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Relevance of Ashwagandha (*Withania somnifera*) root extracts for good health and stamina: A review of recent advancements

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ABSTRACT

Herbal plants have been the primary source of medicines for humans since ancient times, and currently around eighty per cent of global population depends on traditional medical system. World Health Organization (WHO) has reported that the international market value for herbal products is approximately equivalent to $6.2 billion till the date and is believed to reach up to $5 trillion at the end of 2050. The main objective of the study is to identify the traditional uses of ashwagandha root extracts for health and longevity, keeping focus on pharmaceutical and biochemical scientific evidence to support the validity. National and international journals have been examined for concrete evidence.

Keywords: Ashwagandha, Chemotherapy use, GABA, Phytochemical content, Aphrodisiac.

INTRODUCTION

India has become one of the world's twelve mega biodiversity hotspots, having an abundance of medicinal plants. Ashwagandha [*Withania somnifera* (L.) Dunal] contributes a promising share among the major medicinal herbs of India. It is often found in Madhya Pradesh, Rajasthan, Gujarat, Punjab, and Uttar Pradesh [1]. Apart from India, it is also raised in Pakistan, Afghanistan, Spain, Africa, and the Canary Islands. Ashwagandha cultivation is a preferable option for places that are not ideal for food crops, and it flourishes in a dry, low-humidity environment. The plant grows abundantly in India's drier subtropical and semi-tropical climates, from the plains to 1,700 metres above sea level. The term “Ashwagandha” was derived from Sanskrit; ‘Ashwa’ means horse and ‘Gandha’ signifies fragrance to some experts and stamina to others. The earlier argues that it has a horse-like smell, while the latter says that it produces horse-like strength [2]. Its two synonyms, Vajagandha and Turangagandha, are listed in Charaka Samhita and Sushruta Samhita, and have similar meanings to Ashwagandha. Horses are represented by the words Vaji and Turanga, while Gandha is represented by the word Gandha. Withania acting as an adaptogen or tonic in Ayurvedic traditional medicine is also known as "Indian ginseng" [3]. Although the seeds, shoots, juice, and leaves were used at the ancient period, ashwagandha root extract is of great medicinal demand nowadays [4].

Active biochemical contents

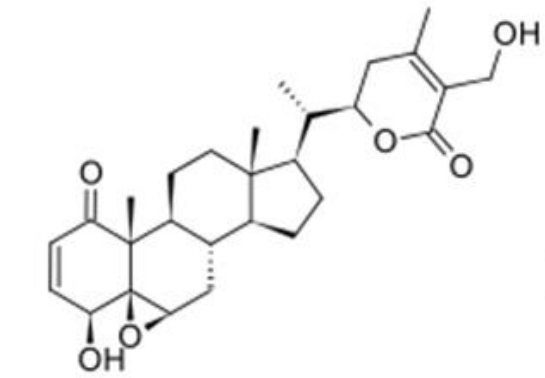
A specific steroidal lactone called withanolides have also been observed in Ashwagandha. The presence of these alkaloids is thought to be responsible for many pharmacological properties of Ashwagandha [5]. Root Alkaloids, 18 fatty acids, beta-sitesterol, polyphenols, and phytosterols are also found in the roots [4].

Common uses

Ashwagandha had already traditionally used as an aphrodisiac. It has a long list of uses as a home remedy. It is part of the Ayurvedic, Siddha, and Unani traditions, and is listed in the Indian Materia Medica. Scientific researches on ashwagandha strongly claim a vast range of potentially advantageous and diverse uses for health improvement and support. A discussion of each of these potential applications are as follows.

