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JATAMANSI (*NARDOSTACHYS JATAMANSI* DC.) IN DEPRESSION AND ANXIETY DISORDERS: AN INTEGRATIVE NARRATIVE REVIEW OF TRADITIONAL KNOWLEDGE AND MECHANISTIC INSIGHTS

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Abstract

Depression and anxiety disorders are among the main contributors to the global burden of mental illness. It is affecting the quality of life and imposing critical socioeconomic challenges. Although conventional pharmacotherapy is beneficial for many patients, its long-term use is often associated with delayed therapeutic response, adverse effects, and incomplete remission. It underscoring the need for safe and evidence-based complementary therapies. *Nardostachys jatamansi* DC. (*Jatamansi*), Family Valerianaceae, A well-known medicinal plant in Ayurveda, has traditionally been depicted as a *Medhya*, *Nidrajanana*, *Unmadahara*, and *Apasmarahara* drug, denoting its therapeutic applicability in disorders affecting the mind and nervous system.

This review aims to critically integrate the classical Ayurvedic literature with contemporary experimental and clinical evidence pertaining to the role of *Jatamansi* in the management of depression and anxiety disorders. The review summarises its Ayurvedic attributes, phytochemical constituents, pharmacological mechanisms, preclinical studies and available clinical evidence with centering on antioxidant, anti-inflammatory, neuroprotective, neurotransmitter modulating, and hypothalamic -pituitary- adrenal (HPA) axis regulating activities. The current evidence implies that *Jatamansi* exhibits significant antidepressant and anxiolytic potential in various experimental models. While preliminary clinical studies indicate beneficial effects in improving symptoms of depression and anxiety. However, limitations such as small sample sizes, variability in extract standardisation, and the scarcity of high-quality randomised controlled trials mandate further investigation.

The integration of traditional Ayurvedic knowledge with modern scientific evidence underlines *Jatamansi* as a promising complementary therapeutic agent for depression and anxiety. Future well-designed mechanistic studies and large-scale clinical trials are required to substantiate its efficacy, safety, and clinical applicability in evidence-based mental healthcare.

Keywords: Nardostachys jatamansi, Depression in Ayurveda, Anxiety, Neuroprotection, Antidepressant, Anxiolytic

Introduction

Mental health conditions account for a significant portion of the overall burden of disease on a global scale[1]. Most mental health challenges are primarily driven by depressive and anxiety disorders, with depression holding the second position of greatest disability burden[2]. Poor efficacy and low tolerability are the limitations of currently available antidepressants. In terms of efficacy, about 30% of patients achieve complete clinical remission, 40% respond partially, and another 30% maintained a baseline status. Clinicians cannot predefine which medication will work for a patient, and therapeutic effects are delayed by 4 to 6 weeks. Tolerability issues endure across both acute and chronic treatment phases, spanning from the pervasive burden of SSRI-induced sexual dysfunction to the severe

cardiotoxic and anticholinergic side effects of older TCAs. Patients often have comorbid conditions. These medications present dangerous risks for pharmacokinetic and pharmacodynamic drug-drug interactions, such as the life-threatening serotonin syndrome[3].

The limitations of conventional pharmacotherapy have driven an escalating demand for alternative therapeutic avenues in mental health care. There is an acute necessity to investigate safer, plant-based interventions for depression and anxiety. Investigating natural botanical compounds offers an encouraging pathway toward identifying well-tolerated alternatives. These can effectively alleviate symptoms while diminishing the adverse physical burdens and toxicities associated with modern synthetic agents.

Nardostachys jatamansi, traditionally used as a nerve tonic and costly incense herb, holds deep historical significance with roots extending to the earliest global civilisations. Its name was identified around 3000 BCE by the Mesopotamians in their cuneiform wedge-shaped script, and by 2500 BCE, it was actively exported to Assyria, Greece (as *Nardus*), and Egypt, where it was known as *Sumbul-e-Hind*. It is featured in the Bible as *Spikenard* for religious and social gatherings, emerged in medieval German plant books as a luxury fragrance brought by Alexander the Great, and was indexed as *nalada* in the ancient Indian *Atharvaveda*. Historically traced to the social, cultural, and religious life of Utharakhand, its medicinal properties exclusively for treating conditions like insomnia, epilepsy, hysteria, and heart palpitations have been extensively recorded across centuries of classical Ayurvedic texts (such as the *Charaka* and *Susruta Samhita*), the Mongolian *Bower's* manuscript, and historical Unani medical literature[4].

