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Asgand (*Withania somnifera* Dunal) in Unani and Modern Pharmacology - Comprehensive Review

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ABSTRACT:

Background: *Asgand*, *Withania somnifera* Dunal, a well-known medicinal plant, occupies a prominent position in the Unani System of Medicine due to its wide range of therapeutic applications.**Objective:** The present review aims to compile and critically analyze the available information on *Asgand* from classical Unani literature along with findings from contemporary scientific studies.**Method:** An extensive review of the literature was carried out across PubMed, Google Scholar, ScienceDirect, and SCOPUS, using keywords such as *Asgand* and *Withania somnifera* Dunal**.** Classical texts such as *Al-Qanoon fi'l-Tibb*, *Al-Hawi*, *Makhzan-ul-Advia*, and *Khazain-ul-Advia* were reviewed to document its nomenclature, botanical description, mizaj (temperament), af'al (pharmacological actions), istemalāt (therapeutic uses), dose, and adverse effects**.** Additionally, modern pharmacological and experimental studies were explored to validate its traditional claims **Results:** *Asgand* has been classified under *Muqawwi-e-A'ṣāb***,** *Muqawwi-e-Bāh*, and *Muqawwi-e-Badan*. It has also been described by classical Unani scholars for its tonic, aphrodisiac, nervine, anti-inflammatory and rejuvenative properties. Evidence suggests that *Asgand* exhibits adaptogenic, immunomodulatory, anti-stress, antioxidant, neuroprotective, and reproductive health–promoting activities, which corroborate its traditional Unani uses **Conclusion:** This review highlights the therapeutic potential of *Asgand* as a valuable Unani medicine and emphasizes the need for further clinical studies to standardize its dosage forms and establish its efficacy and safety through evidence-based approaches.

Keywords: *Asgand*, *Withania somnifera* Dunal, Unani medicine, Therapeutic potential ,Pharmacological actions.

BOTANICAL NAME: *Withania somnifera* Dunal [1]

INTRODUCTION: *Withania somnifera* Dunal, commonly known as *Asgand*, is a key herb in traditional medicinal practices, particularly in Unani medicine. Often called "Indian Ginseng" or "Indian Winter Cherry," it is celebrated for its ability to boost both physical and mental endurance while reducing stress. The name "somnifera," derived from Latin, means "sleep-inducer," highlighting its calming and anti-stress effects. Asgand is utilized to soothe the mind, reduce fatigue and nervous tension, enhance sexual vitality, and support restful sleep.The term "Ashwagandha," originating from Sanskrit, combines "ashwa" (horse) and "gandha" (smell), referencing the distinct earthy scent of its roots, that recalls the smell of a wet horse. The herb's importance is reflected in ancient texts, such as Dioscorides' "Kitab-al-Hashaish" (78 A.D.), and it is officially recognized as a medicinal drug in the Indian Pharmacopoeia. Two varieties of Asgand have been mentioned in classical Unani literature; "*Asgand Nagori*" and "*Asgand Dakhani*." Nagori is preferred for its more potential medicinal properties.[1]

Fig. Asgand Leaves

Fig. Asgand Root

VERNACULAR NAMES:[2]

Arabic	Kaknaj-e-Hindi
Bengali	Ashvaganda, Asvagandha
English	Winter cherry
Gujarati	Asan, Asana, Asoda, Asundha, Ghodaasoda
Hindi	Asgandh, Punir
Malayalam	Amukkiram, Pevetti
Marathi	Askandha,
Sanskrit	Ashvagandha, Ashvakandika
Tamil	Amukkira, Asubam, Asuvagandi
Telugu	Asvagandhi, Penneru
Urdu	Asgand, Asgand Nagori

SCIENTIFIC CLASSIFICATION:[2]

Kingdom	Plantae
Sub-kingdom	Tracheobionta
Super-Division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Solanales
Family	Solanaceae
Genus	Withania
Species	Somnifera

HABITAT:[3]

Asgand is a kharif crop that matures in the late rainy season. It can be cultivated as a rain-fed crop in semi-tropical regions receiving 500 to 800 mm of annual rainfall. It is found in drier parts of India, Sri Lanka, Afghanistan, Baluchistan and Sind and is distributed in the Mediterranean regions, the Canaries and Cape of Good Hope. The plant naturally grows in the forests of Madhya Pradesh, the western Himalayas of India, and the foothill regions of Punjab, Himachal Pradesh, and Uttar Pradesh. The fresh roots of *Withania somnifera* Dunal are typically harvested between January and March and then dried in the shade for several days. The dried material maintains its medicinal potency for less than two years.

