

A Review on Ashwagandha [Withania Somnifera]

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Abstract: *Ashwagandha [Withania somnifera] is a highly revered herb in the Indian Ayurvedic system of medicine. Ashwagandha is an Ayurvedic herb commonly used in world-renowned traditional Indian medicine.*

Ashwagandha roots are traditionally known to possess a variety of therapeutic properties, and potential health promoters not adequately supported by laboratory studies. However, most, if not all, of its preventative and therapeutic potentials have been attributed to its bioactive components, steroid alkaloids and lactones. In contrast to the traditional use of the roots, we examined the bioactivities in Ashwagandha leaves. It is an anti-inflammatory and anti-arthritis agent and has been shown to be useful in clinical cases of rheumatoid arthritis and osteoarthritis. Large-scale studies are needed to demonstrate its clinical efficacy in stress-related disorders, neuronal disorders and cancer.

Keywords: *Withania Somnifera, Immune Function, Anti-Stress Activity, Anti-Inflammatory Activity*

I. INTRODUCTION

Ashwagandha (Withania somnifera), also known as Indian ginseng and Indian winter cherry, is an important ancient plant whose roots were used in the Ayurvedic and Unani systems of traditional Indian medicine. Corresponding author contact information: M.Umaddevi * Tamil Nadu Agricultural University, Coimbatore, India Email: debjit_cr@yahoo.com Grows in dry parts of subtropical regions. Rajasthan, Punjab, Haryana, Uttar Pradesh, Gujarat, Maharashtra and Madhya Pradesh are the main ashwagandha producing states in the country. Estimated production of Ashwagandha root in India is more than 1500 tons and annual demand is around 7000 tons hence more cultivation, and production required. Ashwagandha, the Indian cherry or winter ginseng, has been used as a calming and precious herb in indigenous and Ayurvedic healing systems for over 4,000 years. The roots, leaves and fruit (berries) have tremendous medicinal value. A famous Ayurvedic Ashwagandha is a rejuvenating herbal compound used in many toners and formulas, no side effects [2]. The pharmacological effects of WS roots are attributed to the presence of withanolides, a group of steroid lactones [3]. Its leaves are used in Ayurveda and Unani systems to treat tumors and tuberculous glands [4]. Several steroid withanolides lactones have been isolated from the leaves of *Withania somnifera* [5] and exhibit antibacterial, antifungal and antitumor properties [6]. Ashwagandha is used to calm the mind, relieve fatigue and nervous weakness, enhance sexual energy increase and promote deep sleep. The herb is called Rasayana. In Ayurvedic practice, it acts as a tonic for vitality and longevity. It is also classified as an adaptogen [7]. Two types of Asgand have been mentioned in Unani classical literature: 1) Asgand Nagori and 2) Asgand Dakani. AsgandNagori is preferred for its potential medicinal properties.



Fig 1. Ashwagandha

Taxonomical Classification Kingdom: Plantae, plants Subkingdom: Tracheobionta, vascular plants;

Super division: spermatophytes, seed plants;

Division: Angiosperm Class: Dicots

Order: Tubiflorae Family: Solanaceae Genus: *Withania*

Species: Dunal somnifera

Kingdom:	Plantae
Subkingdom:	Tracheobionta
Division:	Magnoliophyta
Class:	Magnoliopsida
Subclass:	Asteridae
Order:	Solanales
Family:	Solanaceae
Genus:	<i>Withania</i>
Species:	<i>somnifera</i>
Binomial name	
<i>Withania somnifera</i> (L.) Dunal	

Since ancient times, plants and herbal preparations have been used for medicine, taste, aroma or other qualities. Research conducted over the past few decades has confirmed several claims about the use of various plants in traditional medicine. Medicinal plants is of low toxicity. The effectiveness and safety of herbal medicine has attracted the majority of the pharmaceutical community to research into medicinal plants.

Withania somnifera, commonly known as Ashwagandha, Indian ginseng, The winter cherry is an important medicinal plant from the nightshade family that has been used in indigenous and Ayurvedic medicine for over 3,000 years¹. It was given local names like Punir, Asgandh (Hindi), Ashwagandha (Bengali), Ghodakun, Ghoda (Gujrati), Pulivendram (Telugu), Amukkura, Amkulang (Tamil), etc. Ashwagandha means “horse smell” in Sanskrit, which probably refers to the smell that emanates from its root and resembles that of a sweaty horse. The species name somnifera means in Latin “to make you sleep” and is said to have sedative properties. It is a xerophytic plant found in arid regions of India, Sri Lanka, Afghanistan, Balochistan and Sindh and is distributed in Mediterranean regions³. It can be used very usefully in both sexes and even during pregnancy without any side effects. Withanolides, a group of steroid lactones found in the roots of *Withania somnifera*, are attributed to the pharmacological effects of *Withania somnifera*. In addition, several steroidal withanolide lactones have been isolated from the leaves of *Withania somnifera* and exhibit antibacterial, antifungal and antitumor properties. Ashwagandha is often available as churna, a fine powder that can be mixed with



