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EFFECT OF JATAMANSI ON NEUROLOGICAL DISORDERS -A REVIEW ARTICLE

DR. ARCHANA PRAJAPATI

Associate Professor in Dept. of Dravyaguna Vigyan, Ishan Ayurvedic Medical College and Research Centre, Greater Noida U.P.

Corresponding Author – Dr. Archana Prajapati, Associate Professor in Dept. of Dravyaguna Vigyan, Ishan Ayurvedic Medical College and Research Centre, Greater Noida U.P.

ABSTRACT

A primitive, endangered herbal remedy from the Valerianaceae family is called Nardostachys jatamansi DC. In the Ayurvedic and Unani medical systems, the rhizomes of this hairy, perennial, dwarf, herbaceous plant are employed for medicinal purposes. Numerous medicinal activities, including antifungal, antibacterial, antioxidant, hepatoprotective, and cardioprotective qualities, have been linked to Nardostachys jatamansi. It is used to treat CNS problems and insomnia. There have also been reports on the plant's spasmolytic, bronchodilator, vasodilator, and platelet aggregation inhibitory properties. The main secondary metabolites found in the plant are actinidine, nardostachone, and gatamansone. The possible health advantages of this medicinal plant are outlined in this review article based on published research. The review also emphasizes the need of using this herb in the Ayurvedic medical system and the potential for further study.

KEYWORDS – Neurocognitive, Jatamansi, Jatamansone, Nardostachys etc.

INTRODUCTION

Small perennial rhizomatous plant Nardostachys jatamansi DC grows from 2300 m to 6000 m above sea level on steep, wet, rocky, grassy slopes in India, Nepal, China, and Bhutan. There are three forms of polyploidy in V. officinalis: diploid, tetraploid, and octaploid. The oblong-ovate, long, sessile leaves are 15 to 20 centimeters in length. Dense cymes of pink or blue-tinged flowers. This taxon's roots are made up of short, thick, dark grey rhizomes that are topped with the tufted, fibrous, reddish-brown remnants of the radical leaves' petioles. Several traditional medical systems employ its rhizomes in their treatments.[1]

It works well as a laxative, antiepileptic, tonic, antispasmodic, and stimulant 1. Many different conditions, including those of the digestive, circulatory, neurological, pulmonary, urinary, reproductive, and skin systems, have historically been treated with jatamansi. Additionally, it has strong anti-ischemic, anti-arrhythmic, anticonvulsant, hepatoprotective, hypotensive, hypolipidemic, and tranquilizing properties. Nardostachys jatamansi roots and rhizomes have been used to cure mental weakness, syncope epilepsy, and hysteria.

In addition, it has cardioprotective properties and is used to treat neurological conditions. Numerous pharmacological properties, including as antibacterial, antifungal, hypotensive, anti-arrhythmic, and anticonvulsant properties, are exhibited by the essential oil extracted from the roots. The main ingredient in N. jatamansi plants is sesquiterpene, which also includes jatamansone and nardostachone. This page provides an overview of the plant's phytochemistry and pharmacological properties that have been documented[2].

Kingdom	**Plantae**
• Division	Mangnoliophyta
• Class	Mangnoliopsida
• Order	Dipsacales
• Family	Valerianaceae
• Genus	Nardostachys
• Species	Jatamansi
• Botanical	*Nardostachys*
• name	*jatamansi* DC
• Part used	Rhizomes,Rhizome oil

SYNONYMS –

ACCORDING TO HABITAT

- किरातिनी- **किरातबहुले**पार्वत्यप्रदेशेजाता|- Jatamansi grows in the mountains of Himalaya.
- **तपस्विनी- जटिलत्वात्**पार्वत्यप्रदेशे**स्थितत्वाच्चतपस्विनीव** दृश्यते|- Jatamansi commonly found in high altitudes of Himalaya, it has mattedhair like that of sage.

