



## **An exploration of Nutraceutical potential of *Withania somifera*: A review**

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### **ABSTRACT**

*Ashwagandha (Withania somnifera) is a medicinal herb deeply rooted in traditional ayurvedic medicine, renowned for its adaptogenic properties and multifaceted therapeutic potential. The abstract presents a concise overview of the current scientific literatures on Ashwagandha, focusing on its diverse biological activities and potential applications in human health. Ashwagandha neuroprotective effects have gained attention, with evidence suggesting its potential in addressing neurodegenerative disorders and cognitive decline. The herbs anti-inflammatory and anti-oxidant properties contribute to its efficacy in managing conditions associated with oxidative stress and chronic inflammation, while immunodulatory effects supports immune system function. This abstract highlights Ashwagandha as a versatile botanical with promising therapeutic applications.*

**Keyword:** *Ashwagandha, Withania somnifera, nutrient composition, anti-stress, anti-inflammatory, Rasayana.*

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### **INTRODUCTION**

Ashwagandha is also called as *Withania somnifera* and in generic language it is known as Indian ginseng which widely distributed in the parts of India, Nepal, Yemen and China from family Solanaceae. The active phyto-constituents found in plant roots, primarily withanolides, alkaloids and sito-indosides, are traditionally used to treat a variety of brain problems [1].

It is a semi-arid shrub native to Southeastern countries along with India. Its availability has been reported in African countries namely Egypt, South Africa, Morocco and Congo [2].

Ashwagandha is used traditionally to general wellbeing and to reduce stress [3] along with promoting "youthful vigour" by improving endurance and muscle strength [4]. Conventional uses of this plant indicate that it has anti-inflammatory properties against a wide range of human medical conditions, including cancer, hypertension, asthma and diabetes [5].

Various parts of Ashwagandha plant have reported over 50 chemical constituents, with steroidal alkaloids and lactones, collectively known as withanolides, being the most important. A review of relevant in-vitro, in-vivo, and clinical studies revealed that Ashwagandha extracts and phytochemicals have potent protective effect against cancer, inflammation, microbial diseases, diabetes and cardiovascular diseases along with an hepatoprotective, hypolipidemic, hypoglycemic and spermatogenic activity. Ashwagandha has also been reported to be active against various neurological and psychological conditions, including Alzheimer's diseases, parkinson's disease, ischemic stroke, attention deficit hyperactivity disorder, schizophrenia, obsessive-compulsive disorder and anxiety [6].

In Ayurvedic medicine, *Withania somnifera* is widely known and respected medicinal plant. It is being used as a potent natural adaptogen and a "Rasayana". It is widespread in the tropical climates of the South Africa, Indian subcontinent, the Mediterranean, and the Middle east [7].

### **TAXONOMY OF ASHWAGANDHA**

In India it grows in dry areas of subtropics. The Primary Ashwagandha producing states in India includes Rajasthan, Punjab, Haryana, Uttar Pradesh, Gujrat, Maharashtra and Madhya Pradesh. The expected production Ashwagandha roots in India is more than 1500 tones, with an annual requirement of approximately 7000 tones, necessitating more planting and production [8].

It is 2 meters tall and a meter wide evergreen, xerophytic, woody, short, tender perineal shrub. It has tormented branches that are covered in quite short silver hair that radiate from the mid of the stem. The

stems colour is brown in appearance and erect to prostrate. The arrangement of leaves are alternate, almost hairless and green and dull, simple, glabrous, green elliptic leaves. At the leaf nodes, 1-7 inconspicuous bisexual flowers appear. The 5-sectioned calyx is approximately 5mm in length, and the pod is approximately 20mm long, 5-8mm long, and light yellow to yellow-green [9].

### NUTRIENT COMPOSITION

In traditional medicine, Ashwagandha is a renowned herbal remedy and healthy food that is being used as treatment for several conditions related to heart diseases. Human can use it as a solitary herb or as an ingredient in recipes that contain both herbs and minerals. Human dosages of Ashwagandha are typically between 4 to 6g/day, and they are thought to be safe and non-toxic [10].

The *Withania somnifera* plant has a large number of well-known beneficial chemical compounds which accounts for 80 in total. The roots of Ashwagandha are rich in minerals, including iron, lactones, nitrate, potassium, somniferine, somninine, tannins, tyrosine, and a variety of biochemically diverse alkaloids [11].

Flavonoids are among the many healthful components ashwagandha. It is a natural source of several antioxidants, including, glutathione peroxidase, catalase, and superoxide dismutase, which are known to improve health [12].

Table 1: nutrient Composition in 100g of Ashwagandha powder

Nutrients	Per 100g amount
Energy	245
Carbohydrate	49.3
Protein	3.9
Fats	0.3
Iron	3.3
Calcium	23
Crude Fiber	32.3

### HEALTH BENEFITS OF ASHWAGANDHA

*Withania somnifera* L., also known as Ashwagandha is a well-liked ayurvedic herb with rejuvenating, energizing and longevity benefits. It is a typical component of formulations that are herbominerals or polyherbal and are used for medicinal or preventative purposes [13].

