



# A Review on Pharmacological Action and Therapeutic Uses of Balchar (*Nardostachys jatamansi* DC): Unani Perspective

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

*Nardostachys jatamansi* DC, commonly referred to as 'Balchar', is a perennial herb within the *Valerianaceae* family, locally known as "Jatamansi" or "Sumbul-ut-teeb". This species is indigenous to the Himalayan Mountain range, with its habitat extending across China, India, Nepal, Bhutan,

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and Myanmar, thriving at elevations between 3,000 and 5,000 meters. The roots of *Nardostachys jatamansi* are utilized in traditional Unani medicine for the treatment of various ailments, including hepatitis, inflammation, and obstructions. The genus *Nardostachys*, particularly *Nardostachys jatamansi*, is rich in phytoconstituents such as actinidine, angelicin, jatamansin, jatamansone, and jatamansinol. Extensive pharmacological research has demonstrated the plant's antilithiatic, antidiabetic, anti-inflammatory, hepatoprotective, cognitive-enhancing, cardioprotective, hypolipidemic, anticonvulsant, antidepressant, antiandrogenic, and antibacterial properties. This review aims to elucidate the therapeutic applications of *Nardostachys jatamansi*, drawing on traditional Unani medicine and contemporary scientific investigations.

**Keywords:** *Nardostachys jatamansi* DC; *Balchar*; hepatoprotective; *Sumbul-u-teebe*; Unani medicine.

## 1. INTRODUCTION

*Nardostachys Jatamansi* DC. is a tiny herbaceous species from the *Valerianaceae* family, also known as Indian nard, *balchar*, or spikenard" [1]. "It is also traded by the name 'jatamansi' in Nepal, Pakistan, and India. Bhulte, Bala-tagra, Bhutijatt, Jatalasi, Jatamashi, Kalichhad, Kukilipot, Mansi, Masi, Masijara, Pangbu, Poi, and Sumbulu are the other vernacular names used in these countries" [2]. "The name '*jatamansi*' is derived from the appearance of the rhizomes covered with rust-colored tufted fibrous remains of petioles which look like the twisted, unkempt locks of hair of a hermit. 'Jata' is a Sanskrit word meaning matted and uncombed lock of hair. It also means root" [2]. "In some Islamic tales, the powdered root of *N. jatamansi* is associated with the forbidden fruit that Adam ate in heaven. In Medieval European cuisine, *N. jatamansi* is commonly used to season foods as part of a spice blend. Hippocrates used the herb to sweeten and spice wine drinks. The plant's rhizomes are used in Ayurvedic medicine for bitter tonics, stimulants, anti-epileptic, antispasmodics, and hysteria relief" [3]. "*Nardostachys jatamansi* DC have constituted an important part of the 'havan samagri' or powdered mixture of medicinal herbs/plants, used in religious pyres of Hindus in India. There is a belief that the burning of these herbs/plants have curative properties against many diseases. This perennial, hairy, rhizomatous medicinal herb thrives on steep, damp, rocky, and undisturbed grassy slopes between 3000 and 5000m [1]. The species is native to the Himalayan Mountain range, occurring in India (the states of Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh), Nepal, Bhutan, Myanmar, southwest China, Jammu and Kashmir" [4]. "It is listed in the top 20 most traded plants in India and is largely exploited. Due to its wide range of uses in traditional medicine and excessive over-

exploitation as well as small reproductive phase and low germination rate (10-20%), it is now on the verge of extinction. Recently, the International Union of Conservation of Nature Red list of threatened species has enlisted *N. jatamansi* as a critically endangered (CR) medicinal plant. There are four binomials that are treated synonymous to the species. These are *N. chinensis* Batalin, *N. gracilis* Kitam. *N. grandiflora* DC. and *Patrinia jatamansi* D.Don. However, Webberling (1975) considered the genus *Nardostachys* to be monospecific and noticed that variability of different characters is not discontinuous as many transitional forms occur, all falling in a continuous range of variability within *N. jatamansi*. Webberling (1975) thus recognized five forms, namely *jatamansi*-type, *grandiflora*-type, *gracilis*-type, *longiflora*-type and *laxiflora*-type. It has long history of use in ethnomedicine perfume, incense and modern medicine"(1).In Unani literature, *Balchar* has been used for *Mudirr-i-Hayd* (Emmenagogue) to harmonize menstruation, *Muḥallil* (Resolvent) to disperse ailments, *Mudirr-i-Bawl* (Diuretic) to cleanse, *Kasr-i-Riyāh* (Carminative), and *Muqawwī-i-Qalb* (Cardiotonic). *Nardostachys jatamansi* contains sesquiterpenes and coumarins as its major active constituents, the principal sesquiterpene is Jatamansone or Valeranone(5).The purpose of this paper is to highlight the therapeutic applications of *Nardostachys jatamansi*, drawing on descriptions in Unani literature and scientific studies undertaken on various portions of the plant.

