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Review Article

PUNARNAVA *(BOERHAVIA DIFFUSA)*: A PROMISING INDIGENOUS HERBAL DRUG

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ABSTRACT
Ayurveda is a sea of knowledge which is widespread not only on the surface but is indeed deep remarkably as well. It emphasises on the preventive aspect of the health and discusses the analysis and management of various physical and mental disorders. While viewing this traditional knowledge, one comes across a very important herb Punarnava (*Boerhavia diffusa*). It is a trailing herb which is found throughout India. This herb has registered its importance in various formulations as it has been significantly found to be effective in diseases like shotha (inflammation) and pandu (anaemia). The market analysis shows that many different formulations are available in which the punarnava mandur and Punarnava ashtaka kwatha are being prescribed at large.
In this article, summarization of the various synonyms, morphological properties, pharmacological activities, uses, dose and formulations of the selected drug from various classical texts up to modern era is attempted.
The review indicates that this indigenous medicinal drug has wholesome references in various ancient and modern texts. This plant has proved itself to be beneficial in the past, is a drug of choice nowadays and seems to be effective in future. More research needs to be carried out in formulating new medicines which can contribute to animal life and mankind.
Keywords: Punarnava, *Boerhavia diffusa*, Shotha, Pandu, Punarnava ashtaka kwatha

INTRODUCTION

The universe is considered to be panchbhautik in nature[1] and so is the human body. With the upcoming of dvapar, treta and kal yug, the diseases also made their way in the lives of plants, animals and humans as well. In order to treat them in humans, the science which reflects one of the most ancient knowledge is Ayurveda. This science lays stress on the maintenance of equilibrium of Dosha (the body humours), Dhatu (the body tissues) and Mala (the body wastes) for a proper healthy body and mind.[2]For achieving the health, it emphasises on the preventive aspect mentioned as the daily regimen and the seasonal regimen. Not only the regimens but it also focuses on proper ahaar (diet), nidra (sleep) and brahmcharya (celibacy) for the maintenance of health.[3] In the state of disease, various dietary and medicinal managements have been discussed by the great vaidyas like Acharya Charaka and Acharya Sushruta in their Samhitas. So, this is a science of indigenous origin which has valued on the holistic approach towards overall health of an individual. While focussing on treatment, it lays stress on the various preparations which are either herbal or herbal-mineral in origin. One of the drugs which is well known and is long established plant in the scientific system of ancient Indian medicine is Punarnava. This plant is found as a perennial spreading herb and as weed in the various parts of Indian states. In Ayurveda, this drug is known to be used as mutravirechniya (diuretic), shothahara (anti-inflammatory), kaashara (antitussive), jvarhara (antipyretic), rasayana (rejuvenator) and what not. Not only the roots as therapeutic agent but the whole plant of this herb is also being taken as diet by some tribal groups for which mainly the leaves are used. This drug has been cited as bitter, coolant and astringent in nature. The main part used it whole plant specifically the mool (the root). The dose has been expressed as 20-30 g for decoction. Known with different local names, the herbal drug has been extensively used in past, is one of the most efficient drug of present and promises itself for the future. An attempt has been made to focus the light on the stand of the herbal drug, Punarnava, in some of the Ayurvedic texts from Vedic period up to the modern day era.

Classical Review

Charaka Samhita: Acharya Charaka have categorised Punarnava as swedopaga[4] (an adjunct to sweating therapy), anuvasanupaga[4] (an adjunct to oleating therapy), kaashara [4] (anti-tussive) and vayasthapana[4] (rejuvenator). Its mool (root) has been written to be used with dahi maanda in kushtha (skin disorder).

Sushruta Samhita: Acharya Sushruta has categorised this plant in vidharigandhadi gana[5] and shaak varga.[6] In this Vedic text, punarnava mool has been told to be used in pittaj ashmari (renal stones) [7]; milk boiled with root, Shotha (anti-inflammatory) [8]; mool kwatha with shunthi, Mooshaka vish (rat bite) [9]; mool (root) of shveta variety with honey), Alarka visha (bite of a rabied dog)[9]; mool (root) of shveta variety with dhatura seed powder and water and in jvara (all types of fever)[10]; ksheerpaka of mool of shveta (white) variety. It is one of the components of Ek rasa sangyaka agad[11] to be used as antitoxin.

