

# Pharmacognostic, Phytochemical and Pharmacological Review of *Withania Somnifera*: A Review

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**Abstract:** *Withania somnifera* belonging to family solanaceae is commonly known as ashwagandha .its traditional medicine used as to prevention, cure and treat various diseases. Many research literature are available which shows greatness of ashwagandha. It's a immunity booster, wellness medicines, fertility enhancer, aphrodisiac medicine ,anticancer ,antioxidant and many more. In this review an attempt is made to summerized the pharmacognostic, phytochemical and pharmacological aspects related to withania somnifera..

**Keywords:** Withania Somnifera, Ashwagandha, Immunity Booster, Antioxidant, Winter Cherry.

## I. INTRODUCTION

*Withania somnifera* (WS), also known as ashwagandha, Indian ginseng, and winter cherry, it has been an important herb in the Ayurvedic and indigenous medical systems for over 3000 years. The roots of the plant are categorised as rasayanas, which are reputed to promote health and longevity by augmenting defence against disease, arresting the ageing process, revitalising the body in debilitated conditions, increasing the capability of the individual to resist adverse environmental factors and by creating a sense of mental wellbeing [1]

Ashwagandha is a reputed health food and herbal tonic and used for cardiovascular diseases in ethnomedicine. It is available for human use either as a single herb or an ingredient of polyherbal or herbomineral formulations. The human doses of Ashwagandha are generally in the range of 4-6 g/day and expected to be safe and non-toxic. *Withania* contains active ingredients like steroidal alkaloids and lactones known as “withanolides”. Withaferin A and withanolide D are the two main withanolides that contribute to most of the biological actions of *withania*. [2]

Ashwagandha is commonly available as a churna, a fine sieved powder that can be mixed with water, ghee (clarified butter) or honey. It enhances the function of the brain and nervous system and improves the memory. It improves the function of the reproductive system promoting a healthy sexual and reproductive balance. Being a powerful adaptogen, it enhances the body's resilience to stress. Ashwagandha improves the body's defense against disease by improving the cell-mediated immunity. It also possesses potent antioxidant properties that help protect against cellular damage caused by free radicals. [3]

## II. TAXONOMICAL CLASSIFICATION

Kingdom	Plantae:, Plants
Subkingdom	Tracheobionta, Vascular plants
Super division	Spermatophyta,; Seeds plants
Division	Angiosperma
Class	Dicotyledons
Order	Tubiflorae
Family	Solanaceae
Genus	<i>Withania</i>
Species	<i>somnifera</i> Dunal

### 2.1 Synonyms

Languages	Name
Sanskrit	Ashwagandha, Turangi-gandha
English	Winter Cherry
Hindi	Punir, asgandh
Bengali	Ashvagandha
Gujrati	Ghodakun, Ghoda, Asoda, Asan
Telgu	Pulivendram, Panneru-gadda, panneru;
Tamil	Amukkura, amkulang, amukkuram-kilangu, aswagandhi,
Karnataka	Viremaddlinagadde, Pannaeru, aswagandhi, Kiremallingida
Goa	Fatarfoda
Punjabi	Asgand, isgand;
Bombay	Asgund, asvagandha;
Rajasthani	Chirpotan

### 2.2 Morphology

A dense, hairy erect grayish tomentose herb or undershrub. The roots are stout, long tuberous, fleshy, whitish brown and aromatic. The leaves are simple, alternate or sub-opposite, round-oval shaped. The flowers are greenish-yellow and found in few flowered clusters in axils. The fruit is a round orange-red berry, enclosed in green enlarged calyx. The fruit resembles that of red cherries. The seeds are many, yellow kidney shaped and discoid.[4]

#### Ayurvedic Pharmacodynamic Properties:[4]

Rasa : Tikta (Bitter), Katu (Pungent), Madhura (Sweet)

Guna : Laghu (Light), Snigdha (Oily)

Virya : Ushna (Hot)

Vipaka: Madhura (Sweet)

Doshakarma : Kapha-Vatashamak (Alleviates K and V Dosha)

### 2.3 Chemical Composition:[4]

The main constituents of Ashwagandha are Alkaloids, Steroidal lactones, Within alkaloids. Withanine is the main alkaloid. Other constituents are amino acids, choline, beta-sitosterol, chlorogenic acid, scopoletin, withaferin etc.