water, ghee, or honey. Increases central nervous system "CNS" function and improves memory. As a Rasayana herb, the herb's decoction and extracts exhibit excellent immunomodulatory effects by activating macrophages, granulocytes, complement systems, natural killer cells, and nonspecific lymphocytes. etc. Regular consumption is believed to reverse aging, correct sensory abnormalities and muscle wasting, rejuvenate the reproductive system and increase fertility. It is widely used in the treatment of various ailments, especially asthma, bronchitis, inflammatory diseases, ulcers and stomach problems⁸. Steroids Lactones are the most important

phytochemicals of this species⁹. Several in vitro and in vivo studies have convincingly demonstrated the ability of withania somnifera to be anti inflammatory antioxidant, antimicrobial, anxiolytic, aphrodisiac, immunomodulatory, antihyperglycaemic, anticancer, CNS depressant, hepatoprotective, lipid lowering and cardiovascular antistress, diuretic, to be adaptogen , anti-stress, anti-epileptic, anti-arthritis, impotence and suppressant HIV/AIDS⁸. Several studies have shown that ashwagandha is a very effective approach to treating neurological disorders such as Parkinson's and Alzheimer's. This review aims to highlight the main pharmacological and medicinal properties of *Withania somnifera* and to provide up-to-date information on their botanical, chemical, ethnopharmacological, phytochemical and pharmacological studies.

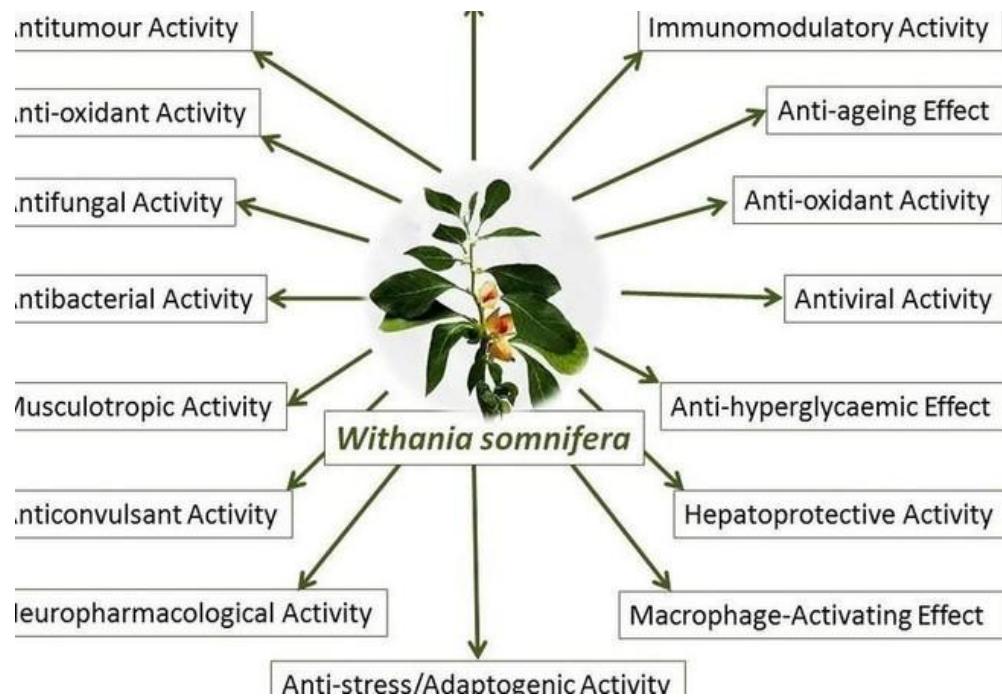
Vernacular Names Arabic: Kakanj-e-Hindi

Bengali: Ashvaganda, Asvagandha

English: Winter cherry Gujarati: Asan, Asana, Asado, Asundha, Ghadaasoda Hindi: Asgandh, Punir

Ashwagandha is a Rasayana of the Ayurvedic system of medicine. It is a really powerful restorative tonic with multiple pharmacological properties such as neuroprotective, anti-stress, anti-arthritis, anti-tumor, analgesic and anti-inflammatory properties.





India has emerged as one of the world's twelve mega-biodiversity hotspots, boasting a large number of medicinal plants. Ashwagandha [*Withania somnifera* (L.) Dunal] makes a promising contribution among the great medicinal herbs of India. It is common in Madhya Pradesh, Rajasthan, Gujarat, Punjab and Uttar Pradesh [1].

In addition to India, it is also grown in Pakistan, Afghanistan, Spain, Africa and the Canary Islands. Ashwagandha cultivation is a preferred choice for locations that are not ideal for growing food, and it thrives in a dry, low-humidity environment. The plant grows abundantly in the drier subtropical and subtropical climates of India, from the plains to 1,700 meters above sea level.

The term "Ashwagandha" was derived from Sanskrit; "Ashwa" means horse and "Gandha" means fragrance to some experts and endurance to others. The former argues that it smells like a horse, while the latter says it produces a force similar to that of a horse [2].

