Review Article

REVIEW OF ETHNO-MEDICINAL AND PHARMACOLOGICAL ACTIVITIES OF

PYGMAEOPREMNA HERBACEA (ROXB.) MOLDNPK.: A SOURCE PLANT OF BHARANGI

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Abstract

Lack of Sanskrit knowledge and urbanization or staying away from nature leads difficulty in identifying the plants. In Ayurvedic classics description of plant morphology mentioned in the form of synonyms. The synonyms of the plants are given in the literature which may not provide clear cut idea regarding its complete morphology. Many languages in India made much more difficulty in their identification. Bharangi is commonly used drug in folklore medicine to cure many ailments like rheumatism, respiratory disorders, fever, and toothache etc., Clerodendrum serratum (Linn.) Moon. is used as Bharangi in some places and Pygmaeopremna herbacea (Roxb.) Moldnk. is considered as true Bharangi by many. W. Ferguson in 1861 identified the source of Gantubharangi of Southern India as Pygmaeopremna herbacea and a pamphlet published at Colombo in 1887 has a figure of the plant and its root. Recent researches reported its Antipyretic, Anti-nociceptive, Anti-inflammatory, Anti-cancer, Anti-microbial and other activities proved by many experiments.

Keywords: Bharangi, Pygmaeopremna herbacea (Roxb.) Moldnk., Clerodendrum serratum (Linn.) Moon., habitat, phytochemical, ethno botany, pharmacology.

INTRODUCTION

Among Triskandhas (three pillars) of Ayurveda, Oushadha (medicine) plays an important role as it serves both the purposes of Ayurveda i.e. maintenance of health and treatment of disease. Classics of Ayurveda quoted plenty of drugs, some of which still not have been identified. Classical drugs are quite often substituted due to the lack of morphological descriptions. Most of these drugs are practiced by the folklore people to cure many diseases. Much more information regarding the identification and uses of the herbs can be obtained from these people. Tribal peoples are using either the drugs not described in Ayurvedic Materia Medica or classical drugs with a novel indication. Pygmaeopremna herbacea is one such plant which is used by the folklore practitioners in the name of Bharangi to cure many diseases. In Siddha system of medicine P. herbacea is used to cure disorders like respiratory system, cuts and wounds. A preparation of root is given internally for rheumatism by the folklorist people to cure many diseases. Much more information regarding the identification and uses of the herbs can be obtained from these people. Tribal peoples are using either the drugs not described in Ayurvedic Materia Medica or classical drugs with a novel indication. Pygmaeopremna herbacea is one such plant which is used by the folklore practitioners in the name of Bharangi to cure many diseases.

Vernacular Names

Assam: Matiphesua, Matia Jam; Bengal: Bamanhati, Bhuijam; Gujrati: Gheetali; Hindi: Bharangi; Kannada: Nai thega; kerala: Siru thekku; Marathi: Gantubharangi, Bharangamula; Mundari: Horacalu, Huringcarpandu, Otecalu, Otejo; Sanskrit: Bhumjambu; Santali: Kadamet, Phin jamun; Tamil: Bumisamba, Sirudekku; Telugu: Advinellikura, Gantubharangi, Janna, Kuraneli, nelaneredu; Uttaranchal: Kamraj.1,6,7

Taxonomical Classification

Scientific name: Pygmaeopremna herbacea
Kingdom: Plantae
Subkingdom: Tracheobionta
Superdivision: Spermatophyta
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Asteridae
Order: Lamiales

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Family: Verbenaceae
Genus: Premna

Habitat
Sub tropical Himalaya, 500 - 3,000 ft., from Kumaon to Bhutan, Western Ghats of Madras Presidency.

Habit
A small under shrub; stem hardly any; flowering branches 2.5 – 10 cm. springing up after the jungle fires. Leaves 10 by 5 - 7.5 cm, sessile, obovate, obtuse, mature, pubescent on the nervae, microscopically dotted above, minutely deciduously pubescent beneath, nerves 5 pairs. Corymbs 3.8 cm diameter, pubescent, somewhat dense; peduncle 0 - 3.8 cm. calyx 2.5 mm, subequally 5-toothed, closely pubescent; lobes ovate, obtuse. Corolla 4 mm greenish white, hairy in the throat, 4-lobed obscurely 2-lipped. Drupe 6 mm in diameter globose.

