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Review Article

A COMPREHENSIVE REVIEW OF *WOODFORDIA FLORIBUNDA* SALISB.

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ABSTRACT

Indian medicinal plants are the essence of Ayurveda and Ayurvedic treatments. When used judicially and clocking with the basic principles they produce miraculous effects. Fire flamed Bush (*Woodfordia floribunda* salisb), commonly called as *Dhavari*, *Dhataki*, belongs to the family Lythraceae. It is an important medicinal plant of tropical and subtropical India. *Dhataki* is a deciduous shrub, usually with a much fluted stem, spreading branches, 1-3 m high, rarely up to 7 m, commonly occurring throughout North India, ascending to an altitude of 1,500 m in the Himalayas, but rather scarce in South India. Acharya Charak quoted it among the fermenting agents (*Asava yoni*) and described under *Purisasangrahniya*, *Mutravirajaniya* and *Sandhaniya* group of drugs. The reported pharmacological activities of *Woodfordia floribunda* salisb. are antitumor activity, DNA inhibitory activity, immunomodulatory activity, antioxidant activities, antihyperglycemic activity, anti- inflammatory and analgesic properties, antimicrobial activity, hepatoprotective activity, etc. *Dhataki* is one of the major ingredient of many important formulations used in Ayurvedic system of medicine such as *Dhatakyadi taila, Dhatakyadi curna, Pusyanuga curna, Brhat Gangadhara curna, Arvindasava.* So this review paper is an attempt of the author to provide details of this medicinal plant *Dhataki* about its classical references, synonyms, botanical description, phytochemical and pharmacological activity and classical medicinal uses.

KEYWORDS: Fire flamed Bush, *Woodfordia floribunda* salisb., *Dhataki, Sandhaniya.*

INTRODUCTION

Fire flame bush (*Woodfordia floribunda* salisb.) commonly called as *Dhataki*. The generic name of the plant honors E.James Alexander woodford (1771-1837), a botanist and physician who was the first to successfully grow *woodfordia* to flowers under glass.[1] It is mainly emphasized in the ancient Ayurvedic texts as one of the most important fermentation products, hence the names *Madyapuspa* and *Madakara*. According to professor Priyavrat Sharma in his Dravyaguna vijnanam the main function of *Dhatki* is Stambhan.[2] *Dhatki* is widely cultivated as an ornamental shrub. It is cultivated in gardens for its flowers, which are borne during the summer months. The flowers are flame coloured, hence the name is fire flamed bush, and yield a red dye used to color fabrics. Flower of *Dhataki* is *Sangrahak*, *Uttejak* (stimulant), *Vishnasak* (anti poisonous), *Raktsravnirodhak*, *Vranropak* (wound healing), *Vransodhak*. This plant are reported to be used for the treatment of dysentery, diarrhoea, *Sangrahani*, *Raktpradar*, leucorrhoea, piles, liver disease, *Sarpvish*, wound.[3] Dried flower are useful in disorders of the mucous membranes, haemorrhoids and derangements of the liver. In the konkan leaves are used in bilious sickness, juice of leaves is applied to the crown of the head, while the patient is made to hold a mouthful of sesamum oil.[4]

Botanical Origin

Woodfordia floribunda Salisb; *Woodfordia fruticosa* (L.) kurz.; *Lythrum fruiticosum* Linn.[2]

Family: Lytharaceae

Scientific Classification[5]

Table 1: Showing Scientific Classification of *Woodfordia floribunda* Salisb.

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Myrtales
Family:	Lytharaceae
Genus:	*Woodfordia*
Species:	*W.Floribunda*

Vernacular Name :

Table 2: Showing Vernacular Name of *Woodfordia floribunda Salisb.*

Sanskrit[6]	*Dhatupushpika, Dhauri, Agnijwala, Kunjara, Tamrapushpi, Madkara, Madniyahetu, Madyavasini, Subhiksha, Sidhupuspi, Bahupuspika, Gucchapuspa, Parvatiya*
English	Fire flame bush, Shiranji tea
Hindi	Davi, Tavi, Dhaiphul
Gujarati	Dhavadi
Marathi	Dhalas
Kannada	Bela, Tamrapuspi
Malyalam	Tatiri, Tatiripuspi
Tamil	Dhattari, Jargi, Velakkai
Telugu	Dhataki, Jargi, Serinji
Oriya	Dhobo
Konkani	Dhauri
Urdu[7]	Jetiko