Its two synonyms Vajagandha and Turangagandha are listed in Charaka Samhita and Sushruta Samhita and have similar meanings to Ashwagandha. Horses are represented by the words Vaji and Turanga while Gandha is represented by the word Gandha. *Withania*, which acts as an adaptogen or tonic in traditional Ayurvedic medicine, is also known as "Indian ginseng" [3].

Although the seeds, shoots, sap, and leaves were used in ancient times, Ashwagandha root extract has great medicinal uses. current demand [4]climate conditions for growth *Withania somnifera* is grown as a late rainy season (Kharif) crop.

Semiarid areas that receive 500 to 750 mm of rainfall are suitable for growing as rain crops. When a winter rain or two comes, improves root development. The crop requires a relatively dry season during its growing season. It tolerates a temperature range of 20 to 38 °C and up to 10 °C. The plant grows from sea level to an altitude of 1500 meters.

CHEMICAL COMPOSITION :-

Laboratory analysis shows that *Withania somnifera* root contains 35 chemical components [9]

The biologically active chemical components are alkaloids (isopellertierins, anferins), steroidal lactones (withanolides, withaferin's), saponins and withanolides.

Withania somnifera is also rich in iron.

The roots of Withania somnifera consist of withanolides, believed to be responsible for its exceptional medicinal properties. Withanolides are steroids and share a similarity, both in their effect and appearance like Asian ginseng (Panax ginseng), known as ginsenosides.

Ashwagandha withanolides have been studied in a variety of animal studies examining their effects on numerous diseases, including immune function and also cancer [10].

Withanine is the most important chemical component among all alkaloids. Ashwagandha chemical analyzes show that its main components are alkaloids and steroid lactones.

The other alkaloids are sommine, withanolides, pseudo-withanine, Tropine, somniferin, somniferin, 3-acetyl-2-hydroxy-1,2-dihydro-3H-indole, choline, cuscohigrin, anapherin and anahydrin.

Two acylsteryl glucosides, namely sitoindoside VII and sitoindoside VIII, have been isolated from root. The leaves contain steroid lactones, commonly referred to as withanolides.

Withanolides contain a C28 steroid core with a C9 side chain containing a six-membered lactone ring [11].

Twelve alkaloids, 35 withanolides and several sitoindosides have been isolated and studied from Withania somnifera. Asitoindoside is a withanolide containing a glucose molecule at carbon 27.

Most of the pharmacological activity of Withania somnifera has been divided into two main withanolides, withaferin A and withanolides D.

The roots contain the steroid lactone known as withanolides and mainly show therapeutic activity and general health maintenance such as antiepileptic, anti-infectious, anti-aging, Antioxidant, hypoglycaemic, hypocholesterolemic activities, Immunomodulator, memory enhancer, anti-cancer and together a powerful adaptogen.

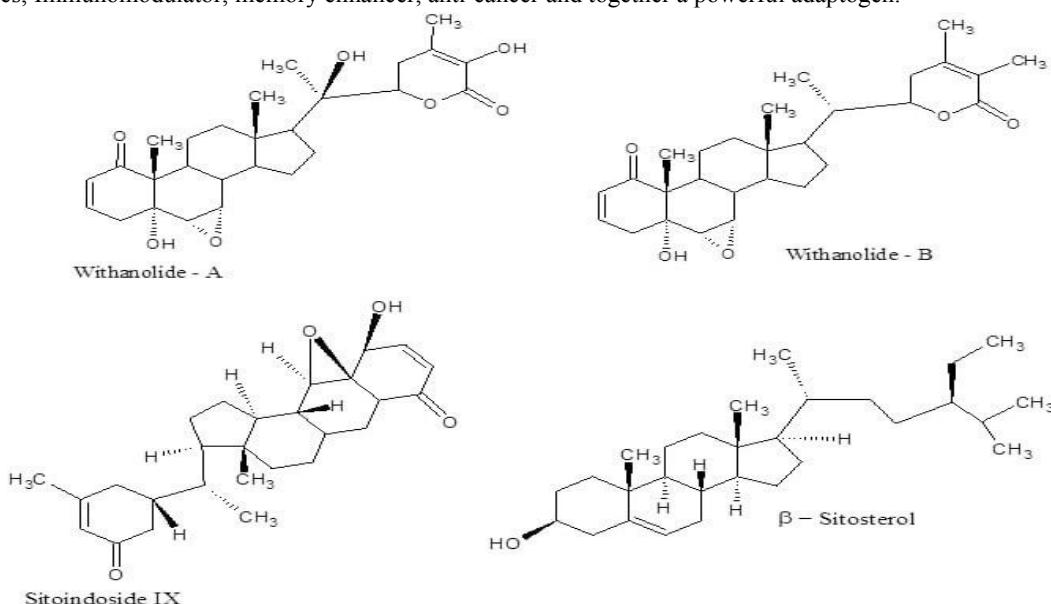


Figure 2: Structures of various chemicals and alkaloids present in ashwagandha roots.

Extraction Methods Of Ashwagandha

1] Extraction by Maceration and Hot Continuous Percolation Process

100 g of Withania somnifera dried roots were exhaustively extracted with various solvents (alcohol, water, hydro alcohol (50:50)), using different drugs – solvent ratios hot continuous percolation (10 hours) and maceration methods (10 hours).