ACCORDING TO MORPHOLOGY

- **जटिला- जटाधारिणी**|- Jatamansi has matted hair.
- **भूतजटा- भूतघ्नीजटायुक्ता**|- Jatamansi has fibers in rhizomes which appear like matted hairs.
- **कृष्णजटा- कृष्णवर्णजटायुक्ता**|- Rhizome of Jatamansi is black in color.

- मिशि- **कृष्णवर्णा**|- Rhizome of Jatamansi is black in color.
- **सुलोमशा- शोभनैलोमभिर्युक्ता।-** Fibers on the rhizome are neatly arranged like matted hair.

ACCORDING TO PROPERTIES AND ACTION

- मांसी- मांस**हिनस्तीति, लेखनत्वात्।-** Reduces fat because of Lekhana Karma (emaciating action).
- प्लाङ्गा- **पलंमांस कपषतिहिनस्तीति**| - Reduce Mamsa (fat stored in flesh)
- **नलदम** – **सुगन्धि**: |- Rhizome of Jatamansi has an agreeable odor.
- माता– **मातेव निद्रापयति**| - Induces good sleep.

AYURVEDIC PROPERTIES

Rasa – Tikta, Madhura, Kashaya

Guna – Laghu, Snigdha

Virya – Sita

Vipaka- Katu

Karma -Tridoshahara, Manadoshahara, Bhutaghna

CLASSICAL REFERENCE OF JATAMANSI (BHAVA PRAKASHA/ NIGHANTU)

REFERENCES	SLOKS
Bhava Prakasha Nighantu Karpooradi Varga- 89	**जटामांसीभूतजटाजटिलाच तपिस्वनी**|
Bhava Prakasha Nighantu Karpooradi Varga- 89	मांसीतिक्ता**कषायाच** मेध्या**कान्तिबलप्रदा**| स्वाद्वीहिमा**त्रिदोषास्रदाहवीसर्पकुष्ठनुत्**||
Dhanwantri Nighantu Chandanadi Varga- 44	मांसीस्वादु**कषायास्यात्कफपित्तास्र**नाशिनी| **विषमारुत हृदबल्या**त्वच्या**कान्तिप्रसादनी**||

Kaiydeva Nighantu Aushadi Varga, 1364-1365	मांसीस्वादुहिमातिक्ता**तुवराबलंकान्तिंदा**| **त्रिदोष विष विसर्प, दाहलोहित कुष्ठनुत** ॥
Raja Nighantu Chandandi Varga, 95	**जटामांसी-** **सुरभिस्तुजटामांसी**काया**कटुशीतला**| **कफहद्भूतदाहघनी**पित्तघ्नी**मोदकान्तिकृत्**॥
Raja Nighantu Chandandi Varga, 97	**गन्धमांसी-** **गन्धमांसी**तिक्तशीता**कफकण्ठामयापहा**| **रक्त**पित्त**हरावर्ण्यविषभूतज्वरापहा**॥
Raja Nighantu Chandandi Varga, 99	**आकाशमांसी- अभ्रमांसी**हिमा**शोफ व्रण नाडीरूजापहा।** **लूतागर्दभजालादि**हारिणी**वर्णकारिणी**॥
Priya Nighnatu Shatpuspadi Varga, 37	मांसीमेध्यातुतिक्ता**स्यादनुष्णवर्णकारिणी**| **रक्तवातहरीनिद्राजननी**कुष्ठहारिणी॥
Nighnatu Sangreha	**जटामांसी**तुतुवराशीतलाकान्तिकारका| **बल्याकट्वी**स्वादुतिक्ता**कफान्तर्दाहपित्तहा**॥ **विसर्पकुष्टत्वग्दोषभूतबाधाज्वरापहा**| दाहंत्रिदोषंवातं**च रक्तदोषं**विषं**हरेत्**॥

CHEMICAL CONSTITUTENTS

The following chemical components make up Nardostachys jatamansi: 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, seychellene, seychellene, valeranal, and valeranone. ketone, sesqueterpin ketone, spirojatamol, gum, sugar, starch, volatile essential oil, and bitter extractive materials, among other substances[3,4,5]. Sardin, Sardal, jatamnsic acid, b-maline, and patchouli alcohol[6] are other sesquiterpenes. Sardocachin, dihydrojatamansin, jatamansic acid[7], jatamansinone, oroseolol, oroselone, seselin, nardostachyin,

nardosinone, spirojatamol[8], jatamol A and B[9], calarenol[10], seychellene, seychelane, coumarin: xanthogalin[11] are some of the additional sesquiterpenes that are known. Actinidine is another alkaloid that has been mentioned. Nardal has been discovered to be an active ingredient[12].

