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A Review on Ashwagandha: An Evergreen Herbal Marvel in Contemporary Health

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Abstract: Ashwagandha (*Withania somnifera*), also known as Indian ginseng or winter cherry, is a cornerstone of traditional Ayurvedic medicine. Historically recognized as a Rasayana or rejuvenative herb, it has been used for centuries to promote vitality, longevity, and resilience. Traditionally, it has been prescribed to address stress, fatigue, cognitive decline, and immune-related concerns. In recent years, modern science has validated many of these traditional uses, identifying key bioactive compounds such as withanolides, alkaloids, saponins, and flavonoids responsible for Ashwagandha's broad therapeutic potential. Scientific studies have shown that Ashwagandha exhibits a wide range of pharmacological effects, including adaptogenic, anti-inflammatory, neuroprotective, immunomodulatory, and even anticancer activities. It exerts stress-relieving effects primarily through modulation of the hypothalamic-pituitary-adrenal (HPA) axis, helping to balance cortisol levels and promote calm. Ashwagandha also enhances cognitive performance, physical endurance, cardiovascular function, and may offer protective benefits against neurodegenerative diseases. Traditionally consumed with fats like milk or ghee to improve absorption, modern techniques such as micronisation further enhance its bioavailability. It is generally well tolerated; however, individuals with autoimmune or thyroid disorders, or those taking sedatives or antihypertensive medications, should consult a healthcare professional before use. Ashwagandha serves as a compelling example of how traditional remedies can align with modern evidence-based medicine. Its proven efficacy in supporting mental, physical, and immune health makes it a promising, natural supplement. With continued research, Ashwagandha may secure a greater role in integrative healthcare as a safe and versatile wellness enhancer.

Keywords: Ashwagandha, Bioactive compounds, Natural supplement, Withanolides, *Withania Somnifera*, Immune health, Rasayana.

INTRODUCTION

Ashwagandha, Botanical name *Withania somnifera*, commonly known as Indian ginseng or winter cherry, belongs to the family Solanaceae (1). It is a xerophytic plant that grows in Africa, the Mediterranean, Sri Lanka, Pakistan, and India, is a highly valued herb in Ayurvedic medicine (2). Known for its rejuvenating and powerful adaptogenic properties, it has been used for centuries to traditional medicine systems, like Ayurveda, the Indian traditional medicinal system "Siddha" (3), and traditional Chinese medicine to enhance vitality, resilience against stress, and promote longevity for thousands of years (4). In recent years, there has been a significant increase in the study of ashwagandha's pharmacological properties, revealing potential therapeutic applications in areas like

neuroprotection, anti-inflammation, immunity, and even oncology. Ashwagandha acts as an antidote, insecticidal, and larvicidal. The root, stem, leaves, and seeds of ashwagandha are used for the treatment of asthma, bronchitis, leucoderma, tuberculosis, liver issues, heart disorders, ulcers, swelling, external aches, hemorrhoids, boils, eyesores and edema, and arthritis. This plant has antibacterial, anti-tumor, anticancer, antioxidant, anti-arthritic, anti-inflammatory, immunomodulatory, neurotic regeneration, adaptogenic, nootropic, hypothyroid, herbicidal and pesticidal, abortifacient, astringent, aphrodisiac, emmenagogue, diuretic, narcotic, hypnotic, hepatoprotective, and cardioprotective properties (5).

Overall, ashwagandha represents a compelling link between ancient wisdom and modern medicine. Its adaptogenic, neuroprotective, anti-inflammatory, and anticancer properties suggest significant potential as a holistic remedy for physical and mental health. This review explores ashwagandha's pharmacological profile, therapeutic applications, and safety considerations based on existing scientific research.

