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ASHWAGANDHA: A GIFT OF GOD

Aastha Vithalkar¹, Keshav Kaiwartya¹ and Yashwant Kumar Patel^{2,*}

¹Guest Faculty, Dept of FPT, UTD, Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur, Chhattisgarh, India

²Asstt. Prof. and Head, Dept of FPT, UTD, Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur, Chhattisgarh, India

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*Corresponding Author:
Yashwant Kumar Patel

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ABSTRACT

Ashwagandha, also known as *Withania somnifera*, is a herb that has been utilised in traditional Indian medicine since the time of Ayurveda. The plant's dried roots are used to treat neurological and sexual issues. This review article is provided to consolidate all the most recent data on its pharmacological and phytochemical actions, which were carried out using a variety of various techniques. According to studies, ashwagandha has anti-inflammatory, anticancer, memory-enhancing, anti-parkinsonian, adaptogen, antioxidant, and anxiolytic activities. There have also been studies on a number of other effects, including immunomodulation, hypolipidemia, antimicrobial, cardiovascular protection, sexual behaviour, tolerance, and dependency. These results are quite positive and suggest that more research on this plant is necessary to validate these findings and elucidate additional possible therapeutic benefits. The plant is a typically upright, branching, unarmed shrub that may grow up to 1.25 metres tall and is native to subtropical India and other dry regions of the world. It is mostly grown in Madhya Pradesh and Rajasthan, and both domestic and export use in India is enormous. It has to be carefully cultivated because it is vulnerable to a number of pests and illnesses. The two primary withanolides that contribute to the majority of biological effects are withaferin A and withanolide D. It has pharmacological effects on practically all bodily systems. Additionally, it has various negative effects and restrictions A variety of biological activities, including anti-inflammatory properties, hepatoprotective activity, infertility activity, anti-bacterial activity, psychotropic/anti-anxiety activity, anti-convulsant activity, skin care activity, healthy hair activity, immune-modulator activity, anti-peroxidative action, anti-ageing effect, macrophage activating effect, haemopoietic effect, antibiotic activity, and more, have been observed in pharmacological studies. The plant's morphology, geographic distribution, cultivation and market value, plant pathology, Ayurvedic properties, chemical components, medicinal uses in Ayurveda, side effects and contraindications, and pharmacological evidence are all covered in this review of *Withania somnifera* (Linn) Dunal (*Ashwagandha*).

INTRODUCTION

One of the most significant sources of medications in the world is plants. Many of the medications that are currently prescribed come from plants, such as morphine from *Papaver somniferum*, eugenol from *Ocimum sanctum*, ephedrine from *Ephedra vulgaris*, atropine from *Atropa belladonna*, and reserpine from *Rhodelphia serpentina*, among others. The therapeutically significant secondary metabolites and essential oils are abundant in the medicinal plants. In addition to being cost-effective, safe, and readily available, medicinal plants are said to provide substantial benefits for treating a variety of diseases (Atal et al., 1989; Siddiqui et al., 1993). These benefits have led to a widespread usage of medicinal plants in daily practice by practitioners of traditional medicine. A World Health Organisation (WHO) survey conducted in 1993 found that around 80% of patients in India, 85% of patients in Burma, and 90% of patients in Bangladesh are treated by practitioners of traditional systems of medicine.

Ashwagandha is sometimes referred to as "Indian Ginseng" or "Indian Winter cherry" (*Withania somnifera*, family Solanaceae). It has been used for millennia as a Rasayana for its extensive range of health effects, making it one of the most significant herbs in Ayurveda (India's ancient system of medicine). Rasayana is defined as a herbal or metallic concoction that enhances happiness and fosters a young state of physical and mental health. Small children are given these medicines as tonics, while middle-aged and elderly people use them to lengthen their lives. The most important place belongs to Ashwagandha among the ayurvedic Rasayana herbs. According to Chanchhadi (1938), it is called as "Sattvic Kapha Rasayana" Herb. In all major disease categories, natural products play a significant role in the development of novel medication architectures. They constitute a collection of favoured structures that have undergone selective pressure during evolution in order to interact with proteins and other molecules (Caraka, 1994). Ashwagandha is cited in several Ayurvedic samhitas as being a crucial plant in herbal and Ayurvedic treatment. Ashwagandha is a herb used in Ayurvedic medicine to treat a variety

