A REVIEW ARTICLE ON PHYTOCHEMISTRY AND PHARMACOLOGICAL PROPERTIES OF SUMBUL TEEB (*NARDOSTACHYS JATAMANSI DC*) – AN IMPORTANT MEDICINAL HERB

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Abstract: Sumbul teeb(*Nardostachys jatamansi DC*) is perennial herb whose rhizome is mainly used as drug .It has been used in the treatment of many disease. Aims and objective othis review to search literature for the pharmacological activities, Phytochemical investigation and Pharmacognostical Studies. The review also highlights the need for the use of Sumbul teeb in Unani system of Medicine and future prospects for further research.

Keywords: Sumbul teeb, Pharmacological studies, Phytochemical investigation and Pharmacognostical studies.

INTRODUCTION

Arabic and Persian physician describe Jatamansi under name of Sumbul-i-hindi "Indian spike". The auther of the Makhzanul Advia, Kabiruddin compares Jatamansi root to the tail of a sable. Ainslie state that the bytins in lower india prepare a fragrant and cooling liniment for the health. Sir W.O'Shaughnessy states as the result of his experience which Jatamansi that it is a perfect representative for valereian it is the Nardin of Diocorides, which that writer tells us was also called Gangitis, because the ganga flowed from the foot of the mountains where the plant grew. The word *'Valeriana'* is found within writings of the ninth and tenth century, [1] The plant has been valued for centuries in Ayurvedic system in India.

Unani in ancient Greek and Arab, and in ancient Egypt and Rome for its medicinal values. The powdered root of *N. jatamansi* is also mentioned in some Islamic traditions as the fruit which Adam ate in Paradise, which God had forbidden him to eat. *N. jatamansi* is also used to season foods in Medieval European cuisine, especially as a part of the spice blend used to flavour. Hippocrates used in sweetened and spiced wine drink.[2]

Vernacular

Persian	:	Sumbul ut teeb
Arabic	:	Sumbul-i-hindi, Sumbul asafeer
Hindi	:	Jatamansi, Balchir, Balchar
English	:	Spikenard
Sindhi	:	Marhi mar
Latin	:	Nardo
Unani	:	Nardeen, Isramaros, Lolanitas, Gamogitas, Bolaqitas, Berus
Bengali	:	Jatamansi
Marathi	:	Jatamansi
Tamil	:	Jatamanshi
Telgu	:	Jatamanshi
Sanskrit	:	Mamsi, Jaa, Jaila
Assamese	:	Jatamansi, Jatamangshi
Gujrati	:	Baalchad, Kalichad
Kannada	:	Bhootajata, Ganagila maste
Kashmir	:	Bhutijat
Malayalam	:	Manchi, Jatamanchi
Oriya	:	Jatamansi
Punjabi	:	Billilotan, Balchhar, Chharguddi
Urdu	:	Sumbul-ut-teeb

[4], [8], [11], [9], [7], [21]

Sumbul teeb (*Nardostachys jatamansi)* Rhizome

Sumbul teeb (*Nardostachys jatamansi)* powder

Habitat

It is native to India and Bhutan, this species is distributed in Himalayas, Nepal, Pakistan, Tibbet, Bhutan and Sikkim between 3000 to 4500 meter elevation. [3] The rhizome is short, thick and dark gray or yellowish brown and surrounded by double layer of reddish brown tufted fibres. [4], [5] Jatamansi is a perennial herb containing a cylindrical rhizome covered with brown to deep greyish fibres, length is 2.5-7cm & diameter is 0.5-3cm. Fibres are produced by an accumulation of scaletons at the leaf bases. Removal of the leaf bases, aerial parts and adventitious roots showed the presence of rough surface with transverse rings. Fracture is easy and splintery. [6]

Description

Macroscopic: Dreid rhizomes, dark brown 2.5-7.5 cm long, cylindrical, coverd with reddish brown fibres forming a network with a skeleton of seedling leaf bases, fracture, brittle, internal colour reddish brown, strongly aeromatic taste acrid, slightly bitter.

