaves are quite tasty. The edges of the leaves are wavy or flat. It is pink, white, and hairy below and smooth, globular, and green on top. The seeds sprout prior to the beginning of the monsoon<sup>6</sup>.

The tiniest, tiny or sub-umbellate flowers, which are often pink, white, and approximately 1.5 mm long, are found on the terminal branch. Hermaphrodite, pediculate, cream, yellow, or rose-red are the colours. Bracts are active and alive.

The position of the calyx and corolla is occupied by a tubular perianth, which has a funnel-shaped top and base and is restricted above the ovary. Five of the lobes are tiny and pointed. They go through two to three levels and receive little exercise. The stigma is peltate. The achenes are five-ripened, detachable, ovate, oblong, hairy, and glandular. It is brilliant yellow, brown, or brownish grey, cylindrical, snappy, conical, or

tapering. It has a tuberous tap root. It is incredibly flavorful, meaty, and thick. To restore this plant, some employees have studied tissue culture<sup>7</sup>

### Microscopic Characters

The characteristics of this powder include corking cells in the surface view, acicular calcium oxalate crystals up to 40, prismatic calcium oxalate crystals up to 25, thin narrow fibres at sharp points and narrow lumens up to 800, simple to five-compound oval to rounded starch grains up to 15, and simple pitted vessels up to 200.

The formation of different multicellular and anomocytic hairs is visible in both the top and lower epidermis of the plants. Palisade is a spongy, 2-4 lying palisade made up of isodiametric or polyhedral cells that is shaped like a single plate.<sup>8</sup>

### The phyto-chemical components

Plants in their whole often include the following phytochemical components: Nitrate Potassium, Rotenoid, Liriodendrin, Punarnavine (Alkaloids), Sitosterol (Phytosterols), and Boerhavine (Xanthenes) The complete plant typically has the following components (Salts). The most recent dihydroisophurenoxanthine, Alanine, Arachidic Acid, Behenic Acid, Boerhavone, Campestarol, Daucosterol, Beta-Ecdysone, and Flavone are also included in root canals, as are rotenoidsboeravinones AI, BI, C2, D, E, and F, as well as 5-7-dihydroxy-3'-4'-dimethyl, XY-6-8 Histidine, Hypoxanthine-9-l-arabinofuranoside, Galactozone, Glutamic Acid, glutamine, glycerol, and glycine.<sup>9</sup>

### Uses in medicine

Boerhaavia diffusa was well-known for having effective medications in both the conventional and folk streams of indigenous medical systems. Different components of the plant are employed as an anti-stress agent, as well as in the treatment of cancer, jaundice, dyspepsia, inflammation, spleen development, and stomach discomfort. It has an intense and bitter taste.<sup>10</sup>

### LEAVES:

Punarnava leaf juice is used topically to the eyes in this method of therapy. Punarnava leaves vegetables to avoid edoema. Chronic ophthalmia and honey leaf juice spilled into the eyes. According to the Unani medical system, the leaves are beneficial for joint discomfort, ophthalmia, dyspepsia, leukaemia, and spleen enlargement. They are also tasty, alexiteric, and beneficial for ophthalmia and spleen expansion. Many regions of India consume the leaves of B. diffusa as green vegetables. It promotes masculinity, treats night blindness, and heals corneal ulcers.<sup>11</sup>

**Seed:** Skulls, seeds, and carminative remedies for lumbago. The seeds are regarded as promising blood cleaners. Energizers and digestion aids are both utilised with seeds.

**Roots:** According to legend, the roots of anasarca, ascites, and jaundices have diuretic and laxative properties and can be used as a remedy. Root juice is effective in treating encephalitis, rheumatism, urinary disorders, and asthma. B. Diffusa roots have been used often as a stress-relieving medication for the treatment of

dyspepsia, jaundice, and spleen enlargement. The widespread usage of *B. diffusa* roots to treat liver problems was verified, as researchers showed.<sup>12</sup>

### **Formulations based on Ayurveda**

There are several formulas available in ayurvedic books and on the market, some of which are detailed below:

#### **Traditional Products**

Punarnavasava, ManduraPunarnavadi, Punarnavasataka, Punarnavambu, Punarnava, Punarnava Guggula, Churna, Punarnavasak Kwath, Ghrit Sothagha Lepa.

#### **Ayurvedic, Ophthalmic drugs**

It happened only once. Punarnava is a laxative and should be avoided by children under the age of 12 and pregnant women. Contraindications for Nayan Jyoti Divya Drasti

#### **Therapeutic Uses**

Herb is used to treat jaundice, poor digestion, enlargement of the spleen, and relief from abdominal discomfort. It is also used as a diuretic, expectorant, and stomachic.