The extracts were dried and the percentage yields of extracts were determined. Preliminary phytochemical test was carried out to identify the nature of phytoconstituents present in the extracts[12].

2] Extraction by microwave method:

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10g. of *Withania somnifera* dried roots were exhaustively extracted with various solvent (alcohol, water, hydro - alcohol (50:50) and using different drug - solvent ratios (1 : 6 , 1 : 8 and 1:10) using microwave assisted extraction for 1 -2 min. and the micro-power is used for extraction is 800 MHz The extracts were evaporated above their boiling points. Finally, the % yields were calculated of the dried extract.[13]

Biochemical-properties

The biochemical composition of *Withania somnifera* has been extensively studied and studied. About 35 compounds were analysed in the laboratory.

- Alkaloids: About 13 alkaloids are known as isopelletierine, anaferine, cuseohigrine, anahigrine, tropine, etc.
- Somniferin: It is a bitter alkaloid with some hypnotic activity.
- Steroidal lactones: withanolides, withanoferins
- Saponins: These are those that have an additional acyl group (sitoindosides VII and VIII
- Withanolides with carbon in position 27: sitoindosides IX and X.
- Iron.

Others: resin, fat, dyes, a reducing sugar, phytosterols , Purangol and a mixture of saturated and unsaturated acids.

Medicinal values

- This herb is considered an adaptogen, which is a non-toxic herb that acts non-specifically to normalize physiological function by acting on the HPA axis and the neuroendocrine system.
- Ashwagandha is effective for insomnia but does not act as a sedative. Its rejuvenating and enervating properties generate energy, which in turn helps the body calm down and sleep. Thus, it helps the body address a stress-related condition rather than masking it with sedatives. An herb that rejuvenates the nervous system, eliminates insomnia and reduces stress
- Ashwagandha has been shown to lower blood pressure and is very effective in stopping stress-related ulcers from forming
- For arthritis, which affects painful, dry, swollen and inflamed joints, ashwagandha would be the herb of choice.
- One of the special properties of Ashwagandha is that it enhances Ojas. Ojas is the most subtle and refined level of the physical body and the end result of healthy food being properly digested. It is responsible for a healthy immune system, physical strength, a glowing complexion, mental clarity and a sense of well-being. Allows consciousness to flow within the body. With the decrease in Ojas, we are less in touch with ourselves and more prone to illness and a sense of disharmony. 'Ojakshaya' (decreased ojas) is an AIDS/HIV-like condition
- Research on ashwagandha has shown that extracts from the plant have a direct spermatogenic effect on the seminiferous tubules of immature rats, presumably by exerting an effect similar to that of testosterone.
- Ashwagandha increases haemoglobin (red blood cell count) and melanin in hair. Stabilizes blood sugar and lowers cholesterol.

Immune function

Ashwagandha has been shown in studies to improve immune function as well as its ability to treat cancer. It was shown in a study where mice given a daily dose of ashwagandha increased phagocytosis and intracellular macrophage activity against a pathogen. A study in mice found that the tumor-fighting abilities of macrophages were significantly affected by ashwagandha root extract. In addition to providing an immunogenic effect, Ashwagandha was used to prevent organ failure in mice treated with immunosuppressive drugs, resulting in a significant increase in haemoglobin levels, red blood cell count, white blood cell count, platelet count and body weight [12]. Mice's immune systems were eventually suppressed using a variety of approaches before being exposed to infectious organisms in a series of studies. Mice pre-treated with any of six herbs, including ashwagandha, performed much better than controls in every experiment. The mice that received the herbs recovered quickly, with less discomfort and a very low mortality rate. These herbs reduced engineered neutropenia (a lack of neutrophils, a type of white blood cell) but increased leukocytosis (an increase in white blood cells). Antibiotics and these herbs were used together in therapies that had much better healing effects than either treatment alone. Herbs also minimized stress-related damage [13].



Antioxidant activity

Ashwagandha appears to have significant antioxidant activity, which is also one of its signalling pathways. In one study, ashwagandha was found to reduce free radical oxidation in the liver of mice while boosting the activity of antioxidant enzymes such as superoxide dismutase (SOD) and catalase [14]. In other studies, ashwagandha was found to suppress free radical activity in stress-induced mice [15]. In another study, ashwagandha administered once daily for 21 days increased SOD, catalase, and glutathione peroxidase- levels in rats in a dose-dependent manner [16]. Based on research, Ashwagandha increased SOD activity in the pancreas of diabetic rats when used as part of an Ayurvedic herbal formulation.

Mental stress exemption

Ashwagandha has been used to treat mental and emotional well-being. For example, in animal studies, it was designed to stimulate memory and cognitive function, either by increasing acetylcholine activity in the brain or by binding to cholinergic receptor sites [17]. This plant also exhibits GABA mimetic effects, meaning that it can mimic some of the relaxing effects of the neurotransmitter GABA [18,19]. However, it improves neurological and psychomotor functions by reducing mental stress.

