

Nutritional and Health Beneficial Properties of *Psoralea corylifolia* and *Withania somnifera*: A Comprehensive Review

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ABSTRACT

Medicinal plants have been a cornerstone of traditional medicine for centuries, offering a wide range of bioactive compounds with therapeutic effects. Among them, *Psoralea corylifolia* (Babchi) and *Withania somnifera* (Ashwagandha) are medicinal plants extensively used in traditional and modern medicine for their diverse therapeutic and nutritional benefits. *Psoralea corylifolia* is a rich source of bioactive compounds such as flavonoids, coumarins, bakuchiol, and essential oils, which contribute to its potent antioxidant, antimicrobial, anti-inflammatory, and hepatoprotective properties. Traditionally, it has been employed in managing skin disorders, osteoporosis, vitiligo, and immune-related conditions. *Withania somnifera*, known as Ashwagandha, is a well-established adaptogenic herb with a broad spectrum of pharmacological benefits. It contains withanolides, alkaloids, and saponins, which are crucial in stress management, neuroprotection, anti-aging, and immune modulation. Its anxiolytic, anti-fatigue, and cognition-enhancing properties have made it a valuable component in managing neurodegenerative disorders, anxiety, and fatigue-related syndromes. Moreover, its anti-inflammatory and anti-diabetic effects contribute to improved metabolic health and overall well-being. Both plants exhibit significant potential in modern integrative medicine due to their ability to regulate oxidative stress, enhance immune function, and modulate inflammatory pathways. Their nutritional and therapeutic applications extend to functional foods, nutraceuticals, and pharmaceutical formulations. This comprehensive review highlights their phytochemical composition, nutritional and potential health benefits, emphasizing their role in disease prevention and holistic health management. Understanding the synergistic effects of these botanicals can pave the way for novel therapeutic strategies and evidence-based applications in clinical and dietary interventions.

KEY WORDS: BIOACTIVE COMPOUNDS, *PSORALEA CORYLIFOLIA*, *WITHANIA SOMNIFERA*, NUTRITIONAL BENEFITS.

INTRODUCTION

Medicinal plants have been an integral part of traditional medicine systems across various cultures, offering therapeutic benefits through their bioactive compounds. For centuries, these plants have played a crucial

role in healing practices, providing natural remedies for a wide range of ailments [1,2]. Their bioactive constituents, including alkaloids, flavonoids, terpenoids, and polyphenols, exhibit diverse pharmacological properties such as anti-inflammatory, antimicrobial, antioxidant, and analgesic effects. As interest in natural medicine continues to grow, scientific research is increasingly validating the efficacy of medicinal plants, paving the way for their integration into modern healthcare and pharmaceutical development [3,4]. Among them, (commonly known as Babchi) and *Withania somnifera* (commonly known as Ashwagandha) are widely recognized for their medicinal and nutritional properties. These plants have been extensively used in Ayurveda,

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Traditional Chinese Medicine, and other indigenous healing practices for their diverse pharmacological activities [5].

Psoralea corylifolia, also known as "Babchi" or "Bu gu zhi" in traditional Chinese medicine, is a perennial herbaceous plant belonging to the Fabaceae family. *P. corylifolia* is indigenous to Asia, mainly China and India, and has been used in traditional medical systems for ages [6]. It is a commonly used spice and medicinal plant in the region and is often used in flavorings and pharmaceuticals [7, 8]. *Psoralea corylifolia* is valued for its rich composition of flavonoids, coumarins, and essential oils, which contribute to its antioxidant, anti-inflammatory, antimicrobial, and hepatoprotective properties. It has been traditionally utilized for managing skin disorders like psoriasis, vitiligo, eczema and leprosy, bone health, and reproductive wellness.