This review investigates Ayurvedic descriptions, phytochemistry, preclinical evidence, and clinical studies supporting the use of *Jatamansi* in depression and anxiety disorders.

Methodology

An extensive literature search was conducted using PubMed, Google Scholar, Scopus, ScienceDirect, and Web of Science to identify applicable studies on *Nardostachys jatamansi* DC. (Jatamansi) in depression and anxiety. Search terms comprised "Jatamansi", "Nardostachys jatamansi", "depression", "anxiety", "antidepressant", "anxiolytic", and

"Ayurveda". Classical Ayurvedic texts and major Nighantus were reviewed for traditional information. Experimental studies, clinical trials, and relevant review articles were included.

Overview of Jatamansi

Botanical identity of Jatamansi Rhizome

Table 1: Macroscopic features[5]

Forms and Dimensions	Stout, woody, cylindrical, and frequently arched dried rhizomes. They measure up to 1 cm thick and 2.5 to 8 cm long.
Colour	Dark grey to dark brown externally, the internal surface is reddish brown
Surface Texture	Densely covered with silky, reddish-brown fibres that form a matted network, which are the skeletons of sheathing leaf bases.
Fracture	Becomes short pieces upon breaking(Brittle fracture), exposing an uneven internal surface with a prominent cambium ring surrounding a porous wood
Organoleptic Properties	Strongly aromatic odour with an acrid, slightly bitter taste

Table 2: Microscopic Features[5]

Cork	Consists of 2 to 5 layers of cells filled with oil globules
Cortex	Characterised by the presence of schizogenous canals
Phloem and Cambium	Phloem is in the form of patches of small cells, and the cambium ring is distinct and continuous
Xylem	Consists of vessels showing scalariform thickening, which are scattered individually or in rows of two or three
Advanced Structures (Older Rhizomes)	One or more stellate-shaped rings of interxylary and medullary cork. This partially or fully separates the rhizome into four to nine vascular strands by joining the outer cork
Storage	cork cells, which act as a storage organ for oil globules. Other tissues in between the strands are usually non-functional

Table 3: Vernacular names[6]

English	Jatamansi
Hindi	Jatamansi, Bal-chir
Sanskrit	Jatamansi
Bengali	Jatamansi
Tamil	Jatamanshi

Habitat of *Nardostachys jatamansi*

Nardostachys jatamansi is an indigenous flowering plant of the valerian family that occurs sporadically in the alpine and subalpine tracts of the Himalayan region. It specifically thrives at very high altitudes, ranging between 3000 and 5000 m above sea level. Due to its highly stringent, ecologically specific habitat requirements, paired with a short reproductive phase and a low natural seed germination rate of only 10% to 20%, the species struggles to spread naturally and faces severe extinction risks from illegal overharvesting in these wild terrains[5].

Jatamansi in Ayurveda

Table 4: Synonyms

Madanapala Nighantu (Karpuradi Varga)[7]	Mansi, Jata, Bhutakeshi, Kravyada, Analada, Shikha, Krishna, Putanakeshi, Gandhamansi, Pishachika, Bhutajata, Jatila and Tapasvini.
Kaiyadeva Nighantu (Aushadhi Varga)[8]	Mansi, Mata, Bhutakeshi, Naladam, Jatilam, Jata, Sulomasha, Mishi, Himsra, Kravyada, Dwipini, Shikha, Kiratini, Bhutajata, Janani, Tapasvini, Krishnajata, Keshi, Peshi and Bhutashipha.
Bhavaprakasha Nighantu (Karpuradi Varga)[9]	Jatamansi, Bhutajata, Jatila, Tapasvini and Mansi
Raja Nighantu (Chandanadi Varga)[10]	Mansi, Jatila, Peshi, Kravyadi, Pishita, Mishi, Keshini, Jata, Himsra, Jatamansi, Mansini, Jatala, Nalada, Meshi, Tamasi, Chakravartini, Mata, Bhutajata, Janani, Jatavati and Mrigabhaksha

