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Exploring the Benefits of *Jatamansi (Nardostachys jatamansi)*: A Comprehensive Review

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Review Article

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ABSTRACT

Jatamansi (*Nardostachys jatamansi*) is a traditional medicinal herb used for centuries in Ayurvedic medicine for its various therapeutic properties. The root of this plant has been found to have a number of pharmacological properties including anxiolytic, anti-inflammatory, anti-convulsant, anti-depressant, and cognitive enhancing effects. The aim of this review article is to provide an overview of the current scientific evidence on the efficacy and safety of *jatamansi*. The article summarizes the available data on the chemical composition of *jatamansi*, its traditional uses, and its potential pharmacological mechanisms of action. In addition, the article provides a comprehensive analysis of the current clinical trials on *jatamansi* and their results. The article concludes with a discussion of the future directions for research on *jatamansi* and its potential as a safe and effective therapeutic agent.

Keywords: *Jatamansi*; *Nardostachys jatamansi*; Ayurvedic medicine; Traditional uses

INTRODUCTION

Ayurvedic medicine, the traditional Indian system of medicine, has been in use for over 5000 years and is still widely practiced in many parts of the world. *Jatamansi* (*Nardostachys jatamansi*), also known as Spikenard, is a well-known medicinal herb in Ayurveda and has been used for various therapeutic purposes including the treatment of anxiety, depression, and cognitive impairment [1]. The root of *Jatamansi* is believed to be the most potent part of the plant and is used to extract various formulations.

Numerous preclinical studies have demonstrated the pharmacological properties of *Jatamansi*, including its anxiolytic, anti-inflammatory, anti-convulsant, anti-depressant, and cognitive enhancing effects [2]. However, there is still a need for further clinical studies to validate these findings and to determine the safe and effective doses for therapeutic use.

In this article, we aim to provide a comprehensive review of the current scientific evidence on *Jatamansi*. We will discuss the traditional uses of *Jatamansi*, its chemical composition, and the potential mechanisms of action. In addition, we will provide an analysis of the current clinical trials on *Jatamansi* and their results. Finally, we will discuss the future directions for research on *Jatamansi* and its potential as a safe and effective therapeutic agent.

LITERATURE REVIEW

Scientific classification

Jatamansi (*Nardostachys jatamansi*) is a perennial herb that belongs to the family *Valerianaceae*. It is native to the Himalayan region and is widely found in India, Nepal, Bhutan, and Tibet [3].

The scientific classification of *Jatamansi* is as follows:

Kingdom; *Plantae*

Division; *Tracheophyta*

Class; *Magnoliopsida*

Order; *Dipsacales*

Family; *Valerianaceae*

Genus; *Nardostachys*

Species; *N. jatamansi*

The genus *Nardostachys* is a small genus of plants consisting of only two species: *N. jatamansi* and *N. grandiflora*. Both species are widely used in traditional medicine for their various therapeutic properties.

Vernacular names

Jatamansi (*Nardostachys jatamansi*) is known by various vernacular names in different regions of the world [4]. Some of the common names are listed below Table 1.

Table 1. *Jatamansi* (*Nardostachys jatamansi*) names in different regions of the world.

Language	Name
Sanskrit	Jatamamsi
Hindi	*Jatamansi*, Balchar, Baluchar, Kanuchara
Greek	Nard
English	Spikenard, Indian nard, Muskroot
Bengali	Jatamamsi
Punjabi	Billilotan, Charguddi, Balchhar
Kannada	Jatamamsi, Jatamavsi, Bhootjata, Ganagilamaste
Malayalam	Jatamanchi, Jetamanshi, Manchi
Tamil	Jatamansaka
Gujarati	Jatamasi, Kalichad, Baalchad
Marathi	Jatamavshi, Jataman

These names reflect the cultural and traditional significance of *Jatamansi* in different regions of the world. The root of *Jatamansi* is widely used in traditional medicine for its various therapeutic properties, and its aromatic fragrance has also made it a popular ingredient in perfumes and cosmetics.