Ashtanga Sangraha: In this Ayurvedic text Punarnava is included in Kaashara mahakshaya (as antitussive) [12] and Vayasthapana mahakshaya (decoction effective as rejuvenator).[13] Punarnava mool (root) is quoted to be effective in Madatya (alcoholism)[10]; Ghee to be prepared with decoction of punarnava, milk and madhuyashti kalka, as Rasayana (rejuvenator)[10]; Punarnava powder is to be used. The plant has also been included as Shaak (as vegetable diet). [14]

Bhavprakash Nighantu: This is one of the most authentic texts of Dravyaguna written in 16th century A.D. In this text the two varieties of Punarnava have been illustrated separately. These are shveta (white) and rakta (red) punarnava. Shveta punarnava has its synonyms as shvetmoola, shothaghni, and dirghapatrika. It is said to have katu (pungent) and kashaya (astringent) taste and is used in pandu (anaemia), shotha (inflammation), decreased digestive fire, udarroga (abdominal disorders) and for the elimination of vayu (flatus), vish (toxins), kapha (phlegm).[15] Rakta Punarnava has its synonyms as raktpushpa, shilatika, shothaghni, ksudra varshabhu, varshketu and kathillaka. It is constituted by tikta (bitter) rasa, has katu vipaka and is sheetal (coolant), light and increases vata in the body.[15] It is malasangrahaka (astringents) in action and is beneficial in kapha, pitta and rakta disorders. Karvellaka (bitter gourd) and rakta punarnava (red variety) have both been named as kathillaka in Anekartha naam varga. [16] It has been told to be used in Sanhdivaata (Osteoarthritis); Punarnava kwatha with kalka of kapur and shunthi to be given for seven days, and in various eye disorders.[17]

Adarsha Nighantu: This is an Ayurvedic text in which the content of Dravyaguna has been discussed at large. In this Punarnavadi varg has been discussed with Punarnava as its first plant. The different synonyms and regional names have been told. The etymology of the synonyms of the plant has been written like Punarnava (this plant grows green every year and is effective in diseases like pandu (anaemia) due which it is appreciated), Varshabhu (this plant grows green every year by itself), Vishakha (due to widely spreading stems). Mool (root), patra (leaves) and panchanga (whole plant) has been told to be used. The dose evaluated is 1-2 tola (1tola = 12g) in jalodara (ascites) and shotha (inflammation), 0.25-0.5 tola (1tola = 12g) in other ailments. The rasa (taste) in the plant is katu (pungent), tikta (bitter), kashaya (astringent), virya (potency) is ushna (hot), vipaka as Katu (pungent) and doshakarma is kaphavata shamaka.[18]

Sharangdhar Samhita: This is an Ayurvedic text written in modern period around 13th century A.D. In this text Punarnava rasanjana has been described. The mool has been said to be rubbed and used with different substances and is effective in various disorders such as with milk in netra kandu (itching of eyes), with honey in netrasrava (watery eye), with taila in timir roga (pre-glaucomatic condition and glaucoma) and with kanji in rataundhi (night blindness).[19]

Ras Tantra Sar V Sidh Prayog Sangrah: This text is a reputed ayurvedic text for various formulations written in 19th century AD. In this literature various aspects of a herbo-mineral formulation Punarnava mandur has been discussed. The technique of the formulation has been referred from Bhavprakash). The dose is cited as 2-4 tabs twice a day with gud (jaggery) and water as anupana. In a constipated person with indigestion, haritaki powder is to be mixed and given. For immediate effect, yograj guggul may also be added. This formulation is beneficial in disorders like shotha (inflammations), pandu (anaemia), kamala (jaundice), udarroga (abdominal disorders), shoola (painful conditions), shwasa (difficulty in breathing), kaasa (cough), jvara (fever), arsha (piles), sangrahini (irritable bowel syndrome), krimi (worm infestation), vaatrakta (gout) and kushtha (skin disorders). It has been specially highlighted to be used in pandu (anaemia) and kamala (jaundice).[20]

The same reference of Punarnava mandur has also been found in Rasa Tarangini[21].

