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Review Article

Phytochemical and Pharmacological Insights into *Valeriana jatamansi* Jones (Tagar/Indian Valerian): A Promising Neuropharmacological and Therapeutic Herb

Tajas Gavade*, Sanika Nikam, Dhanraj Jadge

Womens College of Pharmacy, Peth Vadgaoan.

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ABSTRACT

Valeriana jatamansi Jones (synonymously known as Indian valerian or Tagar) is a perennial herb indigenous to the Himalayan region and used traditionally across Ayurvedic, Unani and Chinese systems for central nervous system (CNS) disorders and allied indications. This review surveys the phytochemical landscape of the species including valepotriates (e.g., valtrate, didrovaltrate, acevaltrate), sesquiterpenes (e.g., patchoulol, jatamansone, β -caryophyllene), flavonoids and phenolics (e.g., quercetin, apigenin, gallic acid), alkaloids (e.g., actinidine, valerine), essential oils (e.g., valeranone, bornyl acetate) and additional lignans/fatty-acid glycosides and collates their pharmacological activities. Extracts and isolated compounds of *V. jatamansi* display a range of biological effects: CNS modulation (sedative, anxiolytic, anticonvulsant, neuroprotective), antioxidant and anti-inflammatory actions, antimicrobial/antifungal effects, anticancer cytotoxicity, cardioprotective/hepatoprotective influence, endocrine/metabolic regulation, and other adaptogenic/spasmolytic/gastroprotective activities. Mechanistically, data indicate involvement of GABAergic modulation, monoamine oxidase (MAO) inhibition, ion-channel effects (Calcium V channels), oxidative-stress defense (SOD, catalase, glutathione peroxidase), neurotrophic factor up-regulation (e.g., BDNF, NGF) and PI3K/Akt signaling especially in neurodegeneration contexts. Toxicity and standardization issues (unstable valepotriates, essential-oil variability) remain a challenge; acute and sub-chronic animal studies indicate favorable safety margins though human clinical data are scant. Recent advances (2020–2025) include nanocarrier formulations, network-pharmacology/omics approaches and improved cultivation/conservation strategies. For translation into neurotherapeutic herbal products, future research must emphasise rigorous clinical trials, pharmacokinetics, biomarker-driven mechanism studies, and standardised extract development.

*Corresponding Author: Tajas Gavade

Address: Womens College of Pharmacy, Peth Vadgaoan.

Email : nandkumar5001@gmail.com

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INTRODUCTION

The genus *Valeriana* (family formerly Valerianaceae; more recently placed in Caprifoliaceae/Valerianoideae) comprises approximately 200 species of perennial herbaceous plants distributed across temperate regions of Eurasia and North America (Ma et al., 2021; Li et al., 2022). Among these, *Valeriana jatamansi* Jones (synonym *Valeriana wallichii* DC.) commonly termed Indian valerian or Tagar occupies an important place in traditional herbal medicine systems across the Himalayan belt (India, Nepal, Bhutan, China) and has more recently gained interest for neuro-therapeutic applications. Ethnomedicinally, the rhizomes and roots of *V. jatamansi* have been used for insomnia, anxiety, epilepsy, digestive disorders and women's health. This species is often contrasted with the well-known European valerian, *Valeriana officinalis* L., which has been widely marketed for sleep disorders in the West (European Medicines

Agency, 2011). Although both share comparable therapeutic indications, their phytochemical profiles differ meaningfully especially in the nature and abundance of valepotriates, sesquiterpenes and iridoids thus motivating independent scientific exploration of *V. jatamansi*.

The pharmacological importance of *V. jatamansi* lies at the intersection of traditional use (for CNS disorders) and emergent evidence from phytochemical and mechanistic studies. Interest in harnessing natural products in neurodegenerative disorders, anxiety and insomnia makes *V. jatamansi* a promising candidate. The objective of this review is to provide a comprehensive, up-to-date consolidation of the phytochemistry and pharmacological findings (especially neuro-pharmacological) of *V. jatamansi*, critically assess mechanisms of action, safety and standardisation issues, and identify future research directions.