Similarly, *Withania somnifera*, often referred to as the "Indian Ginseng," has been used in Ayurvedic medicine for more than 3000 years. It belongs to the Solanaceae (nightshade) family of plants, and grows wild in Africa, the Mediterranean and India. Ashwagandha is also cultivated for medicinal purposes [9]. Although the berries and leaves appear to have medicinal properties, it is the roots that have been traditionally employed and are the focus of modern medical research. It is renowned for its adaptogenic and rejuvenating properties. It contains a wide array of bioactive compounds, including withaferin A, withanolides, alkaloids, and saponins, which exhibit immunomodulatory, neuroprotective, and anti-stress effects [10, 11]. This review aims to provide a comprehensive evaluation of the nutritional and health-beneficial properties of *Psoralea corylifolia* and *Withania somnifera*. It explores their phytochemical composition, pharmacological activities, and potential applications in modern healthcare. By analyzing recent scientific findings, this review highlights the therapeutic potential of these medicinal plants and their role in promoting human health and well-being.

Psoralea corylifolia: *Psoralea corylifolia*, also known as "Babchi" or "Bu gu zhi" in traditional Chinese medicine, is a perennial herbaceous plant belonging to the Fabaceae family. *P. corylifolia* is indigenous to Asia, mainly China and India, and has been used in traditional medicine for generations [12]. The plant is extremely valuable biologically, and it has long been used to treat a variety of skin ailments, including psoriasis, leukoderma, and leprosy.

P. corylifolia is valued in traditional Chinese medicine (TCM) for its numerous medicinal properties, and it has been used to treat a variety of ailments, including skin disorders and reproductive health issues. *P. corylifolia* has been valued for centuries for its dermatological characteristics, especially in the treatment of skin conditions such as psoriasis, eczema, and vitiligo. Its seeds contain bioactive compounds, such as furanocoumarins like psoralen, which have long been utilized to improve skin pigmentation and alleviate dermatological complaints [13, 14].

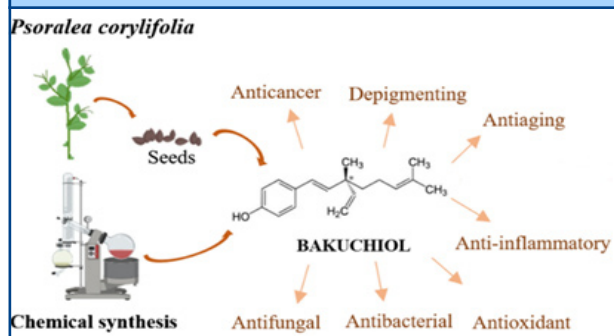
Pharmacological research on *P. corylifolia* extends well beyond its dermatological uses. This remarkable botanical

exhibits a broad spectrum of medicinal properties, including anti-inflammatory, antioxidant, antidiabetic, and hepatoprotective effects. Its diverse pharmacological benefits highlight its importance in traditional medicine and its potential as a valuable therapeutic agent in modern pharmacology. With the growing demand for natural remedies and traditional treatments, interest in the pharmacological potential of botanicals like *P. corylifolia* is also increasing. The plant's rich chemical composition and bioactive compounds offer promising avenues for drug discovery and development. Given the rising prevalence of chronic diseases and the challenge of antibiotic resistance, there is a pressing need for novel therapeutic agents with diverse mechanisms of action. *P. corylifolia* stands out as a promising candidate due to its multifaceted pharmacological properties and long history of use in traditional medicine [15].

Phytochemical composition of *Psoralea corylifolia*:

P. corylifolia, a member of the Fabaceae family, has a diverse phytochemical profile throughout its plant sections. The seeds, fruits, roots, and aerial sections of *P. corylifolia* contain a varied array of chemical components. A literature review revealed over 155 phytochemicals belonging to different chemical classes viz flavones, coumarins, monoterpenes, chalcones, lipids, resins, stigmateroids and flavonoids have been isolated from *P. corylifolia* plant parts [16]. Some of its important pharmacologically active constituents are bakuchiol, corylin, genistein, isobavachalcone, isopsoralen, psoralen, psoralidin which attributes to its anti-microbial, anti-inflammatory, anti-psoriasis, anti-vitiligo, anti-cancer, and many other activities. It is interesting to note that most of the active constituents of this herb are found in the seeds. These compounds are crucial and widely used in traditional medicine, skincare, and modern pharmacology [17, 18].