Geographical source

Jatamansi, also known as Spikenard, is a perennial herb that grows in the high altitude Himalayan region of India, Nepal, Bhutan, and Tibet [5]. *Jatamansi* is often found in the alpine meadows and subalpine forests at elevations between 3000 to 5000 meters above sea level [6]. *Jatamansi* is primarily found in high altitude regions. The plant prefers moist, shady conditions and is often found along streams and riverbanks.

Cultivation and morphology

Cultivation: *Jatamansi* is a slow-growing herb that is propagated through division of rhizomes or stem cuttings. It is commonly grown in the high altitude Himalayan regions, where the soil is well-drained, rich in organic matter, and has a slightly acidic to neutral ph. The plant prefers partial to full shade and requires a cool and moist growing environment to thrive [5].

Morphology: *Jatamansi* is a perennial herb that grows to a height of 30 cm-90 cm. The plant has a thick, fleshy rhizome that is brown in color and produces roots at regular intervals. The leaves are lance- shaped, alternate, and grow up to 15 cm in length. The plant produces clusters of small, pink to purple, fragrant flowers on spikes that rise above the foliage. The plant produces a single stem that is upright, robust and unbranched [6].

Phytochemicals present in *jatamansi*

Jatamansi is known to contain a variety of phytochemicals including essential oils, sesquiterpenes, triterpenes, and alkaloids [7-9]. The following is a list of some of the phytochemicals found in different parts of the *Jatamansi* plant as shown in Table 2.

Table 2. Phytochemicals present in *jatamansi*

Sr.No.	Plant part	Phytochemicals
1	Rhizome	Nardol (sesquiterpene alcohol)
		Jatamansone (sesquiterpene)
		Valeranone (sesquiterpene)
		Jatamansic acid (sesquiterpene)
		Nardostachin (sesquiterpene)
		Nardosinone (sesquiterpene)
		Patchouli alcohol (sesquiterpene alcohol)
		α-bulnesene (sesquiterpene)
2	Stem	β-caryophyllene (sesquiterpene)
		α-humulene (sesquiterpene)
		Germacrene D (sesquiterpene)
3	Leaves	β-caryophyllene (sesquiterpene)
		α-humulene (sesquiterpene)
		Germacrene D (sesquiterpene)
4	Flowers	Nardol (sesquiterpene alcohol)
		Valeranone (sesquiterpene)
		Nardostachin (sesquiterpene)
		Patchouli alcohol (sesquiterpene alcohol)
		α-bulnesene (sesquiterpene)

Medicinal effects of plants parts

Different parts of the plant, including the roots, leaves, and stems, are used for various medicinal purposes. Here are some of the commonly known medicinal effects of different parts of *Jatamansi* with references:

Roots

Anti-anxiety: The roots of *Jatamansi* have been shown to have anxiolytic effects and are commonly used to treat anxiety and stress-related disorders [10].

Cognitive enhancer: The root extract of *Jatamansi* has been found to improve cognitive function and memory in experimental studies [11].

Anti-inflammatory: The root extract has shown anti-inflammatory effects in experimental studies and may be useful in treating inflammatory conditions [12].

Leaves

Anti-inflammatory: The leaves of *Jatamansi* have been found to have anti-inflammatory properties and may be useful in treating conditions such as arthritis [13].

Stems

Antioxidant: The stem extract of *Jatamansi* has been found to have strong antioxidant properties and may help protect against oxidative damage [14].

It is important to note that while these effects have been demonstrated in experimental studies, more clinical research is needed to fully establish the medicinal effects of *Jatamansi* and its different parts. Additionally, the use of *Jatamansi* as a medicine should be under the supervision of a qualified healthcare practitioner.

Pharmacological activities hepato-protective activity

Protection against toxic injury: The root extract of *Jatamansi* has been found to protect against toxic injury to the liver in experimental studies [15].

Antioxidant activity: The root extract of *Jatamansi* has been shown to have strong antioxidant activity, which may contribute to its hepato protective effects [16].

Reduction of liver damage markers: The root extract of *Jatamansi* has been found to reduce markers of liver damage in experimental studies.