## 2. MATERIALS AND METHODS

In the context of Unani medicine, a comprehensive literature review was undertaken by searching all accessible classical textbooks using key terms *Sumbul-ut-teebe*, *Jatamansi*, *Balchar*, *Billilotan*. Additionally, electronic databases such as Google Scholar, ResearchGate, and PubMed were searched for

terms such as *Jatamansi*, *Balchar*. The search covered both ancient Unani terminology and botanical nomenclature. Data gathering and subsequent analysis involved thorough consideration of review articles and experimental investigations. This rigorous method sought to gather essential material from both traditional Unani sources and contemporary scientific research, resulting in a comprehensive analysis of *Nardostachys jatamansi's* therapeutic applications in the context of unani medicine.

### 3. OBSERVATIONS

#### 3.1 Geographical Distribution

The species is endemic to the Himalayan Mountain range, occurring in India (the states of Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Sikkim and Arunachal Pradesh), Nepal, Bhutan, Myanmar and southwest China [4].

#### 3.2 Botanical Description

**Leaves:** are rosy, slightly pink or blue in dense cymes.

**Colour:** reddish brown tufted fibres crowned in dark greyish rhizomes.

**Odour:** Aromatic.

**Size:** Rhizomes are 2.5 to 7.5 cm in length.

**Shape:** Elongated and cylindrical.

**Rhizome:** A transverse section of the rhizome shows a thin periderm, it can be more or less circular in outline. A large parenchymatous cortex contains starch and an endodermis containing globules of volatile oil. Within a ring of collateral vascular bundles lies large pith containing scattered groups of sclerenchymatous cells.

**Cork:** 2-5 layers of cells filled with oil granules.

**Cortex:** Cortex is broad, 7-11 layers

**Cambium ring:** Distinct and continuous

**Leaves:** Leaves develop from both rootstock and stem. Basal leaves in rosettes are 15-18 cm long and 2.5 cm wide, longitudinally veined; leaves on stem are about 7.5 cm long and 2.5 cm wide, sessile, base attenuate into petiole nearly equal to leaf blade in length, margin entire apex

obtuse. Leaves are cauline, lower ones elliptic to obviate; upper ones sessile, on lanceolate to lanceolate, sometimes serrate.

**Flowers:** "The inflorescence may have one or in rare cases 2-3 terminal capitate clusters. Flowers are pale pink or blue. Its calyx is 5-lobed; fruit, usually ciliate. Corolla purple-red, campanulate, 4-9mm, 5 lobbed; lobes broadly ovate to oblong. Stamens are nearly equal to corolla in length and are generally 4 in numbers, filaments villous. Style nearly equal to stamens in length, stigma capitate. The flowers are arranged in clusters and have many small flowers. They are bilaterally symmetrical and usually bisexual" [3].

**Fruit:** small sized about 4mm in length, covered with white hairs and crowned with dentate calyx teeth [5].

#### 3.3 Taxonomic Classification

Botanical name: *Nardostachys jatamansi* DC

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Dipsacales

Family: Valerianaceae

Genus: *Nardostachys*

Species: *Jatamansi*[6]

#### 3.4 Description in Unani Literature

Its origin spans from Gadwal to Sikkim in the Himalayas and can also be found in parts of Asia and Europe [7]. It grows to about the size of a finger, with a thickness slightly less than that of a finger, and features several rings that merge in one area. The root is somewhat hard and is used for coloring. There are two types: one black and one red. It is fragrant and therefore used in perfumes. It is also used in *Majūn*, with the black, fragrant, and soft variety being preferred. The roots are hard, the hairs remain intact, and with a little shaking, dust starts to fall off [8].