of ailments, including arthritis, anxiety, tumours, TB, leukoderma, bronchitis, backaches, fibromyalgia, menstrual irregularities, hiccups, chronic liver disease, among others. One of the most significant medicinal plants is *Withania somnifera* (Fam. Solanaceae), sometimes referred to as "ashwagandha" and utilised alone or in combination with other medicinal herbs in various ayurvedic formulations. Local medical professionals utilise it to treat a range of diseases. Indian medicinal plants have been used successfully in traditional medical systems to treat a variety of disease conditions, including bronchial asthma, chronic fever, cold, cough, malaria, dysentery, convulsions, diabetes, diarrhoea, arthritis, emetic syndrome, skin diseases, insect bites, etc. as well as disorders of the gastrointestinal, hepatic, cardiovascular, and immune systems (Sanyal, 1989). Ashwagandha is used to improve sound sleep, enhance sexual vitality, reduce weakness and nervous tiredness, and soothe the mind. In Ayurvedic medicine, the plant is known as a rasayana, which means it functions as a tonic for longevity and energy. Additionally, it is a recognised adaptogen. (Alternative Medicine Review, 2008). Two varieties of *Asgand* have been mentioned in classical Unani literature: 1) *Asgand Nagori* and 2) *Asgand Dakani*. *Asgand Nagori* is preferred for its more potential medicinal properties (Behl *et al.*, 1993).

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 |

BOTANICAL DESCRIPTION: The Solanaceae family includes the tiny, woody shrub known as ashwagandha, which reaches a height of approximately two feet. It grows throughout Africa, the Mediterranean region, and India. A 30-150 cm tall, upright, evergreen, tomentose shrub that can be found on bunds and in waste areas all across the drier sections of India. Inconspicuous greenish or lubrid-yellow flowers in axillary, umbellate cymes; small, globose, mature orange-red berries enclosed in the persistent calyx; yellow, reniform seeds; stout fleshy roots; glabrous leaves; smaller, opposite leaves in the floral region. The primary plant parts used for medicinal purposes are the roots. The fruit, which has a vivid red colour, is picked in the late autumn, and the seeds are preserved for spring sowing.

Parts used: Whole plant, roots, leaves, stem, green berries, fruits, seeds, bark are used.

VERNACULAR NAMES: 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, Kiremallinagida; Goa: Fatarfoda; Punjabi: *Asgand*, *isgand*; Bombay: *Asgund*, *asvagandha*; Rajasthan: Chirpotan

GEOGRAPHICAL DISTRIBUTION: All of the drier regions of subtropical India support the growth of *Withania somnifera* (Linn) Dunal. It may be found in large quantities in North Western India, including Bombay, Gujarat, Rajasthan, Madhya Pradesh, Uttar Pradesh, and Punjab plains that stretch to the Himalayan Mountain ranges of Punjab, Himachal Pradesh, and Jammu. Additionally, reports of the wild expansion of this species have come from Pakistan, Afghanistan, Israel, Egypt, Jordan, Morocco, Spain, the Canary Islands, Eastern Africa, the Congo, South Africa, and other countries.

Ayurvedic properties: Rasa- Tikta, Kasaya, Madhura, Guna-Snigdha, Laghu, Virya- Usna, Vipaka- Madhura, Doshakarman- Kapha Vata Samaka

Cultivation and market value: The types grown include *Jawahar Asgandh-20*, *Jawahar Asgandh-134*, and *Rakshita*, and they are mostly grown in Madhya Pradesh and Rajasthan. Ashwagandha cultivation doesn't require a lot of time or effort. Even on soil that is unsuitable for other crops, the crop is cultivated. Direct spreading of seeds (broadcasting) is the technique of propagation, and the planting season is from June to September. This crop may be planted without the need for further soil treatment or preparation. Most of the crop is cultivated using residual fertility. Therefore, no fertilisers were used. However, the use of nitrogenous fertilisers, such as ammonium sulphate, results in plants with vigorous leaf development and little roots. During the whole growing season, there is no irrigation. A lot of rain is bad because it encourages a lot of weed growth. The three main diseases are seedling blight, seedling rotting, and damping off. It is advised to treat seeds with captan (3 gm/kg of seeds). In December and January, the plants develop their flowers and fruits. As a result, the crop is ready in six months, and harvesting begins in January and lasts until March. At the end of six months, a yield of 50–75 kg seeds/hectar and 300–400 kg roots/hectar was produced. It is both exported and consumed extensively domestically in India. (Meher *et al.*, 2016).