Antifungal and anti-bacterial activity

Jatamansi (*Nardostachys jatamansi*) has been studied for its potential antifungal and antibacterial activity. Here are some of the findings from experimental studies on the antifungal and antibacterial activity of *Jatamansi* with references:

Antifungal activity

Inhibition of fungal growth: The root extract of *Jatamansi* has been found to have antifungal activity, inhibiting the growth of several fungal species. Antibacterial activity:

Inhibition of bacterial growth: The root and stem extracts of *Jatamansi* have been found to have antibacterial activity, inhibiting the growth of several bacterial species [17].

Antimicrobial activity: The root extract of *Jatamansi* has been found to have antimicrobial activity against several bacterial species, including Escherichia coli and Staphylococcus aureus [18].

Cardio protective activity

Jatamansi (*Nardostachys jatamansi*) has been studied for its potential cardio-protective activity, meaning its ability to protect the heart from damage. Here are some of the findings from experimental studies on the cardio-protective activity of *Jatamansi* with references:

Reduction of heart injury markers: The root extract of *Jatamansi* has been found to reduce markers of heart injury in experimental studies [19].

Protection against oxidative stress: The root extract of *Jatamansi* has been found to protect against oxidative stress-induced heart injury in experimental studies.

Hypo-lipidemic activity

Hypo-lipidemia refers to a condition characterized by reduced levels of lipids, particularly cholesterol, in the blood. The plant is known to have a hypo-lipidemic effect due to the presence of various active compounds, such as jatamansin, nardostachin, spirojatamol, and nardosin.

Studies have shown that *jatamansi* possesses hypo-lipidemic activity by reducing the levels of serum cholesterol, Low-Density Lipoprotein (LDL) cholesterol, and triglycerides while increasing the levels of High-Density Lipoprotein (HDL) cholesterol. The plant's hypo-lipidemic effect is believed to be due to the presence of compounds that inhibit the absorption of cholesterol and lipids from the digestive tract and also stimulate the liver's ability to remove excess cholesterol from the blood.

In a study conducted by Adhikari et al. the hypo-lipidemic activity of *jatamansi* was evaluated in rats fed with a high-fat diet. The results showed that *jatamansi* supplementation reduced serum cholesterol levels by 15.7%, triglycerides by 28.7%, and LDL cholesterol by 18.5% [20]. Furthermore, the study found that *jatamansi* supplementation increased the levels of HDL cholesterol by 15.9%.

Another study by Mohan et al. investigated the hypo-lipidemic activity of *jatamansi* in experimental rats. The study found that *jatamansi* supplementation reduced the levels of serum cholesterol by 17.7%, triglycerides by 24.3%, and LDL cholesterol by 19.1%. Additionally, the study reported an increase in the levels of HDL cholesterol by 14.7% [21].

Thus, *jatamansi* has been found to possess hypolipidemic activity, reducing serum cholesterol, triglycerides, and LDL cholesterol while increasing HDL cholesterol levels. The plant's hypolipidemic effect is believed to be due to its ability to inhibit the absorption of cholesterol and lipids from the digestive tract and stimulate the liver's ability to remove excess cholesterol from the blood.

Anti-depressant activity

Depression is a mental disorder characterized by persistent feelings of sadness, hopelessness, and loss of interest in activities. The plant is believed to have an antidepressant effect due to the presence of active compounds, such as jatamansin, spirojatamol, and nardosin.

Studies have shown that *jatamansi* has a significant antidepressant effect in experimental animals, as it has been found to modulate neurotransmitter levels and the stress response in the brain. In a study conducted by Parmar et al. the antidepressant activity of *jatamansi* was evaluated in mice using the Forced Swim Test (FST), a commonly used method for assessing antidepressant activity [22]. The results showed that *jatamansi* significantly reduced the immobility time of the mice in the FST, indicating its antidepressant activity.

Another study by Sairam et al. investigated the antidepressant activity of *jatamansi* in mice using the tail suspension test (TST), another commonly used method for evaluating antidepressant activity [23]. The study found that *jatamansi* significantly reduced the immobility time of the mice in the TST, indicating its antidepressant effect. Furthermore, the study reported that *jatamansi* supplementation increased the levels of brain monoamines, such as serotonin and norepinephrine, which are important neurotransmitters involved in regulating mood and stress.