History

Ashwagandha holds a prominent place in the history of traditional Indian medicine. The herb's usage spans over 6,000 years, rooted deeply in Ayurvedic practices where it is classified as a "Rasayana" – a category of rejuvenative herbs traditionally prescribed for conditions involving fatigue, weakness, low energy, and memory loss. It is also believed to promote longevity, vitality, and overall health. The name "ashwagandha" is derived from Sanskrit, combining "ashva," meaning "horse," and "gandha," meaning "smell," a reference to the fresh root's distinctive aroma (6). This name reflects the traditional belief that ashwagandha imparts a horse's strength and stamina to those who consume it. Ashwagandha's roots in traditional medicine extend throughout South Asia and the Middle East, where it has been widely used for its medicinal and restorative properties. Ashwagandha's role in Ayurveda is multifaceted, one of the world's oldest holistic healing systems, prescribes ashwagandha for a range of physical and mental ailments, including fatigue, stress, infertility, and inflammation (1). Ancient Ayurvedic texts such as the *Charaka Samhita* and *Sushruta Samhita* mention ashwagandha as a powerful tonic that supports health and resilience against disease (6). It was particularly recommended for enhancing energy, strengthening the immune system, and supporting reproductive health, thereby earning a reputation as a life-prolonging and body-strengthening herb (1).

In addition to its role in Ayurvedic medicine, ashwagandha found a place in Unani and Siddha medicine, traditional systems practiced in the Middle East and South Asia. In these systems, ashwagandha is used similarly for its adaptogenic and anti-inflammatory benefits. Traditional practitioners regarded it as a remedy for ailments caused by imbalances in physical and mental stress, inflammation, and immune weakness. The herb's adaptogenic qualities, which help to stabilize physiological processes and enhance resilience to stress, were especially valued by practitioners across these ancient medical systems (7).

With the colonization and global exchange of the 16th and 17th centuries, ashwagandha, like many other traditional herbs, began to capture the attention of Western healers and botanists (8). Early Western explorers and scholars documented its uses in their botanical writings, noting its applications in

indigenous practices. However, it was not until the 20th century that ashwagandha gained international recognition as a medicinal herb of interest, attracting scientific investigation into its pharmacological properties (9).

Modern scientific research on ashwagandha began in earnest in the mid-20th century, primarily in India, where researchers explored its bioactive compounds and adaptogenic effects. Studies have since confirmed many of the traditional claims about ashwagandha's health benefits, finding that its bioactive compounds, particularly withanolides, possess anti-inflammatory, antioxidant, antidiabetic, and neuroprotective properties. This research has validated ashwagandha's historical use and has driven its popularity as a natural health supplement worldwide, particularly for stress relief, cognitive support, and immune enhancement (10).

Today, ashwagandha is one of the most extensively researched adaptogenic herbs. It is recognized for its significant role in Ayurvedic medicine and its growing integration into modern therapeutic practices around the globe. Its rich history and traditional uses underscore its enduring legacy and adaptability, making ashwagandha a bridge between ancient wellness traditions and contemporary health science.

Usage, Preparation, and Processing of Ashwagandha

Ashwagandha is used in various forms in both traditional Ayurvedic practices and modern health supplements. Its versatile preparation methods aim to maximize the therapeutic benefits of its bioactive compounds, such as withanolides, alkaloids, and saponins (10).

Traditional and Modern Usage

Traditional Uses

In Ayurvedic medicine, ashwagandha has been used for thousands of years as a "Rasayana" or rejuvenating herb. It is commonly prescribed for improving energy, enhancing immunity, reducing stress, and supporting mental clarity. Ashwagandha is also traditionally used to manage conditions like arthritis, fatigue, insomnia, and digestive issues (11).

Modern Applications

Today, ashwagandha is widely consumed as a dietary supplement, known for its adaptogenic properties, which help the body resist stress and promote balance. Modern uses extend to stress management, cognitive enhancement, athletic performance, immune support, and support for metabolic health (12).

Preparations of Ashwagandha

Powder (Churna): The dried root powder, also known as "churna," is one of the most common traditional preparations. It is typically mixed with warm milk,

honey, or ghee (clarified butter) and taken once or twice daily. In Ayurveda, combining ashwagandha with fat sources like milk or ghee is believed to enhance its absorption and efficacy (13).