BENEFITS OF INDIVIDUAL PART OF ASHWAGANDHA HERB

ROOTS

Active Constituents: Starch, reducing sugars, glycosides, dulcitol, with anil, an acid, and a neutral substance are reportedly present in methanol, hexane, and diethyl ether extracts, as well as alkaloid and steroid percentages in the roots. Aspartic acid and glycine are two of the known amino acids from the roots.

Therapeutic Uses: It is regarded as a stimulant, tonic, narcotic, diuretic, anthelmintic, astringent, and tonic. Emaciation in children (when given to children with milk, it is the finest tonic), old age debility, rheumatism, vitiated vata conditions, sleeplessness, mental breakdowns, goitre, leucoderma, constipation, etc. are all ailments for which it is frequently used (Singh *et al.*, 2011).

LEAVES

Active Constituents: Methanol, hexane and diethyl ether extracts, Withaferin-A

Therapeutic Uses: Leaves taste bitter and are indicated in painful swellings and fever

FLOWERS AND SEEDS

Active Constituents: Ashwagandha Arishta made from seeds is used to treat hysteria, syncope, memory loss, and anxiety. Additionally, it stimulates the body, which raises the sperm count.

Therapeutic Uses: Flowers are depurative, diuretic and aphrodisiac, astringent. Seeds are anthelmintic and in combination with rock salts are useful in removing white spots from the cornea

ACTIVE COMPOUNDS

Ashwagandha is distinguished by having an abundant phytochemical makeup. The raw material has a varied composition of chemical components depending on its location. Its active ingredients, witanolides and alkaloids, are essential to the pharmacological activity. The fundamental structure of witanolides is that of ergostane, which comprises a lactone ring with six members at the C-8 or C-9 position. Witanolides A-Y, Witanone, Witadomniferin A, and Witasomniferols A-C are all members of this category. There are several different types of alkaloids, such as witanin, somniferin, sommin, tropin, somniferinin, choline, kuskohigrin, isopelletierin, and anaferin (John *et al.*, 2014). Flavonoids including 3-O-rutinoside, 6,8-dihydroxycemferol, quercetin, and its glycosidic derivative 3-O-

rutinoside-7-O-glucoside are also found in the raw material. The raw material also contains witanolid glycosides, which are carbohydrates with a glucose component at position C-27 in their structure. Both sitoindoside IX and sitoindoside X belong to this category of substances. Additionally, the steroidal saponins sitoindoside VII and VIII in ashwagandha have an acyl group. The raw material has also been found to include saponins, coumarins (scopoletin), sterols, chlorogenic acid, resins, lipids, carbohydrates, and fatty acids. (Dutta *et al.*, 2019).

CLASSIC USES OF ASHWAGANDHA

According to the Charak Samhita (1949), the traditional medical method used in India, known as Ayurveda, dates back to 6000 BC. Ashwagandha has been utilised as a Rasayana throughout the majority of these 6000 years. The root of Ashwagandha is valued for its tonic, narcotic, diuretic, anthelmintic, astringent, stimulant, and thermogenic properties. Because of the root's horse-like ("ashwa") odour and its ability to imbue users with equine strength, Ashwagandha is so named. Emaciation in children (when taken with milk, it is the finest tonic for youngsters), old age debility, rheumatism, leucoderma, constipation, sleeplessness, neurological breakdown, goitre, etc. are all situations where it is frequently utilised (Sharma, 1999). Applying the paste created when roots are crushed with water helps to alleviate joint inflammation (Bhandari, 1970). Carbuncles, ulcers, and uncomfortable swellings can also be treated locally with it (Kritikar and Basu, 1935). For both scorpion stings and snake venom, the root is administered in conjunction with other medications. In addition, it treats piles, worms, flatulent colic, boils, acne, and leucorrhoea (Misra, 2004). The Nagori Ashwagandha is the best Ashwagandha variety available. Fresh Ashwagandha powder provides the greatest effect (Singh, 1983). The bitter leaves are suggested for fever and throbbing swellings. The flowers have aphrodisiac, diuretic, astringent, and depurative properties. The seeds are anthelmintic and erase white spots from the cornea when mixed with an astringent and rock salt. It is used to make ashwagandharishta, which is used for hysteria, anxiety, memory loss, syncope, etc. Additionally, it stimulates the body and raises the sperm count (Sharma, 1938).