Figure 1: The comprehensive pharmacological benefits of *Psoralea corylifolia* (Adapted from [17])

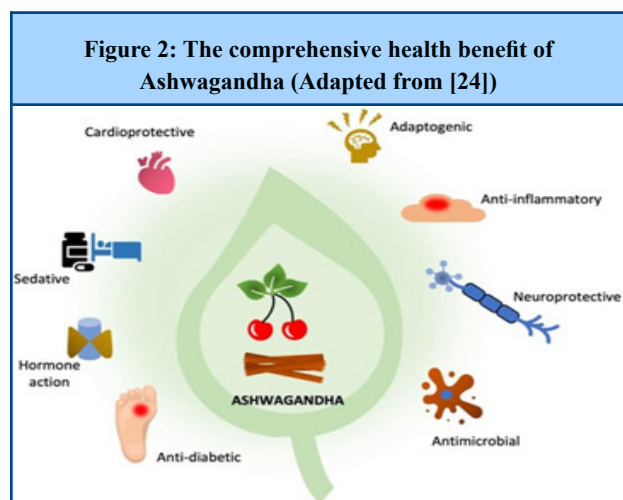


Traditional Uses Exploration: *P. corylifolia* has been used traditionally across several cultural systems for ages. In traditional Chinese medicine (TCM), it is regarded for its varied therapeutic capabilities and is used to cure a variety of diseases. Traditional use includes the treatment of skin illnesses such as psoriasis, eczema, and vitiligo, owing to its ability to promote skin pigmentation and reduce symptoms. It is also used for its anti-inflammatory, antibacterial, and analgesic qualities, making it an attractive option for treating inflammatory diseases and infections [19]. Furthermore, *P. corylifolia* is used to promote reproductive health,

increase libido, and treat menstruation irregularity. Scientific data supporting these traditional uses continues to develop, validating the efficacy of *P. corylifolia* in traditional medicinal systems [20].

Bioactive compounds derived from *Psoralea corylifolia* have a wide range of pharmacological actions, making them a promising therapeutic target. Studies have shown that it has anti-inflammatory qualities, which are attributed to compounds such as bakuchiol and flavonoids that suppress pro-inflammatory mediators [21]. Furthermore, *P. corylifolia* extracts have powerful antioxidant properties, scavenging free radicals and protecting cells from oxidative damage. Its antibacterial capabilities have been tested and found effective against numerous bacterial and fungal diseases. Furthermore, *P. corylifolia* chemicals have anti-diabetic properties by controlling glucose metabolism and insulin sensitivity. Hepatoprotective qualities have also been found, with substances such as bakuchiol protecting the liver from toxins and oxidative stress. Furthermore, research indicates anticancer potential, with *P. corylifolia* substances displaying cytotoxic effects on cancer cells and suppressing tumor growth via multiple methods [22].

***Withania somnifera*:** Indian ginseng, also known as Ashwagandha, Indian winter cherry, or *Withania somnifera*, has been a cornerstone of Ayurvedic medicine since ancient times. Traditionally valued for its nervous system-strengthening properties, this herb boasts adaptogenic effects and medicinal uses, earning its reputation as a potent 'rasayana' or rejuvenating agent. [23, 24].



Ashwagandha's rich history in traditional Indian medicine spans nearly 3000 years, with its root utilized for diverse purposes, including as an aphrodisiac, narcotic, tonic, diuretic, anthelmintic, and stimulant. Native to India, it is also cultivated in regions like the Mediterranean countries, the Himalayan areas, Africa, Canary Islands, Cape of Good Hope and Australia [25,26]. In recent years, Ashwagandha has garnered significant attention for its potential health benefits, particularly in enhancing stress resilience, cognitive function, and physical performance. Research suggests that Ashwagandha supplementation may offer

neuroprotection, relief from obsessive-compulsive disorder, and exhibit anti-inflammatory, immunomodulatory, and antibacterial properties [27].