Microscopic: Transverse section of rhizomes shows cork consisting of 2-5 layer of cells filled with oil globules, cortex characterized by the presence of schizogenous canals, phloem in the form of patches of small cells, cambium ring distinct and continuous, xylem consist of vessels, scattered individually or in rows of two or three bases, with scalariform thickening. Elder rhizomes show one or more stellate shaped rings of inter xylary and medullary cork, completely or incompletely separating the rhizomes into four to nine vascular strand by joining outer cork, each separated strand is circled by a few layers of cork cells consisting of an outer cortex zone followed by two or more functional vascular bundles, tissues in between the strands are usually non-functional except for the cork cells which act as storage organ for oil globule.

Unani Literature

According to "Dioscorides" Sumbul teeb is a dried rhizome of a small herb. The term Sumbul means aroma and it is of three types -

i. Sumbul teeb
ii. Sumbul hindi
iii. Sumbul jabli

All mentioned Jatamansi are found in India. [4],[7]

According to Ibn-e-sina Sumbul teeb are of two types.

i. Sumbul teeb (Sumbul asafeer, Sumbul Nardeen)
ii. Sumbul romi (Sumbul ikleti, Sumbul hindi, Sumbul sori).

According to "Dioscorides" best Sumbul teeb is that which has more hair and yellowish in colour, aroma like nagarmotha where as small Sumbul teeb causes abrasions or cut on the tongue [4],[7]

Hasa's Mustamala (Parts used):

Dried rhizome and its oil [6]
Root [4], [8], [9]

Mizaj, (Temperament)

Hot and dry [7]
Hot 1 and dry 2 (Ibne Sina, 2010;[10] Hkm Kabiruddin, 2000)[9]
Hot and dry 2 (Hakeem A.H, 2002)[11]

Miqdar-e-khurak (Doses)

3 to 6gm [7]
Adult 4.5 masha [11]
Children 2 masha [11]
2-5 masha [9]

Muzir (Adverse effect):

Kidney [4] ,[11]

Musleh (correctives):

Kateera (*Sterculia urens*) and Bans lochan [4]
Kateera (*Sterculia urens*), Aspagol (*Plantago ovata*) and Tabasheer (*Bumbusa arundinacea*) [11]

Badal (Substitutes):

Doda (*Withania coagulans*), Iskhar makki (*Andropogon schoenanthus*) and Tejpaat (*Cinnamomum tamala*), Post-e-bekh-e-kibr (*Caparis spinosa root bark*), Sumbul romi (*Nardostachys jatamansi*) [4]

Iskhar makki (*Andropogon schoenanthus*) and sajaz hindi [11]

Aafaal (Phamracological actions)

Deobstruant	[4]
Anti-inflammatory	[4]
Diuretic	[4]
Emmenagogue	[3]
Cardio-tonic	[3]
Hepato-tonic	[3]
Nervine-tonic	[13]
Stimulant	[13] ,[14]
Carminative	[15]
Lithotryptic	[21]
Antiemetic	[21]
Antacid	[17] ,[1]
Antispasmodic	[14], [13]
Alexipharmic	[18]
Anti-asthmatic	[4]
Adepogenous resolvent	[16], [4], [13]

Vision improver	[14]
Carminative Used in palpitation, epilepsy	[18]