Aphrodisiac

In a clinical experiment using Withania to study the aging process, 71.4% of male rats were found to have an increase in sexual performance. The traditional use of the herb as an antidepressant appears to be supported by these findings [20].

Anti-inflammatory and antiarthritic activity Ashwagandha has been shown to have powerful anti-inflammatory properties. For example, in one study, its anti-inflammatory activity was shown to be quite similar to that of a 5 mg/kg dose of hydrocortisone [21]. In another study, five plants were tested for their anti-inflammatory properties. Results have shown maximal anti-inflammatory effects in ashwagandha [22].

Anti-Stress and Anabolic Activity

A comparison of ginseng (Panax ginseng) and ashwagandha (Withania somnifera) was made primarily based on their useful similarities. Each herb was tested in mice for (1) anti-stress and (2) anabolic effects using aqueous reactions of the powdered root. Compared to controls, ashwagandha and ginseng had anti-stress activity, while ginseng activity was enhanced. Although both herbs had tremendous anabolic activity, the mice given ashwagandha gained greater body weight than those treated with ginseng in the anabolic study [23].

Morphine dependence

Morphine Addiction Since ashwagandha has only been tested on mice, it also has the ability to combat those used for morphine. In what appeared to be a 10-day study, ashwagandha prevented an improvement in morphine tolerance. This is crucial to building tolerance. As a substance, it often ends up in better doses and is abused. Ashwagandha also reduces the breakdown of morphine, which is a sign of morphine dependence [23]. Articular assistance Apart from the above benefits of Ashwagandha, it also aids the thyroid, liver, and pancreas work efficiently. In a scientific study, a combination of Ashwagandha and other herbs (Tinospora cordifolia, Eclipta alba, Ocimum sanctum, Picrorhiza kurroa, and shilajit) given once daily for 28 days reduced blood sugar levels and free radical activity in the pancreas of diabetic rats. Results indicated a positive relation between the reduction in blood sugar and the pancreatic free radical scavenging activity [25]. Safety A 90-day oral remedy of 3 doses of ashwagandha was administered to rats to assess performance impairment.

Investigators tested food intake, body weight, haematological, biochemical, and histopathological markers. On gross and histopathological examination, they found the brain, heart, lungs, liver, kidneys, stomach, spleen, testicles and ovaries to be normal. In rats, subacute toxicity tests did not confirm any damage [25].

Ashwagandha appears to be a safe herb. One observation, however, suggests that ashwagandha should be avoided during pregnancy.

PHARMACOLOGICAL ACTIVITY

Centuries of Ayurvedic clinical practice using *Withania somnifera* have proven its pharmacological value as an adaptogen, antibiotic, abortifacient, aphrodisiac, astringent, anti-inflammatory, deobstructive, diuretic, narcotic, sedative and tonic. Ashwagandha has been found to: Provide potent antioxidant protection Stimulate activation of cells in the immune system, including lymphocytes and phagocytes Counteract the effects of stress and commonly sell Wellness[18]

Anti-inflammatory Activity Withaferin

A exhibits quite potent antiarthritic and anti-inflammatory effects. Anti-inflammatory effects have been attributed to biologically active steroids, of which Withaferin A is a major component. It is as effective dose for dose as hydrocortisone sodium succinate [19]. It has been shown to be effective in suppressing arthritic syndrome without any harmful effects. Unlike hydrocortisone-treated animals that lost weight, apherin-treated animals with arthritis syndrome gained weight. Interestingly, withaferin A appears to be more effective than hydrocortisone in adjuvant-induced arthritis in rats, a quasi-experimental approximation of human rheumatoid arthritis. -25 mg/kg body weight of albino rats intraperitoneally and a single dose had a real breakthrough time as it is able to effectively suppress the infection after 4 hours administration [20]. Asgand (*Withania somnifera*) has been shown to possess anti-inflammatory residences in many animal forms of infection, including carrageenan-induced infection, cotton ball granuloma, and adjuvant-induced arthritis. Detailed studies were performed to monitor the release of serum β -1 globulin during infection using modes of infection viz. Major segment of adjuvant-induced arthritis and formaldehyde-induced arthritis. The experiments showed

Antibiotic Activity

Recently, the antibiotic activity of the roots and leaves has been demonstrated experimentally. Withaferin A at a concentration of 10 μ g/ml inhibits the growth of various gram-positive bacteria, aerobic and acid-fast bacilli and pathogenic fungi. Active against *Micrococcus pyogenes* var. *aureus* and partially inhibited the activity of *Bacillus subtilis* glucose-6-phosphate dehydrogenase. Withaferin A inhibited ranikhet virus. The shrub extract is effective against vaccinia viruses and *Entamoeba histolytica* [26]. Asgand demonstrated the protective effect against systemic infections caused by *Aspergillus*. This protective activity was likely associated with activation of macrophage function, as evidenced by the observed increase in phagocytosis and intracellular destruction of peritoneal macrophages induced by Ashwagandha treatment in mice. [27] The antibiotic activity of Withaferin A is due to the presence of the unsaturated lactone ring. The lactone showed potent therapeutic activity in experimentally induced abscesses in rabbits, slightly stronger than penicillin. This supports the reputation of the leaves as a healing agent for ulcers and carbuncles in the indigenous medicinal system [28].