In old Unani literature, it is recommended to use fresh, with a red-black color, a strong aroma, and short hair. Distasteful and old varieties are undesirable due to their unpleasant smell.

High quality can be identified by the fragrance lingering in the mouth for a long time. From twenty-eight seers, seven and a half tolas of oil can be extracted [8].

The plant grows up to half a meter in height, with rough leaves and branches. Various fibers in the rough parts begin emerging near the root, giving it a shape resembling the jata, or hair, of a sadhu. This distinctive appearance is why it is called jatamali. The leaves are approximately three centimetres long and two and a half centimetres wide [9].

### 3.5 Vernacular Names

Arabic: Sumbul-ut-teeb

Bengali: Jatamansi

English: Muskroot, Indian Spikenard, Spikenard

Gujarati: Baalchad, Kalichad

Hindi: Balchar, Balchir, Jatamansi

Kannada: Jatamanshi, Jatamansi

Kashmiri: Bhut-jaat, Bhutijatt, Kukilipot

Malayalam: Jatamanchi, Jetamanshi, Jatamamshi

Orrisa: Jatamansi

Punjabi: Billilotan, Balchar, Chharguddi

Persian: Sumbul-utteeb

Sanskrit: Mansi, jati, jatila Jatamansi, Janani Jatamansi, Sukshmapatri, Bhutajata,

Tamil: Jatamanji, Jatamanshi

Telegu: Jatamanji, Jatamanshi, Jatamsi

Urdu: Sumbul-ut-teeb, Balchar[6,10]

### 3.6 Wajāh Tasmiyāh (Nomenclature)

The plant grows up to half a meter in height, with rough leaves and branches. Various fibers emerge from the rough parts near the root, giving it a shape resembling the jata, or hair, of a sadhu, which is why it is called jatamansi[11].

### 3.7 Ajza-i- Musta'mala (Parts Used)

Root and Branch[12][9]

### 3.8 Mijaz (Temperament)

Hot and Dry 2<sup>nd</sup>[11,11,8,12]

Hot 1<sup>st</sup> and Dry 2<sup>nd</sup>[7,11,9,13]

Some physicians describe it as hot and dry of 3<sup>rd</sup> degree[8].

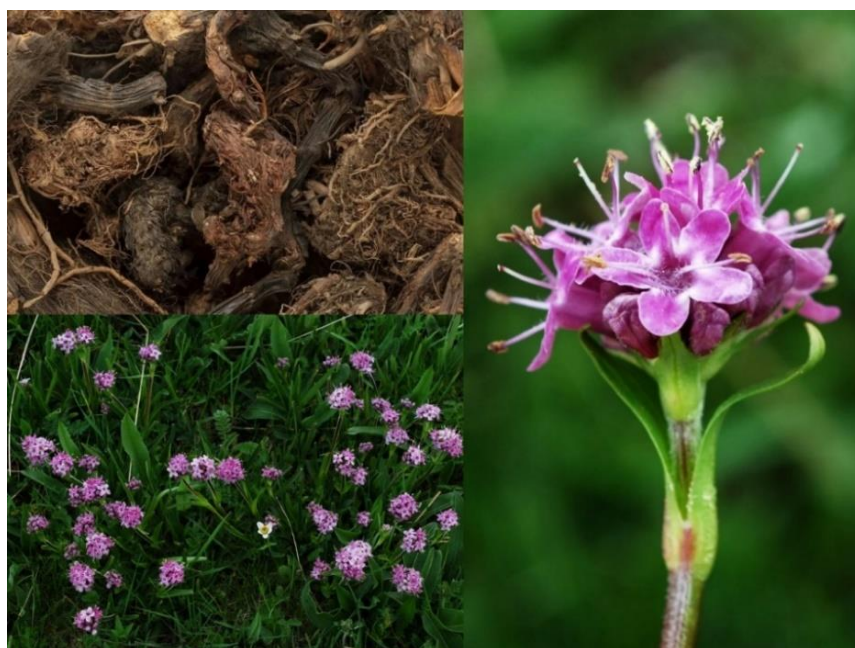


Fig. 1. Rhizome and plant of *balchar*

### 3.9 Miqdar Khurak (Dose)

3.5 –4.5 or upto 7 gms[8]