1. Relevance in Chemotherapy and radiation-based treatment

Chemotherapy and radiation therapy are very common to treat cancer patients. Both of these treatments have the potential to lower white blood cell (WBC) counts, and chemotherapy can cause mylosuppression, or a reduction in the capacity of the bone marrow to produce WBC. As a result, the



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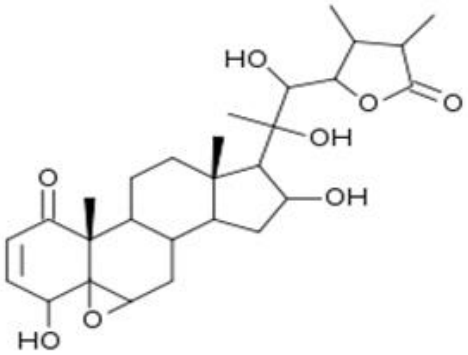

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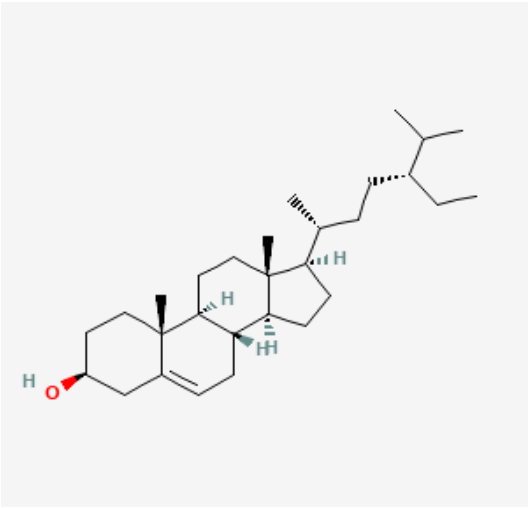
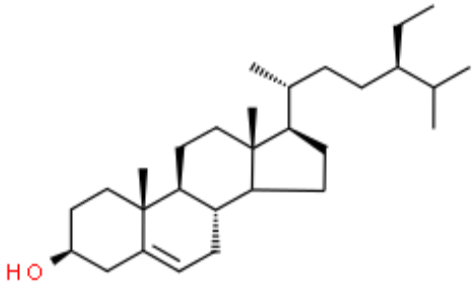


Beta-sitesterol



Phytosterols

Figure 1: Structures of various chemicals and alkaloids present in ashwagandha roots

patient may be more susceptible to other infections. When combined with chemotherapy or radiation therapy, Ashwagandha has been shown to increase WBC count in animals [7-9]. This herb has also been shown to reduce mylosuppression when used in conjunction with chemotherapy in other studies [10].

Furthermore, ashwagandha has been shown in several studies to inhibit tumor growth in test animals while boosting radiosensitivity, to destroy cancerous cells [11]. Even without radiation therapy, Ashwagandha was able to inhibit tumor growth in animals in one study.

2. Immune function

Ashwagandha has been shown in studies to improve immune function in addition to its ability to treat cancer. It was demonstrated in a study in which mice given a daily dose of Ashwagandha had increased phagocytosis and intracellular macrophage activity against a pathogen. In a study on mice, the tumor-fighting abilities of macrophages were found significantly affected by ashwagandha root extract. In addition to providing immunogenic effect, ashwagandha has been used to prevent organ failure in mice treated with immunosuppressive medications, resulting in significant increases in hemoglobin level, RBC count, WBC count, platelet count, and body weight [12].

Ultimately, mice's immune systems were suppressed using a various approach before being subjected to infectious organisms in a series of studies. Mice which were pretreated with one of six herbs, including ashwagandha, appeared much better than the control ones in each experiment. Mice given the herbs rapidly recovered, with less illness, and very low fatality rate. Artificially produced neutropenia (a lack of neutrophils, a type of white blood cell) was reduced by these herbs, but leucocytosis was increased (an increase of white blood cells). Antibiotics and these herbs were used together in therapies that had a much better healing impact than either treatment alone. Stress-related damage was also minimized by the herbs [13].

3. Antioxidant activity

Ashwagandha seems to be have significant antioxidant activity, which is also one of its signaling pathways. In a study, Ashwagandha was found to reduce free radical oxidation in the liver of mice while strengthening antioxidant enzyme activity like superoxide dismutase (SOD) and catalase [14]. In other studies, Ashwagandha was found to suppress free radical activity in stress-induced mice [15]. From another study, Ashwagandha, given once daily for 21 days, boosted SOD, catalase, and glutathione peroxidase levels in rats in a dose-dependent manner [16]. From one investigation, Ashwagandha enhanced SOD activity in the pancreas of diabetic rats when used as an aspect of an Ayurvedic herbal formulation.

