

Therapeutic Properties and Significance of Different parts of Ashwagandha- A Medicinal Plant

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ABSTRACT

Withania somnifera, also known as Ashwagandha, Indian ginseng, Winter cherry, Ajagandha, Kanaje (Hindi), Amukkara (Tami), is a member of Solanaceae or nightshade family. Ashwagandha has been used as a sedative, a diuretic, a rejuvenating tonic, an anti-inflammatory agent, aphrodisiac and an immune booster. Ashwagandha increases the count of white blood cells and prepares the body to produce antigens against various infections and allergies. Ashwagandha is used to treat various disorders that affect human health including central nervous system (CNS) disorders, particularly in epilepsy, stress and neuro-degenerative diseases like Parkinson's and Alzheimer's disorders, cerebral ischemia, and even in the management of drug addiction. The most useful usage is to reduce stress and perhaps aid in sleep. It is an ingredient in many formulations prescribed for a variety of musculoskeletal conditions (e.g., arthritis, rheumatism), and as a general tonic to increase energy, improve overall health and longevity, and prevent disease in athletes, the elderly, and during pregnancy. Ashwagandha's chemopreventive properties make it a potentially valuable add-on for patients undergoing radiation and chemotherapy.

Keywords: Ashwagandha, *Withania somnifera*, withanolides, withaferins.

INTRODUCTION

Botanical Name: *Withania somnifera*

Common Names: Ashwagandha, winter cherry

Parts commonly Used: Root (Dried)

TAXONOMICAL CLASSIFICATION

Kingdom : Plantae;

Subkingdom : Tracheobionta, Vascular plants;

Super division : Spermatophyta, Seed plants;

Division : Angiosperma

Class : Dicotyledons

Order : Tubiflorae

Family : Solanaceae

Genus : *Withania*

Species : *somnifera* Dunal

Solanaceae is one of the major families in the plant kingdom and comprises about 85 genera and more than 3000 species¹. India has one of the oldest, richest and most diverse cultural traditions associated with the use of medicinal plants. This knowledge is accessible from thousands of medical texts and

manuscripts. This traditional knowledge forms the codified system of medicine and exists in the form of Ayurveda, Unani, Siddha and Swa-riga (Tibetan) system of medicine. The Indian systems of medicine use more than 8000 species of medicinal plants. Ashwagandha, is a shrub cultivated in India and North America whose roots have been used for thousands of years by Ayurvedic practitioners.

The fruits from several of its species are edible, and some are used in traditional medicine². The plant *Withania somnifera* (L.) Dunal, commonly known as "Ashwagandha", is well known for its therapeutic uses in the Ayurveda system of traditional medicine^{3,4}. The roots of this plant have been used as an adaptogen and to treat arthritis, asthma, dyspepsia, hypertension, rheumatism, and syphilis⁵. Earlier pharmacological investigations of *W. somnifera* have revealed its antiinflammatory, antioxidant, immunomodulatory, and tumor cell proliferation inhibitory activities. The species name *somnifera* means "sleep-inducing" in *Latin*⁶. It grows as a short shrub (35–75 cm) with a central stem from which branches extend radially in a star pattern (stellate) and covered with a dense mat of woolly hairs (tomentose). The flowers are small and green, while the ripe fruit is orange-red and has milk-coagulating properties. The plant's long, brown and tuberous roots are used for medicinal purposes⁷. The root contains flavonoids and active ingredients of the withanolide group. It is an ingredient in many herbal formulations prescribed for a variety of musculoskeletal conditions such as arthritis, rheumatism etc.

MEDICINAL PROPERTIES

Ashwagandha is highly esteemed as "rasayana" drug by Ayurvedists which is capable of imparting long life, youthful vigour and good intellectual powers. The root is the main commercial part and it is bitter in taste, hot in action, germicidal, aphrodisiac, diuretic and alleviative of "vata" and "Kapha". It cures ulcers, fever, cough, dyspnoea (Respiratory trouble), dropsy (excessive collection of watery fluid in the tissues or cavities of the body), impotence, rheumatism, toxicosis and leucoderma. The drug is a good tonic. It improves physical strength and is prescribed in all cases of general debility. Drug is very effective in the treatment of anxiety neurosis and is found to possess significant anti-tumour activity. *Asvagandharishtam*, *chavanaprasam*, *Valiya Narayana tailam* etc. are some of the important preparations using the drug.