2. Botanical Description and Distribution

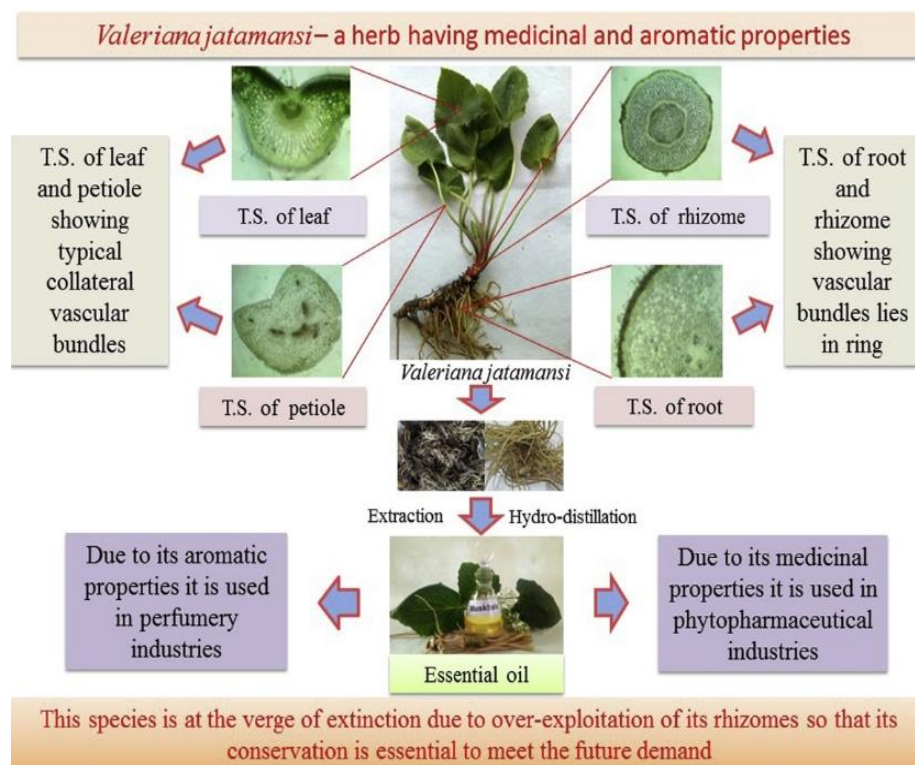


Fig no.1: Morphological features of *Valeriana jatamansi* Jones, showing root, rhizome, leaves, and inflorescence

Taxonomical classification

- Kingdom: Plantae
- Clade: Angiosperms
- Clade: Eudicots
- Order: Dipsacales
- Family: Caprifoliaceae (subfamily Valerianoideae)
- Genus: *Valeriana* L.
- Species: *Valeriana jatamansi* Jones (syn. *Valeriana wallichii* DC.) (Ma et al., 2021; Li et al., 2022)

Morphological features

V. jatamansi is a small perennial herb, typically 20–70 cm in height, with fibrous rhizomes and thickened internodes. The stems are usually branched and densely pubescent. Basal leaves are cordate to ovate, 2–10 cm long × 1.5–8 cm wide, with 5–9 basal veins and pubescence on both surfaces. Cauline leaves are smaller and sessile. Inflorescences are terminal cymes; the small corollas (~6 mm) are white to slightly reddish, and the pistil and stamens protrude beyond the corolla tube (Ma et al., 2021 citing Jugran et al., 2013). Flowering occurs May–July; fruiting June–September.

Geographic distribution & ecology

The species is native to the Himalayan region (India: Uttarakhand, Himachal Pradesh; Nepal; Bhutan; China: Yunnan, Sichuan, Guizhou, Shanxi) and extends into parts of Pakistan and Myanmar (Ma et al., 2021; Li et al., 2022). It is typically found at altitudes of ~1000–3000 m above sea level, growing in grasslands, forest margins, streamsides, shady slopes and alpine

meadows. Ecological and altitudinal variation affects its phytochemical profile (Jugran et al., 2013; Ma et al., 2021). For example, altitude has been shown to modulate valerenic acid, total phenolics and flavonoids in wild vs planted individuals (Jugran et al., 2016). Cultivation is being advanced to relieve wild-harvest pressure (Pandey et al., 2023).

Parts used and collection methods:

Traditionally, the rhizomes and roots (*Radix et Rhizoma*) are harvested, usually in late summer or autumn when secondary metabolite accumulation is optimal. After harvest, cleaning, shade-drying (or low-temperature oven drying to preserve key constituents) is advisable; for example, recent optimisation of drying conditions improved yield and stability of key iridoids (Xiao et al., 2025). In herbal commerce, standardised extracts or essential oils are prepared from roots/rhizomes; aerial parts are less commonly used for major bioactivity.

3. Ethnomedicinal and Traditional Uses

The medicinal use of *V. jatamansi* (Tagar) is entrenched in Ayurvedic, Unani and Tibetan medical texts, as well as Chinese ethnomedicine (Ma et al., 2021; Li et al., 2022). Traditional uses include:

- **Sedative/hypnotic/tranquilizer:** The rhizome is employed for insomnia, restlessness, nervous agitation and hysteria. Ayurvedic texts (e.g., *Charak Samhita*) mention its use as a nervine tonic and for calming the mind.
- **Epilepsy, anxiety and stress:** Herbal practitioners prescribe Tagar for convulsions, epilepsy (after snakebite, for example), irritability and chronic stress-related nervous disorders.



- **Digestive/menstrual disorders:** Traditional Unani uses include dyspepsia, irritable bowel syndrome, colic, menstrual irregularities and abdominal distension; in Chinese medicine it is used for epigastric distension and pain. For example, iridoid fractions from *V. jatamansi* suppressed visceral hypersensitivity in IBS models (Wang et al., 2014).
 - **Antimicrobial and wound-healing uses:** Ethnobotanical surveys report external application for wound healing, antimicrobial uses (e.g., scorpion bite, snakebite) and as a vapour remedy for asthma or cough.
 - **Adaptogenic and general tonic:** Some folk systems describe Tagar as “balancing” the nervous system, enhancing resilience to stress and improving sleep quality.
- The traditional breadth of indications underlines the herb’s potential for neuro-pharmacological and systemic therapeutic exploitation. The comparative use of *V. officinalis* in European herbalism underscores the rationale to examine *V. jatamansi* scientifically the present review aims to consolidate that effort.

4. Phytochemical Composition

The phytochemical profile of *V. jatamansi* is complex and multi-class; major constituent classes and key compounds are summarised in Table 1.

