National Institutes of Health
Office of Dietary Supplements

Ashwagandha: Is it helpful for stress, anxiety, or sleep?

Fact Sheet for Health Professionals

Introduction

Withania somnifera (L.) Dunal is an evergreen shrub cultivated in tropical and subtropical areas of Asia, Africa, and Europe. It is commonly called by the Sanskrit name, ashwagandha, because the plant's roots are said to smell like a wet horse ("ashwa" for horse and "gandha" for smell) [1]. Also known as Indian ginseng and winter cherry, ashwagandha has been used in the traditional Ayurvedic and Unani medicine systems of India as an adaptogen, which is loosely defined as a compound or product that increases the ability of a person to resist, adapt, or become resilient in nonspecific ways to biological, physical, or chemical stressors [2,3].

The species name *somnifera* comes from the Latin word for sleep inducing, signifying another purported property of this botanical [4]. In addition to sleep, ashwagandha is commonly promoted for stress and anxiety reduction and for cognitive disorders.

Ashwagandha is rich in phytochemicals, including steroidal lactones (known as withanolides) and alkaloids. While withanolides are believed to be responsible for many of ashwagandha's proposed effects, evidence from preclinical studies suggests that other, non-withanolide components may also be involved [5-7].

Efficacy

Stress and anxiety

Results from several clinical trials suggest that ashwagandha extracts may help reduce stress and anxiety. A 2021 systematic review identified seven studies investigating ashwagandha to treat stress and anxiety [7]. A total of 491 adults, all from India, with either self-reported high stress and anxiety or a diagnosed anxiety disorder, were randomized to take ashwagandha or placebo for 6 to 8 weeks. Six of the studies used extracts made from ashwagandha root alone (three studies, KSM-66), root and leaf (two studies, Sensoril or Shoden), or unspecified parts (one study), while the seventh study used dried root powder made into granules. The ashwagandha dose varied from 240 to 1,250 mg/day of extract or 12,000 mg/day of whole root granules equivalent to 6,000 mg of root powder. Overall, the studies found that ashwagandha significantly reduced stress and anxiety levels (subjectively measured by validated rating scales), reduced sleeplessness and fatigue, and reduced serum cortisol (a stress hormone) levels, compared with placebo. In several studies, benefits appeared to be greater with doses of 500 to 600 mg/day compared with lower doses.

Results from three additional small studies published after this 2021 review also suggest that ashwagandha has a beneficial impact on perceived stress. One clinical trial conducted in Florida included 60 men and women (mean age 34 years) experiencing perceived stress. Participants took capsules containing 225 mg/day or 400 mg/day of a proprietary ashwagandha root and leaf extract (NooGandha) or placebo for 30 days [8]. Compared with placebo, participants taking both doses of ashwagandha extract reported positive effects on stress, anxiety, depression, and food cravings as measured by validated rating scales. In addition, participants taking the 225 mg dose had lower saliva cortisol levels than those in the placebo group.

At two health centers in India, 130 healthy men and women age 20 to 55 years with self-reported stress were randomized to take a sustained-released ashwagandha root extract (Prolanza) or placebo for 90 days [9]. The extract was standardized to contain 15 mg withanolides per 300-mg capsule, and participants took one capsule daily. Compared with placebo, participants taking ashwagandha extract reported improvements in stress levels and sleep quality as measured by validated rating scales. They also had lower serum cortisol levels. In addition, participants reported improvements in psychological well-being, memory, and focus.

At the University of Colorado, Colorado Springs, 60 students (9 males, 49 females, and 2 nonbinary; age 18 to 50 years) were randomized to take an ashwagandha root extract (Gaia Herbs) or placebo for 30 days in a double-blind trial [10,11]. The extract contained 2.5 mg withanolides per 350-mg capsule, and participants took two capsules daily. The investigators gathered qualitative, subjective information from participants during daily check-ins and focus groups. Participants who took ashwagandha extract reported increased well-being, including a sense of calm, improved energy levels, heightened mental clarity, and enhanced sleep quality. While descriptions of stress were comparable in both groups, participants taking ashwagandha were more likely to describe their stress as manageable compared with those taking placebo.