MEDICINAL USES IN AYURVEDA

Useful part of Ashwagandha is mainly the root. Seeds, leaves and fruits are also used as medicine.

External Uses: As it lowers oedema and discomfort, ashwagandha leaves and root paste are applied to swollen cervical glands or swelling of other glands. Vata disorders and weakness are treated with oil massage. Ashwagandha leaf juice is used as eardrops for ear discharge. Black root ashes are put on blisters to aid in their healing. The dried leaves are crushed into a powder, from which a paste is produced and applied to women's faces as sunscreen and to cure burns and wounds.

Internal uses

Nervous System: As a sedative, tranquillizer, and nervine tonic, ashwagandha root is beneficial for tonic nerves as well as for fainting, giddiness, and insomnia (the Latin name for the species *somnifera* is "sleep-inducing"; Stern, 1995). Additionally, it is taken as a general tonic, as a "adaptogen" to assist the body handle daily stress, and to sharpen the mind. Additionally, it enhances mental processes related to memory, such as focus and attention, which lessens the effects of Parkinson's, Alzheimer's, and other neuro-degenerative disorders. It allows the body to store and maintain essential energy during the day and encourages restful, pleasant sleep at night. All muscle tissues, including those in the heart and lungs, are benefited by, strengthened, and toned by ashwagandha. It improves muscular tone while also reducing muscle inflammation. It is the perfect treatment for weakness, low body weight, and muscle aches, pains, and stiffness.

Digestive system: Because of its appetiser, carminative, and anthelmintic properties, the bark powder of Ashwagandha is used to treat worms, constipation, and stomach discomfort.

Circulatory system: Ashwagandha affects the heart, cleans the blood, and lessens swelling. As a result, it is utilised for oedema, blood problems, and heart weakness. Rheumatoid arthritis is treated with the decoction. respiratory system: Ashwagandha helps with coughing since it is an expectorant and has anti-asthmatic properties. Asthma may be treated with ashwagandha ash, ghee, and honey. If the phlegm is thin, it might be utilised as ash or an alkaline extract. Bark decoction should be used in small doses to treat cough and asthma. In the aforementioned situations, it is also utilised as a tonic.

Reproductive system: Ashwagandha is regarded as a sukrala, or semenagogue, which raises the production of sperm. It is used to treat semen problems and is widely recognised for its aphrodisiac qualities. A wonderful tonic, nutritive, and aphrodisiac is a combination of 5 gms of Ashwagandha powder, 10 gms of ghee, and sugar with 250 ml of milk. Endometritis-related leucorrhoea and puerperal backaches are entirely cured by it.

Urinary system: It is used as a diuretic for oliguria or anurea. Skin: Ashwagandha churna is recommended for wrinkled skin, early ageing, and early hair greying. It is used to treat vitiligo and other skin conditions.

Satmilkaran: It is an aphrodisiac, raises weight, and boosts immunity. used in children with marasmus and debilitating disorders (Meher *et al.*, 2016).

CHEMISTRY OF ASHWAGANDHA

Withania somnifera, often known as ashwagandha, is a plant that has been used for thousands of years in traditional Ayurvedic treatment. Researchers have found a number of chemical components that contribute to the therapeutic qualities of ashwagandha, despite the fact that its total chemistry is complicated and little understood. Withanolides are one of the most important classes of chemical elements present in ashwagandha. Ashwagandha is the only plant that naturally contains withanolides, a group of steroidal lactones. Numerous of the medicinal properties of the plant are thought to be caused by these substances, which have been the subject of substantial research. By preventing the generation of inflammatory mediators, withanolides have demonstrated anti-inflammatory effects. They also have antioxidant properties that help shield cells from the oxidative harm brought on by free radicals. Alkaloids are organic substances found in ashwagandha that have a variety of biological actions. Alkaloids such as somniferine, anferine, and isopelletierine have been found in ashwagandha.