Table 5: Properties and Action[11]

Rasa (Taste)	Tikta (Bitter), Kashaya (Astringent)
Guna (Properties)	Laghu (Light)
Virya (Potency)	Sheeta (Cold)
Vipaka(Metabolic Proprties)	Katu (Pungent)
Karma	Medhya (Cognitive enhancer), Tridoshanut (Balances Vata, Pitta and Kapha), Varnya (Enhances complexion), Nidrajanana(Promotes sleep) and Kushtagna(Alleviates skin diseases).

Ayurvedic Understanding of Depression and Anxiety

In Ayurveda, depression is recognised as both an emotional state (*Manasika bhava*) and a distinct psychological disease (*Manasika vyadhi*) arising from the disruption of the body-mind axis. Rather than a purely localised mental issue, its pathology is deeply tied to an imbalance of Sharirika doshas (bodily humours), especially Vata, which regulates mental and physical movements, and to *Kapha,* alongside *Tamas,* becoming the dominant *manasika dosha* over *Rajas*, leading to stagnation, lethargy, and apathy. Scholars classically correlate the symptoms of depression with conditions such as *Vishada* (despondency), *Avasada* (inertia), *Manodhukhaja unmada* (grief-induced mental affliction), and *Kaphaja unmada*(severe psychomotor retardation and withdrawal). Individuals with a weak mind (*Avara satwa*) are highly vulnerable, as emotional distress (*Shoka*, *Bhaya*) impairs the biological fire (*Agni*), resulting in poorly metabolised Rasa Dhatu, an obstructed pathway to the mind (Manovaha srotas), and a severe depletion of vital life essence[12].

"Not having what you like, and not liking what you have," which is compounded by modern digital overstimulation and volitional transgression (*Pragyaparadha*). To address this, Ayurveda categorises mental resilience into sixteen distinct *Manasika Prakriti* profiles based

on combinations of the three *Gunas*. Beyond herbal remedies, Ayurvedic texts introduce *Acharya Rasayana*, where practising virtuous behaviours (such as avoiding alcohol, practising *Japa* chants, and showing reverence to *Astikas*) functions directly as a cognitive rejuvenator. In severe or non-responsive cases, protocols such as *Satvavajaya Chikitsa*(inducing directly antagonistic emotions like love to conquer anger), *Daivavyapashraya Chikitsa* (divine therapy using Mani-gems, Homa-fire offerings, and pilgrimages), and *Trasana*/*Tadana Chikitsa*(shock therapy using dark confinement or itching from *Kapikachchu* to reset deranged senses)[13].

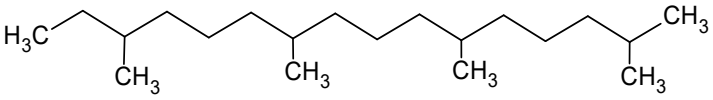
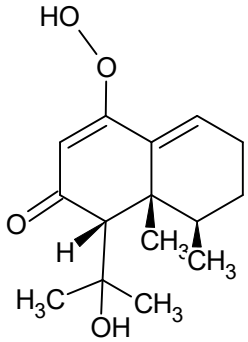
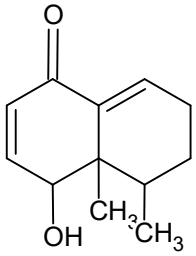
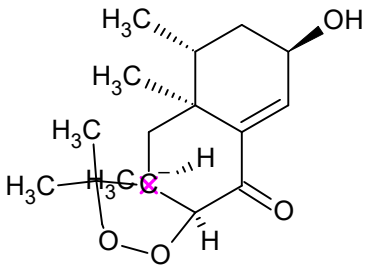
Phytochemistry Relevant to Neuropsychiatric Action

