

## THERAPEUTIC USES OF PUNARNAVA (BOERHAVIA DIFFUSA LINN)

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## ABSTRACT

Plants are the companion of human and there is no possibility of life without plants. In ancient era diseases were treated by plants. In the same manner *Punarnava* was used from ancient times to treat liver diseases. This drug has anti-inflammatory, diuretic, cardiogenic, antioxidant and several other properties. Due to its *Madhura*, *Tikta* and *Kashaya Rasa* it is useful in *Paittika* disorders like *Pandu roga* i.e. it is Hepatoprotective, and due to *Ushna Virya* it pacifies the *Kapha* and *Vata* like *Asthama*, *Amavata* etc. This drug also used to treat oedema. All these properties make this drug very important medicinal plant.

**Key Words:** Cardiogenic, Anti oxidant activity.

## INTRODUCTION

*Punarnava* is known by the botanical name of *Boerhavia diffusa* and belongs to Nyctaginaceae family. It is one of the best diuretic known among a variety of herbs mentioned in the *Ayurvedic* text. *Punarnava* as its name suggest means tendency to rejuvenate. Although it acts as a rejuvenator for all the systems of the body but basically it works as a rejuvenator for the urinary system. In *Atharvaveda*, *Punarnava* is described and its use as *Tridoshaghna*, *Kusthaghna*, *Rasayana*, *Jvaraghna*, *Kasahara*, *Sothahara* and as *Raktavardhaka*<sup>1</sup>. In *Charaka Samhita* it comes in *Vayahsthapana Mahakashaya*<sup>2</sup> and in *Rasayanaprakrana* by name of *Punarnava*. In *Sushruta Samhita* it is explained in *Vidarigandhadi gana*<sup>3</sup>, *Vatasansamana* and *Tiktavarga*. In *Ashtanga Hridaya* also it comes in *Vidaryadi gana*<sup>4</sup>. There are two varieties of *Punarnava*—

1. *Rakta Punarnava (Boerhavia diffusa Linn)*
2. *Shweta Punarnava (Boerhavia verticillata Poir.)*

*Rakta Punarnava* is superior in quality. *Shweta Punarnava* is also called as *Vrschiva* or *Varsabhva*. In *Bhava Prakash Nighantu* its pharmacological properties are discussed as – it is *Tikta*, *Katupaka*, *Hima* and *Laghu*, *Vatala*, *Grahini*, *Sleshma Pitta Rakta Vina-shini*<sup>5</sup>.

**Synonyms:-**

**Sothaghni**– It removes *sotha* (oedema).

**Mandala patrika** – Its leaves are round.

**Raktapatrika** – Red tinges of leaves.

**Varshaketu** – It is well available in rainy season.

**Botanical description:** Herbaceous, diffuse, root large, fusiform, stems prostrate or ascending, reaching 0.6-0.9m long, divaricately branched, slender, cylindrical, thickened at

the nodes, minutely pubescent or nearly glabrous, often purplish. Leaves at each node in unequal pairs, the larger 2.5-3.8 cm, the smaller 1.3- 2cm long, both nearly as broad as long, broadly ovate or suborbicular, rounded at the apex, green and glabrous above, usually white with minute scales beneath, the margins entire, often coloured pink, somewhat undulate, base rounded or subcordate, petioles nearly as long as the blade, slender. Flowers very small, shortly stalked or nearly sessile, 4-10 together, in small umbels arranged in slender long-stalked corymbose, axillary and terminal panicles, bracteoles small, lanceolate, acute. Perianth 3mm long, ovarial part of tube 1.25mm long, contracted above the ovary, glandular- viscid, limb funnel shaped, dark pink, with 5 narrow vertical bands outside. Stamens 2 or 3 slightly exerted. Fruit 3mm long, clavate, rounded, broadly and bluntly 5- ribbed, very glandular<sup>6</sup>.