The properties and usage of various parts of Ashwagandha are briefly described here.

A. Leaves

The leaves are anthelmintic (kills intestinal worms) drug with reducing fever. A fomentation of the leaves is used for sore eyes, boils, and swollen hands and feet. Paste of the leaves is locally applied to kill lice infesting the body, and over carbuncles (An acute suppurative inflammation of the skin and tissues under the skin, rapidly spreading around the original point of infection) and syphilitic sores. An ointment prepared by boiling the leaves in fat is useful for bedsores and wounds. Leaves have been reported to be anti-inflammatory agent. In addition to its medicinal use, Ashwagandha is also extensively used at home in the form of tea.

B. Roots

The most common benefit of **ashwagandha root** includes boosting the immune system. The roots are capable of increasing the number of white blood cells. It helps to relieve insomnia and possess mild sedative properties that help to promote sound sleep. It also helps to regulate blood sugar levels and is beneficial in the treatment of weight loss. The roots of *Withania somnifera* are alterative, aphrodisiac, deobstruent, diuretic, narcotic, sedative and restorative in nature. The pharmacological activity of the root is attributed to the alkaloids and steroidal lactones. According to research reports, Ashwagandha roots powder can be an effective herbal supplement for the treatment of cancer. It has the ability to slow tumor growth. It helps to cure erectile dysfunction and improve male sperm count. **Ashwagandha root** is a popular male sex tonic in India. It also helps to reduce a bad cholesterol level which is responsible for hypertension and cardiovascular problems. Recent studies revealed that ashwagandha root contains steroidal properties which can be effective in treating inflammation. It is also used to treat low back pain and sciatica. It is generally safe to use, as it is purely natural and free from side effects. Root contains an alkaloid somniferine. The roots of *W. somnifera* are used to prepare the herbal remedy ashwagandha, which has been traditionally used to treat various symptoms and conditions^{8,9,10}. The root is a tonic,

stimulant, alternative, aphrodisiac, narcotic, diuretic, abortifacient (agent which promotes abortion) and deobstruent (drug that removes an obstruction to secretion or excretion by opening of the natural passages or pores of the body.) The roots of the plant are categorized as rasayanas, which are reputed to promote health and longevity by augmenting defence against disease, arresting the ageing process, revitalizing the body in debilitated conditions, increasing the capability of the individual to resist adverse environmental factors and by creating a sense of mental well being¹¹. It is given in 30 grams doses in general debility, rheumatic affections, dyspepsia (indigestion) loss of appetite, cough and dropsy. Half to one drachm (3.89 gm) of the root with milk or ghee is given as an aphrodisiac. 45 grams of the powdered root are given with sugar candy twice a day in leucorrhoea, blood discharges from the uterus etc. Half to drachm of the powder is given daily with sugar, honey, long pepper and ghee in spermatorrhoea, debility etc. The root is very efficacious for toning up the uterus of women who habitually miscarry. A decoction of the root is used with long pepper, ghee and honey in scrofula (a disease of the lymphatic gland, often of the neck). In chest complaints and colds, a decoction is recommended. A paste made of the roots and leaves is applied over carbuncles, ulcers, and swellings; a warm paste of the fresh roots is used over scrofulous and other glandular swellings.

C. Berries and seeds

The berries and seeds are diuretic and are also used for treating chest complaints. In India, seeds of the Ashwagandha are used to thicken milk. The berries are used as a substitute for rennet, to coagulate milk in cheese making.