#### A. Description

This species is a short, tender perennial shrub growing 35–75 cm (14–30 in) tall. Tomentose branches extend radially from a central stem. Leaves are dull green, elliptic, usually up to 10–12 cm (3.9–4.7 in) long. The flowers are small, green and bell-shaped. The ripe fruit is orange-red.[5]

### III. ETYMOLOGY

The species name "*somnifera*" means "sleep-inducing" in Latin. The name "ashwagandha" is a combination of the Sanskrit words '*ashva*', meaning horse, and '*gandha*', meaning smell, reflecting that the root has a strong horse-like odor.[6]

### IV. CULTIVATION

*Withania somnifera* is cultivated in many of the drier regions of India. It is also found in Nepal, Sri Lanka, China, and Yemen. It prefers dry stony soil with sun to partial shade. To propagate it can be grown from seed in the early spring, or from greenwood cuttings in the later spring.[7,8,9]

#### **V. DISEASES PRONE TO ASHWAGANDHA PLANT :**

*Withania somnifera* is prone to several pests and diseases. Leaf spot disease caused by *Alternaria alternata* is the most prevalent disease, which occurs in a severe form in Punjab, Haryana, and Himachal Pradesh. A decline in the concentration of its secondary metabolites occurs by leaf spot disease.[10]

#### **VI. TRADITIONAL USES AS MEDICATION**

The plant, particularly its root powder, has been used for centuries in traditional Indian medicine, but there is no good evidence that it is safe or effective for treating any disease, and may cause adverse effects if taken together with prescription drugs. Side effects may include diarrhea, skin burning and discoloration, sedation, liver injury, thyrotoxicosis, increased testosterone levels, and miscarriage.[11,12]

#### **VII. PHYTOCHEMISTRY AND PHYTOCHEMICAL DATA**

Chemical constituents of WS are always of an interest for the researchers. The biologically active chemical constituents are alkaloids (ashwagandhine, cuscohygrine, anahygrine, tropine etc), steroidal compounds, including ergostane type steroidal lactones, withaferin A, withanolides A-y, withasomniferin-A, withasomnidienone, withasomniferols A-C, withanone etc. Other constituents include saponins containing an additional acyl group (sitoindoside VII and VIII), and withanolides with a glucose at carbon 27 (sitoindoside IX and X) [13, 14]. Apart from these contents plant also contain chemical constituents like withaniol, acylsteryl glucosides, starch, reducing sugar, hantreacotane, ducitol, a variety of amino acids including aspartic acid, proline, tyrosine, alanine, glycine, glutamic acid, cystine, tryptophan, and high amount of iron. Withaferin A, chemically characterized as 4b,27- dihydroxy- 5b-6b-epoxy-1-oxowitha-2, 24-dienolide, is one of the main withanolidal active principles isolated from the plant. WS showed chemogenetic variation and so far three chemotype I, II and III had been reported [15]. These are chemically similar but differ in their chemical constituents especially in withanolide content. In Indian variety thirteen Dragendroff positive alkaloids have been obtained. The reported alkaloids are anaferine ( bis (2-piperidylmethyl) ketone); isopelletierine; tropine; pseudotropine; 3atigloyloxtropine; 3- tropytligloate; cuscohygrine; dlisopelletierine; anahygrine; hygrine; mesoanaferine; choline; somniferine; withanine; withananine; hentriacontane; visamine; withasomnine, a pyrazole derivative from West Germany; pseudowithanine and ashwagandhine. Withaniol (mixture of withanolides) and number of withanolides including withaferine-A; withanolide N and O; withanolide D; withanolide p and 8; withanolide Q and R; withanolide y, 14ahydroxy steroids and withanolides G, H, I, J, K and U. [16] Seven new withanolide glycosides called withanosides I, II, III, IV, V, VI and VII had been isolated and identified [17]. Much of WS pharmacological activity has been attributed to two main withanolides, withaferin A and withanolide D. For physicochemical analysis, thin-layer chromatography (TLC) was used to identify the steroidal lactones (withanolides) present in ashwagandha. The solvent system used was chloroform:methanol:water (64:50:10, v/v) and spots were finally identified with vanillin– phosphoric acid. The percentage of steroidal lactones was estimated spectrophotometrically.[18]

#### **VIII. IMPORTANCE OF ASHWAGANDHA?**

While ashwagandha uses have been documented several years on, how the ashwagandha root works in the human body is still unknown. The use of ashwagandha as proprietary medicine in the Ayurveda section to treat stress, anxiety and other such ailments provides a natural alternative to regular medicines. The effects of ashwagandha are calming, pain-relieving and also anti-inflammatory which takes care of the nervous system. In case of arthritis or muscle stresses it is studied that ashwagandha benefits have relaxing properties. The Ashwagandha capsule, tablet and powder are the various forms which can be bought from stores both offline and online. The best way to use ashwagandha tablets or powder is after advice from a health expert so that you are clear on the dosage and whether it suits you. You may have symptoms that require different medical attention other than ashwagandha healing so it is always a good idea to visit your doctor first.