3 – 5 gms[7,9,12]

### 3.10 Af'al (Actions)

*Mudirr-i-Hayḍ* (Emmanagogue)[7,11,11,12]

*Muḥalil* (Resolvent)[8,7,13]

*Mudirr-i-Bawl* (Diuretic)[7,8]

*Kāsir-i-Riyāḥ* (Carminative)[7,11]

*Muqawwi-i-Qalb* (Cardiotonic)[7,11]

*Muqawwī-i-Dimāgh* (Brain tonic)[7,8,9,13]

*Muqawwī-i-Bāh* (Aphrodisiac)[8,7,11]

*Mutayyib-e-dahan*[7,11]

*Muqawwi sadriya*[8,11,13]

*Mufattiḥ-i-Sudad al-jigar wa mida*(deobstruent)[8,7,13,11]

*Muqawwī mida wa jigar* (Stomachic and hepatotonic)[8,11,11,9]

*Mufattit-i-Ḥaṣāt*/(Lithotropic)[7]

*Musākhin* (Calorific)[7,11]

*Jālī*(Detergent)[7]

*Mujaffif* (Desiccant)[8,11]

*Mujaffif Qūruh* (Cicatrizant)[8,13]

*Muqawwī Chashm* (Eye tonic)[13,8]

*Mushtahī* (Appetiser)[8,11]

*Dafia Qai'* (Anti-Emetic)[8,11]

*Mohsin-e-loun* (Brightens the complexion)[11,7]

*Muqawwī Shar* (Hair tonic)[13,8]

Increases Retentive power[8,11]

Tiryāq (Antidote)[13]

### 3.11 Iste'malat (Therapeutic Actions)

1. *Balchar* is used as *farzaja* (vaginal suppository) in *kasrat-e-*

*tamth*(menorrhagia) and *ihibas-i-tamth* (amenorrhoea) and is helpful in maintaining pregnancy [8]

2. Oral or local use of *Balchar* either single or in combination with other drugs is beneficial in *Warm-i-Raḥim-wa-mathāna*[8].

3. *Aabzan* (sitzbath) with *Joshānda*(decoction) of *Balchar* is beneficial in warm-i-raḥem (endometritis). [8,13]

4. Paste of *Balchar* when applied on forehead relieves headache [8]

5. Powder of *Balchar* with water when taken orally alleviates abdominal pain,helps in digestion of food,*asbi amraz, duwar, ghashi, zoaf-i- dimagh, muqawwi bah* when used with *sharab*[8]

6. *Joshānda* of *Balchar* and *afsanteen* resolves the inflammation of stomach and liver. [8,13]

7. *Balchar* is beneficial in *khafaqan*[13] and all types of *yaraqan*. [8,13]

8. *Dhooni* (Fumigation) of *Balchar* relieves the *sudda* (obstruction) of uterus [8]

9. Powdered *sumbul- ut –teeb* when rubbed over teeth relieves toothache and when applied on body acts as anti-diaphrotic[8]

10. Due to its properties like *jali* and *mohasin-i-lawn*, *balchar* is used as face pack in *chloasma*, freckles. [7,11,8].

11. *Sumbul- ut –teeb* prevents loss of eyelashes when applied over eye lids [8,13]

12. *Balchar* with salt and vinegar is beneficial in *ascites*, used as a blood purifier [8]

13. Used locally/orally with alcohol in *haemorrhoids*, colouring and lengthening of hair [8]

14. It helps in relieving vasomotor symptoms in postmenopausal women.

### 3.12 Madarrat (Toxicity, Side effects and Adverse effects)

On Kidneys[8,7,11,9,8]

### 3.13 Musleh (Corrective)

*Kateera*, *Binsaloochan*[8]

*Rogan-i-gul* [7,9,12]

*Kateera*, *Isphagol* and *Tabasheer* [11,9]

### 3.14 Badal (Substitute or Alternatives)

*Saad koofi*,

Azkhar maki,  
Sajiz hindi,

Post bikh-i-kaba (*Capparis spinosa*L.),

Sumbul roomi,

Darchini (*Cinnamomum zeylanicum*) [7,11,9,8,12]

### 3.15 Phytoconstituents

Nardostachys jatamansi contains sesquiterpenes and coumarins as its major active constituents. The principal sesquiterpene is Jatamansone or Valeranone.