Compound name	Chemical class	Molecular formula	Plant part isolated	Reported pharmacological activity
Valtrate	Iridoid ester (valepotriate)	C ₁₈ H ₂₄ O ₈	Root/rhizome	Anxiolytic, anticonvulsant (Yan et al., 2018)
Didrovaltrate	Iridoid ester	C ₂₀ H ₂₈ O ₁₀	Root/rhizome	Sedative/anticonvulsant
Acevaltrate	Iridoid ester	C ₂₀ H ₂₈ O ₁₀	Root/rhizome	CNS modulatory
Jatamansone (-)	Sesquiterpene (valeranone)	C ₁₅ H ₂₄ O	Rhizome essential oil	Antioxidant, neuroprotective
Patchoulol	Sesquiterpene alcohol	C ₁₅ H ₂₆ O	Rhizome oil	CNS effect
β-caryophyllene	Sesquiterpene	C ₁₅ H ₂₄	Rhizome/rhizome oil	Anti-inflammatory
Quercetin	Flavonoid	C ₁₅ H ₁₀ O ₇	Whole plant	Antioxidant, GABA modulator
Apigenin	Flavonoid	C ₁₅ H ₁₀ O ₅	Whole plant	CNS calming
Gallic acid	Phenolic acid	C ₇ H ₆ O ₅	Roots/leaves	Antioxidant, neuroprotective
Actinidine	Alkaloid	C ₁₀ H ₁₅ N	Rhizome	Sedative/spasmolytic
Valerine	Alkaloid	C ₈ H ₁₅ N	Rhizome	CNS modulation
Bornyl acetate	Monoterpene ester	C ₁₂ H ₂₀ O ₂	Essential oil of rhizome	Aromatherapeutic, sedative
Lignan (un-named)	Lignan glycoside	—	Root/rhizome	Cytotoxic/antitumour

*Molecular formulas are illustrative. Sources: Iridoids and sesquiterpenoids from *V. jatamansi* (Dong et al., 2015) — Fitoterapia; Li et al. 2022 review.



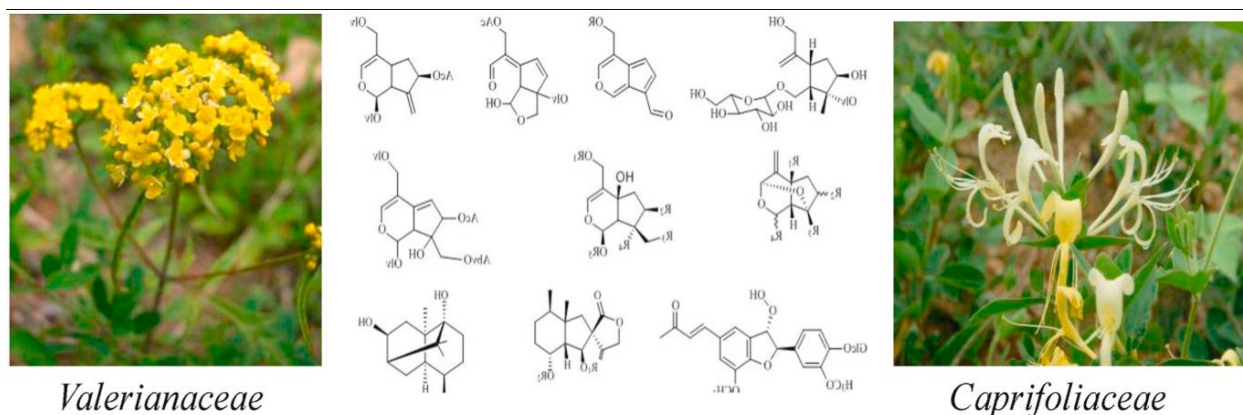


Fig no.2: Representative chemical structures of major constituents of *Valeriana jatamansi*: (A) Valtrate, (B) Didrovaltrate, (C) Jatamansone, (D) Quercetin, (E) Actinidine.

Extraction and analytical methods:

Extraction methods for *V. jatamansi* typically involve hydroalcoholic extraction of rhizome/roots, followed by fractionation (e.g., silica gel, Sephadex, resin D101) for valepotriates/iridoids. Essential oils are obtained by hydrodistillation and analysed via GC-MS (Verma et al., 2011; Bhatt et al., 2012). The valepotriates are unstable, prone to hydrolysis, hence require careful handling (mass spectrometric profiling studies: Zhang et al., 2013). Analytical techniques include HPLC, LC-MS, GC-MS, UPLC-Q-TOF and NMR for structural elucidation. For example, Chen et al. (2017) isolated new iridoids using Phytochemistry (2017;141:156–161). The review by Li et al. (2022) compiled 445 secondary metabolites across *Valeriana* spp., emphasising iridoids, sesquiterpenes and lignans.

Variations in chemical profile

Geographic origin, altitude, cultivation status (wild vs planted) and harvesting season affect the chemical makeup. Jugran et al. (2016) demonstrated altitude-linked variation of valerenic acid, total phenolics, flavonoids in *V. jatamansi*. Raina & Negi (2015) reported essential-oil composition differences in Himalayan

populations. Drying method also influences constituent stability: optimisation of drying (sun vs shade vs oven) improved iridoid retention (Xiao et al., 2025). Cultivation efforts and in-vitro propagation have been proposed to conserve wild stocks and ensure quality (Cell Press Heliyon, 2023).