Antioxidant effect

The brain and nervous system are relatively more susceptible to free radical damage than other tissues because they are rich in lipids and iron, both of which are known to be important in the formation of reactive oxygen species. Age and neurodegenerative diseases such as epilepsy, schizophrenia, Parkinson's, Alzheimer's and other diseases. Levels of enzymes, superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) in rat brain frontal cortex and striatum. Decreased activity of these enzymes leads to the accumulation of toxic oxidative free radicals and the resulting degenerative effects. Increasing these enzymes would represent greater antioxidant activity and a protective effect on neuronal tissue. WS-active glycowithanolides were administered once daily for 21 days, dose-dependent increases in all enzymes were observed; the increases are comparable to those observed with the administration of diphenyl (a known antioxidant). This implies that WS has an antioxidant effect in the brain, which could explain its various pharmacological properties [29]. Another study evaluated the effect of, an aqueous suspension of WS root extract, on stress-induced lipid peroxidation (SLP) in mice and rabbits. Lipopolysaccharides (LPS) and peptidoglycans (PGN) from *Klebsiella pneumoniae* increased blood levels of LPO from *Staphylococcus aureus*. Simultaneous oral administration of the WS extract prevented an increase in LPO [30]. In addition to liver lipid peroxidation (LPO), the serum enzymes alanine aminotransferase, aspartate aminotransferase and lactate dehydrogenase were evaluated as



indicators of hepatotoxicity. Silymarin (20 mg/kg, p.) was used as a comparison. Iron overload induced a marked increase in serum enzyme and liver LPO levels, which was dose-attenuated by glycowithanolides (WSG) and silymarin [31].

Anti-aging activity

Ashwagandha was tested for its anti-aging properties in a double-blind clinical study. A group of 101 healthy men aged 50 to 59 were given the herb at a dose of 3 grams daily for a year. Subjects experienced significant improvements in haemoglobin, red blood cell count, hair melanin, and seat height. Serum cholesterol decreased and nail calcium was preserved. Seventy percent of study participants reported an improvement in sexual performance [32].

Anticonvulsant activity

Asgand root extract administration was found to reduce twitches and clonus and decrease the severity of twitches in 70% and 10% of animals, respectively, at a dose of 100 mg/kg and the EEG wave pattern. Asgand root extract demonstrated a reduction in the severity of motor seizures induced by electrical stimulation in the right basolateral nucleus-tonsil complex via bipolar electrodes.

Nootropic activity And The effects of sitoindosides

VII-X and Withaferin, isolated from the aqueous methanol extract of roots of cultivated WS cultivars, were tested on cholinergic, glutamatergic and GABAergic receptors in rat brain. The compounds slightly increased acetylcholinesterase (AChE) activity in the lateral septum and globus pallidus and decreased AChE activity in the vertical diagonal band. These changes were accompanied by increased M1 muscarinic cholinergic receptor binding in the lateral and medial septal and frontal cortices, whereas M2 muscarinic receptor binding sites were increased in multiple cortical regions. Regions including the cingulate, frontal, parietal, and retrosplenial cortex. The data suggest that the compounds preferentially affect events in the basal and cortical forebrain cholinergic signalling cascade people. WS; WS root) induced by neurite outgrowth in cultured rat cortical neurons was identified as the major metabolite after oral intravenous administration of withanoside. Sominon significantly induced axonal and dendritic regeneration and synaptic reconstruction in cortical neurons of cultured Abeta-damaged rats. Withanolides IV can improve neuronal dysfunction in Alzheimer's disease and that the active ingredient after metabolism is Sominon. In another study, animals treated with reserpine also showed poor memory performance in the elevated cross maze task paradigm. Chronic administration of WS significantly reversed reserpine-induced retention deficits. In several studies, WS root extract improved retention of a passive avoidance task in a reduction paradigm in mice. WS also reversed the scopolamine-induced disruption in acquisition and retention and treatment-induced amnesia of attenuated acute electroconvulsive discharge (ECS) immediately after exercise. SEC treatment. WS is said to show a nootropic effect in naïve and amnesiac mice.

Antiparkinsonian properties

Parkinson's disease is a neurodegenerative disorder characterized by a selective deficiency of dopaminergic (DA) neurons from the substantia nigra pars compacta. However, the events causing and/or mediating the deficiency of nigral DA neurons remain unclear. Neuroleptic-induced catalepsy has long been used as an animal version to screen pills for Parkinsonism. Administration of haloperidol or reserpine caused catalepsy in mice. Reserpine-induced catalepsy and desire for treatment of Parkinson's disease. In another study, 6-hydroxydopamine (6-OHDA) is one of the most commonly used rat models of Parkinson's disease. There is ample evidence in the literature that 6-OHDA causes its toxic manifestations through oxidative stress.