Ayurveda Sara Sangrah: In this text various formulations of Punarnava are mentioned like Punarnava arka,[22] Punarnava kshaar,[23] Punarnava arishta,[24] Punarnavadi taila,[25] Punarnavashtaka kwatha,[26] Punarnavadi kwatha.[27] Of these formulations Punarnava ashtaka is one of the most commonly used formulations. The composition is as follows (Figure 1):

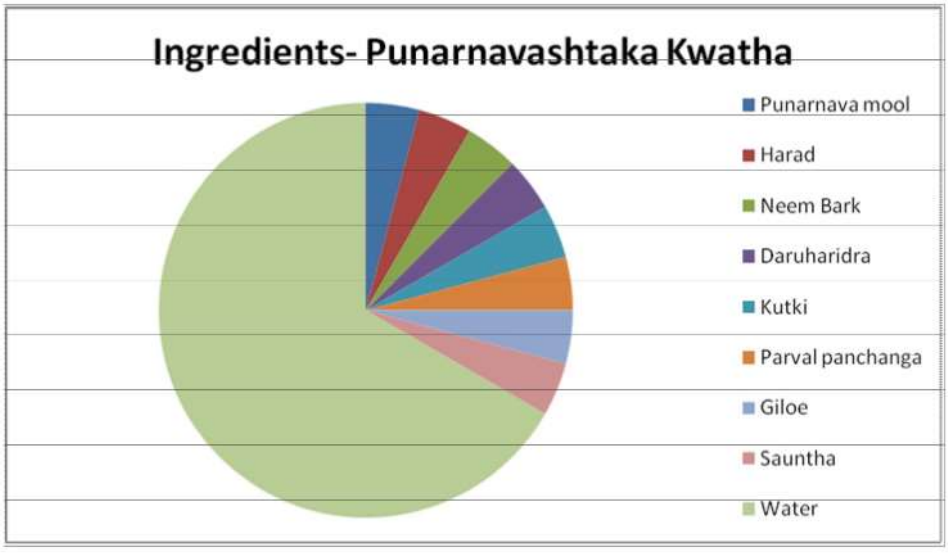

Figure 1: The ratio of enlisted ingredients in *Punarnava Ashtaka kwatha*[26] as per *Ayurveda Sara Sangraha.*

Method: The drugs are powdered. 1 tola (1tola = 12g) of the powder is taken, 16 times quantity of water added and heated until ¼ is left behind. It is filtered and to the decoction 1-2 tola (1tola = 12g) cow milk is added and given to the patient 2-3 times a day. This formulation is useful in hepato - splenomegaly, inflammation, joint pains etc. This formulation can also be used as anupana.

Chakradatta Samhita: In Adarsha Nighantu the reference of Chakradatta is also available. Acharya Chakrapani has quoted the drug to be used in Shotha (inflammation); ghee prepared with punarnava kwatha and kalka), vidradhi (abcess); water boiled with shveta punarnava mool and in vishdosha like snakebite; shveta punarnava mool powder with tandulodaka in pushya nakshatra. In this text the uses discussed in other texts has also been mentioned.

In Haarit Samhita kwatha of punarnava mool has been told to be effective in nidranasha (insomnia). [10]

In Sodhal Nighantu, Acharya Sodhal has described its uses in yonishool (vaginal pain), [17] delayed parturition and vishvikara.[17]

In Vaidyamanorama, Punarnava has been told to be used in pain due to Gulma (glandular enlargement) [17] and for easy parturition.