AIM AND OBJECTIVE-

To evaluate the Neurocognitive effect of Jatamansi

METHODOLOGY

The material of jatamansi plant collected from different articles, textbooks, authentic websites, like -Pubmed central, NLM, AYU, Ayush Dhara, etc.

PHARMACOLOGICAL ACTION

ANTIDEPRESSANT ACTION

By using the forced swim test, tail suspension test, and locomotor activity in inbred male Swiss, the antidepressant effect of the methanolic extract of N. Jatamansi was identified. In mice that were both sleep-deprived and normal, the effectiveness of the extract at doses of 200 and 400 mg/kg, p. o. was compared with the conventional medication imipramine [10 mg/kg, p. o.]. In mice with normal and sleep-deprived sleep patterns, N. jatamansi at 200 and 400 mg/kg, p.o. had a substantial antidepressant-like effect in both TST and FST. Their effectiveness was found to be similar to imipramine at 10 mg/kg, p.o. In comparison to a normal control, it did not demonstrate any appreciable alteration in the mice's locomotor functions.[13]

ANTICONVULSANT ACTION

The anticonvulsant properties of an ethanolic extract made from N. jatamansi roots were investigated. A decrease in the extension/flexion ratio demonstrated a substantial rise in the seizure threshold induced by N. jatamansi root extract when compared to the maximum electro shock seizure model. Nevertheless, the extract had no effect on seizures brought on by pentylenetetrazole. The protective index of phenytoin was also significantly increased from 3.62 to 13.17 by pre-treating rats with phenytoin at doses of 12.5, 25, 50, and 75 mg/kg in addition to 50 mg/kg of N. jatamansi root extract. The synergistic impact of both medications was well confirmed by the dosage response tests of phenytoin in blood levels when combined with N. jatamansi extract and when taken alone[14].

ANTIFUNGAL AND ANTIBACTERIAL ACTION

The antibacterial activity of 61 additional medicinal plants from 33 other families, including Nardostachys jatamansi, was evaluated against a variety of microbes. The antimicrobial action of the extracts was tested against Saccharomyces cerevisiae, Aspergillus niger, Candida albicans, Streptococcus faecalis, Klebsiella pneumonia, and Staphylococcus epidermidis[15] using dilutions of agar ranging from 500 ѵg/ml to 1000 ẏg/ml, in conjunction with

Nardostachys jatamansi. Nardostachys jatamansi's methanolic extract is efficient against the majority of bacteria, supporting its use as an antibiotic and antifungal agent[16, 17].

ANTIPARKINSON ACTION

For three weeks, rats were given 200, 400, or 600 mg/kg body weight of N. jatamansi roots. Day 21 saw the injection of 2 µl of 6-OHDA [12 µg in 0.01% in ascorbic acid-saline] into the right striatum, while 2 µl of vehicle was given to the sham-operated group. The rats were given a 6-OHDA injection, examined for neurobehavioral activity, and then, six weeks later, they were killed to estimate the amount of reduced glutathione and lipid peroxidation. The expression of tyrosine hydroxylase, measurement of catecholamines, dopaminergic D2 receptor binding, and the activities of glutathione-transferase, glutathione reductase, and catalase. N. jatamansi[18] substantially and dose-dependently recovered the reduction in locomotor activity and muscle coordination brought on by 6-OHDA injections, as well as the increase in drug-induced rotations.

