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Scientific basis for the use of Indian ayurvedic medicinal plants in the treatment of neurodegenerative disorders: ashwagandha.

Ven Murthy MR, Ranjekar PK, Ramassamy C, Deshpande M.

Author information

Abstract

Ayurveda is a Sanskrit word, which means "the scripture for longevity". It represents an ancient system of traditional medicine prevalent in India and in several other south Asian countries. It is based on a holistic view of treatment which is believed to cure human diseases through establishment of equilibrium in the different elements of human life, the body, the mind, the intellect and the soul [1]. Ayurveda dates back to the period of the Indus Valley civilization (about 3000 B.C) and has been passed on through generations of oral tradition, like the other four sacred texts (Rigveda, Yajurveda, Samaveda and Atharvanaveda) which were composed between 12(th) and 7(th) century B.C [2, 3]. References to the herbal medicines of Ayurveda are found in all of the other four Vedas, suggesting that Ayurveda predates the other Vedas by at least several centuries. It was already in full practice at the time of Buddha (6(th) century B.C) and had produced two of the greatest physicians of ancient India, Charaka and Shushrutha who composed the basic texts of their trade, the Samhitas. By this time, ayurveda had already developed eight different subspecialties of medical treatment, named Ashtanga, which included surgery, internal medicine, ENT, pediatrics, toxicology, health and longevity, and spiritual healing [4]. Ayurvedic medicine was mainly composed of herbal preparations which were occasionally combined with different levels of other compounds, as supplements [5]. In the Ayurvedic system, the herbs used for medicinal purposes are classed as brain tonics or rejuvenators. Among the plants most often used in Ayurveda are, in the descending order of importance: (a) Ashwagandha, (b) Brahmi, (c) Jatamansi, (d) Jyotishmati, (e) Mandukparni, (f) Shankhapushpi, and (g) Vacha. The general appearance of these seven plants is shown in Fig.1. Their corresponding Latin names, as employed in current scientific literature, the botanical families that each of them belongs to, their normal habitats in different areas of the world, as well as the common synonyms by which they are known, are shown in the Table 1. The scientific investigations concerning the best known and most scientifically investigated of these herbs, Ashwagandha will be discussed in detail in this review. Ashwagandha (*Withania somnifera*, WS), also commonly known, in different parts of the world, as Indian ginseng, Winter cherry, Ajagandha, Kanaje Hindi and Samm Al Ferakh, is a plant belonging to the Solanaceae family. It is also known in different linguistic areas in India by its local vernacular names [6]. It grows prolifically in dry regions of South Asia, Central Asia and Africa, particularly in India, Pakistan, Bangladesh, Sri Lanka, Afghanistan, South Africa, Egypt, Morocco, Congo and Jordon [7]. In India, it is cultivated, on a commercial scale, in the states of Madhya Pradesh, Uttar Pradesh, Punjab, Gujarat and Rajasthan [6]. In Sanskrit, ashwagandha, the Indian name for WS, means "odor of the horse", probably originating from the odor of its root which resembles that of a

sweaty horse. The name "somnifera" in Latin means "sleep-inducer" which probably refers to its extensive use as a remedy against stress from a variety of daily chores. Some herbalists refer to ashwagandha as Indian ginseng, since it is used in India, in a way similar to how ginseng is used in traditional Chinese medicine to treat a large variety of human diseases [8]. Ashwagandha is a shrub whose various parts (berries, leaves and roots) have been used by Ayurvedic practitioners as folk remedies, or as aphrodisiacs and diuretics. The fresh roots are sometimes boiled in milk, in order to leach out undesirable constituents. The berries are sometimes used as a substitute to coagulate milk in cheese making. In Ayurveda, the herbal preparation is referred to as a "rasayana", an elixir that works, in a nonspecific, global fashion, to increase human health and longevity. It is also considered an adaptogen, a nontoxic medication that normalizes physiological functions, disturbed by chronic stress, through correction of imbalances in the neuroendocrine and immune systems [9, 10]. The scientific research that has been carried out on Ashwagandha and other ayurvedic herbal medicines may be classified into three major categories, taking into consideration the endogenous or exogenous phenomena that are known to cause physiological disequilibrium leading to the pathological state; (A) pharmacological and therapeutic effects of extracts, purified compounds or multi-herbal mixtures on specific non-neurological diseases; (B) pharmacological and therapeutic effects of extracts, purified compounds or multi-herbal mixtures on neurodegenerative disorders; and (C) biochemical, physiological and genetic studies on the herbal plants themselves, in order to distinguish between those originating from different habitats, or to improve the known medicinal quality of the indigenous plant. Some of the major points on its use in the treatment of neurodegenerative disorders are described below.

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