Modern Review

Scientific Classification: In modern period, the crude drugs have extensively been classified and studied according to their taxonomy. In view of this classification, the Punarnava is categorised as under;

Kingdom: Plantaeae
Order: Caryophyllales
Family: Nyctaginaceae
Genus: Boerhavia
Species: *Boerhavia diffusa*

The other synonyms of this drug are *Boerhavia adscendens, Boerhavia caribaea, Boerhavia coccinea, Boerhavia paniculata and Boerhavia viscosa.*

Reference is also found that there are six species which are found in India: *Boerhavia diffusa, Boerhavia chinensis, Boerhavia rependa, Boerhavia repens, Boerhavia erecta and Boerhavia rubicunda.* This plant is found throughout the warmer parts of the country up to the height of 2000 m in the Himalayan area. It is also found grown in the wastelands and fields after the rainy season.[28]

D**ravya Guna Vijnana**: Prof. P. V. Sharma has categorised this plant as mutravirechniya (diuretic). The drug has been introduced with the classification that has been mentioned in Charaka Samhita and Sushruta Samhita. The botanical source (Latin name- *Boerhavia diffusa* and family- Nyctaginaceae) is defined and different synonyms with regional names enlisted. This perennial spreading herb has been completely described in terms of its morphology. The three varieties have been told to be found throughout India. Chemically this plant contains the main alkaloid Punarnavine (0.04%) with potassium nitrate. Bhasma contains sulphates, chlorides, nitrates and chlorates. Naturally provided with madhur (sweet), tikta (bitter) and kashaya (astringent) rasa, this herb has laghu (light) and ruksha (dry) properties, shows madhur vipaka and has ushna virya. It is tridoshahara in nature. The various actions and uses have been discussed. The mool (root), seeds, and panchanga (whole plant) are the main parts to be used. The dosage form found to be written is Swarasa (juice): 5-10 ml, seed powder: 1-3 g. The formulations enlisted are Punarnava ashtaka, Punarnava asava, Punarnava ambu and Punarnava mandur.[29]

The Ayurvedic Pharmacopeia of India: In this official text, Rakta Punarnava has been discussed. The plant have been introduced with its botanical source (Latin name: *Boerhavia diffusa*, Family: Nyctaginaceae and whole plant to be used) and said to be collected after rainy season. The various synonyms and regional names have been compiled. External morphological characters of all the parts of the plant have been elaborated. The microscopic characters of root stem and leaves are found. The identity, purity and strength (Foreign matter: Not more than 2%; Total ash: Not more than 15%, Acid insoluble ash: Not more than 6 %; Alcohol soluble ash: Not less than 1%; Water soluble ash: Not less than 4%) have been elucidated which helps in the standardisation of various samples of the crude drug. The chemical present is an alkaloid (Punarnavine), ras panchaka discussed and various formulations written are Punarnavasava, Punarnavashtaka kwatha, Punarnavadi mandur, Sukumara Ghrita and Shothaghna lepa. 20-30 g of the drug is to be used for decoction therapeutically in Shotha (inflammation) and Pandu (anaemia).[30]

Recent Researches on Punarnava: The scientists have been carrying an extensive research on Punarnava (*Boerhavia diffusa*). The recent researches have proved the actions of this drug in various disorders as mentioned in the classical texts. This plant has shown hepatoprotective activity[31], anti-diabetic activity[32] and has anti-oxidant effect in rats.[33] The leaves have various nutritive components like Vitamin C, sodium and calcium.[28] The roots of *Boerhavia diffusa* contains various chemical constituents like alkaloids (punarnavine), rotenoids (boeravinones), flavonoids, amino acids, lignans (liriodendrons), ß sitosterols and tetracosanoic, esacosanoic, stearic and ursolic acids[34] due to which various pharmacological activities are reported .The main rotenoids also known as boeravinones are the metabolites responsible for various activities.[34] The studies have revealed their structure as below (Figure 2):