NOOTROPIC ACTION

To assess learning and memory factors, the passive avoidance paradigm and the raised plus maze were used. Both young and old mice received three doses (50, 100, and 200 mg/kg, p.o.) of an ethanolic extract of N. jatamansi over the course of seven days.[19] In young mice, the 200 mg/kg dosage of N. jatamansi ethanolic extract dramatically enhanced learning and memory. It also corrected the amnesia caused by scopolamine (0.4 mg/kg i.p.) and diazepam (1 mg/kg i.p.). The reversal of scopolamine-induced amnesia raises the possibility that the enhanced memory is the result of enhanced cholinergic transmission in the brain. Therefore, N. jatamansi may show to be an effective memory-restoring medication in the treatment of dementia in the elderly[20].

ANTIOXIDANT AND STRESS RELIEVING ACTION

The antioxidant property of N. jatamansi hydro-ethanolic extract was used to assess its anti-stress effects. Wistar rats were pre-treated orally with 200 and 500 mg/kg of N. jatamansi extract, respectively, and then separated into four groups: naïve, stressed, T-200, and T-500 stressed. Rats were restrained on metallic chambers for 4 hours at 4°C. After that, the rats were sacrificed, and changes in biochemical parameters brought on by stress, as well as the frequency and severity of ulcers, were measured. By assessing the free radical scavenging activity, N. jatamansi' s in vitro antioxidant activity was investigated. Strong antioxidant activity was displayed by N. jatamansi, which also effectively corrected the stress-induced rise in LPO and NO levels as well as the decline in brain catalase activity. The noteworthy anti-stress action of N. jatamansi may be attributed to its antioxidant properties.[21]

ACTION ON NERVOUS SYSTEM

In one study, 6-OHDA injection was used to establish a Parkinson disease model in wistar rats. It was shown that the medication resulted in a significant increase in D2 receptors and a notable decrease in biogenic amine. Inhibitory neurotransmitters and biogenic amines are elevated in the brain by N. jatamansi. In this work, tail suspension and the forced swim test were used to measure the antidepressant effects of three doses—50, 100, and 200 mg/kg—given

over the course of 14 days. The ethanolic extract of N. jatamansi exhibited antidepressant effects that were on par with imipramine (15 mg/kg) and sertraline (20 mg/kg). 50 mg/kg of N. jatamansi ethanolic extract was utilized in conjunction with dosages of 12.5 mg/kg, 25 mg/kg, 50 mg/kg, and 75 mg/kg of phenytoin. But an excerpt from N.[22]

NEUROPROTECTIVE ACTION

In a middle cerebral artery [MCA] occlusion model of acute cerebral ischemia in rats, the protective effect of N. jatamansi was investigated on neurobehavioral activities, thiobarbituric acid reactive substance [TBARS], reduced glutathione [GSH], thiol group, catalase, and sodium potassium-ATPase activities. Catalase and Na [+] K [+] ATPase activity was considerably reduced by MCA blockage. The MCA occlusion group also saw a substantial reduction in neurobehavioral activities, namely in spontaneous motor activity and motor coordination. According to the study, N. jatamansi is useful in treating focal ischemia, most likely because of its antioxidant properties. In a different trial, rats received four weeks of treatment with 200, 400, or 600 mg/kg body weight of N. jatamansi roots. When N. jatamansi was used as a pre-treatment, lesioning was followed by enhanced lipid peroxidation and a substantial reduction in glutathione concentration in the substantia nigra.[23]

ANTICATALEPTIC ACTION

Using behavioral, biochemical, and neurotransmitter measurements in a rat model of haloperidol-induced catalepsy, the antioxidant and anticataleptic properties of hydro alcoholic root extract from Nardostachys jatamansi were examined. Male wistar rats were given a dose of haloperidol (1 mg/kg, i.p.) to induce catalepsy. When comparing the drug-treated groups to the haloperidol-treated group, a substantial decrease in the cataleptic ratings was seen in each group, with the largest drop occurring in the Nardostachys jatamansi (500 mg/ kg body weight) provided group.[24]