Antiparkinsonian effects of WS extract have been suspected in numerous diseases due to its powerful antioxidant, antiperoxidative and free radical quenching properties. Rats were previously treated orally with the WS extract for three weeks. On day 21, 6-OHDA was infused into the correct striatum even as the sham received vehicle. Three weeks after 6-OHDA injections, rats were evaluated by neurobehavioral hobby and sacrificed five weeks after injury for lipid peroxidation, decreased glutathione levels, glutathione-S-transferase sport, glutathione reductase, GPX, SOD, and CAT,



catecholamine levels, D2 dopamine receptor binding, and tyrosine hydroxylase expression. The WS extract significantly reversed all parameters in a dose-dependent manner. Tardive dyskinesia is one of the predominant side effects of long-term treatment with neuroleptics.

The pathophysiology of this disabling and often irreversible motion sickness remains unclear. Empty chewing movements are very common in rats as the animal version of tardive dyskinesia. Oxidative stress and lipid peroxidation products are implicated in the pathophysiology of tardive dyskinesia. Repeated treatment with reserpine on alternate days over a period of days induced empty chewing movements and tongue protrusion in rats. Chronic remedy with WS root extract for a period of four weeks in animals treated with reserpine noticeable and dose-dependently decreasing. Reserpine caused empty chewing movements and protruding tongue. In another study, WS-glycowithanolides (WSG) co-administered with haloperidol for 28 days inhibited the induction of the neuroleptic drug TD. however, it was not affected by the GAB-aminergic antiepileptic sodium valproate, both of which are distributing Administered as WSG for 28 days. Antioxidant effect of WSG, against its GABA mimetic movement, proposed to prevent haloperidol-induced TD.

WS significantly reversed catalepsy, tardive dyskinesia and toxic manifestations caused by 6-hydroxydopamine and may offer a new therapeutic approach for the treatment of Parkinson's disease. The cardiovascular protection of WS may be useful as a general tonic, in part due to its beneficial effects on the cardiopulmonary system, as reported in the following studies. The effect of WS on the cardiovascular and respiratory systems has been studied in dogs and frogs [46]. The alkaloids had sustained hypotensive, antibradycardia, and respiratory stimulant effects in dogs. The study found that the antihypertensive effect was mainly due to the blocking effect of autonomic ganglia and that a depressant effect in higher brain centres also contributed to hypotension. The alkaloids stimulated the vasomotor and respiratory centres in the dog's brainstem. The cardioinhibitory effect in dogs appears to be due to ganglion blockade and direct cardio depressant effects. The alkaloids produced immediate but short-lived prominent cardiopressor effects and a weak but sustained cardiotonic effect in isolated normalandhypodynamic frog hearts. In another study, left ventricular dysfunction was observed as a decrease in heart rate, a change in left ventricular maximum positive and negative rates, and an increase in left ventricular end-diastolic pressure in the control group. the experimental rat model with isoprenaline-induced myonecrosis. Increasing endogenous antioxidants, maintaining myocardial antioxidant status and significantly restoring most of the altered hemodynamic parameters may contribute to its cardioprotective effect .

Immunomodulatory Activity

Asgand demonstrated significant modulation of immunoreactivity in animal models. Asgand administration was found to prevent myelosuppression in mice treated with three immunosuppressive drugs, namely cyclophosphamide, azathioprine and prednisolone. Asgand treatment was found to significantly increase Hb concentration, red blood cell count, platelet count and body weight in mice [48]. Asgand extract administration was found to significantly reduce cyclophosphamide (CTX)-induced leukopenia .Asgand extract administration increased the number of β -esterase-positive cells in the bone marrow of CTX-treated animals compared to the CTX-only group . Administration of Asgand extract was found to significantly reduce leukopenia induced by a lethal underdose of gamma radiation. Withaferin A and withanolides E showed specific immunosuppressive effects on human B and T lymphocytes and mouse thymocytes. Withaferin E had a specific effect on T lymphocytes in . Withaferin A affected both B and T lymphocytes.

Anti-hyperglycemic Effect

Asgand, together with other components of a compound formulation (Transenna), has been reported to reduce streptococcal (STZ)-induced hyperglycemia in rats. STZ is a consequence of decreased superoxide dismutase (SOD) activity of pancreatic islet cells to accumulate degenerative oxidative free radicals in the beta islets [

Hypolipidemic effect

WS root powder reduced total lipids, cholesterol and triglycerides in hypercholesterolemic animals. On the other hand, it significantly increased the plasma levels of HDL cholesterol, the activity of HMG-CoA reductase and the content of bile acids in the liver. A similar trend in the excretion of bile acids, cholesterol and neutral sterols was also reported in