#### **Drug action Bacteriostatic properties**

The in-vitro antibacterial effectiveness of crude extracts of aerial and root sections from the *Boerhaavia diffusa* plant against six microorganisms, including *E. coli* ATCC 69314, *K. pneumoniae* NCIM 2719, *P. aeruginosa* NCIM 2200, and *S. aureus* NCIM 2200, was tested by YL Ramchandra et al. in 2012. They tested the Gram-negative and Gram-positive bacteria *A. tumefaciens* NCIM 2943, *S. aureus* NCIM 2080, and *B. subtilis* MTCC 441 using the agar well plate method, and they discovered that the methanol crude extract of the plant's aerial portion had higher antibacterial activity than petroleum ether extract and chloroform extract. The compounds found in *B. Diffusa* leaves may be the cause of the plant's antibacterial effectiveness against various Gram-positive and Gram-negative bacteria. Gram-positive bacteria such *S. aureus*, *B. subtilis*, *S. faecalis*, and *M. luteus*, as well as the gram-negative bacteria examined, were all suppressed by ethanol extract.<sup>13</sup>

#### **Antidiabetic Action**

When rats and mice were subjected to carbon tetrachloride, Nalamolu et al. observed in 2004 that an alcoholic extract of the whole plant of *B. Diffusa* demonstrated hepatoprotective effect. An oral treatment of an aqueous solution of *B. Diffusa* leaf extract caused a considerable rise in plasma insulin levels and a significant drop in blood glucose in a study of normal and all oxan-induced diabetic mice. The body is more strongly affected by glibenclamide.<sup>14</sup>

#### **Antinociception Activity**

The analgesic effects of morphine, juice, but not decoction, were drastically reversed in mice when acetic acid was administered intraperitoneally (5 mg/kg). According to the active anti-nociceptive *B. Diffusa* theory,

active anti-nociceptive *B. Diffusa* is largely present in fresh leaf juices and, when evaluated in these pain models, has a potent antibacterial action. 2000: Hiruma-Lima and others.<sup>15</sup>

### **Action in Hepatoprotection**

According to Rawat et al., 1997, *B. diffusa* (2ml/kg) aqueous root extract demonstrated considerable thioacetamide hepatoprotection effectiveness and marked resistance against the majority of blood markers, including GOT, GPT, ACP, and ALP but not GLDH and bilirubin. Studies have shown that an aqueous medication (2ml/kg) has more hepatoprotective properties than a powder (PD).<sup>16</sup>

### **Anti-inflammation Activity**

The maximum anti-inflammatory activity of ethanol extract of leaves at 400 mg/kg was seen with 30.4, 32.2, 33.9, and 32 percent with carrageen, respectively, in serotonin, histamine, and dextran-mediated rat paw edoema models. Additionally, COX-1 was found in an ethanol extract of stem bark with an IC50 value of 100 ng/ml, showing that the drug has anti-inflammatory properties. 1978; Bhalla et al. The anti-inflammatory potency of a plant latex extract was assessed using a carrageenan-induced inflammatory paradigm. 2003 Kulkarni et al.<sup>17</sup>

### **Anticonvulsant properties**

*B. Diffusa*'s crude Methanolic extract and its liriiodendrin-rich fraction were discovered to exert dose-dependent inhibition of PTZ-induced convulsions. [35, 36] Adesina and others, 1979.

### **Anti-stress and immunomodulatory Activity**

Researchers found that *B. diffusa* root ethanol extracts increased stress resistance in a swim endurance test and that cold alleviates stress in their investigation. Increased carbon clearance suggested immunomodulatory activity, which suggested that the reticuloendothelial system was activated. The DTH response to SRBC enhanced in mice, signalling immune system cell-mediated actions and stimulatory effects on lymphocytes and accessory cell types. Sumanth and his colleagues.<sup>18</sup>

### **Anti-Bronchial Asthma Activity**

Dhoompan, a form of bronchial asthma treatment, uses dried leaves (smoking). Black pepper, ginger juice, and punarnava (*Boerhaavia diffusa*) are all effective expectorants that can be used with the leaf decoction.

### **Anti-Viral Activity**

According to Verma and Awasthi et al., 1979, the addition of the aqueous extract of dried root powder before virus injection resulted in the maximum antiviral activity in each case. Many pharmacological, medical, and antibacterial effects have been claimed to the *Boerhaavia diffusa* plant. Purification and isolation of the active ingredient Recent research has revealed the antiviral efficacy of this plant against phytopathogenic viruses. If used as a foliar spray in the field, this antiviral drug might protect some commercially valuable crops from being naturally infected by plant viruses.<sup>19</sup>

## Anti-genetic Activity

According to Shukla et al., 2003, *Boerhaavia diffusa* is widely utilised in herbal medicine and the Ayurvedic approach because it contains a variety of clinically vital components. This investigation measures the genetic diversity in *Boerhaavia diffusa* comparing accessions from diverse geographic origins within the Indian Territory using spontaneous amplified polymorphic DNA (SAP DNA).<sup>19</sup>

## Conclusion

Most frequently, renal and urinary problems are treated with punarnava. Punarnava possesses diuretic and anti-inflammatory effects. It is employed as a heart and kidney tonic. India is home to it, especially during the rainy season. Punarnava possesses diuretic and anti-inflammatory effects. It tastes spicy and harsh. The entire plant has therapeutic qualities, but the roots in particular. Punarnava herb is most frequently used to treat renal problems and urinary tract infections in Ayurvedic medicine. Punarnava Himalaya Herb can cure obesity, generalised fever, and jaundice. More research is required to confirm the events' veracity. To corroborate these behaviours, pharmacological action on lab animals would be utilised.

*Source of Support and Finance -None*

*Conflict of Interest -Nil*

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