**Table 1. Unanicompound formulations**

S.No.	Unani compound Formulations	Part used	Dose and Method of use	Indications
1	Unani formulation	Root	As per required for <i>Ābzan</i>	Beneficial in acute inflammation of bladder
2	Unani formulation	Root	<i>Ābzan</i>	Retention of urine
3	Arasto sager	Root	4.5 <i>Māsha</i>	Useful in ulceration of eyes, chalazion, abdominal pain, colitis, fevers.
4	<i>Ītrifal kaseer -ul-munfa</i>	Root	7-9 <i>Māsha</i>	Increases eyesight
5	<i>Ītrifal muqawwi dimagh</i>	Root	1 <i>tola</i> empty stomach	Brain tonic, rhinitis, in respiratory diseases
6	<i>Anoshdārū loalawī</i>	Root	As per requirement ( <i>Ma'jūn</i> )	Stomach, heart and brain tonics
7	<i>Iyarij logaziya</i>	Root	14gm with warm water and honey	Headache, migraine, otalgia, vertigo, deafness
8	<i>Iyarij shabyaar</i>	Root	3.5gm with warm water or rose water	Removes melancholic and phlegmatic morbid matters.
9	<i>Bāsaliqūn Kabeer</i>	Root	As per required	Glaucoma, epiphora
10	<i>Bāsaliqūn degar</i>	Root	As per requirement ( <i>Ma'jūn</i> )	Rhinorrhoea, diseases of head
11	<i>Jawārish anareen</i>	Root	3.5-7gm	Liver tonic, appetizer
12	<i>Jawārish jalinoos</i>	Root	9-13.5gm after meals	Halitosis, body tonic, anaphrodisiac
13	<i>Jawārish Javid</i>	Root	7 <i>Māsha</i>	Stomach tonic, increases memory, helpful in haemorrhoids, brightens face
14	<i>Jawārish jalali</i>	Root	4.5-9gm	Appetizer, increases libido
15	<i>Jawārish habulaas</i>	Root	3.5gm	Cholera, anti-emetic
16	<i>Jawārish khusravi</i>	Root	1 tab	Increases libido, memory, paralysis, bell's palsy, tremors, palpitations
17	<i>Habb-e-iyarij</i>	Root	3 tab twice a day	Chronic headache, epilepsy, eye diseases
18	<i>Habb-e-hilteet</i>	Root	1 tab once a day	Increases libido, strengthens stomach
19	<i>Habb-e-rajgati</i>	Root	1 tab after lunch	Appetizer, increases digestion
20	<i>Habb-e-mullayin</i>	Root	1 tab twice a day	Constipation, stomach ache
21	<i>Habb-e-munshat</i>	Root	1 tab	Increases libido

**Table 2. Chemical constituents part of plant herb [3]**

S.no	Part of plant herb	Chemical Constituents
1	Root	Angelicin, Jatamansic acid, Aendesmol, B-eudesmol
2	Rhizomes	Jatamansone, 1-2% volatile oil, resin, sugar [14] starch, Dnardostachone[15]Seychellene, Seychelane, $\beta$ -sitosterol
3	Oil of Roots	Oroselol, jatamansin (terpenic coumarins) [16] Jatamanisol, Angelicin [17]

#### 4. PHARMACOLOGICAL STUDIES

**Hepato-protective activity:** After pre-treatment with 800 mg/kg, p.o. of the 50% ethanolic extract of *N. jatamansi*'s rhizomes, rats treated with thioacetamide exhibited considerably lower levels of blood transaminases (aminotransferases) and alkaline phosphatase. The hepatoprotective effect was shown by the normalisation of multiple blood enzymes elevated in response to liver injury induced by thioacetamide [18].

