



AN ANALYTICAL REVIEW OF PUNARNAVA (BOERHAVIA DIFFUSA) WITH RESPECT TO CHAKSHUSHYA PROPERTY.

Ayurveda

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ABSTRACT

The drugs that perform the best efficacious action in treating specific conditions are categorized in specified ganas. Chakshushya gana dravyas are focused in treating the various conditions of ophthalmic manifestations. Chakshushya dravyas are described in the classical texts of Brihatrayi, Laghutrayi, in particular Bhavaprakasha Nigantu. Yogaratnakara mentioned a group of drugs under the chakshushya varga, Punarnava is one among them. It exhibits various actions along with other Ghataka dravyas, when used in compound formulation. Punarnava is a rich source of many alkaloids, tannins, carbohydrates, saponins, glycosides, proteins, amino acids, phytosterols, phenolic compounds, flavonoids and terpenoids. It is extensively used in the treatment of degenerative disorders including ophthalmic manifestations especially in the treatment of corneal ulcers, conjunctivitis and other eye diseases. Many references are found in the Bhaishajya Ratnavali and Basavarajecyam.

KEYWORDS

Punarnava, Boerhavia Diffusa, Flavonoids, Netrabhishyanda..

INTRODUCTION

Indian system of medicine 'Ayurveda' is a traditional antiquity and culmination of time, tested concepts of medicine for healthy life. Acharya Charaka explained the entire diseases and a way of life in the form of Trisutra-Ayurveda, Hetu, Linga, Aoushadha. Ashtangayurveda is a systemic division of all 8 specialities, among them Shalakyta tantra or Urdwanga chikitsa got its importance in treating ENT, Ophthalmology and diseases of head. The treatment modalities are based on aoushadha, kshara, agni and shastra karma(surgery). The drugs that perform the best efficacious action in treating specific conditions are categorized in specified ganas. Chakshushya gana dravyas are focused in treating the various conditions of ophthalmic manifestations. Chakshushya dravyas are described in the classical texts of Brihatrayi, Laghutrayi, in particular Bhavaprakasha Nigantu.

According to Sushruta Samhita - "chakshushe hitam chakshushyam" (Dalhana, S.S. 48/132) Yogaratnakara mentioned a group of drugs under the chakshushya varga, Punarnava is one among them. Punarnava is a traditional ayurvedic herb that is used to rejuvenate the whole body. The plant as a whole is used in the treatment of rheumatoid arthritis, fever, edema, eye problems, stomach issues, and liver disorders. The herb Punarnava has 3 distinct tastes mainly Madhura (i.e. sweet), Tikta (i.e. bitter) and Kashaya (i.e. astringent) Rasa. It has Laghu (i.e. light) and Ruksha Guna (i.e. dry quality) and Ushna Virya (i.e. hot potency). It characterizes Madhura Vipaka (i.e. sweet taste after digestion) and mainly portrays rejuvenating property.¹

Punarnava (Boerhavia Diffusa) is a perennial spreading herb in various parts of India. It is known for its various actions in treating the diseases. It exhibits mutravirechaneeya (diuretics), shothahara(anti-inflammatory), kasahara(anti-tussive), jwarahara(anti-pyretic), rasayana(rejuvenator), nethrya(beneficial for eye diseases).

Classical review of Punarnava in different SamhitasSushruta samhita1(a)

Sushruta samhita ^{1(a)}	1. Vidarigandhaadi gana 2. Shaka varga
Ashtanga sangraha ^{1(b)}	1. Kasahara mahakashaya 2. Vayasthapana 3. Medhya 4. Rasayana 5. Shakha varga
Bhavaprakasha Nigantu ^{1(c)}	1. Malasangrahaka 2. Sandivatahara 3. Nethrya

Sharangadhara samhita ^{1(d)}	1. Netra- srava 2. Timira 3. Adhimantha 4. Ratryandhya 5. Netra kandu 6. Netrya/chakshushya
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Synonyms- Rakta pushpa, shilatika, shothaghi, kshudra, varshabhu, varshaketu

Punarnava as Chakshushya dravya

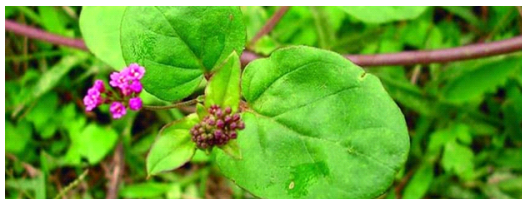
Some of the compound preparations having punarnava as an ingredient and used in eye diseases are:

Text	Preparations	Indications
Bhaishajya Ratnavali ²	Nayanasonita Anjana	Timira, Patala, Netra Pushpa
	Nrupavallabha thailam	Timira, Patala, Kacha, Naktandhya, Arbudha, Divandhyam, Linganasha
	Kanaka thailam	Netra sula
	Tapta raja thailam	Netra sula, timira
Basavarajecyam ³	Karpooradhajana	Timira, patala, kacha, pushpam
Sharangadhara samhita ⁴⁽⁵⁾	Triphala ghrita	Naktandhya, nakulandhya, kandu, pilla, netra srava, patala, timira and kacha
	Punarnava rasakriya	Punarnava used as anjana a. with milk effective in kandu, b. with honey- netra srava, c. with ghrita- netra pushpa(corneal opacity), d. with oil- visual disturbance, e. with kanji- night blindness.

Morphology

Boerhavia diffusa is a perennial creeping weed, prostrate or ascending herb, up to 1 m long or more, having spreading branches. The stem is prostrate, woody or succulent, cylindrical, often purplish, hairy, and

thickened at the nodes. Leaves are simple, thick, fleshy, and hairy, arranged in unequal pairs, green and glabrous above and usually white underneath. The shape of the leaves varies considerably – ovate-oblong, round, or subcordate at the base and smooth above. Flowers are minute and subcapitate. These are hermaphrodite, pedicellate, and white, pink, or pinkish-red in color. The roots are stout and fusiform with a woody. This trailing herb is mainly collected after rainy season in India



Distribution The genus *Boerhaavia* has several species, and is distributed in the tropical, subtropical, and temperate regions of the world [6]. It is found in Australia, China, Egypt, Pakistan, Sudan, Sri Lanka, South Africa, USA and in several countries of the Middle East. Out of the 40 species of this genus, 6 species are found in India – *B. diffusa*, *B. chinensis*, *B. erecta*, *B. repens*, *B. rependa*, and *B. rubicunda*. It is found throughout the warmer parts of the country up to an altitude of 2000 m in the Himalayan region. It grows well on wastelands and in fields after the rainy season [5]

Chemical constituents of whole plant

Characterization of the whole plant extract of *B. diffusa* led to isolation of four new flavonoids and phenol glycosides such as eupalitin 3-O-β-D-galactopyranosyl-(1''2'')-O-β-D-galactopyranoside, 3,3',5-t apiofuranosyl-(1'3')-O-β-D-glucopyranoside [47]. Two quinolizidine alkaloids identified as punarnavine I and punarnavine II was isolated from root, stem and leaves. Several volatile compounds were identified in both root and leaves [38] rihydroxy-7-methoxyflavone, 4',7-dihydroxy-3'-methylflavone and 3,4-dimethoxyphenyl-1-O-β-D

Chemical components of Boerhaavia diffusa (a)

Class	Compounds
Alkaloid	Punarnavine
Rotenoids	Boeravine A-F Hypoxanthine 9-L-arabinofuranoside Hentriacontane, β-sitosterol and ursolic acid
Glycoside	Punarnavoside C-methylflavone 5,7-dihydroxy-3',4'-dimethoxy-6,8-dimethylflavone 40β-ecdysone, triacontane β-sitosterol-β-D-glucoside
Acids	tetracosanoic, hexacosanoic, stearic, palmitic, arachidic acids Boerhavin and boerhavic acid
Lignans	Liriodendrin syringaresinol mono-β-D-glucoside Glycoprotein
Lipids	5-methyleicos-4-ene Eicos-4-ene 4-methyloctadec-3-ene 4-methylnonadecylbenzene
Phenolic compounds	3,4-dihydroxy-5-methoxycinnamoylrhamnoside Quercetin 3-O-rhamnosyl (1→6) galactoside (quercetin 3-O-robinobioside) Quercetin 3-O-(2''-rhamnosyl)-robinobioside Kaempferol 3-O-(2''-rhamnosyl)-robinobioside 3,5,4'-rihydroxy-6,7-dimethoxyflavone 3-O-galactosyl(1→2)glucoside [eupalitin 3-O-galactosyl(1→2)glucoside]Caffeoyltartaric acid Kaempferol 3-O-robinobioside eupalitin 3-O-galactoside Quercetin Kaempferol 6, 9, 11-Trihydroxy-6a12a-dehydrorotenoid (coccineone B)