Sleep

Research is limited, but the results from a few clinical trials suggest that ashwagandha extracts may help with sleep. For example, at one study center in India, 150 healthy men and women age 18 to 65 years with self-reported sleep problems characterized by insomnia and lack of restful sleep were randomized to take an ashwagandha root and leaf extract (Shoden) or placebo for 6 weeks [12]. The extract was standardized to contain 21 mg of withanolide glycosides per 60-mg capsule, and participants took two capsules each day. Both groups reported improvements in sleep quality as measured by a validated rating scale, but the improvements were greater in the ashwagandha group (72%) compared with the placebo group (29%). In addition, participants taking ashwagandha extract showed improvements in sleep efficiency (time in bed spent in sleep), total sleep time, sleep latency (time taken to fall asleep), and awakening after sleep onset as assessed by actigraphy, which involves wearing a watch monitor on the wrist to measure body motion. They also reported improvements in quality of life.

In another trial conducted in India, 80 healthy men and women age 18 to 50 years, half of them with insomnia, were randomized to take an ashwagandha root extract (KSM-66) or placebo for 8 weeks [4].

The extract was standardized to a withanolide content of more than 5% per 300-mg capsule, and participants took two capsules each day. Participants with insomnia who took ashwagandha extract showed improvements in sleep quality, sleep onset latency, mental alertness on rising, and perceived anxiety symptoms compared with those taking placebo, as measured by actigraphy and validated rating scales. Participants without insomnia taking ashwagandha also reported improved sleep but not perceived anxiety symptoms or mental alertness on awakening.

A 2021 systematic review and meta-analysis included five studies (including the two described above), investigating ashwagandha to promote sleep [13]. All studies were conducted in India. A total of 372 adults, either self-described as healthy or with insomnia, took ashwagandha or placebo for 6 to 12 weeks. The dose of the ashwagandha supplement used in these studies ranged from 250 to 600 mg/day as a root extract (KSM-66) or, in one study, 120 mg/day of a root and leaf extract (Shoden). Overall, the studies found that ashwagandha extract had a small but significant effect on improving sleep compared with placebo. The benefits were more prominent when the dose was 600 mg/day and when the treatment duration was at least 8 weeks. Benefits were also more prominent in participants with insomnia.

Safety

In the studies described above and in many other clinical trials, ashwagandha has been well tolerated by participants for up to about 3 months of use. Common side effects are mild and include stomach upset, loose stools, nausea, and drowsiness [7,14]. However, evidence on the safety of longer term ashwagandha use over many months or years is lacking.

There are a few reports of more serious side effects associated with ashwagandha use, including adverse effects on liver function. In an early report of liver injury associated with ashwagandha use, a 20-year-old man in Japan developed liver dysfunction and hyperbilirubinemia after using ashwagandha in combination with multiple antianxiety drugs [15]. Since then, the use of ashwagandha has been linked to acute liver injury in other case reports [16-19]. These include five cases (three men and two women, age range 21 to 62 years), who reportedly took supplements containing 450 to 1,350 mg ashwagandha daily over the course of 1 week to 4 months when signs of liver injury, such as jaundice, pruritus, nausea, lethargy, abdominal discomfort, and hyperbilirubinemia, appeared [17]. In these cases and others, the conditions of the individuals improved over time after they stopped taking the supplement; some also received medical treatment [15,17-19]. However, the contents of the products that the individuals took were not independently verified in all cases, and some products were combination products containing ashwagandha and other ingredients.

Some research in mice and humans suggests that ashwagandha might affect thyroid function [20,21]. In one study, three adult men who took 500 mg/day of a standardized ashwagandha extract (Sensoril) for 8 weeks had small increases in blood thyroxine (T4) levels [22]. A small clinical trial with 50 participants with subclinical hypothyroidism found that ashwagandha (KSM-66), at 300 mg twice daily for 8 weeks, lowered serum thyroid stimulating hormone (TSH) and increased triiodothyronine (T3) and T4 levels compared with placebo [23]. These findings suggest that ashwagandha might interact with

thyroid hormone medications. Ashwagandha might also interact with other medications including antidiabetes medications, antihypertensives, immunosuppressants, and sedatives [7,24].