EFFECT ON ALZHEIMER'S DISEASE

An important plant called Nardostachys jatamansi (D. Don) DC. is utilized in Indian Ayurveda to heal neurological problems and improve memory. Its active phytochemical(s) that provide neuroprotection have not yet been investigated. One neurological ailment that contributes to dementia is Alzheimer's disease (AD), for which there are currently no viable pharmaceutical treatments to cure or reverse the course of AD or to treat its cognitive symptoms. This is an effort to use the Aβ42 protein expressed Drosophila Alzheimer's disease (AD) model to examine the neuroprotective impact of jatamansinol derived from N. jatamansi against Aβ42 protein-induced neurotoxicity. The lifespan, locomotor activity, learning and memory, ocular degeneration, oxidative stress levels, antioxidant activities, cholinesterase activities, Aβ42 protein, and Aβ42 gene expression of Oregon-K (OK) and AD flies were examined after they were raised on ordinary or diet enriched with jatamansinol. In AD flies, jatamansinol decreases Aβ42 protein levels, increases learning and memory, increases locomotor activity, and lengthens the lifespan. In the AD model, jitamansinol suppresses cholinesterase activity, improves eye degeneration, increases antioxidant enzyme activities, and stops oxidative stress caused by the Aβ42 protein. This work demonstrates that jatamansinol protects

against the neurotoxicity caused by the Aβ42 protein in the AD Drosophila model, indicating that it may have therapeutic value for AD.[25]

EFFECT ON AUTISM DISEASE

This plant is well known for having sedative and soothing effects. It aids in nervous system relaxation, enhances the quality of sleep, and lessens anxiety and restlessness symptoms.[26]

EFFECT ON INSOMNIA

Jatamansi helps promote restful sleep. An exacerbated Vata dosha, according to Ayurveda, renders the neurological system sensitive, which causes Anidra (insomnia). Because jatamansi balances the Tridosha, it relaxes the nervous system. Because of its special Nidrajanana (sleep producing) impact, it aids in restful sleep.[27]

DISCUSSION

Ayurvedic doctors have also reported considerable improvements in memory recall and retention following medication extract therapy. the study's findings imply that an alternate therapy for cognitive disorders may be N. jatamansi root extract. For the first time, this study details how Nardostachys jatamansi root extract affected a subjective experiment conducted on human volunteers with a range of cognitive impairments, including memory impairment and memory problems. It is commonly known that stress affects cognition in both humans and animals.[28]

RESEARCH CONDUCTED ON RATS (MICE)

Research conducted on rats has demonstrated that GCs either improve or decrease performance based on the particular type of memory being evaluated and on the (Diamond et al., 1996; Lupien and McEwen, 1997; de Quervain et al., 1998; De Kloet et al., 1999; Roozendaal, 2000) the time of the stress exposure, respectively. Human experimental research has frequently demonstrated that GC administration can impair declarative memory performance, working memory, and delayed recall of declarative information (De Quervain et al., 2000; Newcomer et al., 1999; Wolf et al., 2001). Following exposure to psychosocial laboratory stressors, memory impairment effects have also been reported in young and elderly participants (de Quervain et al., 1998; Kirchbaum et al., 1996; Wolf et al., 1999).

Descriptive learning deficiencies appear to require prolonged therapy (several days) (Young et al., 1999; Wood). & Shors (1998). Gender has a significant impact on how things affect cognition (Carlson and Sherwin, 1999). Stress also lowers the levels of other neurotransmitters, including brain monoamines (GABA, serotonin, norepinephrine, dopamine, and noradrenaline).

According to scientific research, N. jatamansi raises GABA (GAMMA-AMINOBUTYRIC ACID) levels in the brain. N. Jatamansi is thought to lessen depression by raising brain monoamine levels (Dhingra and Goyal, 2008). Prabhu V et al. (1994) investigated the impact of both acute and subchronic treatment in their investigation. Effects alcoholic extract from N. jatamansi DC roots on male albino Wistar rats' levels of gamma-amino butyric acid (GABA), serotonin (5-HT), epinephrine (NE), dopamine (DA), and 5-hydroxyindoleacetic acid (5-HIAA). Compared to the controls, there was a discernible rise in GABA levels in the drug-treated groups. The levels of NE, DA, 5-HT, 5-HIAA, and GABA significantly increased after a 15-day therapy. Jai Prakash and Md. Nazmul (2015) also showed that Jatamansone, the likely active component from Nardostachys jatamansi, may interact with GABA ergic receptors to modulate the metabolic breakdown of serotonin, norepinephrine, dopamine, and other endogenous amines in the central nervous system.