Some important phyto-chemical constituents and mode of action of Punarnava

S. No.	Name	Chemical Constituents	Mode of action	References
1	Eupalitin		Antioxidant	[6]
2	Boeravin one B		Antistress agent,	[7]
3	Boeravin one C		Immunostimulant	[8]
4	Boeravin one D		Immunostimulant	[9]
5	Coccineone B		Spasmolytic effects	[10]
6				
7	Boeravin one F		Immunostimulant	[11]
8	Boeravin one G		Anti-oxidant effects	[12]
9	Boeravin one H		Immunostimulant	[13]
10	Rotenoids		Antioxidant, Diuretic, Antifibrinolytic	[14]

Nutritional Value of Punarnava (100 gms)

Fat	1.61%
Sodium	162 mg (2.26%)
Vit C	44.8mg
Calcium	142mg
Iron	0.012mg

DISCUSSION

Punarnava as Chaksushya

1. Punarnava which is a Rasayana and contains many nutrient materials to rejuvenate the cells of the body. Hence it is one of the Ghataka dravya in many Rasayanas including Chaksushya Rasayanas.

2. Punarnava is a rich source of many alkaloids, tannins, carbohydrates, saponins, glycosides, proteins, amino acids, phytosterols, phenolic compounds, flavonoids and terpenoids, it is extensively used in the treatment of degenerative disorders including ophthalmic manifestations especially in the treatment of corneal ulcers, Abishyanda and Retinal diseases. Many references are found in the Bhaishajya Ratnavali and Basavaraajeyam.¹⁵

3. Boerhavia diffusa (punarnava) root extract exhibits significant anti-cataract activity in experimental animals. The effect can be attributed to inhibition of oxidative stress. Hence the Acharyas have already advocated this herb in the treatment of Kacha, Timira and Patala.¹⁶

4. Anti oxidant activity : Oxygen free radicals produced as a result of metabolic process in our body, induce damage to biomembranes and genetic materials leads to many chronic degenerative diseases including night blindness and Retinal degenerative changes.

Boerhavia diffusa play preventive and productive role to maintain the cell survival, cellular interaction and maintenance of cell membranes. Sharangadhara Samhita and Basavaraajeyam have indicated this precious drug in the management of Nakthandhya, Nakulandhya, Timira and Kacha.¹⁷

5. Anti histaminic activity : Ethanol extract of Boerhavia diffusa linn roots in experimental animals evaluated for anti-histaminic activity. The results are encouraging. Hence Punarnava along with Madhu, or Ksheera Aschotana is indicated in Allergic Conjunctivitis.¹⁸

6. Punarnava juice extract is used in eyes for topical application. Punarnava leaves extract is used for chronic Ophthalmia. Ethanol extract of leaves of Punarnava have exhibited maximum anti-inflammatory effect in animal experimentation. Hence it is used for Anjana purpose in the conditions like Netra Srava, Pilla Rogas etc.¹⁹

7. Nasal drug delivery of the Boerhavia diffusa (punarnava) juice extract is effective in the management of increased intra ocular pressure in chronic simple glaucoma (Adhimantha) . experimental studies also focuses upon the significance of nasal route of drug administration in ophthalmic diseases management. Hence punarnava is indicated in dristimandhya wrt adhimantha.²⁰ There is a need for further study in this aspect.

8. Punarnava which has got the properties of anticancer, may be an indication for the further study in malignant conditions of eye. Acharyas have mentioned punarnava as a arbudahara.

9. Antibacterial and very high Antiviral activity :The aqueous and ethanolic extracts of B. diffusa leaves had activity on E. coli, S. aureus and P. aeruginosa . The aqueous extracts of large plant materials were prepared and tested in vitro as well as in vivo against phyto-pathogenic viruses on their hypersensitive and systemic hosts. Of the large number of plants screened, Boerhavia Diffusa root extracts were found to have a broad spectrum and very high antiviral activity. So, Punarnava is effective in many infective eye diseases due to its anti-microbial activity. Hence, in all types of netrabhishyanda, it is an effective herb.^{21,22}

10. Punarnava along with Gokshura Basthi is effective in the management of Diabetic retinopathy, and related complications²³.

CONCLUSION:

1. Punarnava shows various actions, along with other Ghataka dravyas, when used in different combinations, it is a complete pack of regenerative , antioxidant which is also a Chakshushya dravya explained by Sharangadhara Samhita and Bhavaprakasha Nighantu.
2. Though Punarnava (Boerhavia diffusa) is indicated in various ophthalmic conditions, there is a need to re establish its efficacy with respect to its different actions.
3. Punarnava contains many flavonoids, tannins, alkaloids, vitamins, and antioxidant nutrients which are essential part of Chakshushya property.

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