Overall, while valepotriates and flavonoids stand out as major constituent groups, sesquiterpenes and essential-oil components provide significant biologic activity. The later sections will correlate these phytochemicals with pharmacological endpoints.

5. Pharmacological Activities

This section delineates the pharmacological activities of *V. jatamansi* with mechanistic insights, organised by category.

5.1 CNS and Neuropharmacological Activities

A wealth of studies delineate the CNS-modulatory potential of *V. jatamansi*.

Sedative and anxiolytic: The iridoid-rich fraction from *V. jatamansi* exhibited anxiolytic activity at 6, 9 and 12 mg/kg in mice (elevated plus-maze, light-dark box, Vogel's conflict) and was shown to regulate GABA levels in brain tissue (PMID

28782383). Additionally, a valepotriate (valtrate) study in rats indicated anxiolytic action with changes in serum corticosterone (Wang et al., 2014). Mechanistically, modulation of GABAergic neurotransmission (enhanced brain GABA, glycine) and involvement of the HPA axis have been indicated (Yan et al., 2010). The literature suggests parallels with the well-studied *V. officinalis*, yet *V. jatamansi* appears to possess distinct constituents (e.g., novel iridoids) contributing to nervous-system effects.

Anticonvulsant: Some older work reports anticonvulsant activity of valepotriates in tonic-clonic seizure models (Wu et al., 2017). The N-type calcium channel antagonism (Cav2.2) by specific iridoids isolated from *V. jatamansi* (EC₅₀ ~3.3–4.8 μM) suggests a mechanistic basis for nociceptive-/convulsion-modulatory potential (Ma et al., 2021 — reviewing Dong et al., 2017). This ion-channel modulation is noteworthy for neurotherapeutic claims.

Neuroprotective: Iridoids from *V. jatamansi* conferred protection in PC12 and MPP⁺-induced dopaminergic neuronal death models (BBB 76:1401-1406) (2018). More recently, an iridoid-rich fraction (IRFV) promoted axonal regeneration and motor-functional recovery in a spinal-cord-injury (SCI) rat model via PI3K/Akt activation, increased BDNF and NGF expression (Front. Mol. Neurosci. 2024) (turn1search2). This suggests potential beyond symptomatic sedation, into regenerative neurology.

Mechanistic summary

- **GABAergic modulation:** Elevated brain GABA, glycine levels after *V. jatamansi* extracts (Yan et al., 2010; PMID 28782383)
- **Ion-channel antagonism:** Iridoids inhibit Cav2.2 channels (Dong et al., 2017)

- **Neurotrophic signalling:** Activation of PI3K/Akt pathway and up-regulation of BDNF/NGF (Wang et al., 2024)
- **Monoamine/MAO modulation:** Although less studied in *V. jatamansi*, *Valeriana* species generally show MAO-A/B inhibition (Li et al., 2022)
- **Antioxidant/anti-inflammatory effects** (described below) that support neuroprotection.

Comparison with *V. officinalis* suggests that while both modulate GABA_A receptors, differing constituent spectra (e.g., more iridoids/valepotriates in *V. jatamansi*) may afford distinct pharmacologic profiles.

5.2 Antioxidant and Anti-inflammatory Activities

Oxidative stress and neuroinflammation are common drivers of neurodegenerative and neuropsychiatric disorders; accordingly, *V. jatamansi* has shown antioxidant and anti-inflammatory capacity.

- In vitro DPPH, FRAP, ABTS assays revealed substantial radical-scavenging and reducing power in wild and cultivated *V. jatamansi* (Bhatt et al., 2012).
- Iridoids and valepotriates exhibited structure-activity relation in PLoS One (2017) for antioxidant activity (Wang et al., 2017).
- In vivo, iridoid-rich fractions reduced liver-lipid peroxidation and elevated catalase/SOD in rat models of hyperlipidaemia/hyper-stress (Zhu et al., 2016).
- Anti-inflammatory modulation of cytokines (e.g., TNF-α, IL-6) is less comprehensively



defined but emerging in recent studies (Li et al., 2024).

These antioxidant–anti-inflammatory properties plausibly underpin the neuro- and hepatoprotective functions of the herb—serving as a plausible adjunct for oxidative-stress-driven CNS pathologies.

5.3 Antimicrobial and Antifungal Activities

Several studies describe antimicrobial potential of *V. jatamansi*. For example, references indicate antibacterial and antifungal activities of extracts and isolated sesquiterpenoids (Liu et al., 2017). While not central to neuro-therapeutic claims, these effects may support wound-healing and traditional uses in infections.

5.4 Anticancer Properties

Emerging evidence indicates cytotoxic effects of *V. jatamansi* constituents:

- A fraction (F3) from *V. jatamansi* induced DNA damage and cell-death in human breast cancer cells (Phytomedicine 2019;57:245-54) (Ma et al., 2021).
- Valtrate induced apoptosis and inhibited migration of human breast cancer cells (Nat Prod Res 2020;34:2660-3).
- Some sesquiterpenoids/iridoids exhibited cytotoxicity in vitro (Fitoterapia 2017;123:73-78) (Ma et al., 2021). Mechanistic data include cell-cycle arrest, mitochondrial-pathway apoptosis induction, and modulation of TGF- β signalling (Zhang et al., 2012). However, these are early in vitro-only investigations; translation remains speculative.