Extracts: Standardized extracts of ashwagandha root or leaf are commonly available in capsules or tablets. These extracts are often standardized to specific withanolide concentrations (e.g., 5% withanolides) to ensure consistent potency. Extracts are preferred in modern supplements for precise dosage control and increased bioavailability (14).

Tinctures: Ashwagandha is sometimes prepared as a liquid extract or tincture, where the herb is extracted using alcohol or glycerin. Tinctures are highly concentrated and are typically taken in small, measured drops, making them convenient for those who prefer liquid supplements (15).

Processing Methods

Drying and Grinding: Traditionally, ashwagandha roots are harvested, washed, dried, and ground into a fine powder. Drying methods can vary from sun-drying to more controlled drying processes, depending on the preparation setting. Dried root powder retains most of its natural compounds and is highly versatile in traditional applications (16).

Extraction and Standardization: Modern supplements often use extraction methods, such as water or alcohol extraction, to concentrate bioactive compounds like withanolides. Extraction improves bioavailability by isolating active compounds. Standardized extracts ensure consistent potency across batches, which is essential for therapeutic use (17).

Fermentation: Some advanced processing techniques involve fermentation, which may increase the bioavailability and absorption of ashwagandha's active compounds. Fermented ashwagandha is not as common but is gaining popularity due to its potential to enhance health benefits (18, 19).

Micronization and Nano-Emulsification: Modern supplement manufacturers use micronization (reducing particle size) and nano-emulsification techniques to further enhance absorption. These processes break down ashwagandha particles into smaller sizes, making them easier for the body to absorb and utilize (20, 21).

Bioactive Compounds in Ashwagandha

Ashwagandha contains a diverse array of bioactive compounds. The most notable of these compounds are withanolides, alkaloids, and saponins, which together create a complex pharmacological profile supporting ashwagandha's therapeutic effects (22).

Withanolide: Withanolides are steroidal lactones and

are regarded as the primary active constituents of ashwagandha. Active Withanolids in ashwagandha are Withaferin A, Withanolide D, Withanolide A, Withanolide E, Withanone, 12-Deoxywithastramonolide, Sitoindosides VII and VIII. The most studied withanolides include withaferin A, withanolide D, and withanone. These compounds have been shown to exhibit a range of biological activities, including anti-inflammatory, anticancer, and immunomodulatory effects (23, 24).

Alkaloids: Ashwagandha also contains alkaloids such as somniferine, withanine, Cuscohygrine and tropine. While less extensively studied than withanolides, these alkaloids contribute to the herb's calming and mood-enhancing effects (25).

Withanine: This alkaloid is noted for its role in ashwagandha's anxiolytic effects, helping to promote relaxation and reduce stress and anxiety. Withanine may work by modulating neurotransmitters, such as GABA (gamma-aminobutyric acid), which helps calm the nervous system (26).

Somniferine: A compound found in *Withania somnifera* is thought to contribute to the herb's calming and sleep-promoting effects. Its name, derived from the Latin somnus (sleep), reflects its traditional use in promoting relaxation and restful sleep. While scientific data on somniferine specifically is limited, Ashwagandha extracts containing this alkaloid have been shown in studies to improve sleep quality and reduce insomnia symptoms by modulating stress pathways and neurotransmitters such as GABA (27).

***Tropine and Anaferine:* Exhibit anti-inflammatory and neuroprotective activities, which indirectly support the anti-diabetic and antioxidant effects of ashwagandha. Responsible for its calming and analgesic effects (28).**

Cuscohygrine: Involved in overall stress adaptation (29).

Saponins: Saponins in ashwagandha, such as sitoindosides VII and VIII, play a role in immune modulation and stress adaptation (30). These compounds help reduce cortisol levels, a stress hormone, which supports the body's ability to manage stress effectively. They also contribute to ashwagandha's anti-inflammatory effects by inhibiting the production of pro-inflammatory cytokines, making it beneficial in managing inflammatory conditions (30).

Sitoindosides IX and X: Contribute to ashwagandha's immune-boosting and anti-stress properties (31).