Jatamansi has been found to have significant antidepressant activity in experimental animals, as it has been shown to reduce immobility time in the FST and TST and modulate neurotransmitter levels in the brain. The plant's antidepressant effect is believed to be due to its ability to regulate the stress response and modulate neurotransmitter levels, particularly serotonin and norepinephrine, which play a crucial role in regulating mood and stress.

Antioxidant, neuroprotective activity and stress relieving activity

Antioxidant activity: *Jatamansi* has been found to scavenge free radicals and prevent oxidative damage. Free radicals are highly reactive molecules that can damage cells and tissues, leading to oxidative stress, which is implicated in the development of various diseases, including cancer, cardiovascular disease, and neurodegenerative diseases. In a study conducted by Parmar et al. the antioxidant activity of *jatamansi* was evaluated in mice using the DPPH radical scavenging assay [24]. The results showed that *jatamansi* significantly scavenged the DPPH radical and reduced oxidative damage, indicating its antioxidant activity.

Neuroprotective activity: *Jatamansi* has also been found to have significant neuroprotective activity, as it has been shown to protect neurons from damage and improve cognitive function. In a study conducted by Parmar et al. the neuroprotective activity of *jatamansi* was evaluated in mice using the scopolamine-induced memory impairment model [25]. The results showed that *jatamansi* significantly improved cognitive function and prevented scopolamine-induced memory impairment, indicating its neuroprotective activity.

Stress-relieving activity: *Jatamansi* has also been found to have significant stress-relieving activity, as it has been shown to reduce stress and improve stress-related physiological changes. Stress is a major health problem that can lead to various physical and mental disorders, including depression, anxiety, and cardiovascular disease. In a study conducted by Parmar et al. the stress-relieving activity of *jatamansi* was evaluated in mice using the Forced Swim Test (FST), a commonly used method for assessing stress-relieving activity. The results showed that *jatamansi* significantly reduced the immobility time of the mice in the FST, indicating its stress-relieving activity.

These activities are believed to be due to the presence of active compounds, such as jatamansin, spirojatamol, and nardosin, which scavenge free radicals, protect neurons, and regulate the stress response. The plant's antioxidant, neuroprotective, and stress-relieving activities make it a potential therapeutic agent for the treatment of various diseases, including cancer, cardiovascular disease, neurodegenerative diseases, depression, anxiety, and other stress- related disorders.

Anti-parkinson activity

Parkinson's Disease (PD) is a neurodegenerative disorder that affects movement and coordination, causing tremors, stiffness, and difficulty with balance and gait. Antiparkinson drugs are medications that are used to treat the symptoms of Parkinson's disease, and *Jatamansi* (*Nardostachys jatamansi*) is a plant species that has been found to have antiparkinson activity.

The antiparkinson activity of *Jatamansi* has been attributed to the presence of active compounds, such as jatamansin and spirojatamol, which have been found to have neuroprotective and antioxidant effects. These compounds have been shown to scavenge free radicals and reduce oxidative stress, which are factors that contribute to the progression of Parkinson's disease.

In a study conducted by Parmar et al. the antiparkinson activity of *Jatamansi* was evaluated in mice using the 6-hydroxydopamine (6-OHDA) neurotoxicity model, which is a commonly used model for Parkinson's disease [26]. The results showed that *Jatamansi* supplementation significantly reduced the degeneration of dopaminergic neurons and improved motor function in the mice, indicating its antiparkinson activity.

In another study conducted by Chopra et al. the antiparkinson activity of *Jatamansi* was evaluated in rats using the MPTP-induced Parkinson's disease model [27]. The results showed that *Jatamansi* supplementation reduced the degeneration of dopaminergic neurons and improved motor function in the rats, indicating its antiparkinson activity.

Jatamansi has ability to reduce oxidative stress, scavenge free radicals, and protect dopaminergic neurons from degeneration. The plant's active compounds, including jatamansin and spirojatamol, are believed to be responsible for its antiparkinson effects.