**Improves Learning and memory:** "Three doses (50, 100, and 200 mg/kg, p.o.) of an ethanolic extract of *N. jatamansi* were administered for 8 successive days to both young and aged mice. The 200 mg/kg dose of *N. jatamansi* ethanolic extract significantly improved learning and memory in the young mice and also reversed the amnesia induced by diazepam (1 mg/kg, ip.) and scopolamine (0.4 mg/kg, ip.). Furthermore, it also reversed aging-induced amnesia due to natural aging of mice. As scopolamine-induced amnesia was reversed, it is possible that the memory improvement may be because of facilitation of cholinergic transmission in the brain. Hence, *N. jatamansi* might prove to be a useful memory restorative agent in the treatment of dementia seen in elderly persons" [17].

**Cardio protective activity:** Elevation in serum marker enzymes (alanine amino transaminase, creatine phosphokinase, aspartate amino transaminase, and lactate dehydrogenase) indicated myocardial damage in rats treated with doxorubicin at a dose of 15 mg/kg intraperitoneally. The antioxidant enzymes [superoxide dismutase, glutathione peroxidase, catalase, and glutathione-S-transferase] and lipid peroxidation levels were significantly altered in the animals. By using *N. jatamansi* extract as a pre-treatment, antioxidant enzyme activity was greatly reduced and lipid peroxides were brought back to levels that were almost normal [19].

**Anti-convulsant activities:** "Ethanol extract of the roots of *Nardostachys jatamansi* was studied

for its anticonvulsant activity. The results demonstrated a significant increase in the seizure threshold by *Nardostachys jatamansi* root extract against maximal electroshock seizure (MES) model as indicated by a decrease in the extension/flexion (E/F) ratio. However, the extract was ineffective against pentylenetetrazole (PTZ)-induced seizures. Further, pre-treatment of rats with phenytoin at a dose of 12.5, 25, 50 and 75 mg/kg in combination with 50 mg/kg of *Nardostachys jatamansi* root extract resulted in a significant increase in the protective index of phenytoin from 3.63 to 13.18. The dose response studies of phenytoin alone and in combination with *Nardostachys jatamansi* extract on the serum levels of phenytoin clearly demonstrated the synergistic action of both the drugs" [20].

**Hypolipidemic activity:** "The rats treated with a single dose of doxorubicin at the dose of 15 mg/kg intra-peritoneal showed an increase in serum and cardiac lipids [cholesterol, triglycerides, free fatty acids and phospholipids] along with a significant rise in serum low density lipoproteins, very low-density lipoproteins and drop in high density lipoproteins levels, resulting in alteration of serum and cardiac lipid metabolizing enzymes. Pre-treatment with an extract of *N. jatamansi* at the dose of 500 mg/kg orally for seven days to doxorubicin induced rats showed a significant prevention in the lipid status with the activities of the lipid metabolizing enzymes. Histopathological observations were also in correlation with the biochemical parameters" [21].

**Antidepressant activity:** "The antidepressant activity of methanolic extract of *N. Jatamansi* by forced swim test, tail suspension test and locomotors activity in inbred male Swiss was determined. The efficacy of the extract at the dose of 200 and 400 mg/kg, p. o. was compared with the standard drug imipramine [10 mg/kg, p. o.] in normal and sleep deprived mice. *N. jatamansi* at the dose of 200 and 400 mg/kg, p. o produced significant [ $P < 0.001$ ] antidepressant like effect in normal and sleep deprived mice in

both TST and FST and their efficacies were found to be comparable to imipramine at the dose of 10 mg/kg, p.o. It did not show any significant change in locomotor functions of mice as compared to normal control. However, it significantly [ $P < 0.01$ ] improves the locomotor activity in case of sleep deprivation which is comparable to normal control. This finding suggests that *N. jatamansi* has dose dependent antidepressant activity and can also be used in patients suffering from depression due to sleep disturbances"[20].