Due to the abundance of bioactive components in the plant extract, it possesses anti-inflammatory, immunomodulatory and antioxidant properties. Numerous ailments, including cancer, neurological and cardiovascular disorders, arthritis, impotence, forgetfulness, anxiety, and others are preventing and treated with the plant extract and its beneficial nutrient composition. Different parts of *W. somnifera* exhibits different therapeutic purpose for example roots of withania are bitter in taste and astringent acids, sedative, diuretic tonic, stimulant, thermogenic and aphrodisiac. There are antibiotic in the leaves, anti-tumorous, anti-hepatotoxic properties. The seed contain diuretic and hypnotic properties. Ashwagandha is commonly taken in doses g/day for humans, and these are considered to be safe and nontoxic [14].

### ANTI-INFLAMMATORY PROPERTIES OF ASHWAGANDHA

Major anti-inflammatory activity is possessed by *Withania somnifera*. The three tissues that make up human skin are dermal, fatty subcutaneous, and epidermal. The epidermis, mostly made up of keratinocytes, is divided into several layers according to the degree of keratinocyte differentiation: the stratum corneum, granular layer, spinous layer, and basal layer [15].

It is well recognized that keratinocytes play a significant part in inflammation [16].

Research on the tropical application of Ashwagandha aqueous and organic extracts has validated their chemo-preventive properties against skin cancer [17]. Also, it shows melanin regulatory effects [18].

The water-insoluble Withaferin-A has been shown to be primary organic solvent extract of ashwagandha and it has been shown to have anti-inflammatory, anti-angiogenesis, anti-metastasis and anticancer properties [19].

### NEUROPROTECTIVE EFFECTS

Ashwagandha neuroprotective qualities have drawn more attention in research, which may have implications for treating neurological illnesses. Ashwagandha contains a bioactive molecule called withanolides, which has been linked to cognitive improvement and neuroprotection [20] [21].

## EFFECTS OF ASHWAGANDHA ON ALZHIEMERS

Alzhiemers is a complicated neurological illness that causes due to the accumulation of amyloid beta in the brain. It has been demonstrated in the study that composition of chemical compounds present in Ashwagandha is helpful in the treatment of numerous neurological illnesses, including Alzheimer's diseases. Present study shows that 20mg/ml does of Ashwagandha has an effective result in certain symptoms of Ashwagandha such as rough eyes phenotype [22].

The oral treatment of semi purified extract of Ashwagandha (*W. somnifera*) root restored behavioral impairments, plaque load, and buildup of beta-amyloid peptides in mouse model of AD, according to an inclusion reported while the paper of this review was being reviewed [23].

## EFFECTS ON REPRODUCTIVE HEALTH

Research has demonstrated the anxiolytic, antidepressant, and anti-stress, adaptogen properties of Ashwagandha. In animal models, it has proven to be to be beneficial in treating sexual dysfunction brought on by stress. Steroid lactones, or withanolides, are thought to be the primary phytochemicals in Ashwagandha and one active ingredient that provide the plant its medicinal benefits [24].

As a tonic, Ashwagandha can boost sperm count in male and increases sexual efficacy in adults [25].

## ASHWAGANDHA AS FOOD PRODUCTS

Function foods, in addition to the basic nutritional and organic value, help us function better and in the prevention and treatment of illness and diseases.

Ashwagandha leaves and roots (dose 3-6 grams) can be utilized in powder form in food compositions. Researchers are developing a variety of items containing Ashwagandha, such as shrikhand, namakpara, missi roti, chutney, mruku and so on to obtain medical benefits [26].

## RASAYANA EFFECT OF ASHWAGANDHA

One of the eight subspecialties of Ayurveda is Rasayana Tantra. Is a specialty that takes the shape of anti-ageing recipes, diet plans, action that promote health, and medications. When done correctly, Rasayana can give a person several advantages, including lifespan, longevity, intelligence, immunity to sickness, maximum physical and sensory organ strength, respectability, and brilliance [27].

It is a well-known and respected ayurvedic herb, which is being used in ways like "Rasayana", revitalizer, and organic adaptogen [28].

*Withania somnifera* is a significant herb in Ayurveda which is being consume Rasayana for its various health benefits. This is commonly known as Ashwagandha, Indian Ginseng or Indian winter cherry. Ashwagandha belong to the family *Solanaceae* [29].

In Ayurvedic medicine, *Withania somnifera* is a widely known and respected plant. It is being used as a potent natural adaptogen, a nootropic, also a "Rasayana". It is widespread in the tropical climates of the South Africa, Indian subcontinent, the Mediterranean, and the Middle east [30].

## CONCLUSION

In conclusion, the extensive review of scientific literature on Ashwagandha underscores its multifaceted therapeutic potential and broad spectrum of health benefits. The adaptogenic properties of Ashwagandha have been constantly demonstrated in various studies, showcasing its ability to mitigate the impact of stressors on the body and also exhibits promising neuroprotective effects, suggesting its potential in neurological disorders.

Moreover, Ashwagandha has anti-inflammatory and anti-oxidant properties contribute to its effectiveness in managing condition associated with oxidative stress and chronic inflammation.

In conclusion, the reviewed literature supports Ashwagandha as a promising natural remedy with wide range of potential health benefits.

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