**Distribution:** Throughout India, Baluchistan, Ceylon – Tropical and subtropical Asia, Africa and America.

**Ayurvedic properties:**

**Guna:** Laghu, Ruksha;

**Rasa:** Madhura, Tikta, Kashaya;

**Vipaka:** Madhura;

**Virya:** Ushna;

**Dosha karma:** Tridoshaghna<sup>7</sup>.

**Traditional uses:** Well known use of *Punarnava* is in generalized oedema i.e. general anasarca. Its leaves are anti-inflammatory in action and so external application is done in localized inflammation<sup>8</sup>. Pulp of *Punarnava* and ginger is used in ascites and generalized oedema<sup>9</sup>. Medicated oil or ghee i.e. *Punarnava taila* or ghee are also used in hepatitis<sup>9</sup>. Powder of the leaves and roots of same is given in dose of 40gm in jaundice to remove aggravated *pitta* through purga-

tion<sup>10</sup>. *Punarnava* is also called as *Ashmarighana* i.e. it helps to flush out renal stones from the kidney, *Shothagna* i.e. alleviates oedema.

**Chemical constituents:** Punarnavoside, an antifibrinolytic glycoside, main medicinal part of *Punarnava* alkaloid known as Punarnavine. It is 0.04% in roots, KNO<sub>3</sub>, Na<sub>2</sub>SO<sub>4</sub> & NaCl is main constituent. All these chemical constituents lead to following properties of *Punarnava* –

1. Diaphoretic & Diuretic.
2. Emetic & Expectorant.
3. Laxative & Rejuvenative.
4. Stomachic, Antihelminthic & Purgative<sup>11</sup>.

**Hepatoprotective Activity:** Several studies indicate diuretic<sup>12</sup>, cardiotoxic<sup>13</sup>, anti-inflammatory, antifibrinolytic<sup>12</sup> & antiviral activities of *Boerhavia diffusa*. Hepatoprotective effect was evidenced by changes in serum alanine aminotransferase (ALT), triglycerides, cholesterol & total lipid levels in both serum and tissues. Histopathological studies showed marked reduction in fat deposits in animals receiving *Boerhavia diffusa* along with country made liquor<sup>14</sup>.

**Immunomodulatory effects<sup>15</sup>:** The alkaloidal fraction of *Boerhavia diffusa* was studied for its effect on cellular and humoral functions in mice. Orally administration is significantly inhibited SRBC-induced delayed hypersensitivity reactions in mice. However, the inhibition was observed only during post-immunization drug treatment, while no effect during pre-immunization drug treatment was observed.

**Antioxidant activity:** Leaves revealed stronger antioxidant activity than roots, the first analysis of volatile compounds of a widely used medicinal plant, *B. diffusa*. Ethanol and methanol extracts were pre-

pared and screened for in-vitro antioxidant activities using Ferric reducing power and Hydrogen peroxide scavenging activity. The activity was compared to standard antioxidant like ascorbic acid. Both the extract showed strong antioxidant activity in both the methods. Between these two extracts, ethanolic extract has shown better antioxidant activity as compared to methanolic extract in both the activities<sup>16</sup>.

**Bronchial asthma:** Dried leaves are used in *dhoomapana* (smoking) in treatment of bronchial asthma. The leaf decoction is an excellent expectorant when decocted with *punarnava* (*Boerhavia diffusa*) and then combined with *ginger juice* and *black pepper*<sup>17</sup>.

**Anti fibrinolytic activity:** A study that evaluates the effect of anti-fibrinolytic agents; -aminocaproic acid (-ACA), tranexamic acid (AMCA); anti-inflammatory drugs (indomethacin, ibuprofen, naproxen); and plant extract (root extract of *Boerhavia diffusa*) on endometrial histology of IUD-fitted menstruating monkeys. It is effective in reducing stromal edema, inflammation, & tortuosity of glands, & in increasing the degree of deposition of fibrin & platelets in the vessel lumen<sup>18</sup>.