hypercholesterolemic animals after WS administration. In addition, there was a significant reduction in lipid peroxidation in hypercholesterolemic animals receiving WS compared to % in their normal counterparts. However, WS root powder was also effective in lowering lipid profiles in healthy subjects [52]. In another study of the coagulating aqueous extract of withania fruit in hyperlipidemic rats induced by a high-fat diet for 7 weeks, it significantly reduced elevated lipid levels. Serum levels of cholesterol, triglycerides and lipoproteins. This drug also showed hypolipidemic activity in newt-induced hypercholesterolemia. Histopathological examination of liver tissue from treated hyperlipidemic rats showed comparatively minor degenerative changes compared to hyperlipidemic controls. The lipid-lowering effect of the coagulation-promoting fruits of *Withania* has been described as being comparable to that of an Ayurvedic product containing *Commiphora mukkul*. Another study examined the hypoglycaemic, diuretic, and hypocholesterolemic effects of WS roots in humans. Six subjects with mild NIDDM and six subjects with mild hypercholesterolemia were treated with WS root powder for 30 days. The subjects' blood and urine samples were analysed for appropriate parameters along with the dietary pattern of before and at the end of the treatment period. The blood glucose reduction was comparable to that of an oral hypoglycaemic drug. There was a significant increase in urine sodium, urine volume, a significant decrease in serum cholesterol, triglycerides, LDL cholesterol (low density lipoprotein) and VLDL cholesterol (very high). low-density lipoprotein), indicating that WSroot a is a potential source of hypoglycaemic, diuretic, and hypocholesterolemic agents .

Sexual behavior

The methanolic extract of WS root was orally administered to rats at a dose of 3000 mg/kg/day for 7 days. Their sexual behavior was assessed 7 days before treatment, on days 3 and 7 of treatment, and on days 7, 14, and 30 after treatment by mating each male with a receptive female. WS root extract induced marked impairment in penile libido, sexual performance, sexual potency and erectile dysfunction. These effects were partially reversible upon cessation of treatment. This anti-male effect onwas not due to changes in testosterone levels, but was instead attributed to hyperprolactinaemic, GABAergic, serotonergic, or sedative activities of the extract. WS roots can be detrimental to male sexual competence .

Anti-carcinogenic activity

Ashwagandha is said to have anti-cancer properties. Research in animal cell cultures has shown that the herb reduces the concentration of the nuclear factor kappa, suppresses intracellular tumor necrosis factor and enhances apoptotic signalling in cancer cell lines and tumor size. To study its use in treating different types of cancer, researchers examined the antitumor effects of *Withania sominifera*. One study examined the herb's antitumor effects in urethane-induced lung tumors in Adult male mice. After administration of ashwagandha for a period of seven months, the histological appearance of the lungs of the animals given the herb was similar to that of the lungs of control animals.

Ashwagandha for Weight Loss

TPI JOURNAL Vol.1 No.nine 2012 www.thepharmajournal.com Page | one zero five Ashwagandha, additionally referred to as wintry weather cherry or Indian ginseng, has herbal antioxidants. Therefore, it could enhance universal fitness and sell higher fats burning. In addition, it reveals herbal antimicrobial consequences and may enhance immune characteristic. The frame is going right into a survival mode whilst immune characteristic is compromised with the aid of using pathogens. it isn't a concern for the frame and the weight reduction will as a minimum forestall till the frame completely recovers. Therefore, higher immunity best has a wonderful impact on weight reduction. Because it enables relieve strain and construct a compromised immune system, ashwagandha may be a boon for those who need to shed pounds however are continuously worn-out or get unwell often. It also can lessen inflammation, which may be not unusual place in those who are overweight. Ashwagandha, that is excessive in iron, can assist shape purple blood cells and enhance circulation. According to Brenda Watson and Leonard Smith, the Ashwagandha is the writer of The Fiber35 Diet: Nature's Weight Loss Secret and can assist with strain-associated weight advantage. Cortisol is a hormone produced with the aid of using the adrenal glands. anxious consuming and tension Cortisol is launched in big portions in annoying conditions and as a survival hormone stimulates glucose manufacturing and triggers a starvation reaction

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within the brain. Weight advantage because of excessive cortisol tiers has tendency to build up within the womb. Ashwagandha can clearly decrease cortisol tiers with the aid of using as much as 26%, in keeping with Life Extension mag article "Stress Relief, Neural Protection and Much More from an Ancient Herb" with the aid of using Dale Kiefer. is an adaptogenic herb, helps cortisol manufacturing and the adrenal glands. Some research have proven that Ashwagandha's adaptogenic residences are especially effective whilst utilized in synergistic aggregate with comparable herbs. Watson and Smith advocate the usage of a potent, standardized extract of ashwagandha root alongside the herb eleuthero root and robiola rosea, that are additionally adaptogens, to obtain most fulfilling weight reduction. Because ashwagandha itself is stimulant-free, it could be a secure addition to weight reduction dietary supplements like inexperienced green tea.

ASHWAGANDHA BENEFITS

Ashwagandha utilizes all elements of the body and can be used as a tonic or taken orally. Several researches

II. CONCLUSION

Ashwagandha is a couple of pharmacological movements like anti-strain, neuroprotective, antitumor, anti-arthritic, analgesic and anti-inflammatory etc. It is beneficial for special varieties of illnesses like Parkinson, dementia, reminiscence loss, strain brought on illnesses, malignoma and others.

Ashwagandha is used as a family treatment via way of means of Indians, who don't forget it because the first-rate tonic for antique humans and children, and as aphrodisiac via way of means of younger humans. It is one of the first-rate nervine tonics of Ayurveda, the maximum historic gadget of Medical Sciences.

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