Therapeutic uses:
Sumbul teeb is used as *farzaja* (vaginal suppository) for both *kasrate* tams (menorrhagia) and *ihtibas-i-tams* (amenorrhoea) and is helpful in maintaining pregnancy.
Oral or local use of Sumbul teeb either singly or in combination with other drugs is beneficial in *warm-i-rahim wa masana*.
Aabzan (sitz bath) with *Joshanda* (decoction) of Sumbul teeb is beneficial in *warm-i-rahim* (endometritis).
Paste of Sumbul teeb when applied on forehead relieves headache.
Joshanda of Sumbul teeb and *afsanteen* resolves the inflammation of stomach and liver.
All types of Sumbul teeb are diuretic.
Sumbul teeb helps in digestion of food.
Sumbul teeb with *heeng* is beneficial in *asbi amraz.*
Sumbul teeb is beneficial in *duwar*, *ghashi*, and z*oaf-i- dimagh.*
Sumbul teeb is beneficial in *khafaqan* and all types of *yaraqan.*
Sumbul teeb is *muqawwi bah* when used with sharab.
Dhooni of Sumbul teeb relieves the *sudda* (obstruction) of uterus.
Sumbul teeb removes morbid matter from body, strengthens the body, removes obstruction and resolves the mucoid matter.
Powdered Sumbul teeb when rubbed over teeth relieves toothache.
Chewing of Sumbul teeb alleviates halitosis.
Powdered Sumbul teeb when applied on body acts as anti-diaphrotic.
Due to its properties like *jali* and *mohasin-i- lawn*, Sumbul teeb is used as face pack in chloasma.
Sumbul teeb prevents loss of eyelashes when applied over eye lids.
Sumbul teeb with salt and vinegar is beneficial in ascites.
Powder of Sumbul teeb with honey is used as blood purifier.
N. jatamansi is primarily used in modern medicine for cognitive and neurological function benefits.
Jatamansi relieves symptoms in fever like vertigo, seizures.
Jatamansi oil possess antiarrhythmic activity and also used as a flavouring agent in the preparation of medicinal oil.
The medicated jatamansi oil is extremely beneficial for smooth, silky and healthy hair.
It has protective effect in epilepsy, cerebral ischemia, liver damage.
It is used in mental disorder, insomnia, hypertension and heart diseases.
It is very effective in producing typical non- specific stress manifestation.
It is used as a carminative, as an antispasmodic in hysteria Palpitations and convulsion, seminal debility.
It is also recommended in scorpion string.
The herb increases appetite, relieves the phlegm in cough and asthma, proves useful in hepatitis and treats enlargement of the liver.
[4], [10], [9], [16], [5], [20], [6], [21], [3], [17]

Murakkabat (Compound Formulations):
Habb-e-ayariz [9],[7]
Anoosh daru [9], [7]
Barshasha [9] ,[7]
Jawarish jalinoos [8] ,[7]
Majon-e-Dawidul ward [8], [7]
Dawaul kurkum [9] Safiuddin, 1979)[7]
Dawaul misk moatadil (Kabir uddin,[9] 2000; Safiuddin, 1979)[7]
Khamira Abresham Hakeem Arshad wala (Kabir uddin, 2000;[9] Safiuddin, 1979)[7]
Labob-e-kabeer (Kabir uddin, 2000;[9] Safiuddin, 1979)[7]
Mufarre yaqooti (Safiuddin.,1979;[9] Hakeem Kabiruddin, 2000)[7]
Dawaul misk moatadil (Usmani, 2008;[8] Safiuddin, 1979)[7]
Majoon-e-Sumbul (Kabir uddin, 2002)[9]

Uses in folklore Medicine:
Used in women diseases especially in hysteria and epilepsy
It is used to dye hair black naturally.
It also makes hair smooth and shiny.
Its relaxant quality soothes the body and the mind and is good for inducing sleep.
It helps reduce hyperactivity among children.
Jatamansi is also used to manufacture perfumes.
[3], [7], [9],[4]

Phytochemistry:
Nardostachys jatamansi consists of the following chemical constituents Alpha-patchoulenese, angelicin, beta-eudesemol, beta-patchoulenese, beta-sitosterol, calarene, calarenol, elemol, jatamansin, jatamansinol, jatamansone, n-hexacosane, n-hexacosanol, n-hexacosanyl arachidate, n-hexacosanyl isolverate, nardol, nardostechone, norsechelanone, oroselol, patchouli alcohol, seychelane, seychellene, valeranal, valeranone. Volatile essential oil, resins, sugar, starch, bitter extractive matter, gum, ketone, sesqueterpin ketone, spirojatamol etc[29],[30]. Other sesquiterpenes include nardin, nardal, jatamnsic acid, b-maline and patchouli alcohol.[31] Various other sesquiterpenes known are nardostachone, dihydrojatamansin, jatamansic acid [32]

jatamansinone, oroseolol, oroselone, seselin, nardostachyin, nardosinone, spirojatamol [32] jatamol A and B(31], calarenol, seychellene, seychelane, coumarin: xanthogalin An alkaloid named actinidine has also been reported. Nardal has been found as an active component [23].