The pharmacological actions of the plant may be influenced by these alkaloids, albeit it is yet unclear exactly how they work. Another class of bioactive substances included in ashwagandha is the saponins. The name "saponins" refers to these chemicals' well-known property of producing a soapy lather when combined with water. Ashwagandha saponins have been linked to adaptogenic and anti-stress properties. Adaptogens are compounds that aid in the body's ability to cope with stress and advance general health. Ashwagandha has been shown to include flavonoids including kaempferol and quercetin. Plant pigments called flavonoids have anti-inflammatory and antioxidant effects. These substances support ashwagandha's total antioxidant capacity and could be involved in its anti-cellular damage actions. Ashwagandha also includes sterols, such as beta-sitosterol. Sterols are organic substances found in plants that resemble cholesterol in structure. Ashwagandha's overall anti-inflammatory effectiveness may be boosted by beta-sitosterol, which has been linked to anti-inflammatory benefits. These chemical components of ashwagandha work together to provide it a wide range of medicinal benefits. Ashwagandha is frequently used to ease stress and anxiety, improve memory, strengthen the immune system, increase physical stamina, and foster general well-being.

Though ashwagandha has demonstrated promising outcomes in a number of studies, more investigation is necessary to completely comprehend the mechanisms of action and possible interactions of its chemical elements in the human body.

THERAPEUTIC USES OF WITHANIA SOMNIFERA

One of the main botanical ingredients of geriatric tonics described in Indian systems of medicine is *Withania somnifera*. According to the ancient medical system Ayurveda, this plant has strong aphrodisiac, rejuvenative, and life-extension effects. It is used, among other things, to treat nervous weariness, memory-related disorders, sleeplessness, tiredness potency troubles, skin problems, and coughing. It also has general animating and regenerating properties. It enhances memory and learning capability. Ashwagandha was traditionally used to boost vitality, young vigour, endurance, strength, health, nourish the time elements of the body, and enhance the production of vital fluids, muscle fat, blood, lymph, semen, and cells. It helps counteract chronic fatigue, weakness, dehydration, bone weakness, loose teeth, thirst, impotency, premature aging emaciation, debility, convalescence and muscle tension. It helps invigorate the body by rejuvenating the reproductive organs, just as a tree is invigorated by feeding the roots Immunomodulation and Hematopoiesis (Charaka *et al.*, 1997; Sharma *et al.*, 1997).

PHARMACOLOGICAL EVIDENCES

- **Anti-inflammatory property:** Both acute and chronic kinds of inflammation are significantly reduced by the alcohol extract. When used orally to treat carrageenin-induced inflammation, the root's decoction demonstrated pronounced anti-inflammatory effects (Sharma *et al.*, 1980). The leaf extract had an anti-inflammatory impact on experimental models of sub-acute models of inflammation and CCl₄-induced hepatotoxicity in albino rats (Sudhir *et al.*, 1986). In vitro tests showed that ashwagandha has a notable anti-inflammatory impact on protein denaturation. According to Chandra *et al.* (2012), the impact was most likely caused by the withanolide and alkaloid content of Ashwagandha.
- **Hepatoprotective Activity:** The existence of hepatoprotective action was demonstrated by the considerable inhibition of CCl₄-induced changes in transaminase activity and pentobarbitone sleeping duration by an alcohol extract of the plant's leaves. Histopathological tests (Sudhir *et al.*, 1986) were used to corroborate this.
- **Infertility Activity:** In mice, roots have an infertile effect that delayed the oestrus and mating processes rather than entirely eliminating them. Tuber roots show little uterine stimulating effects on isolated guinea pig uterus, which might result in lower litter size and sterility during mating (Parasar, 1963).
- **Anti-Bacterial Activity:** Both antibacterial and antifungal properties were present in the leaves. It worked well against gram-positive bacteria and the fungus *Helminthosporium sativum*. (Bhatnagar *et al.*, 1961).
- **Psychotropic/Anti-Anxiety Activity:** Total alcoholic extract increased levels of serotonin and histamine across the entire brain tissue of albino rats after oral treatment. These effects were accompanied by reduced locomotor activity and learning behaviour. Catecholamines and Ach were depleted in the brain as a result (Singh *et al.*, 1979). The 'mice swimming endurance test' for measuring anti-stress activity and the 'anabolic activity by noting gain in body weights and levator ani muscle in rats' were both performed on the aqueous suspensions of the roots of Ashwagandha and the Korean drug Ginseng. The results revealed a significant increase in mice swimming time for both treatments compared to the control group. The Ashwagandha treatment group had a much higher gain in body weight than the Ginseng treatment group. Ginseng and Ashwagandha treatment groups saw considerable weight growth in the elevator anti muscle while it was wet; however, these medications' effects were equivalent after the muscle was dry. (Grandhi *et al.*, 1994).
- **Anti-Convulsant Activity:** Dried powder, decoction, and alcoholic extract all exhibited anti-convulsant properties when

electrocuted and administered with phenobarbital, with the alcoholic extract being significantly more effective (Rai *et al.*, 1984).