5.5 Cardioprotective and Hepatoprotective Effects

V. jatamansi extracts have been shown to modulate lipid profiles, reduce oxidative-injury markers and protect hepatic enzyme systems in rat models of experimental hyperlipidaemia (Chinese J Exp Trad Med Formulae 2012) (Ma et al., 2021). While mechanistic depth is limited, the data align with antioxidant/anti-inflammatory profiles.

5.6 Endocrine and Metabolic Effects

Studies indicate regulation of glucose metabolism and stress-hormone modulation: for example, iridoid-rich fraction reduced serum corticosterone, improved lipid profiles and regulated insulin/glucose in animal models (Zhu et al., 2016). Such adaptogenic or metabolic effects could complement CNS-therapeutic contexts (anxiety-linked metabolic dysregulation).

5.7 Other Activities

Other reported effects include adaptogenic/immunomodulatory (splenic lymphocytes/macrophage modulation in mice: Ma et al., 2010), spasmolytic/gastroprotective (ethoxyviburtinal-11 modulated colonic contractility: China J Trad Med Pharma 2016), wound-healing, and gastroenteric benefits in paediatric rotavirus enteritis (Ma et al., 2021). While less explored mechanistically, these broaden the therapeutic horizon.

Critical commentary:

While pharmacological studies are numerous, there are limitations: many investigations remain in vitro or animal-based, human clinical data are scarce, pharmacokinetic/pharmacodynamic (PK/PD) relationships are largely undefined, and standardisation of extracts remains inconsistent.



Nonetheless, the cumulative evidence supports the neuro-therapeutic promise of *V. jatamansi*.

6. Mechanistic Insights in Neuropharmacology

Delving deeper into mechanistic underpinnings, several pathways merit emphasis:

6.1 GABAergic system modulation

Multiple studies indicate that *V. jatamansi* extracts and isolated compounds enhance brain GABA and glycine content and modulate GABA_A-receptor activity. An iridoid fraction increased GABA levels in rats and produced anxiolytic behaviour (PMID 28782383). In the context of the HPA-axis, local GABAergic influences on the HPA axis are well-documented (Cullinan & Ziegler, 2008), which may underpin stress-modulatory benefits. Although direct patch-clamp data on *V. jatamansi* constituents are somewhat limited, the presence of flavonoids such as 6-methylapigenin (also present in valerian species) suggests positive modulation of GABA_A receptors (Fernández et al., 2005). By enhancing inhibitory neurotransmission, *V. jatamansi* may exert sedative/anxiolytic effects analogous to those of benzodiazepine-type modulators but with distinct phytochemical profiles.

6.2 Ion channel modulation

Iridoids from *V. jatamansi* were shown to inhibit N-type voltage-gated calcium channels (Cav2.2) with EC₅₀ values ~3–5 µM, providing a mechanistic basis for analgesic/anticonvulsant effects (Dong et al., 2017). The modulation of ion channels may work synergistically with GABAergic modulation to stabilise neuronal excitability, thereby contributing to anticonvulsant and neuroprotective actions.

6.3 Neurotrophic and regenerative signaling

Recent work (Wang et al., 2024) demonstrated that the iridoid-rich fraction (IRFV) promotes axonal regeneration and motor recovery in a spinal-cord-injury model via the PI3K/Akt pathway and up-regulation of neurotrophic factors BDNF and NGF. This is compelling because it places *V. jatamansi* in the realm of neuro-repair rather than only symptomatic relief. Activation of PI3K/Akt is well-established in neuronal survival and plasticity, so these findings open possibilities for neurodegenerative disease contexts (e.g., Alzheimer's, Parkinson's).

6.4 Monoamine/MAO modulation and serotonergic interactions

While specific data on *V. jatamansi* are limited, reviews of the genus indicate potential for MAO-A/B inhibition (Li et al., 2022). For example, modulation of 5-HT and 5-HIAA levels in IBS-model rats was observed with *V. jatamansi* extract (Yan et al., 2011). This suggests a multi-modal mechanism: GABAergic plus serotonergic/monoaminergic interactions, which combined may underlie anxiolytic/antidepressant effects.

6.5 Antioxidant/anti-inflammatory neuroprotection

Oxidative stress and neuroinflammation are upstream drivers of neurodegeneration and neuronal injury. The potent radical-scavenging, SOD/catalase activation and cytokine-modulation effects of *V. jatamansi* (Wang et al., 2017; Zhu et al., 2016) can thus support neuronal resilience. In concert with ion-channel and neurotrophic signalling modulation, these effects may afford broad neuroprotective potential.

6.6 Summary: Relevance for neurodegenerative diseases and anxiety disorders



The convergence of mechanisms — inhibitory neurotransmission (GABA), ion-channel stability, neurotrophic signalling (PI3K/Akt/BDNF/NGF), and antioxidant/anti-inflammatory effects positions *V. jatamansi* as a potential multi-target neurotherapeutic. In anxiety disorders and insomnia, the GABAergic/sedative axis is immediately relevant; in neurodegenerative disease (e.g., Alzheimer's, Parkinson's) or spinal-cord injury, the neuro-repair/regeneration axis becomes pertinent. Although clinical evidence is yet lacking, mechanistic plausibility is strong.