Volatile oil of Jatamansi possesses an alcohol and its isovaleric ester, a saturated bicyclic sesquiterpene ketone, named jatamansone, and jatamansic acid [6]

N. jatamansi has been discovered with both volatile and non-volatile constituents. Sesquiterpenes and coumarins present in considerable amount in the roots of Sumbul teeb plant are mainly responsible for its essential oil. Sesquiterpenes contribute to the major portion of the volatile compounds while coumarins, lignans, and neolignans alkaloids form the major components of the non-volatile extracts [25]

Major sesquiterpenes are jatamansone and valerone while the rest of sesquiterpenes are jatamansol, jatamansic acid, dihydrojatamansin, nardosatchone. Some minor contributors like jatamol A, jatamol B, nardosinone, jatamansinone, valeranal, seselinnar dostachyins, seychelane, seychellene, cuomarin and xynthogalin have also been reported [22]

In addition it contains epoxy iridoid esters (valepotriates), amino acids (GABA, tyrosine, arginine), alkaloids, phenolic acids, flavanoids. Carbohydrates, tannin, steroid, sterols, mucilage, gums, terpenes and glycosides. The compounds responsible for the pharmacologic activities of the plant have not been completely identified; however two main groups of valerenic acids and valepotriates would be more responsible for the plant activity. Hydrophilic valerenic acids are from sesquiterpenoids whereas hydrophobic valepotriates are from monoterpenoids [26]

Pharmacological Activity

1. Antifungal-Activity

N. jatamansi essential oil demonstrated fungi static activity against *Aspergillus flavus, Aspergillus niger* and *Fusarium oxysporum Mucor fragilis, Rhizopus stolonifer* and the oil was found to be fungi static or fungicidal to one of the molds, depending upon the concentration

2. Hepatoprotective Activity

Root extract of jatamansi also possess hepatoprotective activities and it has been proved by several studies. Pre-treatments of rats with 800 mg/kg body wt of the 50% ethanolic extract of *N. jatamansi* DC demonstrated significant hepatoprotective activity against thioacetamide induced hepatotoxicity. Marked reduction in raised levels of serum transaminase and alkaline phosphatase was observed. Pre treatment of the animals with the extract further resulted in an increase in survival in rats intoxicated with LD**90** dose of the hepatotoxic drug [28].

3. CNS Activity

Valeranone prolonged barbiturate anesthesia, impaired rotarod performance, inhibited electroshock convulsions, potentiated the hypothermic effects. Limited results from

Behavioural tests revealed that an extract from *N. Jatamansi* exhibited significant antidepressant activity studied in 1994 by Prabhu the effect of acute and sub chronic administration of alcoholic extract of the roots of *N. jatamansi* DC on nor epinephrine (NE), dopamine (DA), serotonin (5-HT), 5-hydroxyindoleacetic acid (5-HIAA), gamma-amino butyric acid (GABA), and taurine on male albino Wistar rats. The acute oral administration of the extract did not change the level of NE and DA but resulted in a significant increase in the level of 5-HT and 5-HIAA. A significant increase in the level of GABA and taurine was observed in the drug-treated groups when compared to the controls. A 15-day treatment resulted in a significant increase in the levels of NE, DA, 5-HT, 5-HIAA, and GABA [27]