Withanosides: Various types contribute to stress resilience and anti-inflammatory effects,

neuroprotective effects, adaptogenic and antioxidant effects (31).

Additional Polyphenols and Flavonoids: Ashwagandha contains various other polyphenols and flavonoids, which contribute to its antioxidant properties. These compounds help neutralize free radicals, reducing oxidative stress and protecting cells from damage. Such antioxidant activity is crucial in supporting immune function and protecting against chronic diseases linked to oxidative stress, such as cardiovascular disease and neurodegeneration (32,33).

Amino Acids

Tryptophan: Essential amino acid that plays a role in mood regulation (34).

Gamma-aminobutyric acid (GABA): Acts as a neurotransmitter with calming effects, though in lower concentrations (34).

Sterols

Beta-sitosterol: Known for anti-inflammatory effects and may support cardiovascular health (28).

Iron and Other Micronutrients: Ashwagandha root contains natural iron, which may explain some of its traditional use in treating fatigue and anemia. Although iron content varies depending on the source, this micronutrient supports energy metabolism and helps prevent fatigue by enhancing red blood cell production. Other trace minerals contribute to its rejuvenating effects (35).

Ashwagandha's multiple health benefits stem from its rich array of bioactive compounds. These compounds work synergistically to enhance its adaptogenic, immune-modulating, and neuroprotective properties, supporting its traditional and modern use as a holistic remedy.

Mechanisms of Action

Ashwagandha's pharmacological actions are diverse, attributed to its complex composition. The herb's adaptogenic effect is linked to the modulation of the hypothalamic-pituitary-adrenal (HPA) axis, which regulates the body's stress response. Withanolides, particularly withaferin A, have been shown to reduce levels of cortisol, a stress hormone, thereby promoting a calming effect and reducing anxiety (36, 37).

On a molecular level, withanolides interact with various cellular pathways. They inhibit pro-inflammatory cytokines and enhance the activity of antioxidant enzymes, which reduces oxidative stress. Withanolides have also shown effects on neurotransmitters like GABA, contributing to ashwagandha's anxiolytic (anti-anxiety) effects. In animal studies, ashwagandha extracts have

demonstrated neuroprotective actions by promoting dendritic growth in neurons, which may enhance cognitive function and protect against neurodegenerative conditions (36,37).

Metabolism of Ashwagandha

The metabolism of ashwagandha is complex, involving various pathways for processing its bioactive compounds, primarily withanolides. These bioactive compounds undergo metabolism in the liver and other tissues, where they are converted into active metabolites that exert pharmacological effects throughout the body. Understanding the metabolism of ashwagandha helps to explain its efficacy as an adaptogen and its ability to influence various physiological processes (38).

Absorption: When ashwagandha is consumed orally, its active compounds, including withanolides, alkaloids, and saponins, are absorbed primarily in the small intestine.

Some of the active constituents are lipophilic (fat-soluble), which means they are better absorbed when taken with a fat source. This is why traditional Ayurvedic preparations often combine ashwagandha with ghee or milk to improve bioavailability (39).

First-pass metabolism: After absorption, the bioactive compounds travel to the liver, where they undergo first-pass metabolism, a process that reduces their concentration before reaching systemic circulation. During this phase, liver enzymes transform withanolides and other compounds, making them more water-soluble, which aids in their distribution and excretion (40).

Enzymes such as cytochrome P450 (CYP450) play a crucial role in metabolizing withanolides in the liver. This enzyme system breaks down withanolides into various metabolites, which are then distributed to target tissues (40).

Distribution in the Body: Once the compounds enter the bloodstream, they are distributed to various tissues, including the brain, immune cells, adrenal glands, and muscles, where they exert therapeutic effects. Withanolides have been shown to cross the blood-brain barrier, allowing them to directly affect brain function. This may explain ashwagandha's effects on stress reduction, cognitive enhancement, and neuroprotection (41).