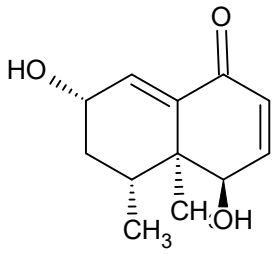
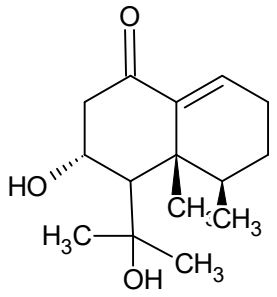
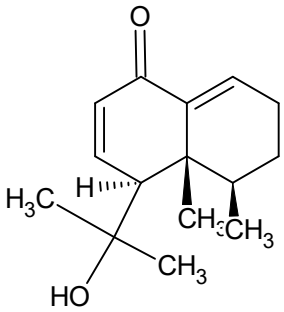
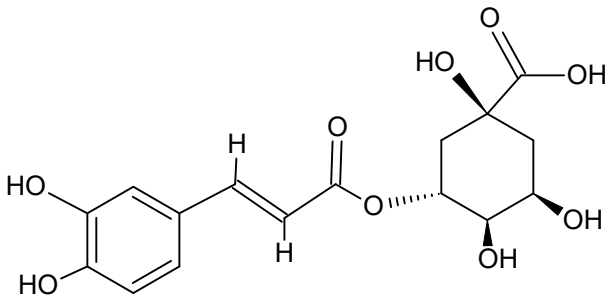
The phytochemistry of *Nardostachys jatamansi* plays an integral role in its neuropsychiatric actions, uniquely demonstrating multi-target mechanisms that alleviate depressive behaviours. Computational profiling and virtual screening of 248 phytochemicals from the plant exhibited that a vast majority possess strong binding affinities toward central nervous system targets heavily involved in mood regulation, such as the $GABA_B$ receptor, Monoamine oxidase A (MAO-A), and Monoamine oxidase B (MAO-B). Significantly,73 of these compounds simultaneously interacted with all three neurochemical targets with high affinity. Among the specific phytochemicals highlighted for their eminent, stable molecular binding capabilities are 1-Eicosene, which demonstrated superior docking scores and stabilising reactivities with critical residues of the $GABA_B$ receptor compared to its endogenous ligand, and Phytane, which reflected highly favourable binding free energies and ligand-induced stabilisation when complexed with both MAO-A and MAO-B enzymes[14].

Phytochemical investigations of the plant's active antidepressant fractions identified fourteen major components in its total methanol extract, including 7-oxonardinoperoxide, desoxonarchinol A, kanshone B, narchinol B, nardosinonediol, kanshone A, 1-hydroxylaristolone, debilon,nardosinone, kanshone H, 1,8,9,10-tetrahydroaristolan-2-one, (-)-aristolone, 1(10)-aristolone-2-one, and jatamol A. The plant's water-soluble fraction, which demonstrated significant antidepressant potential and SERT-enhancing capabilities in vitro and in vivo, was found to be enriched with chlorogenic acid,8a-6,7-dihydrogeniposide, 7-deoxy-8-epi-loganic acid, adoxodisic acid, 8-epi-loganic acid, 8a-6,7 dihydroapodantheroside

acetate and 6”-acetylpatrinalloside. Individual components like chlorogenic acid and desoxo-narchinol A demonstrated specific neurochemical activity by serving as competitive SERT enhancers that successfully reversed the serotonin- reuptake inhibition caused by the clinical antidepressant fluoxetine[15].

Table 6: Phytoconstituents in Jatamansi with Neuropsychiatric Action

Phytoconstituent	Chemical formula	Structure
1-Eicosene	$C_{20}H_{40}$	
Phytane	$C_{20}H_{42}$	
7-oxonardinoperoxide	$C_{15}H_{22}O_4$	
desoxonarchinol A	$C_{12}H_{16}O_2$	
kanshone B	$C_{15}H_{22}O_4$	

narchinol B	$C_{12}H_{16}O_3$	
nardosinonediol	$C_{15}H_{24}O_3$	
kanshone A	$C_{15}H_{22}O_2$	
chlorogenic acid	$C_{16}H_{18}O_9$	

Mechanism of Action

1. Antioxidant Action

The stress triggers oxidative stress in the brain, which is characterised by the accumulation of nitric oxide (NO) and reactive oxygen species (ROS). This oxidative stress leads to a significant elevation of Lipid peroxidation (LPO) and a depletion of the protective antioxidant enzyme, Catalase. When *Nardostachys jatamansi* extract (NJE) is administered, its potent free

radical scavenging activity, attributed to the presence of flavonoids and polyphenols, effectively reverses these destructive processes. Specifically, NJE significantly reduces lipid peroxidation (LPO) and increases or restores catalase activity in a dose-dependent manner, thereby protecting tissue from oxidative breakdown [16].