Anti-convulsant activity

Epilepsy is a neurological disorder characterized by recurring seizures and *Jatamansi* (*Nardostachys jatamansi*) is a plant species that has been found to have anti-convulsant activity. Convulsions, or seizures, can be caused by a variety of factors, including genetics, brain damage, or exposure to toxic substances. Anticonvulsant drugs are medications that are used to treat seizures, and *Jatamansi* has been found to have anticonvulsant activity in animal studies.

The anti-convulsant activity of *Jatamansi* has been attributed to its ability to modulate the activity of neurotransmitters, such as GABA and glutamate, which play a key role in controlling seizures. The plant also contains active compounds, such as jatamansin and spirojatamol, which have been found to have anticonvulsant and neuroprotective effects.

In a study conducted by Goyal et al. the anti-convulsant activity of *Jatamansi* was evaluated in mice using the Maximal Electroconvulsive Shock (MES) and pentylenetetrazol (PTZ) models, which are commonly used models for studying seizures [28]. The results showed that *Jatamansi* supplementation significantly reduced the incidence and duration of seizures in the mice, indicating its anti-convulsant activity.

In another study conducted by Patel et al. the anti-convulsant activity of *Jatamansi* was evaluated in rats using the PTZ-induced seizure model [29,30]. The results showed that *Jatamansi* supplementation significantly reduced the incidence and duration of seizures in the rats, indicating its anti-convulsant activity.

Thus, *Jatamansi* has been found to have significant anti-convulsant activity in animal studies due to its ability to modulate neurotransmitter activity and protect the brain from seizure- induced damage. The plant's active compounds, including jatamansin and spirojatamol, are believed to be responsible for its anti-convulsant effects.

Anti-hyperglycemic effect

Hyperglycemia, or elevated blood sugar levels, is a common condition in patients with diabetes and is associated with various health complications such as heart disease, neuropathy, and retinopathy. The anti-hyperglycemic effect of *Jatamansi* is believed to be due to its ability to regulate glucose metabolism and insulin sensitivity. The plant contains active compounds, such as jatamansin and nardoside that have been found to have hypoglycemic effects and improve insulin sensitivity in animal studies.

In a study conducted by Pandey et al. the anti-hyperglycemic effect of *Jatamansi* was evaluated in rats with streptozotocin-induced diabetes. The results showed that *Jatamansi* supplementation significantly reduced blood glucose levels in the rats, indicating its anti- hyperglycemic effect.

In another study conducted by Singh et al. the anti-hyperglycemic effect of *Jatamansi* was evaluated in mice with type 2 diabetes. The results showed that *Jatamansi* supplementation significantly improved glucose tolerance and reduced blood glucose levels in the mice, indicating its anti-hyperglycemic effect [31].

Thus, *Jatamansi* has been found to have significant anti-hyperglycemic activity in animal studies due to its ability to regulate glucose metabolism and insulin sensitivity. The plant's active compounds, including jatamansin and nardoside, are believed to be responsible for its anti- hyperglycemic effects.

Effect on estrogen and hair growth

Estrogen is a hormone that plays a crucial role in the regulation of various physiological processes, including hair growth. *Jatamansi* (*Nardostachys jatamansi*), a plant species found in the Himalayas, has been found to have an effect on estrogen levels and hair growth.

In a study conducted by Singh et al. the effect of *Jatamansi* on estrogen levels and hair growth was evaluated in rats. The results showed that *Jatamansi* supplementation significantly increased serum estrogen levels and improved hair growth in the rats, indicating its potential for use as a natural remedy for estrogen-related hair loss [32].

In another study conducted by Kumar et al. (2020), the effect of *Jatamansi* on estrogen levels and hair growth was evaluated in mice. The results showed that *Jatamansi* supplementation significantly increased serum estrogen levels and improved hair growth in the mice, supporting its potential as a natural remedy for estrogen-related hair loss [33].

Thus, *Jatamansi* has been found to have an effect on estrogen levels and hair growth in animal studies. Its potential as a natural remedy for estrogen-related hair loss requires further investigation in human studies.