**Anti-diabetic activity:** "The antidiabetic study was carried out to estimate the anti hyperglycemic potential of *Nardostachys Jatamansi* rhizome's hydro alcoholic extracts in alloxan induced diabetic rats over a period of two weeks. The hydroalcoholic extract HAE1 at a dose (500mg/kg) exhibited significant antihyperglycemic activity than extract HAE2 at a dose (500mg/kg) in diabetic rats. The hydroalcoholic extracts showed improvement in different parameters associated with diabetes, like body weight, lipid profile and biochemical parameters. Extracts also showed improvement in regeneration of  $\beta$ -cells of pancreas in diabetic rats. Histopathological studies strengthen the healing of pancreas by hydro alcoholic extracts (HAE1 & HAE2) of *Nardostachys Jatamansi*, as a probable mechanism of their antidiabetic activity"[22].

**Antimicrobial activity:** "Antimicrobial activities of *Nardostachys jatamansi* ethanol extract were studied by disc diffusion technique, and then minimum inhibitory concentration (MIC) determination was done by serial dilution in Mueller Hinton broth. Ethanolic extract of *Nardostachys jatamansi* showed antimicrobial activities with MIC varied between 2.77- 5.82 mg/mL in both MDR and ATCC bacteria. Ethanolic extract of *Nardostachys jatamansi* is an effective antimicrobial agent on MDR bacteria and may help save the lives of many critically ill patients"[23].

**Anti-inflammatory and Anti-candidal activity:** "Desoxo-Narchinol A, Narchinol B, Selinidin/ Jatamansin, Nardosinone and Valerenal were chosen as representative compounds of *N. Jatamansi* for the prediction of pharmacokinetic parameters, in-silico and bioactivity scores. All the compounds were shown results in line with Lipinski Rule of 5 and best acted as enzyme inhibitors with a score greater than 0.00. In light of the above result

findings, *N. jatamansi* was found to possess anti-inflammatory and anticandidal activities"[24].

**Anti-Androgenic activity and its effect on PCOS:** "*N. jatamansi* DC and *T. terrestris* L. extracts were positive on PCOS-induced rat models. These plants normalized estrous cyclicity dose dependently, reduced steroid hormone levels, and improved the ovarian dynamics"[19].

**Activity in Refractory Functional Dyspepsia:** For thirty days, the participants were given 500 mg *N. Jatamansi* DC capsules three times a day, before meals. By self-reporting improvement in at least 50% of symptoms, early satiation and postprandial fullness were evaluated, and the Gastrointestinal Symptom Rating Scale (GSRS) was used to measure other FD symptoms both prior to and during treatment. Following the intervention, the study population's mean GSRS score level dropped noticeably. The main complaints of five patients, who all reported a 50% improvement, were early satiety and postprandial fullness. The results indicate that *N. jatamansi* DC may be useful for people with FD that is refractory[25].

**Activity in inhibition of Benzoyl Peroxide-induced Cutaneous Oxidative stress, toxicity and Ear edema:** Prior to the administration of benzoyl peroxide (20 mg=animal per 0.2 ml acetone), *N. jatamansi* pre-treatment at dosages of 2.5 and 5 mg=kg body weight in acetone significantly inhibited benzoyl peroxide-induced cutaneous oxidative stress, toxicity, and ear edema in a dose-dependent manner. Significant reductions were seen in both xanthine oxidase and cutaneous microsomal membrane lipid peroxidation activities ( $p < 0.05$ ). Furthermore, there was a considerable recovery ( $p < 0.05$ ) of the decreased levels of glutathione and phase II metabolising enzymes. According to our research, *N. jatamansi* can potentially lessen ear edema, toxicity, and cutaneous oxidative stress brought on by benzoyl peroxide. It also appears to be an effective chemo-preventive agent in mouse skin[26-28].

## 5.CONCLUSION

According to Unani Medicine, *N. jatamansi* DC has numerous medicinal properties. Research indicates that this plant has promise for antilithiatic, antidiabetic, anti-inflammatory, hepatoprotective, improves learning and memory, cardioprotective, hypolipidemic activity,



anti-convulsant, anti-depressant, anti-androgenic activity and antibacterial properties. The plant's therapeutic potential stem from bioactive compounds present in its numerous sections, including the root and rhizome. Compound formulations of jatamansi are used in Unani Medicine to treat genitourinary problems like nephrolithiasis and female reproductive system related problems. Additional research is needed to uncover the plant's unique features and possible therapeutic applications in various health conditions.

### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

### CONSENT

It is not applicable.

### ETHICAL APPROVAL

It is not applicable.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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