

Medicinal Evaluation of *Withania somnifera* (L.) Dunal (Ashwagandha)

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Ashwagandha (*Withania somnifera*) or winter cherry, or 'Indian Ginseng' as some may refer to it, is well known for years as an important drug in Ayurvedic literature. All the parts of the plant have shown their remarkable importance in the field of pharmacology. The roots, twigs, leaves, seeds, fruits and even the bark of the plant possess a potential to cure many painful and deadly diseases like asthma, rheumatism, tuberculosis, piles, bronchitis, leucorrhoea, ulcers, eye disorders, chest complaints, female sterility, sexual weakness, spermatorrhoea and many more. Thus, the plant seems to be a precious gift of nature. To evaluate the further medicinal values of the plant, the present report has been organized with the help of recent literature findings.

Key Words: Ashwagandha, *Withania somnifera* (L.) Dunal, Winter cherry, Solanaceae, Withanolides, Withaferin-A, Medicinal properties.

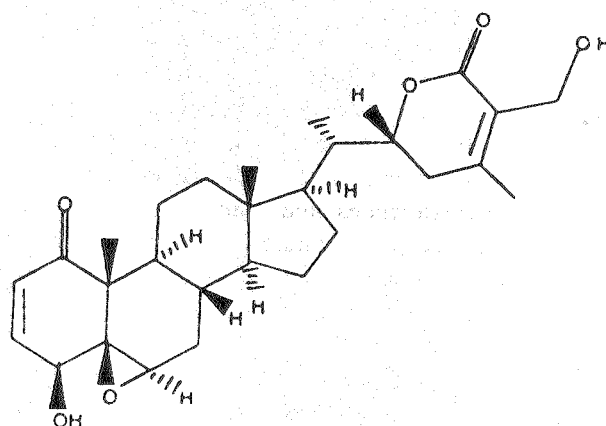
INTRODUCTION

Ashwagandha is a small evergreen shrub which belongs to the family Solanaceae. It is found in the forest lands of Madhya Pradesh, foot hills of Punjab, Himachal Pradesh, Western Uttar Pradesh and in the Himalayas. It is also widely cultivated in the Middle East for its well-recognized medicinal properties. The plant grows successfully in the sandy loam or light-red soils and prefers a subtropical climate. Though there are no known serious pests infesting this crop. An average yield of 300–500 kg/ha of dried roots and 50–75 kg/ha of seeds can be obtained. The commercial drug¹ derived from the plant consists of the dried roots which occur in small pieces. The plant root is described in early and modern Indian literature as a curative for many ills. Ashwagandha is a plant which has drawn attention of many researchers around the world² for its pharmacodynamic or pharmacotherapeutic properties. The plant is often used to cope with depression, anxiety and stress-induced conditions³ through its powerful antioxidant and adaptogenic properties.

In Ayurveda, Ashwagandha is often prescribed as a cognition and memory enhancing herb. The recent research findings have suggested that the plant root can also exhibit immunostimulatory effects^{4, 5} in addition to its mood-stabilizing

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characteristics. It is believed that various medicinal properties of the plant could be due to the presence of several steroid compounds^{2, 6}. One such compound is a withanolide (Withaferin-A) which plays a key role in Ashwagandha's ability to enhance memory and cognition by way of the cholinergic acetyl choline neurotransmitter pathways in the brain⁷. It is also believed that all of the active glycowithanolides in Ashwagandha work together to provide a synergistic effect on the central nervous system (CNS) helping to stabilize mood in clinical conditions of stress, anxiety and depression^{8, 9}.



Withaferin-A

Thus, the following description has been prepared to express the therapeutic importance of Ashwagandha and what new has come up in recent years from this plant in the field of medicine and pharmacology.

In cancer chemotherapy and radiosensitization: Studies on antitumor and radiosensitization properties¹⁰ of Ashwagandha have revealed encouraging results and it seemed that the plant is the natural source for cancer chemotherapy and radiosensitization. The alcoholic extract of the dried roots of the plant as well as the active component Withaferin A, isolated from the extract, showed significant antitumour and radiosensitization effects in experimental tumours *in vivo*, without any noticeable systematic toxicity. However, further studies are needed to explore the clinical potential of this plant for cancer therapy.