CHEMICAL COMPOSITION

The chemistry of *Withania* has been extensively studied and over 35 chemical constituents have been identified, extracted, and isolated¹². The biologically active chemical constituents are alkaloids (isopelletierine, anaferine), steroidal lactones (withanolides, withaferins), saponins containing an additional acyl group (sitoindoside VII and VIII), and withanolides with a glucose at carbon 27(sitoindoside IX and X). It is also rich in iron¹³.

A number of alkaloids are present in various parts of Ashwagandha. The leaves contain chemicals like somnitol, glucose, inorganic salts and a new compound withanone M:P. 263. Besides, nine new steroid allactones Withanolides E, F, G, H, I, J, K, L and M were isolated from the leaves. A pyrazole alkaloid named withasomnine is isolated from the roots [Fig.1].

Another withanolide WS-1 was isolated from the seeds. Withaferin A and Withanolide E exhibited specific immuno-suppressive effect on human B and T lymphocytes. Withanolide E has specific effect on T lymphocytes where as Withaferin A affected both B and T lymphocytes.

The other alkaloids are somniferine, somnine, somniferinine, withananine, pseudo-withanine, tropine, pseudo-tropine, cuscohygrine, anaferine and anhydrine. The leaves contain steroidal lactones, which are commonly called withanolides¹⁴. The withanolides have C28 steroidal nucleus with C9 side chain, having six membered lactone ring. This plant contains flavonoids and many active ingredients of the class withanolides. So far, 12 alkaloids, 35 withanolides and several sitoindosides have been isolated from this plant species and thoroughly studied for its medicinal properties[Fig.2]. Withaferin A is the most important of the withanolides isolated from this plant, to which the curative properties of the leaves are attributed¹⁵.

Alkaloids: About 13 alkaloids are known as Isopelletierine, Anaferine, Cuseohygrine, Anahygrine, Tropine etc.

Somniferin: It is a bitter alkaloid with some hypnotic activity.

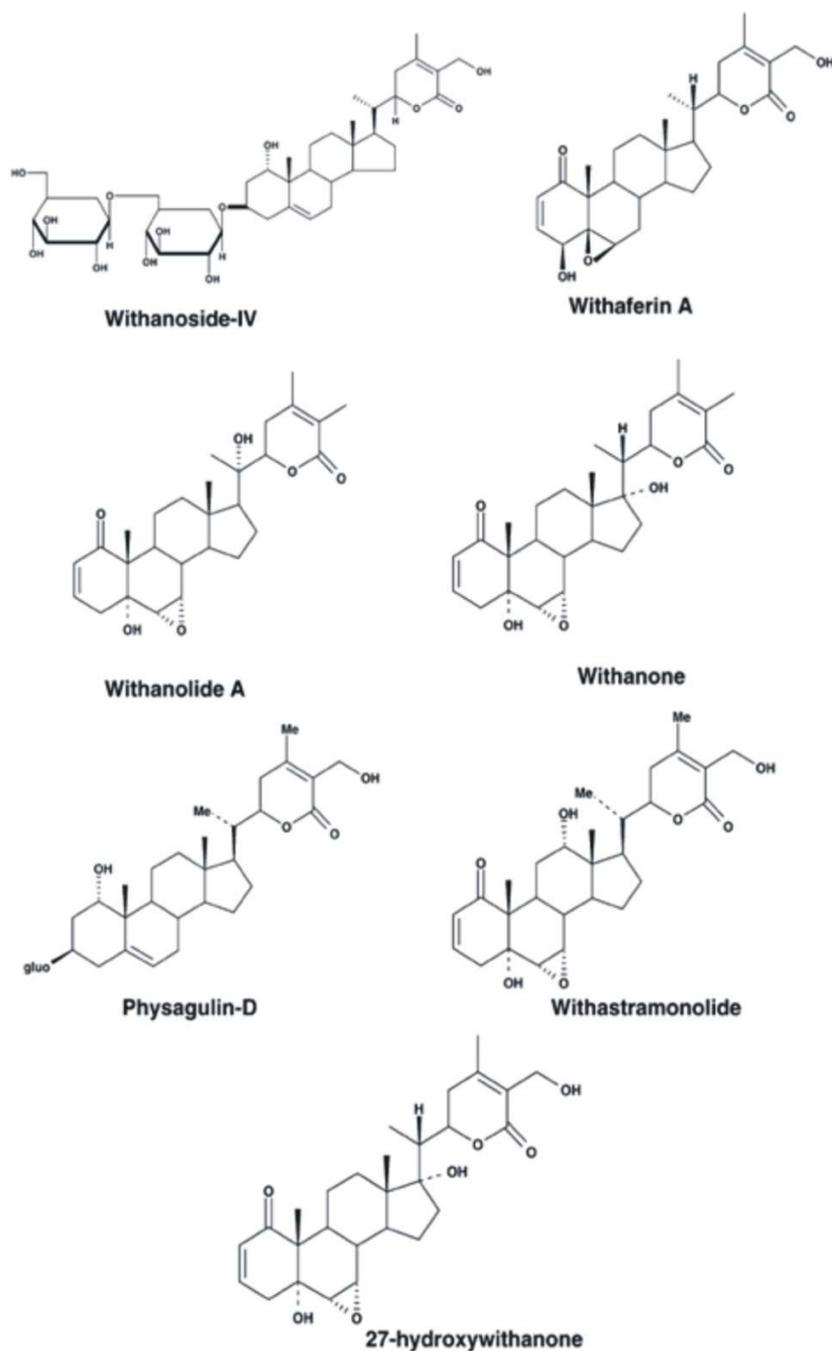
Steroidal Lactones: Withanolides, Withanoferins.