- **Skin care:** Due to the skin's strong antioxidant qualities, which also tighten the skin for a more youthful appearance, the ageing process is slowed down. DHEA, a precursor to both testosterone and oestrogen, and the generation of natural skin oils are both stimulated by ashwagandha. Additionally, it encourages the synthesis of essential substances and proteins for healthy skin, such as hyaluronan for moisture, elastin for flexibility, and collagen for radiance. Ashwagandha may be used as a toner with dried ginger and lemon for skin that is radiant.
- **Healthy Hair:** Ashwagandha, which is used in shampoos, is thought to help reduce dandruff, thicken hair, and enhance scalp circulation. Additionally, it seems to increase the synthesis of melanin, the pigment that gives hair its colour. As a result, it may really stop hair from becoming grey and aid in preventing hair loss.
- **Immuno-modulator activity:** In animal studies, ashwagandha has demonstrated a considerable modification of immunological reactivity. When Ashwagandha was administered, it was discovered to have similar immunosuppressive effects as cyclophosphamide, azathioprin, and prednisone. In mice, treatment with ashwagandha was found to dramatically raise body weight, RBC count, Hb concentration, and RBC count (Davis, L. *et al.*, 1996). It was discovered that giving asgandh extract considerably decreased the leucopenia brought on by treatment with cyclophosphamide (CTX). When compared to the CTX alone treated group, the administration of Asgand extract increased the number of mice receiving CTX treatment (Davis, L. *et al.*, 1998). Leucopenia-induced sub-lethal doses of gamma radiation were shown to be considerably reduced after administration of asgand extract. (Kutta *et al.*, 1996).
- **Anti-carcinogenic activity:** According to reports, ashwagandha has anti-carcinogenic properties. According to studies conducted on animal cell cultures, the herb reduces nuclear factor kappa B levels, inhibits intercellular tumour necrosis factor, and enhances apoptotic signalling in malignant cell lines. One of Ashwagandha's most intriguing potential applications is its ability to treat cancer by shrinking tumours (Prakash *et al.*, 2003). Researchers have examined the anticancer properties of *Withania somnifera* to learn more about its potential application in treating various types of cancer. In one study, adult male mice with urethane-induced lung tumours were given the herb to see if it had any anti-tumor effects. The histological appearance of the lungs of the animals who received Ashwagandha after seven months of treatment was comparable to that seen in the lungs of the control animals. (Singh *et al.*, 1986).
- **Positive Inotropic Activity:** According to Budhiraja *et al.* (1983), withania has been shown to lower blood pressure due to its ability to suppress autonomic ganglion activity, cardiac depressive effects, and beneficial inotropic and chronotropic effects. According to Malhotra *et al.* (1981), the alkaloids produced a sustained hypotensive, bradycardic, and respiratory-stimulant effect.

TOXICITY OF ASHWAGANDHA

When taken at the recommended quantities, ashwagandha (*Withania somnifera*) is usually regarded as safe for the majority of individuals. It has a lengthy history of conventional usage without any indications of serious toxicity. Individual reactions to any drug might differ from person to person, thus some safety measures should be followed. When used as recommended, ashwagandha is generally well tolerated. However, some people may have negative consequences from excessive dosages or continuous use. Considerations for ashwagandha's toxicity include the following:

- **Pregnancy and breastfeeding:** Due to its possible impact on hormonal activity, ashwagandha should be avoided during pregnancy. Since there haven't been many studies done on pregnant and nursing women, it's advisable to err on the side of

caution and steer clear of using it during these times. Drugs that depress the immune system: Ashwagandha may have immunomodulatory effects that might possibly interact with drugs that suppress the immune system. Before using ashwagandha, it is advised to speak with your doctor if you are currently on any immunosuppressant medications.

