Abstract: Inflammation in Ayurveda is known by different names in different contexts namely Shotha, Shopha, Swayathu and Utsedha. Inflammation and edema associated with it is duly recognized in Ayurveda as a pathological manifestation, while modern medicine considers inflammation as a symptom or rather as a healing response of the body in wounds. Inflammation are due to Shroto-dushti (clogging of channels) by Ama (toxic waste of metabolism) i.e. disturbances in micro-channel circulation. Herbal medicines are associated with several therapeutic experiences and practices of indigenous systems of medicine, which serve as guideline for the selection, preparation and application of herbal formulations to achieve therapeutic benefits. In Ayurveda, Punarnava is one of the focus drugs having potent therapeutic potential. The name Punarnava itself means “Rejuvenation”. Punarnava shothaghni punarnavakari cha. (P.V.Sharma, Dravyagunasutram) It has Immunomodulater, Adaptogenic, Anti-oxidant, Hepato-protective, Anti-inflammatory, Anti-diabetic, Diuretic, Antiviral, Anticonvulsant properties. The review indicates that this herb justifies its name by its Rasayana and Anti-oxidant properties. This paper explains the evidence based information on the morphology, phytochemistry and therapeutic potential of this plant, classical as well as modern therapeutics.

Keywords : Punarnava, Rejuvenation, Anti-inflammatory, Rasayana

Introduction: Inflammation in Ayurveda is Shotha. The disturbances in micro-channel circulation in inflammation are due to Shroto-dushti (clogging of channels) by Ama (toxic waste due to deficient metabolism). Classification of shotha in Charaka Samhita as Ekanga (localised), Ardhanga (regional) and Sarvanga (general/dropsy) is based on etiology and may be again classified into two types - due to intrinsic factors (Nija) and exogenous factors (Agantuja).[1] 

<table>
<thead>
<tr>
<th>Nija (intrinsic factors)</th>
<th>Agantuj (exogenous)</th>
</tr>
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<tbody>
<tr>
<td>1. Vataj</td>
<td>1. Abhigaha (Trauma)</td>
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<tr>
<td>2. Pittaj</td>
<td>2. Bhallataka(pushpa, phala/Allergy</td>
</tr>
<tr>
<td>4. Visha (Toxicity)</td>
<td>5. Dahan (Burn)</td>
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<tr>
<td>6. Himvata (Climatic changes)</td>
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Pathological Features of inflammation: Degenerative disorder like Diabetes, Atherosclerosis, Parkinson’s syndrome, Alzheimer’s disease, osteoarthritis and rheumatoid arthritis share a common pathological feature of inflammation. Obesity, ageing and metabolic syndrome is also characterized by a low grade chronic inflammation.[2]

Punarnava is a potential and focus drug since Vedic era. Etymological derivation of word Punarnava (punar + nava), “Punar” means- once again and “nava” means becoming new, is the best lead towards its pharmacological properties. Boerhavia diffusa Linn. (Nyctaginaceae) has been recognized as official botanical source of the classical drug Punarnava. This is also known as spiderlings as this plant grows low and spreads like spider. B. diffusa commonly having red flowers was named in honor of ‘Hermann Boerhaave’, a famous Dutch physician of the 18th century.[3] Plant dries up during the summer season and regenerates again during the rainy season. Multiple benefits of B. diffusa made it true miracle of nature. Numerous studies have been conducted on different parts of B. diffusa.
**Morphology:** Boerhaavia diffusa, is a perennial herbaceous creeping weed. It is up to one metre long or more, having spreading branches. The stem is prostrate, woody or succulent, cylindrical often purplish, hairy and thickened at its nodes. The leaves are simple, thick, fleshy, and hairy, around in unequal pairs, green and glabrous above and usually white underneath; ovate, oblong, round or subcordate at the base; margins smooth, wavy or undulate. Flowers minute, subcapitate, 4-10, together in small bracteolate umbels, red or rose, but the white varieties are also known. Fruit achene, detachable, ovate, oblong, pubescent, five-ribbed, glandular, anthocarpus and viscid on the ribs. Seeds germinate before onset the monsoon. The plant grows profusely in the rainy season and mature seeds are formed in October-November.

**Phytochemistry:** Generally whole plant contains phytochemical constituents as punarnavine (Alkaloids), β-sitosterol (Phytosterols), Liriodendrin (lignans), punarnavoside (Rotenoids), Boerhavine (xanthones) and Postassium nitrate (salts). The roots contains the Borhavinone A-F(A1, B1, C2, D, E and F) besides the new dihydroisoferuxanxin, Alanine, Aspartic Acid, Aspatic Acid, Borhavine, Borhavic acid Campesterol, Daucosterol, Beta Ecdysone, Glutamic Acid, Glutamine, Glycine, Hentriacountance 9-1 arabinofuransoide, Leucine, Liriodendrin, Methoine, oleaic Acid, oxalic Acid, Plamitic Acid, Proline.proline, Hydroxy Serine, Sitosteroleolate, Sistosterol palmitate, stearic Acid, Stigmasterol Tyrosine ursolic Acid, Valine Xylose triacountanolhentriacontane, B- Tyrosine , ursolic Acid; 5,7 dihyoxy-68 dimethyl flavones, and an unidentified ketone.

**Varieties:** In Bhavprakash two varieties of Punarnava has been illustrated separately. These are shweta (white) and rakta (red) Punarnava.