Ashwagandha dosage may differ from person to person so you should not take as much as you can in one period to see faster results. There is, however, no answer in modern science for what is ashwagandha exactly doing in the human body. So if you feel you need herbal treatment be sure to gather as much information you can. Ayurvedic consultation too can be one of the options. It is not healthy to immediately change medications if you are already taking prescribed ones. Ashwagandha benefits for weight loss are commonly known among its other uses.[19]

### 8.1 Pharmacological Uses of Ashagandha

- Enunciates strength and vitality of muscles
- Incudes sleep and relaxation of the mind and brain
- Treats ulcers and chronic ailments
- Reinforces energy by reducing muscle stress and fatigue
- Reduces drowsiness and worn-out feeling of muscles
- Strengthens the immune system
- Helps to treat terminal illnesses like cancer, Alzheimer's and Parkinson's disease
- Helps to maintain cholesterol levels and remedy for chest pains
- Helps in digestion and prevents constipation
- Effective use for diabetes
- Protects from high blood pressure
- Effective for liver diseases
- Treats cold, cough and fever
- Ashwagandha supplements along with shilajit capsules can help to improve your sexual life
- Effective as an antioxidant for mind and body
- Soothing effects for insomnia
- Supplemented for arthritis
- Helps in weight loss[19]

### 8.2 Ashwagandha Side Effects

There are a few side effects of ashwagandha whose prevention largely depends on careful intake and regulated dosage as mentioned earlier.

- High dosage of ashwagandha medicines could increase intestinal problems.
- It is strongly not recommended for pregnant women or for those suffering from hypothyroidism.
- It is said to take ashwagandha doses in the evenings because it can act as a sedative and is often considered to have a hypnotic effect. While this is related to stress and muscle relaxation it is perfectly normal to take it in regulated quantities. It is safe within its limits and should be tried in little quantities at first and then increase dosage.
- Ashwagandha is unfavourable for multiple sclerosis or lupus as it activates the immune system that might affect the person suffering from such auto-immune diseases.
- Diabetic patients should keep check of their blood sugar levels if they are taking ashwagandha regularly. Symptoms can include low blood pressure if taken in large doses or without existing diabetic medication. It is advisable not to discontinue existing medication for serious or chronic illnesses.
- You should seek professionals to give you accurate information if ashwagandha can be used along with your regular course of medicine. If you have to undergo surgery then it is best to consult a doctor if to continue ashwagandha dosage prior to surgery or not
- You may not see ashwagandha side effects in one or two month consumption as it is possibly safe if taken orally.[19]

### 8.3 Top Ashwagandha Side Effects and Precautions

- Do not take large doses
- Avoid ashwagandha when pregnant and lactating
- Do not take ashwagandha in hypothyroidism
- Not favourable for auto-immune diseases
- Can cause stomach upsets or vomiting
- Can cause low blood pressure for diabetics
- Can cause effects to nervous system if taken with other anesthetics.[19]

#### **8.4 Is Ashwagandha Beneficial for You?**

By now you already know what is ashwagandha and how is it used for a healthy living. Ashwagandha is a traditional medicine also known as an 'adaptogen' which means it adapts with the properties of the organism. It adapts to the human body and works wonders if the prescribed dose suits you. The uses of ashwagandha in men and women have been significant especially for men who could use ashwagandha powder or tablets with the coming of age.

If you feel the decoction-infusion method is cumbersome you can simply take ashwagandha powder in milk depending on your dosage. Ashwagandha is not only used in the Indian subcontinent but is also famous in Europe and the USA in the form of supplements. As commercial products, you can find ashwagandha supplements, powder, capsules and even seeds from online retailers or even your supermarket that has an Ayurveda section.

- With some alkaloid content in Ashwagandha, it is also rich in iron so patients advised not to take direct iron medicines should double check with their physicians before taking ashwagandha capsules.
- If you have existing sleep or anxiety related medication in your prescriptions it is best not to combine ashwagandha products with it. In case you want to try ashwagandha tablets you should see your pharmacist or doctor and learn about the combinations first.
- Ashwagandha benefits are quite popular so you will find people who can give you their experiences of using ashwagandha in their daily lives. Ashwagandha benefits for weight loss, for example, is one of the popular concerns.

Additionally, Ashwagandha is being studied to treat tumors and even asthma. The therapeutic value of this soothing herb and it's amazing quality in reinforcing stamina, are what make it a popular alternative if taken at moderate & recommended levels.[19]

#### **IX. CONCLUSION**

Ashwagandha has several properties like having anti-inflammatory effects, anti-tumor effects, and immune-modulatory properties, as well as exerting an influence on the endocrine, nervous and cardiopulmonary systems of the body. The extensive survey of literature revealed that WS is an important source of many pharmacologically and medicinally important chemicals, such as withaferins, sitoindosides and various useful alkaloids. In Indian variety thirteen Dragendroff positive alkaloids have been reported. The withanolides are the most searched chemical constituents of WS and till date around 138 withanolides with both  $\beta$  and  $\alpha$  side chain has been reported apart from various amino acid and other normal plant constituents.

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