Nootropic activity

The nootropic activity of *Jatamansi* (*Nardostachys jatamansi*) has been the subject of various studies due to its potential as a natural remedy for cognitive enhancement and brain health.

Nootropics are compounds that improve cognitive function, including memory, learning, and focus.

In a study conducted by Singh et al. the nootropic activity of *Jatamansi* was evaluated in rats using the Morris water maze test, a commonly used test to evaluate cognitive function in animals [34]. The results showed that *Jatamansi* supplementation significantly improved spatial learning and memory in the rats, indicating its nootropic activity.

In another study conducted by Pandey et al. the nootropic activity of *Jatamansi* was evaluated in mice using the elevated plus maze test, a test that measures anxiety and memory function [35]. The results showed that *Jatamansi* supplementation significantly improved memory function in the mice, indicating its nootropic activity.

Thus, *Jatamansi* has been found to have significant nootropic activity in animal studies, with potential for improving cognitive function and memory. However, further studies are required to confirm these results in humans.

Anti-cancer activity

Cancer is a complex disease that requires multi-faceted approaches for treatment, including the use of natural remedies such as *Jatamansi*.

In a study conducted by Khan et al. the anti-cancer activity of *Jatamansi* was evaluated *invitro* using human cancer cell lines [36]. The results showed that *Jatamansi* extract inhibited the growth of cancer cells, indicating its potential as an anti-cancer agent.

In another study conducted by Pandey et al. the anti-cancer activity of *Jatamansi* was evaluated *invitro* and *invivo* using human cancer cell lines and mice with induced cancer. The results showed that *Jatamansi* supplementation significantly reduced the growth of cancer cells in vitro and inhibited the growth of cancer in mice, indicating its potential as an anti-cancer agent [37].

Jatamansi has been found to have significant anti-cancer activity *invitro* and *invivo* studies. Its potential as a natural remedy for cancer requires further investigation in human studies.

Radio-protective activity

The radio protective activity of *Jatamansi* (*Nardostachys jatamansi*) has been the subject of various studies due to its potential as a natural remedy for protection against radiation- induced damage. Radiation therapy is a common treatment for cancer, but it also leads to side effects such as oxidative stress and cellular damage.

In a study conducted by Verma et al. the radio protective activity of *Jatamansi* was evaluated in rats exposed to gamma radiation. The results showed that *Jatamansi* supplementation significantly reduced oxidative stress and cellular damage in the rats, indicating its radio protective activity. [38]

In another study conducted by Patel et al. the radio protective activity of *Jatamansi* was evaluated in mice exposed to gamma radiation. The results showed that *Jatamansi* supplementation significantly reduced oxidative stress, cellular damage, and DNA damage in the mice, indicating its radio protective activity.[39]

Jatamansi has been found to have significant radio protective activity in animal studies, with potential for reducing oxidative stress, cellular damage, and DNA damage caused by radiation exposure. However, further studies are required to confirm these results in humans.

DISCUSSION

In recent years, *Jatamansi* has received increasing attention due to its potential as a natural remedy for various health conditions. The research studies reviewed in this article indicate that *Jatamansi* has a wide range of medicinal properties, including anti-hyperglycemic, anti-convulsant, anti-depressant, anti- cancer, radio protective, and nootropic effects. The plant has also shown potential as a natural remedy for oxidative stress, cellular damage, and DNA damage caused by radiation exposure.

Jatamansi has been traditionally used in Ayurveda for the treatment of various health conditions, including neurological and mental disorders, skin problems, and digestive disorders. The results of the reviewed studies support the traditional use of *Jatamansi* in Ayurveda and provide scientific evidence for its potential as a natural remedy for various health conditions.

CONCLUSION

In conclusion, *Jatamansi* is a promising plant species with a wide range of medicinal properties, which has the potential to be developed as a natural remedy for various health conditions. Further research is needed to confirm the results of these studies and to determine the optimal dosages and administration methods for *Jatamansi*. Additionally, more research is required to understand the mechanisms of action of *Jatamansi* and to develop safe and effective treatments for various health conditions.

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