Furthermore, there is evidence that Ashwagandha administration may aid with infertility, cancer, and diabetes treatment. Studies have revealed that Ashwagandha may display cardioprotective qualities, be useful in the treatment of sleep disorders, improve stress resilience, reduce anxiety, be beneficial in hypothyroidism, and promote muscle strength and recovery [28,29]. Although Ashwagandha shows potential health benefits, more research is required to uncover how it works and confirm its effectiveness in addressing different health issues.

Nutritional and Chemical Composition: Ashwagandha has gained attention from researchers due to its beneficial bioactive compounds. The primary active constituents of *W. somnifera* are alkaloids, including ashwagandhine, anaferin, and steroidal compounds (such as withaferin A and withanolides A-Y) [30]. Various phytochemicals have been extracted from different parts of the Ashwagandha plant (aerial portions, berries, leaves, and roots). Approximately 13 alkaloids, 138 withanolides, and numerous sitoinosides have been reported in Ashwagandha. However, the primary bioactive compounds in Ashwagandha are withanolide A, withanolide D, and withaferin A [31, 32]. These withanolides play pivotal roles in conferring therapeutic benefits, and include withaferin A, withanolide D, and sitoindosides-IX and X [33,34]. Additionally, from the aerial parts of Ashwagandha, withanosmoniferin-A, and five dihydroxy withanolide-R have been extracted. Other components identified in the species include reducing sugars, starch, acylsterylglucosides, hentriacontane, ducitol, glycoside withanolides (withanosides-IV, V and VI), and alkaloids such as anaferin, choline, hygrine, and somniferine, among others [35,36].

Table 1. Nutritional composition of root powder per 100 grams

Nutritional content	<i>W. somnifera</i> root powder	References
Moisture (%)	7.45	[40,41]
Ash (g)	4.41	
Protein (g)	3.9	
Fat (g)	0.3	
Crude fiber (g)	32.3	
Energy (kcal)	245	
Carbohydrate (g)	49.9	
Iron (mg)	3.3	
Calcium (mg)	23	
Total carotene (µg)	75.7	
Vitamin C (mg)	3.7	

In addition to these bioactive ingredients, Ashwagandha contains amino acids, including tryptophan. Notably, the precise

composition and concentration of bioactive components vary significantly. They are influenced by factors such as the cultivation conditions, specific parts of the plant, and extraction methods [37]. Previous studies indicate that Ashwagandha's active compounds impart adaptogenic properties, which may have a positive impact on health. Moreover, saturated, and unsaturated fatty acids have been extracted in Ashwagandha [38, 39], and its roots are notably rich in iron, playing a crucial role in haem production and oxygen transport throughout the body. Additionally, *W. somnifera* roots provide a significant source of dietary fiber, as highlighted in Table 1.

Therapeutic and Nutritional Benefits of *Psoralea corylifolia* and *Withania somnifera*: Herbal medicines have been used in traditional healing systems for centuries. Among them, *Psoralea corylifolia* (Babchi) and *Withania somnifera* (Ashwagandha) are well-known for their medicinal properties. These plants offer a wide range of therapeutic and nutritional benefits, making them valuable in natural medicine and holistic health practices. *Psoralea corylifolia*, also known as Babchi, is a rich source of antioxidants, including flavonoids, phenolic acids, and terpenoids, which can help protect against oxidative stress and inflammation. It is also a good source of minerals like potassium, magnesium, and iron, essential for maintaining various bodily functions. *Psoralea corylifolia* is traditionally used in Ayurvedic and Chinese medicine for treating various skin conditions, including vitiligo, psoriasis, eczema, and leprosy. Psoralen, a major component, is used in PUVA (Psoralen + UVA) therapy for repigmentation in vitiligo. Its anti-inflammatory and wound-healing properties make it effective for acne and dermatitis treatment. Additionally, *Psoralea corylifolia* has been shown to exhibit antimicrobial and antifungal properties, making it a potential natural remedy for infections [42,43].