The plant is commonly known as *Dhataki* because it provides nourishment to all tissues. Its flower are red in colour (*Tamrapushpi*). Its flowers are simile to red flames (*Agnijwala*). Its flower will do *Dhatu* and *Sareera poshan* (*Dhatupushpika*). It bears flower profusely in bunches (*Bahupuspika*, *Gucchapuspa*). It grows in hills (*Parvatiya*). The flowers are used in fermentation of *alcoholic* beverages (*Madkara, Madniyahetu, Madyavasini, Sidhupuspi*). As it cures *Trishna* etc, very effectively (*Subhiksha*).[8]

Botanical Description

It is an evergreen bushy shrub up to 5m tall with diffuse irregular branching. Black spots are found on the surface of new branches, bark smooth, young shoot terete, clothed with fine white pubescence.[9]

Leaves – Somewhere three leaves are seen in a cluster at a point. 5-9 by 4.3-2.5 cm. opposite breadth, lanceolate or ovate, acuminate simple, serrate margin, 3-sessile, acute, softly velvety above, base rounded or cordate, 16-12 pairs nerves.

Flower – 5 to 75 bright reddish colour, tubular, cymes, pedicel short, glandular pubescent, flowers are grown on the whole parts of branches. They are arised in small clusters. Calyx- 1.6 cm. long striate, covered with glandular dots; petals longer than calyx teeth.

Fruit – 1 cm. small, seeds are brownish bright, irregularly dehiscent, seeds coneate-obovoid brown, smooth.

Seed – light brown, very minute, oblong, very numerous entirely glaborous not exhibiting at any period of its development the smallest trace of a papilla (Flowers in Feb – April and fruits in April – June).

The flowers are stimulant and an infusion of the flowers and leaves is used as an herbal tea.[10]

Habitat

This plant is found throughout India. They are mostly found in the forest of Dehradun at the altitude of 5000' feet. It is also cultivated in gardens. In the other countries Ceylon, Baluchistan, Tropical Africa, China, Japan, Summatra and Java.[11]

Chemical Constituents

Flower – Hecogenin, inositol, kaemperol-3-glucoside, naringenin-7-7 glucoside, tannins (pyrogallol and hydrolysable types), woodferdins A,B,& C, lawsone, betulin etc.[12]

Dried Flower – Dimeric hydrolysable tannins – woodfordins a,b & c,and trimeric tannins woodfordin d and oenothein a and b.[13]

Leaves – Oenothein-b, quercertain-3-0-a-l-arabinoside, quercertain-3-0-6"- β- d-galactopyranoside and myrecetein-3-0-arabino pyranoside.[14]

Stem – Octacosonol and sitosterol[15]

Classical References

In *Brihattrayi, Acharya Charak* has mentioned *Dhataki* under *Purisasangrahaniya, Mutravirajaniya*, and *Sandhaniya mahakasaya* (c.s.su 4/5,31,34)[16] while Acharya Sushruta and Vagbhata has placed under *Priyangvadi* and *Ambasthadi gana* (su.s.su 38/45,46)[17] (A.h.su. 15/38)[18]. Acharya Bhavamisra In *Bhava prakash nighantu*, placed *Dhataki* in *Haritakyadi verg*.[19] In *Dhanwantari nighantu*, *Dhataki* is mentioned in *Chandnadi verg*.[20] Raj nighantu quoted *Dhataki* in *Pipalyadi verg*[21]. Kaiyadeva nighantu has described Dhataki under *Ausadhi verg*.[22] In Saushrut nighantu it is mentioned in *Ambasthadi gana*.[23] In Sodhala nighantu, *Dhataki* is mentioned in *Chandanadi* verg.[24] According to Yogaratnakara, the flowers of *Woodfordia floribunda* have been used as a substitute for *Glycyrrhiza glabra*.[25]

Pharmacological Activities

Antimicrobial activity: Different extracts of dried flowers of *W. Fruticosa* have been reported for their significant antibacterial activity against 14 human pathogens. The methanolic extract has been reported to be most active against pseudomonas pseudoalcaligenes and also more effective against gram negative bacteria as compare to gram positive bacteria.[26-27]

Antiulcer activity: The antiulcer potential of *W.fruticosa* has been reported in ethanol, hydrochloric acid (HCL) and Non-steroid Anti-inflammatory Drugs NSAIDS (Diclofenac sodium) induced ulcer in stomach of Wister albino rats. The roots were extracted with chloroform and methanol. Both the extracts have found to significant antiulcer activity.[28-29]

Hepatoprotective activity: Hepatoprotective activity of petroleum ether, chloroform, ethyl alcohol, and aqueous extract of the flower of *W.fruticosa* has been reported against carbon tetrachloride induced hepatotoxicity.[30]And phenotoin induced liver damage in rats.[31]The methanolic extract of the flowers of *W. Fruticosa* has been reported for hepatoprotective activity against acetaminophen induced hepatic injury in rats[32] and declofenac sodium induced hepatic damage in rats.[33]