Saponins: These are with an additional acyl group (Sitoindoside VII and VIII).

Withanolides With Carbon At 27th Position: Sitoindoside IX and X.

Iron.

Others: resin, fat, coloring matters, a reducing sugar, phytosterol, Ipuranol and a mixture of saturated and unsaturated acids¹⁶.

Ayurvedic properties of Ashwagandha^{17,18,19}:**Vajikara**- Increases sexual desire**Rasayani**- Rejuvenates the body**Balya**- Increases strength**Ati shukrala**- Improves quality and quantity of semen**Shwitrupaha**- Useful in management of white discoloration of the skin**Shothahara**- Useful in management of edematous conditions and helps to clear impurities (Ama) from the various channels of the body.**Kshayapaha**- Useful in treating emaciation and under nutritive conditionsFig. 1. Structures of the main active compounds isolated from the roots and leaves of *Withania somnifera*.

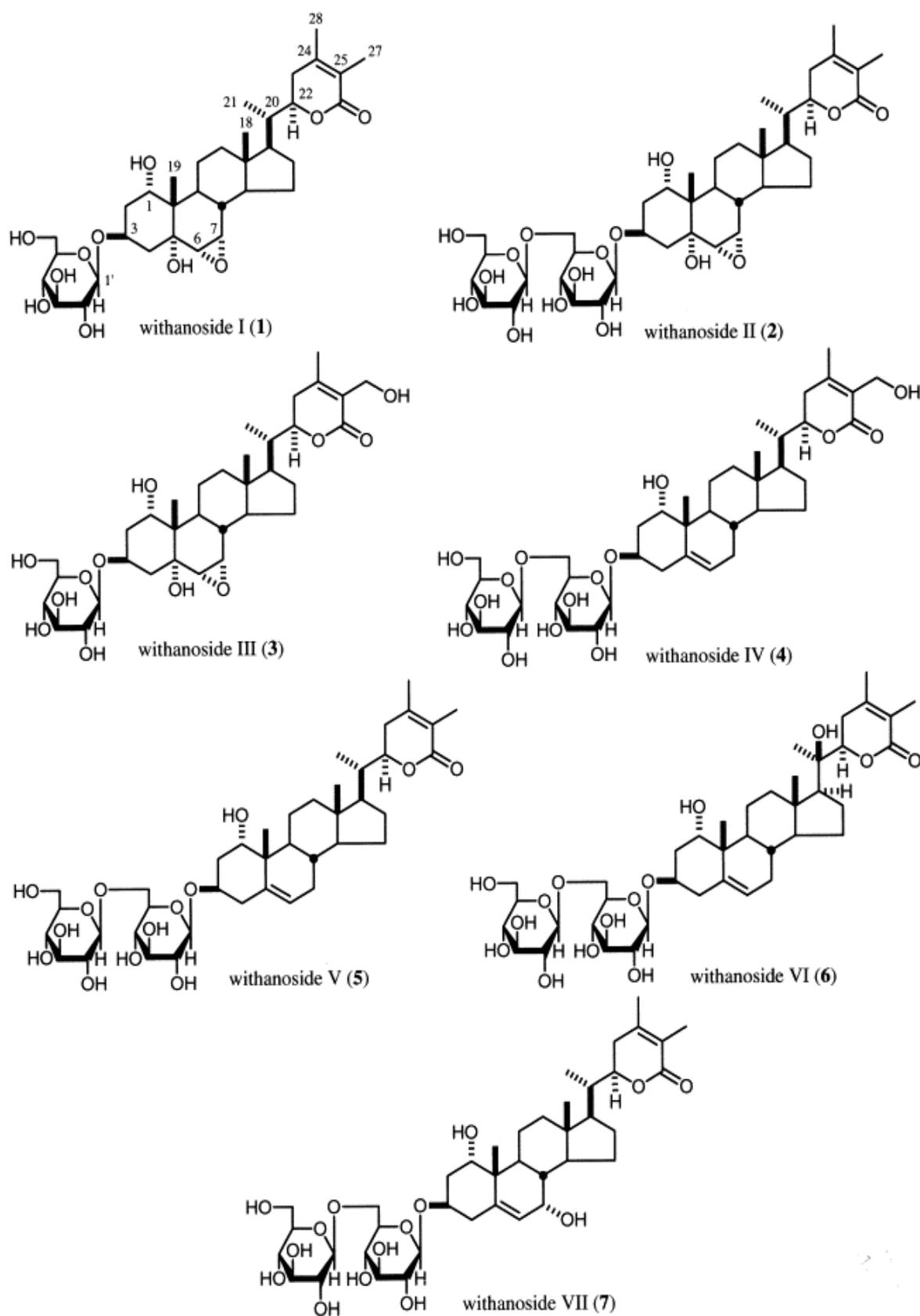


Figure-2 Active ingredients of the class withanolides

THERAPEUTIC SIGNIFICANCE

Tissues Debility, low body weight, emaciation, deficient haemoglobin, anaemia, post-convalescent weakness, athletic exertion and with caution in pregnancy. It is useful for any imbalance in the muscles as it both reduces inflammation and strengthens muscle tone. It is a specific *rasayana* for *mamsa dhatu* and it is an anabolic muscle builder. As it benefits all muscle tissue, it is used as a heart tonic, uterine tonic, lung tonic as well as for increasing muscle