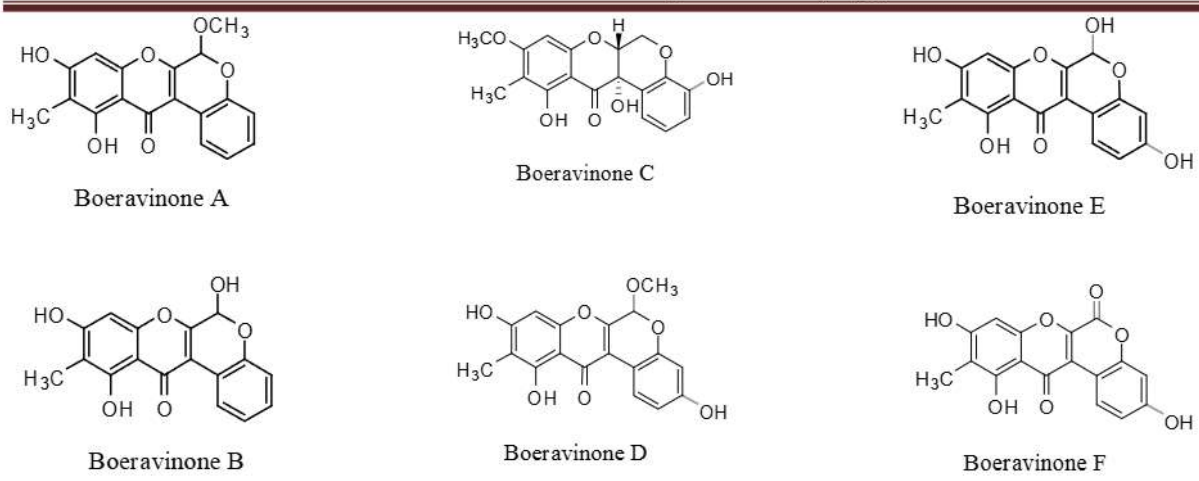

Figure 2: Structures of Boeravinones (A-F) [28]

The plant is also effective in the treatment of abdominal tumours and cancers.[28] It helps in promoting growth when milk fortified with the root is given to the children.[28] It has also been demonstrated that it decreases the levels of albumin urea and increase the level of serum protein and lowered serum cholesterol.[28] Present studies have also indicated that roots possess antistress, adoptogenic, immunopotentiating activity[35] in mice.

CONCLUSION

Ayurveda is itself a library of knowledge which inspires each of us to lead a healthy and quality life. With marked changes in the environmental conditions, the effects on the body are well observed as physic-mental disorders. Looking into these challenges, punarnava is one of the potent herbal drugs that are being used nowadays as single or mixed herbal and herbal-mineral formulation. The traditional texts gives us the knowledge about its various properties and formulations being used in various conditions like inflammations, renal stones, anaemia, jaundice, eye diseases, joint pains etc. The modern research has also proved the efficacy of roots in not only the said disorders but also as antidiabetic, antistress, adoptogenic, immunopotentiator and as antioxidant in various models. Studies have shown that leaves have nutritive components like Vitamin C, sodium and calcium due to which it can be considered as an effective component of the diet. Further studies can be aimed for the analysing the effect of punarnava in of diseases like insomnia, delayed parturition and Yonishool (vaginal pain) for which the references are available in ancient texts. Not only this, but the scope of this drug also lies in the fact that more formulations with other herbs and minerals can be formulated and tested which can prove to be beneficial in animal and human life as well.