Experts advise against the use of ashwagandha by people who are pregnant because it might have the potential to cause spontaneous abortion and by those who are breastfeeding [7,24-28]. Ashwagandha use might also increase testosterone levels [7,29,30], so according to experts, it might not be safe for people with hormone-sensitive prostate cancer [27,28].

Implications for use

Several randomized, placebo-controlled clinical trials, most of them fairly small in size and of short duration, have found that ashwagandha may reduce perceived stress and anxiety and improve the quality and duration of sleep [6,7,31]. Because studies have used various ashwagandha preparations (with different extraction and standardization processes) and doses, it is difficult to identify specific extracts or recommended amounts [6,32]. In addition, most studies have been conducted as part of a traditional medical system, so the potential effects of ashwagandha when used as a dietary supplement outside of that approach remain unclear.

Ashwagandha appears to be well tolerated for up to 3 months of use. However, the efficacy and safety of long-term ashwagandha use over months or years for stress, anxiety, or sleep is not known. In addition, ashwagandha may have potential adverse effects on the liver and thyroid and might not be safe for people with prostate cancer or those who are pregnant or nursing.

References

1. Mandlik Ingawale DS, Namdeo AG. Pharmacological evaluation of Ashwagandha highlighting its healthcare claims, safety, and toxicity aspects. J Diet Suppl 2021;18:183-226 [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/32242751/)]
2. Panossian AG, Efferth T, Shikov AN, Pozharitskaya ON, Kuchta K, et al. Evolution of the adaptogenic concept from traditional use to medical systems: Pharmacology of stress- and aging-related diseases. Med Res Rev 2021;41:630-703. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/33103257/)]
3. Gerontakos SE, Casteleijn D, Shikov AN, Wardle J. A Critical Review to Identify the Domains Used to Measure the Effect and Outcome of Adaptogenic Herbal Medicines. Yale J Biol Med 2020;93:327-46. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/32607092/)]
4. Langade D, Thakare V, Kanchi S, Kelgane S. Clinical evaluation of the pharmacological impact of ashwagandha root extract on sleep in healthy volunteers and insomnia patients: A double-blind, randomized, parallel-group, placebo-controlled study. J Ethnopharmacol 2021;264:113276. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/32818573/)]
5. Holvoet H, Long DM, Law A, McClure C, Choi J, et al. Withania somnifera Extracts Promote Resilience against Age-Related and Stress-Induced Behavioral Phenotypes in Drosophila melanogaster; a Possible Role of Other Compounds besides Withanolides. Nutrients 2022;14. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/36235577/)]