***MAHIYAT:* (Botanical Description):**[4]

- *Asgand* is an evergreen shrub measuring height 30-150 cm with branching.
- Leaves are ovate, glabrous, up to 10 cm long.
- Flowers are greenish yellow about 1 cm in size. A bunch up to 5 flowers grow together as short axillary clusters.
- Fruits are berries up to 6 mm diameter, orange red in colour when ripened, enclosed on membranous calyx.
- The roots are branched with secondary roots.
- The roots are creamy white inside and brownish outside.

***HASASE MUSTAMELA* (Parts used):**

Dried root [5]

***MIZĀJ* (Temperament):**

Ḥārr 1 Yābis 2(Hot 1 and Dry 2) [6]

NAFA-E-KHAAS:

Muqawwi-e-Bah (Aphrodisiac) [7]

***AF'ĀL* (PHARMACOLOGICAL ACTIONS):** [5,8,9]

- *Muhallil -e-Warm* (anti-inflammatory)
- *Muqawwi-i-Aam* (general tonic)
- *Muqawwi-i-Mi'da* (stomachic)
- *Muqawwi-i-A'sab*(neurotonic)
- *Munawwim* (sedative)
- *Muwallid-i-Mani* (spermatogenic)
- *Musammin-e-Badan* (nutritive)

***MUZIR* (TOXICITY):** [2]

Mahrooreen (for persons with hot temperament)

***MUṢLIḤ* (CORRECTIVE):**

Gond Kateera [5]

***BADAL* (SUBSTITUTE):**

Suranjan, Behman Sufaid [5]

***MIQDAAR* (DOSE):**

3 to 5gms [7]

***MURAKKABAT* (COMPOUND FORMULATION)[10]:**

- *Majoon-e-Sohag*
- *Majoon-e-Salab*
- *Zimad-e-Mohallil*
- *Kushta-e-Gaodanti*
- *Halwa-e-Ghekwar*

- *Majoon Zanjabeel*
- *Majoon Muqawwie Reham*
- *Majoon Samagh*
- *Habbe Asgand.*

CHEMICAL COMPOSITION: [11]

The plant contains different classes of chemical compounds and a huge assortment of nutrients and phytochemicals that have gained active research interest because they possess a wide array of health benefits due to their multidimensional importance. The primary active constituents of the plant that have been identified as bioactive are *withanolids A-Y, withaferin A, withasomniferin A, withasomnidienone, withasomnierose A C, withanone* etc. Along with these lactones, the plant extract also contains alkaloids.The extract of roots and leaves of the plant also contains sitoindosides ,withanamides, reducing sugars, peroxidases, glycosides, starch, withanicil , benzyl alcohol, dilcitol, 2-phenyl ethanol,3,4,5-trihydroxy cinnamic acid, benzoic acid and phenyl acetic acid. The medicinal properties of *Withania somnifera* Dunal root are attributed to the presence of numerous alkaloids. Initial studies identified eight brown-colored alkaloids, with withanine being the principal one**.** *Withanine* demonstrated sedative and hypnotic effects in early pharmacological evaluations. Subsequent chromatographic analyses confirmed the presence of a broader spectrum of biochemically heterogenous alkaloids in the root extract. Specifically, 13 alkaloids tested positive using Dradendorff's reagent in the Indian variety of *Withania somnifera.* The identified alkaloids include: *Cuscohygrine, dl-isopelletierine, Anahygrine, Choline, Soniferine, Withanine, Anaferine, Isopelletierine, Tropine, Pseudotropine, 3α-Tigloyloxytropine , 3α-Tropyltigloate, Hygrine, Mesoanaferine, Withananine, Hentriacontane, Visamine, Pyrazole derivative withasomnine, Pseudowithanine, Ashwagandhine***.** The total alkaloid content in the roots of the Indian chemotype *Withania somnifera* Dunal ranges from 0.13% to 0.31%.