**Chemopreventive action:** In the present study, cancer chemopreventive property of *B. diffusa* was evaluated on 7,12-dimethyl benz(a) anthracene (DMBA) induced skin papillomagenesis in male Swiss albino mice (6-7 weeks old). This leads to the supposition that the inhibition of tumorigenesis by the plant extract might have been executed either by preventing the formation of active carcinogens from their precursors or by augmenting detoxification process, preventing promotional events in the mouse skin

through free radical scavenging mechanism<sup>19</sup>.

**Hypoglycemic activity:** An alcoholic extract of the whole plant of *B. diffusa* exhibited hepatoprotective activity against experimentally induced carbon tetrachloride-hepatotoxicity in rats and mice. Study investigating the effect of oral administration of an aqueous solution of *B.diffusa* leaf extract on normal and alloxan -induced diabetic rats showed a significant decrease in blood glucose and a significant increase in plasma insulin levels in normal and diabetic rats. The effect was more prominent than glibenclamide. The chloroform extracts of *B. diffusa* leaves produced dose-dependent reduction in blood glucose in streptozotocin-induced NIDDM rats comparable to that of glibenclamide and this supports the traditional usage of the plant by *Ayurvedic* physicians for the control of diabetes. Study of leaf extract of *B. diffusa* produced dose-dependent reduction in blood glucose probably through rejuvenation of pancreatic  $\beta$ -cells or through extrapancreatic action<sup>20</sup>.

**Anti-inflammatory activity:** Ethanol extract of leaves at dose of 400mg/kg exhibited maximum anti-inflammatory effect with 30.4, 32.2, 33.9 and 32% with carrageenin, serotonin, histamine and dextran induced rat paw edema models, respectively. Ethanol extract of stem bark also exhibited COX-1 and IC50 value of 100ng/ml proving the drug use in the treatment of inflammatory condition<sup>21</sup>. Anti-inflammatory activity was assessed using extract of latex of plant by using acarragenan induced inflammatory model<sup>22</sup>.

**Anticonvulsant activity:** Study showed the crude methanolic extract of *B. diffusa* and its lirioidendrin-rich fraction showed a dose-

dependent protection against PTZ-induced convulsions<sup>23</sup>.

**Antiproliferative and Antiestrogenic Activity:** Antiproliferative and antiestrogenic properties of methanol extract of *Boerhavia diffusa* in MCF-7 breast cancer cell lines. *Boerhavia diffusa* extracts exhibited a strong inhibitory effect on the proliferation of human breast cancer cells in vitro and the antiestrogenic effects are mediated by ER. Phytochemical studies have revealed the pres-

ence of alkaloids, flavonoids, phenols and saponins in BME. The antiestrogenic activity shown by the extract may be attributed to these diverse compounds<sup>24</sup>.

**Table 1: Uses of Punarnava in various diseases & their mode of action**

S. No.	DISEASE	MODE OF ACTION
1	Diabetic Nephropathy	<i>Punarnava</i> speeds up the filtration process of kidneys and flushes out the excessive fluids and other waste products.
2	Obesity	Due to <i>Ushna virya &amp; Laghu, Ruksha Guna</i> and <i>Tikta, Kashaya Rasa</i> .
3	Asthama, Dyspnoea	Removes mucus plug from the bronchial tubes.
4	Congestive cardiac problems	Decreases general anasarca so decreases over load.
5	Anemia	Increase the Hb levels in the body.
6	General debility	Works as <i>Rasayana</i> .
7	Sciatica	Good nerve rejuvenator.
8	Constipation	Mild laxative.
9	Jaundice	Hepatoprotective.

## CONCLUSION

The multiple benefits of *Boerhavia diffusa* made it a true miracle of nature. It has several effects like antioxidant, antifibrinolytic, anti-inflammatory, hepatoprotective effects. A detailed and systematic study is required for identification, cataloging and documentation of plants, which may provide a meaningful way for the promotion of the traditional knowledge of the herbal medicinal plants. In view of the nature of the plant, more research work can be done on humans so that a drug with multifarious effects will be available in the future.

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