Controversial Aspects of Bharangi
In classical text of Ayurveda morphological description regarding Bharangi is not found. In various regions different plants are being used in the name of Bharangi. Charaka mentioned drugs Phanji in the context of Shakavarga (Vegetable group) and Padma under the Puresha sangrahaneeya gana.10. Regarding these two drugs Chakrapani has the opinion that they are the synonyms of Brahmanayashthika.11, 12. Arunadatta opines Phanji as Bharangi. In various Nighantus we can find Brahmanayashthika as the synonym of Bharangi.14-16. In Ayurvedic classics and Nighantus verities of Bharangi was not mentioned. However, Vaidyaka Shabda Sindu explains two varieties of it viz., Shvetapushpa and Neelapushpa, the botanical source of former being considered as Clerodendron indicum kutze. and the later as Clerodendrum serratum Linn.17. Thakur Balavanth Singh is of the opinion that Clerodendrum indicum (Linn.) Kutze., may have the same claim as Clerodendrum serratum to be called by this name. It is also known as Brahmayasti. Some other species such as Clerodendrum infortunatum Linn. is also sometimes used in its place. He also considered that the stem bark of certain tree species such as Elaeodendron glaucum Pers, Gardenia turgiaca Roxb. and Picrosma quaniodes Benn are being used as Bharangi, however, on their own merits of possessing antispasmodic and febrifuge properties may serve as substitutes of original Bharangi of the texts.18. He also opines that Phanji is Rivea ornata Chois or Premna herbacea. Dr. Koppula Hemadri (retired officer, CCRAS, Vijayawada, India) informs that Pygmaeopremna herbacea is being used as Bharangi (Gantubharangi in Telugu).19. Acharya P.V. Sharma opines that Clerodendrum serratum (Linn.) Moon, as Bharangi and Clerodendrum indicum (Linn.) Kutze; as the substitute for Bharangi. Dr. Bapala vaidya describes that Clerodendrum serratum (Linn.) Moon and Clerodendrum siphonanthus (R.Br) C.B. Clark are used as Bharangi. Clerodendrum siphonanthus (R.Br) C.B. Clark is known as Bamanhati in Bengal. In Bombay Clerodendrum serratum (Linn.) Moon. is used as Bharangi. Quissa bark is used as Bharangi in some places.20. In Nighantu Adarsha, it is mentioned that, in the name of Bharangi one can consider 4 different species viz. Clerodendrum serratum, Clerodendrum siphonanthus, Picrosma quassioides and Premna herbacea.21. The roots of Clerodendrum serratum is the accepted source for the drug Bharangi. Other species from which Bharangi is derived are Gardenia latifolia Ait., G. Resenifera Roth., G. Turgid Roxb., Picrosma quassioides Bonn. and Premna integrigelia. However in south Indian Pharmacies it has been observed that the root and root nodules of a tiny plant Pygmaeopremna herbacea (Roxb.) Moldenke. are used as Bharangi in the preparations22. Ayurvedic Pharmacopoeia of India described C. serratum (Linn.) Moon. under Bharangi.23.

Phytochemistry
Root
It contains an orange-brown acid resin (soluble in ether, alcohol and alkaline solutions), traces of an alkaloid and starch, with an entire absence of astrigency.- Study yielded labdanes, clerodens, piparmarins, naturally occurring abietans, kaurenes, byrenes, gibbarrins and miscellaneous diterpenoids.24-26. Several diterpenoids, sirutekkone (C20H20O4 m.p 214°), bharangin quinonemethide (C20H18O4 m.p 213-214°), bharanginin (C20H22O4 m.p 171-173°), bharangifuran, ferruginol, isobharanginin and the diterpenoid phalenolone derivative, pygmaconone (7-isopropyl 3,3-dimethyl-2,3-dihydro-4,9-di-hydroxypelenal-1-one, C30H32O6). A 6-oxygenated coumarin, pygmeoherin (C17H18O4 mp 198-200°) has also been isolated from the roots.27

Root Nodules
It contains the diterpenoid pygmeoecine E (C26H36O4, mp 192-193°).28

Toxicity Study
Alcoholic extract was found to be safe up to a dose of 8.0 g/kg in mice.

Ethno-Botanical Uses
1. In Varanasi, Uttar Pradesh, India, a) The people of tribes administer the paste of whole plant made into pills and is given to cure the conditions like gout and rheumatism.
b) Root paste heated and applied externally for the treatment of rheumatoid arthritis and gout.
2. In Siddha system of medicine, Pygmaeopremna herbacea is used to cure disorders of respiratory system, cuts and wounds.
3. A preparation of root is given internally for rheumatism by the Santals (Campbell).
4. In Huiyian and Sri Lanka, folklore peoples are using the juice of the root mixed with juice of ginger and warm water to treat asthma (difficulty in breathing).
5. In Huiyian, folklore practitioners are using its root for stomachache, rheumatism and dropsy: root bark used for toothache; leaves are used for fever, cough and rheumatism; Poultices applied to boils.
6. In Sri Lanka, folk are using medicated oil prepared from the various parts of this plant for treatment of fever and body pains in pregnant women.
7. In Assam, India, folklore people are using its leaves, fruits and young shoots as vegetable during April – May, these are also having medicinal value so used in fever, sleeping sickness and jaundice.
8. In Thai country, folklore peoples are using this drug to treat cancer.
9. In Sri Lanka, a preparation called “Link Samahan” is prepared by using Premna herbacea and other drugs which is indicated in running nose, sneezing, sore throat.
headache, body ache, fevers, cough, and weakness. Additionally, “Link Samahan” is most effective as a prophylactic, and as such may be given in the form of a beverage periodically if epidemics of viral colds and influenza are prevalent.