***ISTEMAAL* (Therapeutic Uses):**

- *Sayalan al-Rahim* (Leucorrhea)
- *Jiryan* (Spermatorrhea)
- *Riqqat-e-Mani* (Hypospermia)
- *Waj-ul-Qutn* (Lumbago)
- *Waja'al-Mafasil* (Arthritis)
- *Zof-e-Bah* (Sexual debility)

PHARMALOGICAL STUDIES:

Withania somnifera Dunal i.e., *Asgand* is considered to have a number of pharmacological actions based on its alkaloid content.

Anti-Inflammatory activity:

Asgand exhibits significant anti-inflammatory properties across various experimental models. Withaferin-A, one of its key bioactive compounds ,reduces inflammation by inhibiting TNF-α and IL-6, blocking NF-κB activation and decreasing the phosphorylation of p38,ERK1/2, and JNK –mechanisms that help preserve endothelial integrity and reduce leukocyte adhesion demonstrated that *Asgand* root powder significantly decreased paw volume and serum lysosomal enzyme levels in monosodium urate crystal-induced rats, indicating its safe anti-infammatory potential. Similarly, ethanolic extract of *Asgand* showed anti-inflammatory effects comparable to hydrocortisone in both carrageenan and Freud's adjuvant arthritis models.[12]

Effect on Insomnia/Sleep

Sleep disorders including insomnia can insignificantly effect overall health and quality of life. Conventional medication for insomnia often come with side effects such as nausea, dizziness, daytime drowsiness, headaches, nightmares and risk of dependence. As a

result, alternative treatments like herbal supplements are being explored. In animal studies, *Asgand* has been found to increase sleep duration and shorten the time needed to fall asleep in models of caffeine-induced insomnia. It also influences sleep pattern by increasing the amount of non rapid eye movement (NREM) and delta-wave (deep) sleep. These effects appear to be linked to elevated levels and activity of gamma-aminobutyric acid (GABA) and its receptors - GABAA and GABAB-as well as the serotonin receptor 5TH 1A. Additionally, *Asgand* raises overall GABA levels in the brain. The plant's active ingredient may exert their effects by directly binding to GABAA receptors, as the sleep-promoting benefits were introduced. [13]

Anti-Depressant:

One of the most widely recognized benefits of *Asgand* is its ability to reduce stress. As an adaptogen, it helps the body cope with stress and depression. It also lowers the activity of the hypothalamic-pituitary-adrenal (HPA) axis, which plays a key role in the body's stress response. In a small study involving 58 participants, those who took either 250 mg or 600 mg of *Asgand* extract daily for about 56 days reported significantly lower stress levels compared to those who took a placebo. Participants in the *Asgand* group also experienced better sleep quality than the placebo group. Another study with 60 participants found that daily consumption of 240 mg of *Asgand* extract for 60 days led to a notable reduction in anxiety compared to a placebo group. Antidepressant effect of *Asgand* have been compared to those of imipramine. Research supports the potential of *Asgand* root-based treatments as mood stabilizers and in managing symptoms of anxiety and depression. It may also enhance cognitive functions like learning and memory. The plant contains several bioactive compounds, including withaniamides, withaferin A, and withanolides A and D, which contribute to its therapeutic properties. Extracts prepared from *Asgand* root using water and ghee, as well as aqueous, methanolic, and hydro alcoholic solutions, have demonstrated antidepressant effects . Furthermore, *Asgand* has been shown to enhance the effectiveness of conventional antidepressants, including fluoxetine (an SSRI) and imipramine (a tricyclic antidepressant), in animal models of depression. [14]

Anti-oxidant activity and Neuroprotective effects:

The brain and nervous system are particularly vulnerable to oxidative damage due to their high concentrations of lipids and iron—both of which contribute to the generation of reactive oxygen species (ROS). This susceptibility plays a significant role in normal aging processes and is implicated in the pathogenesis of various neurodegenerative and psychiatric disorders, including Epilepsy, Schizophrenia, Parkinson's disease, and Alzheimer's disease. The active constituents of Withania somnifera (WS), specifically sitoindosides VII–X and withaferin A (collectively known as glycowithanolides), have been evaluated for their antioxidant potential. These compounds were tested by measuring the activities of key antioxidant enzymes—Superoxide dismutase (SOD), Catalase (CAT), and Glutathione peroxidase (GPX)—in the frontal cortex and striatum of rat brains. A reduction in the activity of these enzymes leads to the accumulation of oxidative free radicals, resulting in cellular damage and degeneration. Conversely, an increase in their activity is indicative of enhanced antioxidant defence and neuroprotection. In a controlled study, rats were administered glycowithanolides daily for 21 days, resulting in dose-dependent increases in SOD, CAT, and GPX activity. These effects were comparable to those observed with deprenyl, a known antioxidant drug, suggesting that WS exhibits significant antioxidant activity in the brain. This mechanism may underlie many of its observed pharmacological effects. Further studies examined the impact of WS root extract on lipid peroxidation (LPO), a key marker of oxidative stress, in mice and rabbits. LPO levels were artificially elevated using bacterial endotoxins—lipopolysaccharides (LPS) from Klebsiella pneumoniae and peptidoglycans (PGN) from Staphylococcus aureus. Simultaneous oral administration of WS extract effectively prevented the LPO increase, indicating its protective effect against stress induced oxidative damage. In a separate model assessing hepatotoxicity, iron overload significantly elevated hepatic LPO and serum levels of liver enzymes—alanine aminotransferase (ALT), aspartate aminotransferase (AST), and lactate dehydrogenase (LDH). Treatment with glycowithanolides (WSG) attenuated these increases in a dose-dependent manner, with effects comparable to those of silymarin, a well-established hepatoprotective agent. Collectively, these findings support the role of *Withania somnifera* as a potent antioxidant with neuroprotective and hepatoprotective properties, likely contributing to its broad therapeutic potential. [1]

Antibiotic activity:

Studies have demonstrated that both the roots and leaves of *Asgand* possess antibiotic properties. Specifically, Withaferin A, at a concentration of 10 µg/ml, was found to inhibit the growth of various Gram-positive bacteria, acid-fast and aerobic bacilli, as well as harmful fungi. It showed effectiveness against Micrococcus pyogenes var. aureus and partially suppressed the enzyme activity of Bacillus subtilis glucose-6-phosphate dehydrogenase. Additionally, Withaferin A was shown to inhibit the Ranikhet virus. Extracts from the plant also displayed activity against the Vaccinia virus and Entamoeba histolytica. *Asgand* exhibited protective effects against systemic Aspergillus infections, likely due to enhanced macrophage activity. This was indicated by increased phagocytosis and the improved ability of peritoneal macrophages to kill pathogens following treatment in mice. The antibiotic effect of Withaferin A is attributed to the presence of an unsaturated lactone ring. This lactone compound demonstrated potent therapeutic effects in rabbit models with induced abscesses, showing slightly greater effectiveness than penicillin. These findings support the traditional use of *Asgand* leaves in treating ulcers and carbuncles in indigenous medicine. [15]

Cognitive function and Memory enhancement:

Asgand is widely researched for its potential to enhance memory and cognitive performance for making it a promising option for addressing age-related cognitive decline and attention disorders. Preclinical studies suggest that withanolides, active compounds in *Asgand*, enhance brain plasticity, support long-term potentiation, and improve performance in tasks involving spatial memory. These effects are partly attributed to increased levels of brain derived neurotrophic factor (BDNF), a protein that supports neuron growth, survival, and development . Additionally promotes the formation of new nerve cells in the hippocampus-a key brain region for learning and memory, particularly in aging individuals. It also improves cholinergic signaling by altering acetyl cholinesterase activity, which is essential for maintaining attention and memory. Clinical trials have shown improvements in working memory, executive function, and processing speed in both healthy individuals and those with mild cognitive impairment. [16]

Immunomodulation and Hematopoiesis :