**Pharmacological Properties**

![Image 1:Boerhavia diffusa Linn. Natural habitat](image)

1. Classical

**Rasanchaka:**

<table>
<thead>
<tr>
<th>Rasa</th>
<th>Madhura, Tikta, Kashaya</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guna</td>
<td>Laghu, Ruksa</td>
</tr>
<tr>
<td>Virya</td>
<td>Ushna</td>
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<tr>
<td>Vipaka</td>
<td>Madhura</td>
</tr>
</tbody>
</table>

**Karma:** Anulomana, shothahar, Mootral, Tridoshshamaka

**Properties:** Shweta punarnava has katu (pungent) and kashaya (astringent) taste and is used in pandu (anaemic), shotha (inflammation), Agni deepak, udar roga (abdominal disorders) and for the elimination of vayu (flatus), vish (toxins), kapha . Rakta Punarnava is tikta (bitter) rasa, and katu vipaka and is sheetal (coolant), increases vata in the body. It is malasangrahaka (astringents) in action and is beneficial in kapha pitta and rakta disorders. According to Acharya P.V.Sharma, Punarnava is tridosh shakam, mutravirechniya (diuretic). Acharya Charaka has classified it as Kasa-hara (anti-tussive), swedopaga, Anuvanapagaga, vayasthapana-rejuvenator. Sushrut has considered it in Vidaigandhadi gana and shaka varga. He has indicated it in pittaj ashmar (renal stones). Milk boiled with Punarnava root and shunthi is used in shotha (anti-inflammatory). Ashtanga Sangrah

Classical Uses

Anaemic Oedema: Punarnavamandura

Generalised Oedema
1. Paste of Punarnava, sunthi and mustaka should be taken in dose of 10gm with milk 640ml.
2. Punarnavadyarista.
3. The vegetable of Punarnava is particularly efficacious in oedema.
4. Decoction or paste of the root of Punarnava mixed with shunthi should be taken followed by intake of milk for a month.
5. Punarnava, Guduchi and Guggulu pounded in equal quantity alleviate oedema, gula, udara and disorders of kapha.

Edema during Pregnancy: Decoction of Punarnava root, Devadaru and Murva mixed with honey should be taken.

Traditional Medicinal Uses: The root is mainly used to treat gonorrhrea, internal inflammation of all kind, dyspepsia, edema, jaundice, menstrual disorders, anemia, liver, gallbladder and kidney disorders, enlargement of spleen, abdominal pain, abdominal tumors, and cancers. It cures corneal ulcers and night blindness and helps restore virility in men. People in tribal areas use it to hasten childbirth.

Pharmacological and Clinical Properties

Rasayana Properties: Ethanolic extract of roots of B.diffusa was evaluated for anti-stress, adaptogenic activity in albino mice, by swim endurance test and cold restraint stress. The extract improved the stress tolerance and reduced elevated WBC, blood glucose and plasma cortisol. The extract significantly increased DTH response to SRBC in mice, which was comparable with that of Levamisol, indicating stimulatory effects on lymphocytes and accessory cell type required for the expression of reaction.

Immunomodulation: The alkaloidal fraction of B.diffusa was studied for its effect on cellular and humoral functions in mice. Oral administration of the fraction (25-100 mg/kg) 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. A significant dose related increase in antibody titer was observed during pre and post immunization treatment. The alkaloidal fraction showed any blastogenic responsiveness of murine splenocytes to Concanavalin A (Con A) and lipopolysaccharide (LPS). Similarly, it did not display any mitogenic activity. The present study has shown in vivo immune-stimulatory activity of B. diffusa alkaloidal fraction without an in vitro effect.

Hepatoprotective Activity: B. diffusa extract is found to be Anti hepatotoxic and hepatoprotective. An aqueous extract of thinner roots of B. diffusa at a dose of 2mg/kg exhibited remarkable protection of various enzymes such as serum glutamic oxaloacetic transaminase, serum glutamic pyruvic transaminase and bilirubin in serum against hepatic injury in rats. The study shows a beneficial activity of the Punarnava root for the treatment of the jaundice.

Anti-inflammatory Activity: Ethanol extract of leaves at dose of 400 mg/kg exhibited maximum anti-inflammatory effect with 30.4, 32.2, 33.9 and 32% with carragenin, serotonin histamine and dextran induced rat paw edema models respectively. Ethanol extract of stem bark also exhibited COX-I and IC-50 value of 100ng/ml proving the drug use in the treatment of inflammatory conditions.

Diuretic Activity: Maximum diuretic and anti-inflammatory activities of Punarnava observed is therapeutically highly efficacious for the treatment of renal inflammatory diseases and early onset of the liver cirrhosis and chronic peritonitis. The root is used to treat other renal ailments (calculations and cystitis), seminal weakness and blood pressure.

Anti-diabetic Activity: A study was carried out to investigate the effects of daily oral administration of aqueous solution of B.diffusa leaf extract (BLEt) (200mg/kg) for 4 weeks on blood glucose concentration and hepatic enzymes in normal and alloxan induced diabetic rat. A significant decrease in blood glucose and significant increase in plasma insulin levels were observed in normal and diabetic rats treated with BLEt. The results indicate that the reduction in blood glucose produced by the extract is probably through rejuvenation of pancreatic beta-cells or through extra pancreatic action. This study depicts that daily intake of B.diffusa extract by Diabetic Mellitus patients may be useful in the prevention and treatment of the
Diabetes-induced hyper-lipidemia and atherosclerosis. \[4\]

**Conclusion:** The multiple benefits of *B. diffusa* made it true miracle of nature. Numerous studies have been conducted on different parts of *B. diffusa*. A detailed and systemic study is required for identification, cataloging and documentation of plants, which may provide meaningful way for the promotion of the traditional knowledge of herbal medicinal plant.

**References**


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