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REFERENCES

1. Tripathi B. Charaka Samhita Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2005, p. 469.
2. Sharma AR. Sushruta Samhita Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 14.
3. Shukla V, Tripathi RD. Charaka Samhita Vol I. Delhi: Chaukhamba Sanskrit Pratishthan; 2005. p. 171.
4. Shukla V, Tripathi RD. Charaka Samhita Vol I. Delhi: Chaukhamba Sanskrit Pratishthan; 2005. p. 74-78.
5. Sharma AR. Sushruta Samhita. Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 294.
6. Sharma AR. Sushruta Samhita. Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 416-417.
7. Sharma AR. Sushruta Samhita. Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 236.
8. Sharma AR. Sushruta Samhita. Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 351.
9. Sharma AR. Sushruta Samhita. Vol I. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 569-574.
10. Vaidya B. Adarsha Nighantu. Varanasi: Chaukhamba Bharati Academy; 2005. p. 295.
11. Sharma AR. Sushruta Samhita. Vol II. Varanasi: Chaukhamba Surbharati Prakashan; 2004. p. 561.
12. Tripathi R. Ashtanga Sangraha. Delhi: Chaukhamba Sanskrit Pratishthan; 2003. p. 306.
13. Tripathi R. Ashtanga Sangraha. Delhi: Chaukhamba Sanskrit Pratishthan; 2003. p. 310.
14. Tripathi R. Ashtanga Sangraha. Delhi: Chaukhamba Sanskrit Pratishthan; 2003. p. 137.
15. Chunekar K, Pandey GS. Bhaav Prakash Nighantu. Varanasi: Chaukhamba Bharati Academy. 2004, p. 422-424.
16. Chunekar K, Pandey GS. Bhaav Prakasha Nighantu. Varanasi: Chaukhamba Bharati Academy,; 2004. p. 798.
17. Vaidya B. Adarsha Nighantu. Varanasi: Chaukhamba Bharati Academy; 2005. p. 296.
18. Vaidya B. Adarsha Nighantu. Varanasi: Chaukhamba Bharati Academy; 2005. p. 292-293.
19. Tripathi B. Sarangdhara Samhita. Varanasi: Chaukhamba Surbharati Prakashan; 2010. p. 438.
20. Krishan G. RasatantraSara and SidhPrayoga Sangraha. Part I. Ajmer: Krishan Gopal Ayurvedic Bhavan; 2003. p. 513-514.
21. Shastri K. Rasa Tarangini. Varanasi: Motilal Banarsidass Publishers; 2004. p. 738.
22. Sharma RN. Ayurveda Sara Sangraha. Allahabad: Baidyanath Ayurved Bhavan; 2005. p. 562.
23. Sharma RN. Ayurveda Sara Sangraha. Allahabad: Baidyanath Ayurved Bhavan; 2005. p. 613.
24. Sharma RN. Ayurveda Sara Sangraha. Allahabad: Baidyanath Ayurved Bhavan; 2005. p. 652.
25. Sharma RN. Ayurveda Sara Sangraha. Allahabad: Baidyanath Ayurved Bhavan; 2005. p. 689.
26. Sharma RN. Ayurveda Sara Sangraha. Allahabad: Baidyanath Ayurved Bhavan; 2005. p. 711.

27. Sharma RN. Ayurveda Sara Sangraha. Allahabad: Baidyanath Ayurved Bhavan; 2005. p. 722.
28. Rajpoot K, Mishra RN. Boerhaavia diffusa roots (Punarnava mool) – Review as Rasayan (Rejuvenator / Antiaging). Int J Res Pharmaceut Biomed Sci. 2011; 2(4): 1451-1460.
29. Sharma PV. Dravyaguna Vijnana. Varanasi: Chaukhambha Bharati Academy; 2005. p. 630-632.
30. The Ayurvedic Pharmacopeia of India. Part I. Vol I. Government of India: Ministry of Health, Department of Ayush: p. 126-128. Available from http://www.ayurveda.hu/api/API-Vol-1.pdf.
31. Satheesh MA, Pari L. Antidiabetic activity of *Boerhaavia diffusa* L.: Effect on hepatic key enzymes in experimental diabetes. J Ethnopharmacol. 2004 [cited 2013 Feb 21]; 91(1): 109–113.
32. Rawat AKS, Mehrotra S, Tripathi SC, Shome U. Hepatoprotective activity of *Boerhaavia diffusa* L. roots — a popular Indian ethnomedicine. J Ethnopharmacol. 1997 [cited 2013 Feb 20]; 56(1): 61-66.
33. Satheesh MA, Pari L. Antioxidant effect of *Boerhavia diffusa* L. in tissues of alloxan induced diabetic rats. Ind J of Exp Biol. 2004 [cited 2013 Feb 22]; 42(10): p. 989-992.
34. Ujowundu CO, Igwe CU, Enemor VHA, Nwaogu LA, Okafor OE. Nutritive and Anti-Nutritive Properties of *Boerhavia diffusa* and Commelina nudiflora Leaves. Pak J Nutr. 2008 [cited 2013 Feb 21]; 7(1): 90-92.
35. Sumanth M, Mustafa SS. Antistress, Adoptogenic and immunopotentiating activity Roots of *Boerhavia diffusa* in mice. Int J Pharma. 2007 [cited 2013 Feb 21]; 3(5): 416-420

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