weight and tone in convalescents, slow developing children and the elderly. A significant improvement in hemoglobin, red blood cell count, hair melanin, and seated stature was observed. Serum cholesterol decreased and nail calcium was preserved. Erythrocyte sedimentation rate decreased significantly and 71.4 percent reported improvement in sexual performance²⁰.

Immunity Auto-immune conditions, neutropenia, rheumatoid and osteo-arthritis, cancer, and chronic connective tissue disorders. A series of animal studies show ashwagandha to have profound effects on the hematopoietic system, acting as an immunoregulator and a chemoprotective agent^{21,22}. As a painkiller and anti-inflammatory it is commonly used in swollen or painful arthritic conditions. It can strengthen a weakened immune system and protect it from becoming depleted due to immunosuppressive drugs or lifestyle. Improves white blood cell counts. It appears to have both immunosuppressive and immunotonic abilities and is therefore a ‘true’ adaptogen. In addition, this extract inhibited delayed-type hypersensitivity reactions and enhanced phagocytic activity of macrophages when compared to a control group²³. An *in vitro* study showed withanolides from *Withania somnifera* inhibited growth in human breast, central nervous system, lung, and colon cancer cell lines comparable to doxorubicin. Withaferin A more effectively inhibited growth of breast and colon cancer cell lines than did doxorubicin.