10. Chhotanagpur plateau, Jharkhand and Chhattisgarh, India, almost all tribal communities residing in the region know about its important medicinal value and use it in primary healthcare, and it’s also used in the treatment of rheumatism, arthritis, gout, atrophy, cholera and sexual disability.

11. In Mayurbhanj district of Odisha, India, apply the root paste of Premna herbacea and Andrographis paniculata externally on rheumatic and gout affected parts of the body.

12. The plant is used as a folk remedy in the Yunnan province of China to reduce inflammation and to cure malaria.

13. In Sal forest of Jharkhand, India, tribal peoples are using this herb root for curing many skin problems.

14. In Gujarat state, India -

a) Barada Dongarni, region folklore peoples are using whole plant of P. herbacea and is given for increasing the body weight (Bramhanarth) and Vatakaphaha purpose; A pills are made by using leaves of P. herbacea and jaggery given in difficulty in breathing (Asthma), cough (Kasa), fever (Jwara); In Swelling of the body (Shotha) juice prepared out of P. herbacea leaves, flowers and fruits are given; In headache anointment made from leaves of P. herbacea is applied; Smell of leaves of P. herbacea is useful in the headache.

b) Folklore peoples are using its root in toothache and leaves in boils, cough, fever and rheumatism.

c) In Cutch region, folklore peoples are using its leaves paste and honey or dry leaves powder and jaggery are made into pills form and given orally for cough (Kasa) and running nose (Prattishayaya); A paste is made out of leaves and flowers is applied over inflammation condition.

Pharmacological Activities

In vitro cytotoxicity and in vivo antitumor activity

A research study showed two extracts of P. herbacea, aqueous and alcoholic; two fractions of alcoholic extract, ethyl acetate and butanol fractions were screened for their in vitro cytotoxicity by brine shrimp lethality (BSL) assay, trypan blue exclusion assay and MTT assay. Alcoholic extract and its ethyl acetate fraction were found to be the most effective in BSL assay, trypan blue exclusion assay. In vivo antitumor activity was screened in the Ehrlich ascites carcinoma (EAC) model and the Dalton lymphoma ascites (DLA) model. In the Dalton lymphoma ascites (DLA) model, solid tumor was developed by i.m. injection of 1 million DLA cells. Both the extracts and the fractions possessed potent antitumor activity against solid tumor models by significantly reducing the solid tumor weight and volume.

Antitumor Activity

A recent research activity showed alcoholic extract of Premna herbacea Roxb root showed significant (P < 0.05) anticancer activity in Ehrlich Ascitic Carcinoma model in Swiss albino mice at different doses, in that it reduced the body weight, prolonged the life span of the tumor bearing animal. Besides, it also reversed the cancer associated hematological changes in tumor-bearing animal.

Antipyretic, Anti-nociceptive and Anti-inflammatory activities

A research study showed the alcoholic extract of the roots of Premna herbacea was investigated for its antipyretic, antinociceptive and anti-inflammatory potential in animal models. The extract, when administered orally to mice has been found to be safe up to a dose of 8.0 g/kg. A significant antipyretic effect has been observed in rabbits while mild antinociceptive effects were evidenced in mice when tested by chemical as well as thermal methods. The extract did not exhibit any anti-inflammatory activity in acute but significantly reduced the chronic inflammation.

Anticancer activity and Antimicrobial activity

Recent study reported, P. herbacea extract has exhibited anticancer activity in vitro and in tumor-bearing mouse models. Bharargin, a diterpenoid quinonemethide, chiefly present in P. herbacea, exhibited strong antimicrobial activity and reversed a drug-resistant phenotype of Escherichia coli cells carrying multidrug-resistant plasmids. In addition, the mono-acetylated derivative of Bharargin showed greater antimicrobial activity than that of bharargin.

Antifungal, Antibacterial, Anti-amoebic and Blood sugar lowering properties

Research study showed the crude hexane, chloroform and aqueous extracts of this plant have been subjected to screening for different medicinal properties. The crude hexane extract was found to be exhibiting antifungal, antibacterial, anti-amoebic and blood sugar lowering properties. It is interesting to note that the major component bharargin exhibited all the biological properties of the crude hexane extract as well as cytotoxic properties against P-338 tumor cell line. Bharargin exhibit higher efficiency in curing of plasmodium belonging to IncF, H2 and X-groups.

CONCLUSION

Pygmaeopremna herbacea is a well known drug by the tribal people and is being used by them as vegetable and also for medicinal purpose. In south India this drug is used in the name of Bharangi. Phytochemically it contains siruteekone, a diterpenoid, labdanes, clerodims, pinamers, naturally occurring abietans, kaurenes, byrenes, gibrillins and miscellaneous diterpenoid. Research studies with P. herbacea have provided scientific validation for the activities like Anticancer, Antipyretic, Anti-nociceptive Anti-inflammatory, Anti-microbial, Antifungal, Anti-amoebic, blood sugar lowering properties.

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