Antitumor activity: Woodfordin C,a macro-ring hydrolyzable tannin dimmer from dried flower was reported to posses antitumor activity.[34]

Wound healing activity: Oral administration of the ethanolic extract of *W.fruticosa* flower was effective in wound healing.[35]

Immunomodulatory activity: The ethanolic extract of the flowers of *W.fruticosa* was found to show 60% increased bone marrow cells proliferation and offer protection towards cyclophosphamide induced myelosuppression which represent the stimulation of bone marrow.[36]

Anti fertility activity: Anti fertility activity of successive alcoholic, individual aqueous and individual hydroalcoholic extracts was studied in female albino rats. The results revealed that the successive alcoholic extract showed promising abortifacient activity at 100 mg/kg body weight.[37]

Antibacterial activity: The methanol extract of *W.fruticosa* was most active against P. Pseudoalcaligenes in comparison to all the microorganism tested. The plant extract are more active against Gram positive bacteria than Gram-negative bacteria.[36]

Antihyperglycemic activity: The ethanolic extract of *W. Fruticosa* flowers (250 and 500 mg/kg) significantly reduced fasting blood glucose level and increase insulin level after 21 days treatment in streptozotocin diabetic rats.[37]

Antiviral activity: Methanolic and aqueous extracts of the flower and leaves inhibited avian myeloblastosis virus reverse transcriptase (RT). No cytotoxicity was observed in the extracts even at concentrations where there was over 90% inhibition of RT activity.

Antipyretic activity: The ethanolic extract of the flower of *W.fruticosa* was show significant antipretic activity at a dose of 500 mg/kg body weight.

Analgesic activity: The present study revealed the positive analgesic activity of extracts of *W. Fruticosa* stem bark in hot plate model and acetic acid induced writhing model. Pain sensation in acetic acid induced writhing methods is elicited by triggering localized inflammatory responses resulting the release of the free arachidonic acid from tissue phospholipids via cyclooxygenase (COX), and prostaglandin biosynthesis.[38-39]

DNA inhibitory activity: The inhibitory activity of Woodfruticosin (woodfordin C) a new cyclic dimeric hydrolyzable tannin isolated from the leaves of *Woodfordia fruticosa* toward deoxyribonucleic acid (DNA) topoisomerase along with three known flavonol glycosides and three known flavonol glycoside gallates.[40]

Antioxidant activity: The methanolic extract of *Woodfordia fruticosa* flowers on thioacetamide induced oxidative stress in rats in 100 and 200 mg/kg dose. Various serum enzymes like aspartate aminotransferase, alkaline phosphatase and lactate dehydrogenase were studied. Histopathological changes of liver tissue were also evaluated.[41]

Antiproliferative activity: The effect of methanolic extract of *W. Fruticosa* flowers on hepatocellular carcinoma. The effect was tested by following the serum parameters like AFP, ALP,LDH, bilirubin; tissue level of GSH, CAT, MDA, histopathology of liver and immunohisto-chemical analysis of vascular endothelial growth factor. Antiproliferative effect of the ex was studied in human hepatoma plc/ prf/ 5 cells by MTT assay. The chemo-therapeutic drug, 5-flurouracil (5-fu) was used as positive control.[41]

Anti-leucorrhea activity : A clinical study of *Majuphala* powder & *Dhataki pushpa* powder to assess the effect in leucorrhea is undertaken on 30 patients, were divided in three groups Group A of 10 patients were received *Majuphala churna* for 21 days & internally *Yonidhavan* done with *Majuphala* Decoction for 10 days. Group B of 10 patients received internally *Dhataki pushpa* powder externally *Yonidhavana* with *Dhataki pushpa* powder for 10 days. Group c of 10 patients (control group) were received wheat flour in above said same manner.

-Group A (*Majuphala*) & B (*Dhataki*) had shown highly significant results in both cordial & associated symptoms of leucorrhea as compared to control group.

-In local pathology group A (*Majuphala*) & Group B (*Dhataki*) showed significant results in group A (*Majuphala*) in cervisitis the results were significant.

-Group B (*Dhataki*) showed significant results in Hb% [2].