While *Withania somnifera* (Ashwagandha) is widely recognized for its dermatological benefits, owing to its rich content of withanolides, alkaloids, flavonoids, and antioxidants. It is also a good source of vitamins A, C, and E, as well as minerals like potassium, magnesium, and iron. It supports skin health through its anti-inflammatory, anti-aging, wound-healing, and antimicrobial properties [44]. Ashwagandha helps in reducing dark spots and pigmentation by inhibiting melanin production. Its natural skin-lightening properties improve overall skin tone and radiance. The ability to promote collagen synthesis, reduce stress-induced skin issues, and protect against environmental damage makes it an excellent choice for holistic skincare [45].

Both *Psoralea corylifolia* and Ashwagandha can help to boost the immune system, though Ashwagandha is more commonly used for immune support. As it also works synergistically for reducing stress, improving skin conditions, and enhancing overall well-being. While Ashwagandha is primarily an adaptogen and *Psoralea corylifolia* focuses more on skin and bone health, combining the two can provide a comprehensive therapeutic approach for those dealing with chronic inflammation and stress. Both plants have been shown to have neuroprotective effects, and may help protect against neurodegenerative diseases

like Alzheimer's and Parkinson's. Overall, *Psoralea corylifolia* and *Withania somnifera* are two medicinal plants with a wide range of nutritional and therapeutic applications, and have the potential to provide natural remedies for various health conditions. These two herbs can be used individually or together as a part of a holistic approach to health, supporting both physical and mental wellness [46].

Future Perspectives: The increasing interest in natural health solutions has positioned *Psoralea corylifolia* and *Withania somnifera* as promising candidates for various therapeutic and nutritional applications. However, several aspects are required for further exploration and development to fully harness their potential. Future research and development should focus on enhancing bioavailability, ensuring sustainable cultivation, achieving regulatory compliance, and integrating these herbs into evidence-based healthcare models. With continued scientific innovation and interdisciplinary collaboration, these medicinal plants may emerge as key contributors to natural therapeutics and functional nutrition in the years to come.

An upcoming study will conduct an in-depth analysis of *P. corylifolia* phytochemistry and pharmacology, exploring its bioactive compounds and therapeutic potential. Building on existing research, the study aims to highlight the potential of *P. corylifolia* and *Withania somnifera* in drug discovery and development. Through rigorous research, scientists seek to uncover the full range of benefits offered by this plant, ultimately informing the creation of new pharmaceuticals, and advancing medical knowledge. Hence further studies are required to explore their molecular mechanisms, clinical efficacy, and potential integration into modern therapeutic strategies. As scientific research continues to uncover its full pharmacological and industrial benefits, it is essential to ensure responsible utilization, sustainable cultivation, and regulatory compliance to maximize its benefits while minimizing risks. By integrating traditional knowledge with modern scientific advancements, *P. corylifolia* and *W. somnifera* can emerge as a valuable resource for natural healthcare and sustainable innovations in the coming decades.

CONCLUSION

Psoralea corylifolia and *Withania somnifera* are two medicinal plants with a rich history of traditional use. Recent studies have validated their medicinal and nutritional properties, highlighting their potential applications in promoting health and well-being. *Psoralea corylifolia* and *Withania somnifera* offer immense medicinal and nutritional benefits, making them valuable candidates for further research and clinical application. Their bioactive compounds exhibit diverse pharmacological activities, providing a scientific basis for their traditional use. The purpose of this research is to evaluate the current literature on the activity of Ashwagandha, with an emphasis on its potential benefits for stress management, cognitive function, and physical performance.

In conclusion, *Psoralea corylifolia* and *Withania somnifera* hold great promise as medicinal and nutritional agents,

supporting their traditional use in managing various health conditions. Future research should focus on bridging the gap between traditional knowledge and modern scientific validation, ensuring the safe and effective incorporation of these plants into contemporary medicine. As a result, it emerges as a botanical gem with the potential to open new pharmacological and cosmetic paths. Its complex pharmacological potential emphasizes its significance in modern medicine and urges further investigation and use of its bioactive elements.

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