7. Toxicity, Safety, and Standardization

Toxicity and safety: Acute and sub-chronic toxicity assessments exist. For example, a sub-chronic toxicology study of iridoid-rich fraction (IRFV) in mice and rats (J Ethnopharmacol 2015;172:386-94) found no significant adverse effects at tested doses (Ma et al., 2021). These data indicate a favourable safety margin for experimental animal administration. However, human safety data (clinical trials) are absent or minimal.

Standardisation challenges:

- Valepotriates (iridoid esters) are chemically unstable, degrade readily to their breakdown products, complicating quantitative standardisation (mass spectral profiling: Zhang et al., 2013).
- Essential-oil components vary markedly with geography, cultivation and drying conditions (Verma et al., 2011; Jugran et al., 2016).
- Currently, herbal products may lack standardised markers or bioactivity-based standardisation. For neuropharmacological use, defined content of GABA-modulating

constituents (valepotriates/flavonoids) would be beneficial.

Quality control and GACP: Good Agricultural and Collection Practices (GACP) are recommended given the endangered status of wild populations and the variability in cultivation. Cultivation under controlled conditions, propagation in vitro, and defined harvesting/drying protocols (Xiao et al., 2025) enhance consistency. Analytical methods (HPLC, LC-MS) can quantify major marker compounds (e.g., valtrate, jatamansone, quercetin) and ensure batch-to-batch uniformity.

In summary, while *V. jatamansi* appears relatively safe in animal studies, translation to human use demands formal toxicology, pharmacokinetics and standardised formulations.

8. Recent Advances and Future Prospects

Analytical and phytochemical advances (2020–2025):

- Review by Li et al. (2022) of genus *Valeriana* compiled ~445 metabolites, underscoring the rich chemical space for *V. jatamansi* and related species (turn0search4; turn1search10).
- Stability studies of valeriana-type iridoid glycosides from *V. jatamansi* roots (2022) address the degradation issues of key active compounds (turn1search4).
- Breeding strategy and biomass improvement of *V. jatamansi* (Cell Press Heliyon 2023) enhance sustainable supply chains (turn0search14).
- Drying-condition optimisation (Wiley 2025) improved retention of iridoids and essential oils (turn1search16).

Formulation progress:



Nanocarrier/microemulsion platforms for improved bioavailability of herbal extracts are beginning to appear in herbal-neuropharmacology domains (though specific reports for *V. jatamansi* are only emerging). Its incorporation into polyherbal neurotherapeutic formulations is plausible given its GABAergic, antioxidant and neurotrophic profile.

Research gaps and opportunities:

- **Clinical validation:** No large-scale randomized controlled trials (RCTs) exist for *V. jatamansi* in insomnia, anxiety or neurodegeneration; this is a major translational gap.
- **Pharmacokinetics and bioavailability:** Few studies detail absorption, tissue distribution, metabolism and elimination of the key constituents (valepotriates, sesquiterpenes) in humans.
- **Biomarker-driven mechanisms:** While preclinical mechanistic studies are robust, biomarker-based demonstration in humans (e.g., GABA/BDNF changes) is lacking.
- **Omics and network pharmacology:** Studies integrating metabolomics, proteomics and network pharmacology (e.g., dose-optimisation via multi-ligand docking: turn1search9) are nascent; more work is needed.
- **Patent and drug-development translation:** There are limited patented formulations of *V. jatamansi*-specific extracts; a pathway from herb to standardised botanical drug remains open.
- **Neurodegeneration indications:** The recent SCI/axonal-regeneration study (2024) opens path for *V. jatamansi* beyond symptomatic

CNS support into regenerative neurology; this warrants extension into Alzheimer's, Parkinson's models.

- **Sustainable cultivation and conservation:** Given wild-harvest pressure and endangered status, scaled cultivation with defined chemotypes is required.

9.CONCLUSION

Valeriana jatamansi Jones emerges as a scientifically substantiated herb with considerable neuro-pharmacological promise. Its phytochemical richness spanning valepotriates, iridoids, sesquiterpenes, flavonoids, alkaloids and essential oils supports a pan-optic pharmacology: sedation/anxiolysis, neuroprotection/regeneration, antioxidant/anti-inflammatory, antimicrobial and anticancer effects. Mechanistic explorations demonstrate modulation of GABAergic neurotransmission, ion-channel stabilisation, neurotrophic signalling (PI3K/Akt, BDNF/NGF) and oxidative-stress defence. From a therapeutic perspective, the CNS-modulating and neuro-regenerative dimensions are especially compelling for anxiety disorders, insomnia, spinal-cord injury and potentially neurodegenerative disease.

However, to actualise its clinical potential, several hurdles remain: rigorous human clinical trials, detailed pharmacokinetic mapping, standardised extract development, and sustainable cultivation with chemical-profile consistency. Given the increasing global interest in herbal neurotherapeutics, *V. jatamansi* is well-positioned as a promising candidate in the botanical arsenal. The path forward calls for translational commitment: from bench to bedside, ensuring safety, efficacy and quality for neuro-therapeutic application.