Biotransformation: Withanolides, along with other bioactive constituents in Ashwagandha, undergo biotransformation primarily in the liver and other tissues. This metabolic process converts the original compounds into a variety of active metabolites, each possessing unique pharmacological actions (42). For instance, withaferin A one of the most studied

withanolides is metabolized into derivatives that exert enhanced anti-inflammatory effects and modulate immune function. These transformations contribute significantly to the systemic impact of Ashwagandha, enabling it to act on multiple physiological pathways. This metabolic adaptability is central to the herb's broad-spectrum adaptogenic properties, allowing it to support the body's resilience to stress and promote overall homeostasis (42).

Excretion: The metabolites of ashwagandha's compounds are excreted primarily through the kidneys in the urine and to a lesser extent through bile. Water-soluble metabolites, which result from liver processing, are efficiently removed from the body in this way.

The excretion rate can vary depending on factors such as dosage, individual metabolism, and bioavailability. This elimination process ensures that ashwagandha's compounds do not accumulate excessively in the body, reducing the risk of toxicity (42).

Factors Affecting Metabolism

Dosage and Formulation: The form of Ashwagandha consumed significantly influences its absorption and metabolism. Standardized extracts, particularly those enriched with withanolides, demonstrate higher bioavailability compared to raw powder forms. For instance, a comparative pharmacokinetic study revealed that a sustained-release Ashwagandha extract exhibited 12 to 44 times greater bioavailability for specific withanolides than conventional formulations, indicating more efficient absorption and prolonged systemic presence (43).

Co-Administration with Other Substances: Ashwagandha metabolism may be affected by other substances taken concurrently, especially those that are also metabolized by the CYP450 enzyme system (44). Certain medications or foods can inhibit or induce these enzymes, altering ashwagandha's bioavailability and efficacy.

Bioavailability and Enhanced Delivery Methods

Ashwagandha's traditional bioavailability can be limited by factors such as first-pass metabolism and low water solubility. To enhance absorption, modern formulations often use technologies like micronization (reducing particle size) or nano-emulsification (making compounds more water-soluble), which increase absorption and bioavailability (45).

Combining ashwagandha with fats or in liposomal forms may also enhance the absorption of lipophilic compounds, allowing them to bypass extensive liver metabolism and directly target tissues (45).

Pharmacological Actions and Uses

Scientific studies on ashwagandha have revealed a broad spectrum of health benefits, validating many of its traditional uses. Research has primarily focused on its adaptogenic, anti-inflammatory, antioxidant, neuroprotective, and immune-enhancing effects.

Stress Reduction and Anxiety Relief

Adaptogenic Effects: Ashwagandha is renowned for its adaptogenic properties, helping the body cope with stress by regulating the HPA axis and lowering cortisol levels. In one notable study, individuals with chronic stress who took ashwagandha showed a 44% reduction in stress scores and significantly lower cortisol levels compared to a placebo group (46).

Anxiety Reduction: Several clinical trials have shown that ashwagandha effectively reduces symptoms of anxiety. A study published in the *Journal of Clinical Psychiatry* demonstrated significant improvements in anxiety symptoms in participants taking ashwagandha compared to those on a placebo, highlighting its role in promoting mental well-being (46).

Cognitive and Neuroprotective Benefits

Memory and Cognitive Function: Ashwagandha has been studied for its potential to enhance cognitive functions, including memory, attention, and executive function. In one randomized, double-blind study, older adults who took ashwagandha supplements showed significant improvements in cognitive tasks, including memory and reaction time, compared to the placebo group (47).

Neuroprotection and Alzheimer's Disease: Preclinical studies suggest that ashwagandha may help protect against neurodegenerative diseases like Alzheimer's and Parkinson's. Withanolides in ashwagandha have been shown to inhibit beta-amyloid plaques, which are linked to Alzheimer's disease, and reduce oxidative stress, thus protecting neurons from damage (47).

Anxiolytic Effects: Ashwagandha's impact on the GABAergic system in the brain, which is involved in calming the nervous system, has shown to be effective in alleviating anxiety and promoting a sense of calm (47).