4. Mental stress exemption

Ashwagandha has been employed in the treatment of psychological and emotional well-being. In animal experiments, for instance, it has been designed to boost memory and cognitive function either

increasing acetylcholine activity in the brain or binding to cholinergic receptor sites [17]. This plant also exhibits GABA-mimetic action, which means it can imitate some of the relaxing neurotransmitter GABA's effects [18,19]. It nevertheless improves neurological as well as psychomotor function by reducing mental stress.

5. Aphrodisiac

In a clinical experiment of withania to investigate the ageing process, 71.4 per cent of the male rats was reported an increase in their sexual performance capacity. The herb's conventional use as such an antidepressant shows up to be confirmed by these findings [20].

6. Anti-inflammatory and antiarthritic activity

Ashwagandha is shown to have powerful anti-inflammatory properties. For instance, their anti-inflammatory activity was shown to be fairly similar to that of a 5 mg/kg dosage of hydrocortisone in one research [21]. Five plants were examined for their anti-inflammatory properties in another investigation. The findings have shown maximum levels of anti-inflammatory action in ashwagandha [22].

7. Anti-stress and anabolic activity

A comparison of Ginseng (*Panax ginseng*) and Ashwagandha (*Withania somnifera*) was conducted due to their functional similarities. Each herb was examined in mice using water solutions of the powdered root for: (1) anti-stress action and (2) anabolic activity. In the comparison with control ones, Ashwagandha and Ginseng both possess anti-stress activity, while Ginseng's activity was higher. Although both herbs had considerable anabolic activity, the mice given with Ashwagandha gained more body weight than those treated with Ginseng in the anabolic research [23].

8. Morphine dependance

Since Ashwagandha has only been tested in mice, it also has the potential to treat those who are habitual to morphine. In what seems like a 10 days research, Ashwagandha prevented the development of morphine tolerance. This is critical while developing a tolerance for a substance frequently leads to higher doses and abuse. Ashwagandha also reduces morphine secession leaps, which are an indication of morphine dependence [24].

9. Articular assistance

Apart from the above benefits of Ashwagandha, it also aids the thyroid, liver, and pancreas work efficiently. In a scientific study, a combination of Ashwagandha and other herbs (*Tinospora cordifolia*, *Eclipta alba*, *Ocimum sanctum*, *Picrorrhiza kurroa*, and shilajit) given once daily for 28 days reduced blood sugar levels and free radical activity in the pancreas of diabetic rats. Results indicated a positive relation between the reduction in blood sugar and the pancreatic free radical scavenging activity [25].

10. Safety

A 90-day oral treatment of three doses of Ashwagandha in rats was used to detect any potential harm. The researchers looked at food consumption, body weight, haematological, biochemical, and histopathological markers. On gross examination and histopathologically, they found brain, heart, lung, liver, kidneys, stomach, spleen, testis and ovaries were all normal. In rats, subacute toxicity trials revealed no harm [26]. Ashwagandha appears to be a safe herb. Despite this, one study suggests that Ashwagandha should be avoided during pregnancy.

CONCLUSION

A review is an effective approach for accurately and reliably summarizing evidence about the effectiveness of health-care interventions. The Ashwagandha proves to be a promising naturally occurring substance of an effective and reasonably safe radiosensitizer/chemotherapeutic agent, as per initial study. *Withania somnifera* is an Indian plant that was employed in medicine since the time of Ayurveda. Ashwagandha root extract as an aphrodisiac as well as anti-inflammatory agent is well known against bronchitis, asthma, ulcers, emaciation, sleeplessness, and senile dementia. Clinical trials and animal research have verified the use of ashwagandha for anxiety, cognitive and neurological diseases, inflammation, and Parkinson's disease.

Conflict of Interest

None declared.

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