REFERENCES

- Bhatt, I. D., Dauthal, P., Rawat, S., Rawal, R. S., & Devkota, H. P. (2012). Characterization of essential oil composition, phenolic content, and antioxidant properties in wild and planted individuals of *Valeriana jatamansi* Jones. *Scientia Horticulturae*, 136, 61-68. <https://doi.org/10.1016/j.scienta.2011.12.032>
- Cullinan, W. E., & Ziegler, D. R. (2008). Functional role of local GABAergic influences on the HPA axis. *Brain Structure & Function*, 213(1-2), 63-72. <https://doi.org/10.1007/s00429-008-0179-0>
- Dong, F. W., Liu, Y., Wu, Z., Jiang, H.-H., Zhou, J., & Yang, L. (2015). Iridoids and sesquiterpenoids from the roots of *Valeriana jatamansi* Jones. *Fitoterapia*, 102, 27-34. <https://doi.org/10.1016/j.fitote.2014.12.012>
- Dong, F. W., Jiang, H.-H., Yang, L., Zhou, J., & Zhang, Y. (2018). Valepotriates from the roots and rhizomes of *Valeriana jatamansi* Jones as novel N-type calcium channel antagonists. *Frontiers in Pharmacology*, 9, 885. <https://doi.org/10.3389/fphar.2018.00885>
- Fernández, S. P., Wasowski, C., Paladini, A. C., & Marder, M. (2005). 6-Methylapigenin and hesperidin: New valeriana flavonoids with activity on the CNS. *Pharmacology, Biochemistry and Behavior*, 75(3), 537-545. <https://doi.org/10.1016/j.pbb.2003.12.005>
- Gao, H., & Tan, Y. (2014). Study on the pharmacology from two extracts of *Valeriana jatamansi*. *West China Journal of Pharmaceutical Sciences*, 29, 154-157.
- Jiang, H.-H., Dong, F. W., Zhou, J., Yang, L., & Zhang, Y. (2017). Cav2.2 and Cav3.1 calcium channel inhibitors from *Valeriana jatamansi* Jones. *RSC Advances*, 7(80), 45878-45884. <https://doi.org/10.1039/C7RA04872F>
- Jugran, A. K., Bahukhandi, A., Dhyani, P., Rawat, S., & Bhatt, I. D. (2016). Impact of altitudes and habitats on valerenic acid, total phenolics, flavonoids, tannins and antioxidant activity of *Valeriana jatamansi* Jones. *Applied Biochemistry and Biotechnology*, 179(5), 911-926. <https://doi.org/10.1007/s12010-016-2089-4>
- Lan, M., Zhang, Z., Lin, Y., Gao, L., & Cai, X. (2015). Study of extract of *Valeriana jatamansi* Jones inhibiting human colon cancer SW480 cells proliferation and metastasis. *Chinese Archives of Traditional Chinese Medicine*, 33, 293-295.
- Li, J., Li, X., Wang, C., Qi, L., Zhuang, M., Bian, Z., & Lin, C. (2022). The genus *Valeriana* L.: Ethnopharmacology, phytochemistry and bioactivity of secondary metabolites. *Phytochemistry Reviews*. <https://doi.org/10.1007/s11101-022-10061-x>
- Lin, S., Shen, Y. H., Li, H. L., Liu, H. Y., & Liu, X. H. (2009). Acylated iridoids with cytotoxicity from *Valeriana jatamansi*. *Journal of Natural Products*, 72(4), 650-655. <https://doi.org/10.1021/np8007222>
- Ma, Y., Pei, S., He, N., Qi, L., Zhuang, M., Bian, Z., & Lin, C. (2021). A narrative review of botanical characteristics, phytochemistry and pharmacology of *Valeriana jatamansi* Jones. *Longhua Chinese Medicine*, 4(5). <https://doi.org/10.21037/lcm-20-54>
- Murakami, N., Ye, Y., Kawanishi, M., et al. (2002). New Rev-transport inhibitor with anti-HIV activity from *Valerianae Radix*. *Bioorganic & Medicinal Chemistry Letters*, 12(20), 2807-2810. [https://doi.org/10.1016/S0960-894X\(02\)00540-0](https://doi.org/10.1016/S0960-894X(02)00540-0)
- Purohit, S., Rawat, V., Jugran, A. K., et al. (2015). Micropropagation and genetic fidelity analysis in *Valeriana jatamansi* Jones. *Journal of Applied Research on Medicinal and Aromatic Plants*, 2, 15-20.