2. Anti-inflammatory Action

When the microglial cells (the resident brain macrophages) are activated by a pathogen like lipopolysaccharide (LPS), they trigger neuroinflammation by overproducing major pro-inflammatory mediators and cytokines. Specifically, active constituents isolated from the rhizomes and roots of *Nardostachys jatamansi* most notably desoxo narchinol A and narchinol B exert a potent anti neuroinflammatory effect by suppressing this cascade. In both BV2 and cultured primary microglial cells, these compounds significantly inhibit the overproduction of key pro inflammatory cytokines, including TNF alpha, IL-6 and IL-1beta. This suppression of TNF alpha, IL-6 and IL-1beta, in parallal with the dose dependant downregulation of inducible nitric oxide synthase and cyclooxygenase-2 proteins, directly deranges the pathways driving neuroinflammation, pointing to the plant's potential utility in treating neuroinflammatory and neurodegenerative disorders[17].

3. Neurotransmitter Modulation

The ethanolic extract of *Nardostachys jatamansi* exhibits significant antidepressant like activity by modulating central neurotransmitter levels through the inhibition of metabolic enzymes and direct receptor interactions

Serotonin and Dopamine: The extract significantly reduces the activities of both monoamine oxidase-A and monoamine oxidase-B enzymes in the whole brain. Because MAO regulates the metabolic degradation of monoamines, including serotonin, dopamine, and other biogenic amines, inhibiting these enzymes prevents their breakdown. This subsequently increases the concentrations and brain levels of these vital neurotransmitters, which is a primary mechanism driving the plant's antidepressant action.

GABA: *Nardostachys jatamansi* extracts act via $GABA_B$ receptor antagonism, leading to a decrease in the levels of GABA in the brain. This reduction alighns with the neurochemical

hypothesis that $GABA_B$ receptor antagonism serves as an effective pathway for generating antidepressant activity[18].

4. HPA axis modulation

Nardostachys jatamansi extract (NJE) alleviates the behavioural symptoms of Chronic fatigue syndrome (CFS) by modulating the hypothalamic-pituitary-adrenal (HPA) axis. Sufferers of CFS frequently exhibit significant reductions or intriguing abnormalities in HPA axis function. In a rat model of forced swimming, induced chronic fatigue, animals developed severe depression and anxiety over a period of 21 days. Oral administration of NJE (at doses of 200mg/kg and 500 mg/kg) significantly countered these effects by decreasing immobility times and restoring struggling and climbing behaviours. Because these behavioural improvements closely mirrored those produced by the standard anti-stress agent *Panax ginseng*, the researchers concluded that *Nardostachys jatamansi* exerts its protective, antistress effects by directly altering and regulating HPA axis function[19].

Experimental Evidence

Table 7: Summary of Experimental Studies

Article	Experimental model	Extract	Dose	Main findings
Mude et al.,2020[20]	Animals: Albino rats Behavioural tests: To evaluate antidepressant activity- Forced Swim test(FST) and Tail suspension test(TST). to evaluate anxiolytic activity- Elevated plus maze test.	Ethanolic root extract	150 mg/kg and 300 mg/kg body weight	Antidepressant activity: in FST, immobility decreased by 62.19%(at 150 mg/kg) and 48.78%(at 300mg/kg). In TST, immobility decreased by 85.47%(at 150 mg/kg) and 67.90%(at 300 mg/kg). Anxiolytic activity: Increased the preference percentage for the open arms to 113.6% (at 150 mg/kg) and 158.3%(at 300 mg/kg).
Dhingra and Goyal,2	Animals: Swiss Albino mice	Ethanolic rhizome extract	100mg/kg, 200mg/kg, and	Antidepressant like activity: All doses significantly reduced immobility times in both the TST and FST, with the 200 mg/kg