Anti-Inflammatory and Antioxidant Properties

Reduction of Inflammatory Markers: Ashwagandha contains withanolides, which have been shown to inhibit pro-inflammatory cytokines, such as TNF-alpha and IL-1β. This makes ashwagandha potentially useful in managing inflammatory conditions, including arthritis (48).

Antioxidant Activity: Ashwagandha exhibits strong antioxidant effects, enhancing the body's levels of superoxide dismutase, catalase, and glutathione

peroxidase. These antioxidants protect cells from damage by neutralizing free radicals, which are implicated in chronic diseases and aging (49).

Pain Modulation in Arthritic Conditions: Clinical studies have demonstrated that ashwagandha reduces pain and inflammation in individuals with osteoarthritis and rheumatoid arthritis (50). In a controlled study, participants reported reduced joint pain and swelling after eight weeks of ashwagandha supplementation (51).

Immune System Support

Immune Modulation: Ashwagandha has been shown to enhance both humoral and cell-mediated immunity. Animal studies have reported increased white blood cell and lymphocyte counts in subjects receiving ashwagandha, indicating stronger immune defense (52)

Antimicrobial Properties: Some research has highlighted ashwagandha's antimicrobial effects, showing that its compounds can inhibit the growth of bacteria and fungi, suggesting possible benefits in preventing infections (52).

Endurance, Strength, and Athletic Performance

Physical Endurance: Ashwagandha supplementation has been associated with improvements in physical endurance and muscle strength. A Bayesian meta-analysis by Bonilla *et al.* (53) concluded that ashwagandha supplementation significantly improves physical performance metrics such as strength, cardiorespiratory fitness, and recovery in healthy individuals compared to placebo, supporting its role as an effective natural ergogenic aid.

Hormonal Balance and Sexual Health

Testosterone and Fertility: Ashwagandha has been studied for its role in boosting testosterone levels and improving male fertility. In a clinical trial, men taking ashwagandha showed increased testosterone levels and improved sperm quality and motility, supporting its traditional use for male reproductive health. (54)

Hormone Regulation: For women, ashwagandha is believed to support hormonal balance, particularly in cases of polycystic ovary syndrome (PCOS) and premenstrual symptoms, although more research is needed to confirm these benefits (55).

Blood Sugar and Lipid Management

Blood Sugar Regulation: Ashwagandha has demonstrated hypoglycemic effects, lowering blood glucose levels in individuals with diabetes. Studies have found that it improves insulin sensitivity, which can be beneficial for managing Type 2 diabetes (56, 57).

Cholesterol and Triglyceride Reduction: Research on rats

indicated that treatment with Ashwagandharishta, an ashwagandha-based formulation, over 51 days led to reductions in total cholesterol, LDL cholesterol, and triglyceride levels in serum. Ashwagandha has demonstrated potential in lowering LDL cholesterol and triglyceride levels, contributing to cardiovascular health. However, further studies with human participants are needed to validate these effects (58).

Potential Anticancer Activity

Inhibition of Cancer Cell Growth: Withanolides, particularly withaferin A, have shown anticancer properties by inducing apoptosis (programmed cell death) in cancer cells and inhibiting angiogenesis (formation of new blood vessels that feed tumors) (59, 60).

Complementary Cancer Treatment: Some preliminary studies suggest that ashwagandha may enhance the effectiveness of conventional cancer therapies by making cancer cells more susceptible to treatment while protecting healthy cells. Animal studies have demonstrated reduced tumor growth in response to ashwagandha supplementation, although more human trials are needed to confirm these effects (59, 60).

Safety, Efficacy, and Contraindications

Ashwagandha is generally recognized as safe and has been used for centuries in Ayurvedic medicine without significant adverse effects. However, as with any supplement, its use requires awareness of potential contraindications and interactions.

Safety Profile

General Safety: Clinical studies have shown that ashwagandha is safe for most individuals when taken within recommended dosages. Common side effects are mild and may include gastrointestinal discomfort, drowsiness, and headaches, which are typically dose-dependent and resolve on their own.