CONCLUSION

It has been shown that Nardostachys jatamansi operates as a nervine tonic. Its de-stressing properties boost healthy nervine processes and aid in the fight against age-related neurodegenerative illnesses, learning, memory, and cognitive performance. N. jatamansi is a significant medicinal plant that is used to cure a variety of illnesses in the Ayurvedic and Unani systems. The many animal research offers a noteworthy impact of the various actions discussed in the conventional treatises. Numerous features of N. jatamansi have been studied minimally in animal studies, giving researchers a platform to study such activities in order to prove their findings scientifically and benefit mankind. Rhizomes have been utilized traditionally as immunomodulators and also have antidiabetic, nootropic, and anti-Parkinson's properties.

CONFLICT OF INTEREST -NIL

SOURCE OF SUPPORT -NONE

REFERENCES

1.Jadhav, V.M.; Throat, R.M.; Kadam,V.J and Kamble, S.S.; Herbal Anxiolyte, Nardostachs jatamansi J Pharm Res. 2009, 2(8), 1208- 1211.

2.Swee Keong Yeap; Mashitoh Binti Abd Rahman; Noorjahan Banu Alitheen and Wan Yong Ho et al. Evaluation of Immunomodulatory Effect, Selection of the Correct Targets for Immunostimulation Study, American Journal of Immunology 2011, 7(2),17-23.

3.Stanilova,S.A.; Zhelev,Z.D.; Dobreva, Z.G.; Preliminary studies on the immunomodulatory effect of the C3 binding glycoprotein isolated from Cuscutaeuropea; International Journal of Immunopharmacology, , 2011, 22, 15-24.

4.Chatterjee, B.; Basak, U.; Datta, J.; Banerji, A.; Neuman, T. Prange; Studies on the Chemical Constituents of N. jatamansi DC [Valerianaceae], Cheminform 2005; 36:17

5.Bose, B.C; Vijayvarngiya, R.; and Bhatnagar, J.N; Nardostachys jatamansi DC., A Phytochemical study of its active constituents, Indian J Med sci.; 1957, 11(10), 799-802.

6.Rucker, G.; Paknikar, S.K; Mayer, R.; Breitmaier, E.; Will, G. and Wiehl, L.; Revised structure and stereochemistry of jatamansic acid, Phytochem . 1993, 33,141-143.

7.Bagchi, A.; Oshima, Y.; Hikino, H.; Spirojatomol, A new skeletal sesquiterpenoid of Nardostachys jatamansi roots, Tetrahedron. 1990, 46,1523- 1530.

8.Bagchi, A.; Oshima, Y.; Hikino, H.; Jatamols A and B: sesquiterpenoids of Nardostachys jatamansi roots. Planta Med. 1991, 57,282- 283.

9.Rucker, G.; Paknikar, S.K.; Mayer, R.; Breitmaier, E., Will, G.; Wiehl, L.; Revised structure and stereochemistry of jatamansic acid, Phytochem . 1993, 33, 141-143.

10. Sastry, S.D.; Maheswari, M.L.; Chakravarti, K.K.; Bhatacharya, S.C.; Terpenoids-CV1: the structure of calarenol, Tetrahedron. 1967, 23, 1997-2000.

11. Zinzius, J.; Jatamansin- a new therapeutic agent in venous stasis and related diseases. Dtsche Med J. 1961, 20, 423-4.

12. Rucker, G.; Tautges, J.; Wenzl, H.; Graf, E.; Isolation and pharmacological active its of the sesquiterpene valeranone from Nardostachys jatamansi DC (in Germen). Arzneimittel forschung,1978,28,7-13.

13. Ali, S.; Ansari, K.A.; Jafry, M.A.; Kabeer, G.; N. jatamansi protects against liver damage induced by thioacetamide in rats. J Ethnopharmacol ,2000, 71, 359- 363.