008[18]	Behavioural tests: TST and FST Biochemical models: Whole brain mitochondrial fractions evaluated spectrophotometrically to measure Monoamine Oxidase-A(MAO-A) and Monoamine Oxidase-B(MAO-B) enzyme activities. Baclofen-induced reversal model: Pretreatment with baclofen($GABA_B$ receptor agonist) tested in the TST to evaluate the involvement of the GABAergic system.		400mg/kg. Comparative doses: Imipramine(15mg/kg), Sertaline(20 mg/kg), and baclofen (10 mg/kg)	dose exhibiting the most potent effect. The efficacy was comparable to the standard drugs Imipramine and sertraline. MAO inhibition: The 200 mg/kg dose significantly decreased whole brain MAO-A and MAO-B enzyme activities compared to the control, thereby preventing monoamine degradation and increasing monoamine levels. GABAergic interaction: Pretreatment with baclofen significantly reversed the reduction in immobility time achieved by the 200mg/kg extract in the TST, suggesting that the extract also works via $GABA_B$ receptor interaction.
Razack et al., 2018[21]	Animals: Swiss albino mice Behavioural analysis: Elevated plus maze test(EPM), Light dark Box (LDB), Open field test(OFT) and Vogel's conflict Test(VCT) Biochemical models: GABA Quantification, Monoamine profiling(Serotonin, Dopamine and Norepinephrine) and AChE Assay	Hydroethanolic rhizome extract	250 mg/kg for 3,7 and 14 days	Behavioural analysis: Significantly increased open arm entries, time spent in open arms, and duration spent in the lit zone, showing potent anti-anxiety effects. Neurochemical Mechanism: Neurotransmitter elevation of GABA and monoamines.

Clinical Evidence

Clinical study primarily evaluates *Nardostachys jatamansi* for the management of *Anidra*(primary insomnia), highlighting depression and anxiety as major contributing etiological factors in the study's patient cohort. Specifically, baseline observations of the

registered insomnia patients revealed that excessive thinking(*Chinta*) was present in 85.29% of cases, anxiety(*Udvega*) was reported in 64.71%, and depression (*Vishada*) was noted in 29.41%. Following one month of oral administration of *Jatamansi Churna* (4g three times a day with milk), patients experienced highly significant clinical improvements($P<0.001$) in sleep initiation(61.34%), sleep duration (48.25%), and a reduction in disturbed sleep (53.08%). *Jatamansi* provided statistically significant relief in associated psychological and physical distresses, such as a 56% improvement in mental fatigue(*Klama*) and a 45.11% improvement in physical fatigue(*Shrama*). These findings indicate that *Jatamansi* helps mitigate the secondary symptoms and underlying stress-related disruptions associated with anxiety and depression[22].

Safety and Toxicity

Nardostachys jatamansi is entirely safe and devoid of significant toxicity risks. Meticulous evaluation of the crude sample using World Health Organisation (WHO) and Ayurvedic Pharmacopoeia of India (API) guidelines demonstrated that all safety parameters were well within permissible legal boundaries. Specifically, heavy metal analysis revealed that cadmium, mercury, and arsenic were entirely undetectable. At the same time, lead levels (6.9 mg/kg) remained safe and within the acceptable threshold of not more than 10 mg/kg. Additionally, the study noted that highly carcinogenic fungal mycotoxins, such as aflatoxins(B_1, B_2, G_1, and G_2), as well as harmful pesticide residues, were completely undetectable. Finally, the total bacterial, yeast, and mould counts were well below the mandated limits, and specific hazardous pathogens such as Escherichia coli and Salmonella were absent. Consequently, the researchers concluded that *Nardostachys jatamansi* carries no significant risk of toxicity from environmental or agricultural contaminants when prepared for consumption[23].

Conclusion

Ayurvedic descriptions of *Nardostachys jatamansi* as a *Medhya* and *Manasika Rogahara* drug are increasingly supported by experimental and clinical evidence. Antioxidant, anti-inflammatory, neurotransmitter modulating, and neuroendocrine effects provide plausible

mechanisms for its antidepressant and anxiolytic actions. However, larger standardised clinical trials are needed to establish its role in evidence-based psychiatric practise.

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