These results suggest *Withania somnifera* extracts may prevent or inhibit tumor growth in cancer patients, and suggest a potential for development of new chemotherapeutic agents²⁴.

Lungs Asthma, cough and allergic conditions from low immunity with high *kapha* and *vata*. Useful in hayfever, allergic rhinitis from aggravated *vata* and *kapha*.

Nerves Neurosis, insomnia, anxiety, ‘hyper’ symptoms and Attention deficit hyperactivity disorder (ADHD). Very useful in all conditions caused by ‘stress’ as it has a specific affinity for the *majja dhatu* and helps to regulate the movement of *vyana vayu* in the heart. Its tropism for the nervous system benefits Multiple sclerosis. It both relaxes frayed nerves and tonifies the central nervous system to enhance tolerance to stress. Ashwagandha also exhibited an antidepressant effect comparable to that induced by imipramine in the forced swim-induced “behavioral despair” and “learned helplessness” tests²⁵.

Reproductive Its rejuvenating effect on *shukra dhatu* helps to alleviate asthenospermia (increasing sperm motility), oligospermia (increasing sperm count), poor sexual performance and helps to reduce impotence. Its unique action or *prabhava* is to promote sexual potency and sperm production. External application of Ashwagandha oil is used for impotence.

Gynaecology Excellent tonic to the uterine muscles. Used in menstrual imbalance caused by a deficient condition with an aggravation of *vata* and uterine spasms; dysmenorrhoea, amenorrhoea, weakness.

Thyroid Animal studies reveal ashwagandha has a thyrotropic effect.^{26,27} Very useful in hypothyroid to regulate thyroid activity. Withania extract significantly decreased lipid peroxidation in the liver homogenate and significantly increased catalase activity, promoting scavenging of free radicals that can cause cellular damage. These results indicate Ashwagandha may be a useful medicinal plant in treating Hypothyroidism²⁸.

Other Therapeutic Considerations

Studies show Ashwagandha to be effective in the treatment of osteoarthritis,²⁹ inflammation,^{30,31} stroke³² and tardive dyskinesia³³. Studies also reveal Ashwagandha to be a potential antimicrobial agent, with antifungal activity^{34,35} and moderate antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*³⁶.

AYURVEDIC ACTION

1. Traditionally used in Ayurveda as Rasayana (rejuvenative tonic) (Sukh Dev 2006; API 2001; Upton 2000).

2. Traditionally used in Ayurveda to relieve general debility, especially during convalescence or old age (API 2001; Kapoor 2001).
3. Traditionally used in Ayurveda as a sleep aid (Khare 2004; Upton 2000).
4. Traditionally used in Ayurveda to balance aggravated Vata (nervine tonic, sedative) (Kapoor 2001; Khory and Katrak 1999; Nadkarni 1954).
5. Traditionally used in Ayurveda for memory enhancement (Sukh Dev 2006; Upton 2000; Nadkarni 1954).

WARNINGS AND CONTRAINDICATIONS

Large doses of ashwagandha may possess abortifacient properties; therefore, it should not be taken during pregnancy. Since ashwagandha acts as a mild central nervous system depressant, patients should avoid alcohol, sedatives, and other anxiolytics while taking ashwagandha.

CONCLUSION

Even though the outcomes from this review are quite hopeful for the use of Ashwagandha as a multi-purpose medicinal agent, numerous precincts presently exist in the current literature. While Ashwagandha has been used fruitfully in Ayurvedic medicine for centuries, more clinical trials should be conducted to sustain its therapeutic use. It is also imperative to be aware of having a potentiating effect when given in combination with other herbs or drugs.

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