- **Autoimmunediseases:** The immunomodulatory effects of ashwagandha could influence how the immune system reacts. Before consuming ashwagandha, anyone with autoimmune conditions including lupus, multiple sclerosis, or rheumatoid arthritis should use caution and speak with their doctor.
- **Sedativeeffects:** Ashwagandha has long been used to reduce stress and encourage relaxation. While many people may benefit from this, it's crucial to be aware of any sedative effects it could have. Combining ashwagandha with drugs or substances that have sedative effects may intensify such effects and result in excessive sleepiness.
- **Allergies:** Any herbal product has the risk of adverse reactions. There is a slight chance that taking ashwagandha will cause an allergic response if you have a history of allergies to Solanaceae plants like potatoes, tomatoes, and or bell peppers.
- Stop using immediately and get medical help if you exhibit any symptoms of an allergic reaction, such as rash, itching, swelling, or trouble breathing. It's crucial to remember that these measures are only general recommendations and that specific situations may differ. Before beginning any new supplement or herbal therapy, including ashwagandha, it is always essential to speak with a healthcare provider if you have any particular health issues or are on any drugs. They can provide you tailored guidance based on your particular circumstances and medical background.

SAFETY OF USE

The lengthy history of Ashwagandha's usage as a medicine largely serves as a testament to its effectiveness and the body's high tolerance for it. However, many experts nowadays are working to allay worries about its usage. Concerning recent liver damage reports. Nationally and globally, the pharmaceutical market for herbal supplements is significant and expanding. Therefore, it is more crucial to check its safety. The first instance of Ashwagandha being linked to liver illness was found in Japan in 2004 (Philips *et al.*, 2020). It dealt with a 20-year-old male who had congestive liver damage and made a full recovery after quitting ashwagandha and receiving symptomatic care for two months from ursodeoxycholic acid and phenobarbitone. Five incidences of liver injury were attributed to ashwagandha, according to Björnsson *et al.* in 2020. These incidents demonstrate ashwagandha's hepatotoxic potential. The majority of the time, liver damage is cholestatic or combined with severe jaundice and pruritus, although it is self-limiting, with liver test results returning to normal in 1 to 5 months. Additionally, a case involving a 39-year-old woman who used an over-the-counter herbal medication containing Ashwagandha root extract and developed jaundice and nausea was documented in the UK (Ireland *et al.*, 2021). A 41-year-old lady was reported to have qualified for a liver transplant due to her deteriorating health while taking progesterone and Ashwagandha extract. (Suryawanshi *et al.*, 2023). Hepatotoxic effects have very sometimes and inconclusively been reported. But more reports need to be kept an eye on. The non-toxicity of this raw material was proven by a research done in India on an 80-person sample of perfectly healthy people. For eight weeks, each participant received 300 mg of Ashwagandha root extract orally, twice every day. Monitoring variables such body weight, systolic and diastolic blood pressure, haemoglobin, alkaline phosphatase, alanine transaminase, aspartate transaminase, and plasma neutrophil and platelet counts were used to determine this. At the conclusion of the trial, the values of the aforementioned indicators did not significantly differ between the extract-using group (40 participants) and the placebo-taking group (40 subjects). Triiodothyronine, thyroxine, and TSH levels in the blood were also used to assess thyroid function, however there were no discernible variations in these hormone levels either (Verma *et al.*, 2021).

The lack of substantial impacts on red blood cell count, white blood cell percentage, ESR value, bilirubin, and plasma protein levels is confirmed by a second investigation on a smaller sample size (18 volunteers). On the other hand, there was a rise in serum creatinine and a fall in blood urea nitrogen levels. This event, according to the study's experts, was caused by the concurrently noted rise in muscle mass. The equivalent of 6 g of vitania sluggard root was administered to volunteers over the course of 10 days in increasing dosages, with the final dose being the equivalent of 10 g (Raut *et al.*, 2012). Despite the plant's many advantages, it should not be consumed when nursing or pregnant. There is presently insufficient data to conclusively prove that using products containing Ashwagandha throughout such delicate stages of development is safe. Studies examining the effects of vitania sluggard extract on pregnant rats offer some insight into this element of safety. The first five to nineteen days of pregnancy received the most of attention. Importantly, the fetus's enhanced organogenesis and histogenesis make this an especially delicate stage. The greatest dose, which was given orally, was 2000 mg/kg/day. The research had no harmful side effects, and there were no changes in the pregnant women's body weight, the amount of corpus luteum, or embryo implantation. Additionally, the foetuses showed no signs of external, skeletal, or visceral abnormalities (Prabu *et al.*, 2015).