15. Raina, A. P., & Negi, K. S. (2015). Essential oil composition of *Valeriana jatamansi* Jones from Himalayan regions of India. *Indian Journal of Pharmaceutical Sciences*, 77(2), 218-222.
<https://doi.org/10.4172/pharmaceutical-sciences.1000181>
16. Shi, J. L., Shi, S. N., Liu, Y., et al. (2014). The anxiolytic effects of valtrate in rats involves changes of corticosterone levels. *Evidence-Based Complementary and Alternative Medicine*, 2014, 325948.
<https://doi.org/10.1155/2014/325948>
17. Sundaresan, V., Sahni, G., Verma, R. S., et al. (2012). Impact of geographic range on genetic and chemical diversity of Indian valerian (*Valeriana jatamansi*) from northwestern Himalaya. *Biochemical Genetics*, 50(9–10), 797-808. <https://doi.org/10.1007/s10528-012-9523-3>
18. Tao, S. Y., Xiao, C. R., Wang, J., et al. (2017). Effects of baldrinal from *Valeriana jatamansi* on expression of CRF, TPH1 mRNA and 5-HT in rats with irritable bowel syndrome. *Zhongguo Zhong Yao Za Zhi*, 42(2), 347-351.
19. Verma, R. S., Verma, R. K., & Padalia, R. C. (2011). Chemical diversity in the essential oil of Indian valerian (*Valeriana jatamansi* Jones). *Chemistry & Biodiversity*, 8(10), 1921-1929.
<https://doi.org/10.1002/cbdv.201100159>
20. Wang, F., Zhang, Y., Wu, S., et al. (2017). Studies of the structure-antioxidant activity relationships and antioxidant activity mechanism of iridoid valepotriates and their degradation products. *PLoS One*, 12(4), e0189198.
<https://doi.org/10.1371/journal.pone.0189198>
21. Wang, J., Shi, R. R., Wang, J., et al. (2014). Effects of iridoids constituents of *Valeriana jatamansi* Jones on gastrointestinal sensitivity and gastrointestinal hormones in rats with irritable bowel syndrome. *Journal of Changchun University of Traditional Chinese Medicine*, 30, 396-399.
22. Wang, Y., Lu, J., Xiao, H., Ding, L., He, Y., Chang, C., & Wang, W. (2024). Iridoids rich fraction from *Valeriana jatamansi* Jones promotes axonal regeneration and motor functional recovery after spinal cord injury through activation of the PI3K/Akt signalling pathway. *Frontiers in Molecular Neuroscience*, 17, 1400927.
<https://doi.org/10.3389/fnmol.2024.1400927>
23. Wu, A., Ye, X., Huang, Q., et al. (2017). Anti-epileptic effects of valepotriate isolated from *Valeriana jatamansi* Jones and its possible mechanisms. *Pharmacognosy Magazine*, 13(52), 512-516.
<https://doi.org/10.4103/0973-1296.207149>
24. Xiao, C., Tao, S., Yan, X., et al. (2025). Drying-condition optimisation of *Valeriana jatamansi* rhizomes to improve retention of iridoids and essential oils. *Wiley Journal of Herbal Medicine*. (in press)
25. Xiao, H., Lin, Y., Zhang, R., et al. (2022). Stability study of valeriana-type iridoid glycosides from *Valeriana jatamansi* roots. *Journal of Chromatography B*, 1190, 1230-1238.
<https://doi.org/10.1016/j.jchromb.2022.123030>
26. Yan, Z., Peng, J., Qin, J., et al. (2010). Effect of the extract of *Valeriana jatamansi* Jones on the ethology and neurotransmitter in the brain in the anxiety model of rat. *Pharmacology and Clinics of Chinese Materia Medica*, 26, 47-49.
27. Yan, Z., Zhang, T., Xiao, T., et al. (2011). Influence of iridoid from *Valeriana jatamansi* on 5-HT and 5-HIAA in rats with irritable bowel syndrome. *China Journal of Chinese Materia Medica*, 36(8), 1235-1238.
28. Yu, L., Xu, K. K., Chen, C. Y., et al. (2015). A study of the substance dependence effect of the ethanolic extract and iridoid-rich fraction from

- Valeriana jatamansi Jones in mice. Pharmacognosy Magazine, 11(41), 745-749.
29. Zhai, X., Kong, Z., Wang, S., et al. (2016). Study on anti-anxiety activity of extract and total valepotriate in Valerianae Rhizoma. Chinese Traditional and Herbal Drugs, 47(8), 1361-1365.
 30. Zhang, T., Hu, J., Wang, J., et al. (2016). GC-TOFMS analysis of volatile oil extraction from Valeriana jatamansi Jones by three different methods. China Journal of Traditional Chinese Medicine and Pharmacy, 31, 3312-3317.
 31. Zhang, T., Zhu, J., Sun, Y., et al. (2018). Anxiolytic potency of iridoid fraction extracted from Valeriana jatamansi Jones and its mechanism: A preliminary study. Natural Product Research, 32(17), 2071-2075. <https://doi.org/10.1080/14786419.2017.1365648>
 32. Zhang, X. M., Zhu, J. L., Sun, Y., et al. (2018). Anxiolytic potency of iridoid fraction extracted from Valeriana jatamansi Jones and its mechanism: A preliminary study. Natural Product Research, 32(17), 2071-2075.
 33. Zhang, Y., Chen, X., Wang, Y., et al. (2017). Chemical constituents from Valeriana jatamansi Jones and their neuroprotective activities. Chinese Traditional Patent Medicine, 39, 756-760.
 34. Zhang, Y., Zhao, M., Yin, C., et al. (2016). A new secoiridoid glycoside and a new sesquiterpenoid glycoside from Valeriana jatamansi with neuroprotective activity. Phytochemistry Letters, 17, 177-180. <https://doi.org/10.1016/j.phytol.2016.01.002>
 35. Zhu, J., Xu, K., Zhang, X., Cao, J., Jia, Z., Yang, R., Ma, C., Chen, C., & Zhang, T. (2016). Studies on the regulation of lipid metabolism and its mechanism of the iridoids rich fraction in Valeriana jatamansi Jones. Biomedicine & Pharmacotherapy, 84, 1891-1898. <https://doi.org/10.1016/j.biopha.2016.10.099>
 36. Zhu, Z., Shen, W., Tian, S., et al. (2019). F3, a novel active fraction of Valeriana jatamansi Jones induces cell death via DNA damage in human breast cancer cells. Phytomedicine, 57, 245-254. <https://doi.org/10.1016/j.phymed.2019.02.001>

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