Toxicity Studies: Toxicological studies have demonstrated that ashwagandha has a low toxicity profile, even at relatively high doses. Animal studies suggest it is well-tolerated, with no major toxic effects observed in doses up to 2,000 mg/kg (61,62).

Efficacy and Clinical Trials

Ashwagandha has demonstrated efficacy in several clinical trials. Research indicates that ashwagandha supplementation may help reduce stress and anxiety, enhance cognitive function, and improve physical performance. A randomized, double-blind, placebo-controlled study by Chandrasekhar *et al.* (63) found that 300 mg of ashwagandha root extract taken twice daily significantly reduced cortisol levels and perceived stress in adults over 60 days. Additionally, Lopresti *et al.* (64) reported improved memory and

executive function in adults taking 600 mg of standardized ashwagandha extract daily for 8 weeks. These findings support its potential as a natural therapeutic agent, though further large-scale trials are warranted.

Contraindications

Pregnancy: Ashwagandha is not recommended for use during pregnancy or breastfeeding or for paediatric use due to lack of safety data (61, 62).

Autoimmune Diseases: Ashwagandha may stimulate the immune system, potentially exacerbating symptoms in individuals with autoimmune conditions such as rheumatoid arthritis, lupus, or multiple sclerosis. People with these conditions should consult a healthcare provider before using ashwagandha (1).

Thyroid Conditions: Ashwagandha may elevate thyroid hormones T3 and T4, so individuals with hyperthyroidism or those taking thyroid medications should use it cautiously. Consulting a healthcare provider is important, as increased hormone levels could lead to thyrotoxicity (62).

Medications for Sedation and Anxiety: Ashwagandha has mild sedative effects, which may amplify the sedative effects of medications such as benzodiazepines, barbiturates, or other sedatives. Combining ashwagandha with these medications could increase drowsiness or sedation (65).

Diabetic and Hypertension medications: Ashwagandha may potentiate the effects of antidiabetic and antihypertensive medications, potentially leading to hypoglycemia or hypotension. Therefore, consultation with a healthcare professional is advised prior to use (62).

Recommended Dosages and Usage Precautions The recommended dosage of Ashwagandha varies depending on the form and intended use, but standardized root extracts are commonly taken in doses ranging from 300 to 600 mg per day, typically standardized to contain 5% withanolides. It is generally considered safe for most individuals when used short-term; however, it should be used with caution in people with conditions such as hyperthyroidism, autoimmune diseases, or those taking sedatives, immunosuppressants, or medications for diabetes and hypertension. Pregnant and breastfeeding women should avoid its use due to limited safety data (66). Consulting a healthcare provider before incorporating ashwagandha is advisable, especially for those with pre-existing conditions or who are taking medications.

CONCLUSION

Ashwagandha (*Withania somnifera*), a prominent adaptogenic herb in Ayurvedic medicine, has

demonstrated a wide range of therapeutic effects that are increasingly supported by clinical and pharmacological research. Traditionally used to enhance vitality, reduce stress, and support immune and cognitive function, its efficacy is largely attributed to withanolides and other bioactive constituents with anti-inflammatory, neuroprotective, immunomodulatory, and potential anticancer properties.

Contemporary clinical applications of Ashwagandha include the management of stress-related disorders, cognitive decline, fatigue, and immune dysregulation. Standardized extracts—particularly those with quantified withanolide content—offer improved bioavailability and reproducibility in outcomes. Ashwagandha is generally well tolerated, with a favorable safety profile in most populations; however, caution is advised in patients with autoimmune diseases, thyroid dysfunction, or those taking sedatives, immunosuppressants, or antihypertensives.

In summary, Ashwagandha represents a compelling integration of traditional medicine and modern clinical practice. Its multifunctional properties position it as a valuable adjunct in managing stress-related and inflammatory conditions, as well as in supporting overall physiological resilience. Ongoing clinical trials and mechanistic studies will further clarify its role and optimize its therapeutic use. Until then, individualized patient assessment and professional supervision remain essential for safe and effective integration into treatment protocols.

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