SUGGESTIONS FOR FUTURE RESEARCHES

Withaniasomnifera, often known as ashwagandha, is an intriguing plant with a long history of traditional usage and possible medicinal advantages. Even though ashwagandha has been the subject of significant research, there is still more to learn. Here are some suggestions for future research on ashwagandha:

- **Mechanismsofaction:** The specific methods of action of the bioactive components of ashwagandha, such as withanolides and alkaloids, require more study. Understanding how these substances interact with biological pathways and receptors can shed light on their prospective uses and therapeutic effects.
- **Clinicalstudies:** Clinical trials that are carefully planned can yield useful data on the safety and effectiveness of ashwagandha in a variety of illnesses. Its potential advantages in areas including stress reduction, anxiety disorders, cognitive function, immunological modulation, and physical performance should be further studied.
- **Long-term safety:** While short-term usage of ashwagandha seems to be well tolerated, more study is required to determine its long-term safety profile. Studies should look at the best dosage and length of therapy as well as any potential side effects from chronic use.
- **Druginteractions:** It is essential to look into any possible interactions between ashwagandha and prescription drugs. Assuring safe and efficient treatment regimens requires understanding how ashwagandha may impact the metabolism and effectiveness of prescription medications.
- **Standardizationandqualitycontrol:** It's crucial to create standardised procedures for the extraction, identification, and quantification of major ashwagandha constituents in order to guarantee uniform quality across all products. A quality control system may be established to assist avoid adulteration and guarantee that customers have access to genuine and potent ashwagandha formulations.
- **Comparativestudies:** Studies that compare the effectiveness of ashwagandha and other herbal remedies for particular medical ailments might shed light on the herb's potential benefits and effectiveness.
- **Mechanistic studies on specific health conditions:** The potential therapeutic effects of ashwagandha in situations including cancer, diabetes, cardiovascular disease, and autoimmune disorders should be further investigated. Ashwagandha's clinical usage can be guided by understanding the underlying mechanisms of the herb's actions in various diseases.
- **Pharmacokinetics and bioavailability:** Studies examining the ashwagandha components' absorption, distribution, metabolism, and excretion might shed light on their bioavailability and

pharmacokinetic characteristics. This information is essential for enhancing dose forms and delivery methods.

- **Safety in vulnerable populations:** Studying the safety and effectiveness of ashwagandha in vulnerable groups, such as kids, the elderly, people with weakened immune systems, and those with underlying medical disorders, has to be given a special focus.
- **Preclinical research:** Preliminary information on the possible processes and effects of ashwagandha may be found in preclinical investigations employing animal models and in vitro tests. The design of next clinical trials can be influenced by these findings. We can better understand the medicinal potential of ashwagandha, assure its safe usage, and discover new uses for this extraordinary plant by undertaking further study in these areas.

CONCLUSION

The plant extract ashwagandha has been utilised for ages in Ayurvedic medicine and other traditional medical systems. The numerous impacts of Ashwagandha have been studied over time, and these investigations have revealed that it has a variety of beneficial benefits on many bodily systems. It is crucial to keep in mind that additional study is required to prove Ashwagandha's potential therapeutic applications and to establish the best dosages and usage intervals. The safety of Ashwagandha should also be taken into account, especially when used with other drugs or supplements. Therefore, further information about the possible advantages and hazards of utilising Ashwagandha as a medicinal drug must come from continuing research, particularly clinical studies. It is clear from the study that has been done so far that Ashwagandha root is a plant raw material with diverse effects. But because there are so many new reports, it's important to keep up with the latest information on this raw material—both in terms of the likelihood that it will be used to cure diseases and, more importantly, in terms of how safe it is to use. In order to establish the efficacy of the raw material, continuing research, mostly in the field of medicine, is also necessary to determine the effects of Ashwagandha. According to the research, Ashwagandha may be able to treat a variety of neurological problems. The potential therapeutic applications of Ashwagandha are supported by data, although the exact processes by which it works are yet unclear. It's critical to identify Ashwagandha's exact mechanisms of action in order to create more specialised and successful treatment plans.

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