Several animal studies have demonstrated that *Withania somnifera* Dunal significantly influences the hematopoietic system by functioning as both an immune system modulator and a chemoprotective agent. In one study involving mice, treatment with powdered root extract of *Asgand* led to an increase in total white blood cell count. Moreover, the extract reduced delayed-type hypersensitivity responses and boosted the phagocytic activity of macrophages when compared to untreated controls . Recent findings have proposed a potential mechanism responsible for the enhanced cytotoxicity observed in macrophages treated with Withania somnifera extracts . Nitric oxide (NO), known to play a vital role in macrophage-mediated destruction of pathogens and tumor cells, was found to be elevated. *Asgand* stimulated NO production in mouse macrophages in a concentration-dependent fashion. This effect was linked to the up regulation of inducible nitric oxide synthase (iNOS), an enzyme triggered by inflammatory signals and known to suppress the growth of various pathogens. *Asgand* has also been shown to promote the development of cytotoxic T lymphocytes both in laboratory settings and live models, and has exhibited the potential to slow or inhibit tumour development. In one study, animals treated with the extract showed a significant reduction in both the frequency and number of skin lesions compared to controls. Additionally, antioxidant markers in the tissue—such as reduced glutathione, superoxide dismutase, catalase, and glutathione peroxidase—returned to levels close to normal after treatment, suggesting the plant's chemo preventive effects may be attributed to its antioxidant and free radical scavenging capabilities. The cancer-preventive potential of *Asgand* was particularly evident in a study involving Swiss albino mice, where root extract was administered prior to and during exposure to the carcinogen 7,12-dimethylbenzanthracene, which induces skin cancer. Furthermore, an in vitro study found that withanolides derived from Withania somnifera suppressed the growth of human cancer cell lines from the breast, central nervous system, lungs, and colon. The growth-inhibiting effects of Withaferin A, a major bioactive compound in the plant, were even more pronounced than those of the chemotherapy drug doxorubicin in breast and colon cancer cells. These findings suggest that extracts from *Withania somnifera* may have potential as an anticancer therapy by either preventing or slowing tumour growth. [17]

Anti-Obesity effect:

Obesity plays a key role in the development of metabolic syndrome (MetS), as excessive fat build up in adipose tissue can result in both the enlargement (hypertrophy) and multiplication (hyperplasia) of fat cells. This expansion often leads to reduced oxygen supply (hypoxia) due to insufficient blood flow, triggering the release of inflammatory molecules like TNF-α, IL-6, PAI-1, leptin, and resistin from the adipose tissue. These inflammatory factors contribute to oxidative stress, promote chronic inflammation, and increase the risk of various metabolic disorders such as diabetes, dyslipidaemia, cardiovascular diseases, and high blood pressure. Therefore, the development of effective treatments to combat obesity and its related health issues is essential. Research has highlighted the anti-obesity properties of *Withania somnifera* . Withasomniferol D, a recently identified withanolide, has shown promise by reducing fat cell development, shrinking lipid droplets, and lowering the expression of markers linked to adipocyte formation, indicating its potential as an anti-obesity agent. *Asgand* has also been found to improve muscle function, raise HDL (good cholesterol) levels, and reduce body fat, which may support cholesterol regulation . In one study, female rats fed a high-fat diet and treated with Withania somnifera Dunal (1 mg/g over 12 weeks) demonstrated improved cognitive function, with the herb preserving synaptic plasticity. This effect was linked to the activation of PI3K/Akt-1, c-jun, and c-fos, which are involved in cell survival and plasticity. Obesity is known to cause inflammation in the brain, but *Asgand* treatment reduced reactive gliosis and micro gliosis in these rats. It also suppressed the expression of several inflammatory markers such as IL-6, TNF-α, PPARγ, iNOS, and MCP-1, thereby alleviating obesity-induced neural complications. Since obesity stems from an imbalance between energy intake and expenditure, *Asgand's* ability to enhance mitochondrial function in fat and muscle tissue helps increase energy usage. One study found that methanol extracts of Asgand (at 0.25%, 0.5%, and 0.7% doses over 10 weeks) improved mitochondrial activity in rats on a high-fat diet. The treatment prevented fat build up in the liver, lowered serum lipid levels, and reduced overall body weight. Additionally, it improved oxygen utilization in fat and muscle cells and increased UCP-1 expression in mitochondria, which facilitated the browning of subcutaneous fat. Withaferin-A further encouraged the transformation of pre-adipocytes into brown fat cells and enhanced oxygen usage in muscle cells. Asgand's anti-obesity potential is also linked to its ability to stimulate energy expenditure through the AMPK and ERK/MAPK pathways. In a study using two doses of withaferin-A (0.75 mg and 1.5 mg administered orally for seven days), energy usage in both brown and white fat tissues increased via activation of these signaling

pathways. AMPK activation boosted UCP-1 expression, promoting the browning of white fat. This thermo genic response, in turn, led to increased mitochondrial production and the expression of genes involved in fat browning, aiding in weight reduction. Additionally, six withanolides (1–6) isolated from the roots of Withania somnifera Dunal showed anti-fat accumulation effects in 3T3 adipocyte cell lines. These compounds enhanced lipid metabolism by increasing the activity of genes that promote fat breakdown (lipolysis) and suppressing those involved in fat creation (lipogenesis).[18]

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