Ayurvedic Properties And Pharmacological Effect

According to Ayurveda Literature, *Dhataki* is *Kashaya* (astringent) in taste (*Rasa*), light (*Laghu*), dry (*Ruksha*) in properties (*Guna*), pungent (*Katu*) in metabolism (*Vipaka*); cold (*Sheeta*) in potency (*Veerya*); *Kapha- Pitta hara, Madakari* in action(*Karma*). Due to these properties, it pacify *Kapha* and *Pitta dosha* while aggravate *Vata dosha*.[12] Flower of *Dhataki* is highly beneficial in *Atisara, Raktatisara, Jwaratisara, Pravahika, Sangrahani, Raktpradara, Arsha,* Liver disorder, *Sarpavisha, Vrna. Sushruta* mentioned about the properties of *Dhataki pushpa* as *Bhagnasandhankara*, *Pittahara* and *Vrnaropan* (su.s.su.38/45,46).

Medicinal Uses

1. Charaka has indicated the paste should be dusted with the powder of *Priyangu, Lodhra* and *Katphala* mixed with *Lajjalu* and *Dhatki* or of *Panchavalkala* mixed with *Badari* powder or of *Dhataki* and *Lodhra* in fracture with wound. By this wounds heal up. (cs.ci.25,66,67)[42]
2. Charaka has mentioned *Lodhra, Dhataki, Indrayava*, *Karanja* and *Jati*-paste of these should be used in *Kustha* for an ointment and paste. (cs.ci.7.95)[43]
3. Sushruta, in conjunctivitis caused by *Pitta*, powder or liquid extract of *Dhataki* and *Candana* mixed with breast-milk should be used as collyrium. (ss.u.10.9)[44]
4. Vagbhata, for child, *Modaka* (sweet bolus) prepared of *Dhataki* flowers, *Sarkara* and parched paddy should be given in diarrhoea. (A.H.U.1.39)[45]
5. One suffering from dysentery should take *Dhataki*, *Badari* leaves, *Kapittha* juice, honey and *Lodhra*-all together with curd. (BP.Ci.2.120)[46]
6. Liquid gruel processed with *Dhataki* decoction and *Sunthi* and added with sour pomegranate seeds is useful in fever, diarrhoea and abdominal pain. (BS.atisara.318)[46]
7. Powder of *Dhataki* or *Amalaki* 10 gm mixed with profuse honey should be used in Leucorrhoea. (VM.63.4)[47]
8. For conception, the woman, during season, should take *Nilotpala* mixed with *Dhataki* flowers and honey in morning. By this she conceives. (GN.6.5.9)[47]
9. According to Bhavmishra - *Dhataki* and *Badari patra churna* with *Dahi* in *Atisar*.
10. Vangsen- *Dhataki puspa, Sautha* and *Dadimbej peya* in Jwaratisar.[48]
11. According to Sodhal- 1 *Tola* (11gm) *Dhataki puspa churna* with *Tandulodak* in *Svetpradar*.[48]
12. *Cakradutta- dhataki puspa churna* use for *Vrnaropan*.
13. In *Prajasthapana – Nilotpala* and *Dhataki* are mixed and taken with honey in the morning during the *Ritukala* (period of ovulation).[12]
14. In case of *Pittabhisyanda*, the powder or juice of *Dhataki* and *Candana* are mixed with breast milk and applied as *Anjana* (s.s.ut.10).[12]
15. According to Sharangdhar, *Dhatakyadi kwath* in *Balatisara*, contains (*Dhataki puspa, Belgiri, Lodhra, Sugandhabala, Gajjpipali* decoction with honey).[49]
16. *Dhatkyadi taila* for external use in Sutikaroga.[50]

17. According to Bapat the fresh leaves are an excellent remedy in cases of snake-bite. The juice is given internally, a few drops poured into each nostril and some rubbed on the part of bitten.[51]

Part Used: Flower, bark, leaves

Dosage: Powder 1-5 g, *Pushpachurna*- 3-6 g.

Important Preparations: *Dhatakyadi taila, Dhatakyadi curna, Pusyanuga curna, Brhat Gangadhara curna, Kutajarishta, Pippaliyaasava, Kanakasava, Abhayarishta, Ashokarishta, Paarthyadyarishta, Aravindasava*.[52]

CONCLUSION

This paper is an attempt of the author to give a detail review of this important medicinal plant used in Indian system of medicine *Dhataki (Woodfordia floribunda* salisb.). In this artical, we had discussed about the classical references, phytochemicals, pharmacognostical and pharmacological properties of *Woodfordia floribunda* salisb. The various phytochemical present in it are glucoside, tannins, alkaloids which act as active biological constituents and are responsible for different pharmacological actions of *Woodfordia floribunda* salisb. The present Paper also revealed that *Woodfordia floribunda* salisb. act as antimicrobial, antitumor, antifertility, antihyperglycemic, analgesic, antiproliferative and hepatoprotective activity.

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