4. Anticonvulsant Activity

Rao VS *et al.* observe the effect of ethanolic extract of the roots of *N. jatamansi* DC for its anticonvulsant activity and neurotoxicity, alone and in combination with phenytoin in rats. The results demonstrated a significant increase in the seizure threshold by *N. Jatamansi* root extract against maximal electroshock seizure (MES) model as indicated by a decrease in the extension/flexion ratio. However, the extract was ineffective against pentylenetetrazole-induced seizures. Further, pre-treatment of rats with phenytoin at a dose of 12.5, 25, 50 and 75 mg/kg in combination with 50 mg/kg of *N. jatamansi* DC root extract resulted in a significant increase in the protective index (PI) of phenytoin from 3.63 to 13.18 .the dose response studies of phynytoin alone and in combination with Nardostachys jatamansi extract on the serum levels of phenytoin clearly demonstrated the synergistic action of both the drugs.

5. Neuroprotective Activity

Salim S *et al* observed neuroprotective effect of *N. Jatamansi.* Pre treatment with an alcoholic extract of *N. jatamansi* DC dosed at 250 mg/kg of for 15 days protected rats against focal ischemia caused by middle cerebral artery occlusion. The protective effect may be associated with improving glutathione content, inhibiting lipid peroxidation, and activity on the Na+/K+ ATP ase and catalase enzyme systems. *[28]*

6. Antiparkinson's Activity

Parkinson's disease is a most common neurodegenerative diseases, and oxidative stress has been evidenced to play a vital role in its causation. It was evaluated that the ethanolic extract can slow the neuronal injury parkinson's rats. When treated with 200, 400, and 600 mg/kg of *N. jatamansi* DC roots for 3 weeks in rats.

Antiparkinsonism activity was studied on 6-OHDA (12 µg in 0.01% in ascorbic acid-saline) induced Parkinsonism. Three weeks after the 6- OHDA injection, the rats were tested for neuro behavioural activity and quantification of catechol amines, antioxidants, dopaminergic D2 receptor binding and tyrosine hydroxylase expression were also estimated. The increase in drug-induced rotations and deficits in locomotor activity and muscular coordination due to 6-OHDA injections were significantly and dose-dependently restored by *N. jatamansi* DC [29]

7. Tranquilizing Activities

German R *et al* investigated sesquiterpene valeranone (Yatamanson) isolated from *Nardostachys jatamansi* DC rhizomes for tranquilizers activity in rodents and significantly the prolongation of barbiturate hypnosis, the impairment of rotarod performance, as regards the hypotensive property was demonstrate.

8. Antioxidant Activity

The antiperoxidative property of jatamansi was investigated as an iron-induced lipid peroxidation model in rat liver, quantified by thiobarbituric acid reactive substance (TBARS) content. They have observed in their study that the extract provide protection against lipid peroxidation. In other study an aqueous root extract of jatamansi was investigated for its antioxidant and anticataleptic effects on haloperoidal-induced catalepsy rat model of the disease by measuring various behavioural and biochemical parameters.[29]

9. Anti-diabetic activity

The extract of jatamasni has been shown to a significant hypoglycemic activity. It decreases glucose level significantly in diabetic and non-diabetic rats as compared to respective controls. The present study was carried out to evaluate the anti-diabetic activity of *N. jatamansi* ethanolic extract in alloxan induced diabetic rats for 7 days. The ethanolic extract at high dose (1200 mg/kg) exhibited significant antihyperglycemic activity in diabetic rats. The results showed that it has significant antihyperglycemic effect in experimental model of diabetes mellitus.

10. Others activity

Animal studies done on jatamansone have reported anti estrogenic activity [30] moreover, jatamansone have reported antiarrhythmic and antihypertensive activity. Anti asthmatic activity [31], nematicidal activity ([32] and antibacterial activity .[33]

CONCLUSION

N. jatamansi is an important medicinal plant mentioned in Unani
A and Ayurveda system used for treatment of various diseases. The different studies done on animals provide a significant effect of the different activities mentioned in traditional treatise. *N. jatamansi* has many properties with minimum animal studies which provide the researchers a platform to do research on those activities to scientifically validate the finding and serve the humanity. The rhizomes are traditionally used as immunomodulaters, and give various other activities like antiparkinsons, antidiabetic, nootropic activity etc.

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