14. Habibur, Rahman.; Muralidharan, P.; Comparative study of antidepressant activity of methanolic extract of N. Jatamansi DC Rhizome on normal and sleep deprived mice, Der Pharmacia Lettre, 2010, 2(5) ,441-449

15. Rao, V. S.; Rao, A.; Karanth, K. S.; Anticonvulsant and neurotoxicity profile of N. jatamansi in rats. J Ethnopharmacol,2005,102,351-356.

16. Subashini, R.; Yogeeta, S.; Gnanapragasam, A.; Devaki, T.; Protective effect of N. jatamansi on oxidative injury and cellular abnormalities during doxorubicin- induced cardiac damage in rats. J Pharm Pharmacol ,2006,58,257- 62.

17. Kumar, V.P.; Chauhan, N.S.; Padh, H.; Rajani, M.; Search for antibacterial and antifungal agents from selected Indian medicinal plants. Journal of Ethnopharmacology ,2006,107(2), 182-188.

18. Mishra, D.; Chaturvedi, R.V.; Tripathi, S.C.; The fungi toxic effect of the essential of the herb N. jatamansi DC Trop Agricul,1995, 72, 48-52.

19. Ambekar, D.H.T.; Dahikar, S.B.; Antibacterial potential of Some Ayurvedic Preparation to Control Bacterial enteric Infection, Chem Pharm Res.,2010, 2(5),494-501.

20. Ishrat,T.; Agarwal, A.K.; Islam, F.; Attenuation by N. Jatamansiof 6- hydroxy dopamine- induced Parkinsonism in rats, behavioral,neurochemical, and immune histochemical studies. Pharmacol and Biochem Behav , 2006, 83,150-60.

21. Gotumukkala, V. K.; Annamalai, T.; Mukhopadhyay, T. K.; Phytochemical investigation and hair growth studies on the rhizome of N. jatamansi DC. Pharmacognosy magazine, 2011, 7(26), 146-150.

22. Bhattacharyya, S.K.; Bhattacharyya, D.; Effect of restraint stress on rat brain serotonin , J Bio sci, 1982, 4,269-274.

23. Joshi, H.; Parle, M.; N. jatamansi improves learning and memory in mice. J Med Food, 2006, 9,113-8.

24. Lyle, N.; Bhattacharyya, D.; Sur, K.T; Munshi,S. Paul, S.; Chatterjee, S.; Gomes, A., Stress modulating antioxidant effect of Nardostachysjatamansi, Indian Journal of Biochemistry & Biophysics, 2009, 46, 93- 98.

25. Anupama KP, Shilpa O, Antony A, Raghu SV, Gurushankara HP. Jatamansinol from Nardostachys jatamansi (D.Don) DC. Protects Aβ42-Induced Neurotoxicity in Alzheimer's Disease Drosophila Model. Neurotoxicology. 2022 May;90:62-78. doi: 10.1016/j.neuro.2022.02.011. Epub 2022 Mar 2. Erratum in: Neurotoxicology. 2023 Jul;97:152-154. PMID: 35247505.

26. https://www.linkedin.com/pulse/enhancing-autism-care-ayurvedic-principles-practices-ayurmegha/

27. Toolika E, Bhat NP, Shetty SK. A comparative clinical study on the effect of Tagara (Valeriana wallichii DC.) and Jatamansi (Nardostachys jatamansi DC.) in the management of Anidra (primary insomnia). Ayu. 2015 Jan-Mar;36(1):46-9. doi: 10.4103/0974-8520.169008. PMID: 26730138; PMCID: PMC4687238.

28. Renu Sahu, H. J. Dhongade, Ajit Pandey, Poonam Sahu, Varsha Sahu, Dipali Patel and Pranita Kashyap, Medicinal Properties of Nardostachys jatamansi (A Review), Oriental Journal Of Chemistry, ISSN: 0970-020 X CODEN: OJCHEG 2016, Vol. 32, No. (2): Pg. 859-866