Immunomodulatory effects: The immunomodulatory activity⁴ of Ashwagandha has been studied in mice with myelosuppression, induced by one or more of the following three compounds: cyclophosphamide, azathioprin or prednisolone. A significant modulation of immune reactivity has been reported in all the three animal models used. Ashwagandha prevented myelosuppression in mice treated with all three immunosuppressive drugs tested. A significant increase in haemoglobin concentration, red blood cell (RBC) counts, white blood cell (WBC) counts, platelet counts and body weight has been observed in Ashwagandha-treated mice as compared with untreated (control) mice.

In another literature report⁵, the immunomodulatory activities of Ashwagandha extracts, namely WST and WS2, have been studied in mice for immune inflammation: active paw anaphylaxis and delayed type hypersensitivity (DTH). A significant increase in white blood cell (WBC) counts and platelet counts has

been observed in animals treated with WST. A protective effect in cyclophosphamide-induced myelosuppression has been noticed in animals treated with WST and WS2, revealing a significant increase in white blood cell (WBC) counts and platelet counts. Cyclophosphamide-induced immunosuppression has been counteracted by treatment with WS2.

Antistress and anabolic activities: The aqueous suspension of roots of Ashwagandha and the Korean drug Ginseng have been tested comparatively for antistress activity¹¹ by the 'mice swimming endurance test' and anabolic activity¹¹ by noting gain in body weight in rats. A significant increase in mice swimming time has been shown by Ginseng and Ashwagandha as compared to the control group. Significant increase in body weights in the Ashwagandha-treated group was better than Ginseng.

Anxiolytic-antidepressant activity: The roots of Ashwagandha have been used to promote physical and mental health, to provide defence against disease and adverse environmental factors and to arrest the aging process. The plant has been used to stabilize mood in patients with behavioural disturbances. The reported studies⁸ have investigated the anxiolytic and antidepressant actions of the bioactive glycowithanolides, isolated from Ashwagandha roots, in rats. Glycowithanolides induced an anxiolytic effect, comparable to that induced by lorazepam and also exhibited an antidepressant effect, comparable with that produced by imipramine (a tricyclic antidepressant), in rats. These investigations supported the use of Ashwagandha as a mood stabilizer in clinical conditions of anxiety and depression in Ayurveda.

Adaptogenic activity: Ashwagandha is classified in Ayurveda as a rasayana—a group of plant-derived drugs reputed to promote physical and mental health. The adaptogenic activity⁹ of Ashwagandha root extract has been investigated against a rat model of chronic stress (CS). CS induced significant hyperglycaemia, glucose intolerance, increase in plasma corticosterone levels, gastric ulcerations, male sexual dysfunction, immunosuppression and mental depression. These CS-induced perturbations were attenuated by Ashwagandha and by PG (*Panax ginseng*). The results have indicated that Ashwagandha, like PG, has significant antistress adaptogenic activity, confirming the clinical use of the plant in Ayurveda.

In the treatment of rheumatism and sexual disturbances: The root extract of Ashwagandha is mostly used for the treatment of rheumatism and sexual debility¹. The powdered root with sugar has been found very effective for the patient suffering from bloody discharge, leucorrhoea, spermatorrhoea and loss of strength. The root is also considered to be very efficacious for toning up the uterus of women who habitually miscarry. The decoction along with milk has been considered as a cure for female sterility.

Antibacterial, antibiotic, antitumour and antiinflammatory activities¹: The leaf extract of Ashwagandha has been reported to exhibit remarkable activity against bacterial infections. Withaferin-A, present in Ashwagandha, has been receiving a good deal of attention because of its antibiotic and antitumour properties. The plant leaves have been used for curing inflammation of tubercular

glands and also have been reported to possess antihelmintic and analgesic properties.

Medicinal use in bed sores, wounds and eye disorders¹: An ointment prepared from boiling leaves of Ashwagandha has been found useful for bed sores and wounds. The warm leaves are also used for providing comfort for eye diseases.

Miscellaneous properties¹: An infusion of the bark is given for asthma. The Ashwagandha fruits and seeds are diuretic in nature and are also used in chest complaints. A decoction of leaves is used for the treatment of piles and acts as an insecticide, killing the body lice. The ground leaves and roots are used for the treatment of carbuncles, ulcers and painful swellings. The root in the form of decoction has been recommended for the treatment of scrofula, skin diseases, bronchitis, dyspepsia, constipation and also found useful for chest complaints, colds and chills.

Thus, the various laboratory tests and several clinical studies for Ashwagandha root have suggested that this natural constituent is quite safe to use and possesses none or negligible toxicity. The recommended moderate doses for adults range from 75–250 mg per day.

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