6. Speers AB, Cabey KA, Soumyanath A, Wright KM. Effects of Withania somnifera (Ashwagandha) on Stress and the Stress- Related Neuropsychiatric Disorders Anxiety, Depression, and Insomnia. Curr Neuropharmacol 2021;19:1468-95. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/34254920/)]
7. Lopresti AL, Smith SJ. Ashwagandha (Withania somnifera) for the treatment and enhancement of mental and physical conditions: A systematic review of human trials (https://www.sciencedirect.com/science/article/pii/S2210803321000142). Journal of Herbal Medicine 2021;28:100434.
8. Remenapp A, Coyle K, Orange T, Lynch T, Hooper D, et al. Efficacy of Withania somnifera supplementation on adult's cognition and mood. J Ayurveda Integr Med 2022;13:100510. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/34838432/)]
9. Gopukumar K, Thanawala S, Somepalli V, Rao TSS, Thamatam VB, et al. Efficacy and Safety of Ashwagandha Root Extract on Cognitive Functions in Healthy, Stressed Adults: A Randomized, Double-Blind, Placebo-Controlled Study. Evid Based Complement Alternat Med 2021;2021:8254344. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/34858513/)]
10. Baker C, Kirby JB, O'Connor J, Lindsay KG, Hutchins A, et al. The Perceived Impact of Ashwagandha on Stress, Sleep Quality, Energy, and Mental Clarity for College Students: Qualitative Analysis of a Double-Blind Randomized Control Trial. J Med Food 2022;25:1095-101. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/35984870/)]
11. ClinicalTrials.gov. The impact of ashwagandha on perceived stress, sleep and food cravings in college students 2022 (https://clinicaltrials.gov/ct2/show/NCT05430685).
12. Deshpande A, Irani N, Balkrishnan R, Benny IR. A randomized, double blind, placebo controlled study to evaluate the effects of ashwagandha (Withania somnifera) extract on sleep quality in healthy adults. Sleep Med 2020;72:28-36. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/32540634/)]
13. Cheah KL, Norhayati MN, Husniati Yaacob L, Abdul Rahman R. Effect of Ashwagandha (Withania somnifera) extract on sleep: A systematic review and meta-analysis. PLoS One 2021;16:e0257843. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/34559859/)]
14. Tandon N, Yadav SS. Safety and clinical effectiveness of Withania Somnifera (Linn.) Dunal root in human ailments. J Ethnopharmacol 2020;255:112768. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/32201301/)]
15. Inagaki K, Mori N, Honda Y, Takaki S, Tsuji K, et al. A case of drug-induced liver injury with prolonged severe intrahepatic cholestasis induced by Ashwagandha (https://www.jstage.jst.go.jp/article/kanzo/58/8/58_448/_article/-char/en). Kanzo 2017;58:448-54.
16. Weber S, Gerbes AL. Ashwagandha-Induced Liver Injury: Self-Reports on Commercial Websites as Useful Adjunct Tools for Causality Assessment. Am J Gastroenterol 2021;116:2151-2. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/34187981/)]
17. Bjornsson HK, Bjornsson ES, Avula B, Khan IA, Jonasson JG, et al. Ashwagandha-induced liver injury: A case series from Iceland and the US Drug-Induced Liver Injury Network. Liver Int 2020;40:825-9. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/31991029/)]
18. Lubarska M, Hałasiński P, Hryhorowicz S, Mahadea DS, Łykowska-Szuber L, et al. Liver Dangers of Herbal Products: A Case Report of Ashwagandha-Induced Liver Injury. Int J Environ Res Public

Health 2023;20. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/36900932/)]
19. Ireland PJ, Hardy T, Burt AD, Donnelly MC. Drug-induced hepatocellular injury due to herbal supplement ashwagandha. J R Coll Physicians Edinb 2021;51:363-5. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/34882134/)]
20. Panda S, Kar A. Changes in thyroid hormone concentrations after administration of ashwagandha root extract to adult male mice. J Pharm Pharmacol 1998;50:1065-8. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/9811169/)]
21. Panda S, Kar A. Withania somnifera and Bauhinia purpurea in the regulation of circulating thyroid hormone concentrations in female mice. J Ethnopharmacol 1999;67:233-9. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/10619390/)]
22. Gannon JM, Forrest PE, Roy Chengappa KN. Subtle changes in thyroid indices during a placebo-controlled study of an extract of Withania somnifera in persons with bipolar disorder. J Ayurveda Integr Med 2014;5:241-5. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/25624699/)]
23. Sharma AK, Basu I, Singh S. Efficacy and Safety of Ashwagandha Root Extract in Subclinical Hypothyroid Patients: A Double-Blind, Randomized Placebo-Controlled Trial. J Altern Complement Med 2018;24:243-8. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/28829155/)]
24. NatMed. Ashwagandha (https://naturalmedicines.therapeuticresearch.com/databases/food,-herbs-supplements/professional.aspx?productid=953). 2023.
25. American Herbal Products Association. American Herbal Products Association's Botanical Safety Handbook Boca Raton, FL: CRC Press LLC; 1997.
26. Engels G, Brinckmann J. HerbalGram, The Journal of the American Botanical Council. Ashwagandha (https://www.herbalgram.org/resources/herbalgram/issues/99/table-of-contents/hg99-herbprofile-ashwagandha/). 2013; Issue 99.
27. National Center for Complementary and Integrative Health. Ashwagandha (https://www.nccih.nih.gov/health/ashwagandha). 2023.
28. Mikulska P, Malinowska M, Ignacyk M, Szustowski P, Nowak J, et al. Ashwagandha (Withania somnifera)-Current Research on the Health-Promoting Activities: A Narrative Review. Pharmaceutics 2023;15. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/37111543/)]
29. Smith SJ, Lopresti AL, Teo SYM, Fairchild TJ. Examining the Effects of Herbs on Testosterone Concentrations in Men: A Systematic Review. Adv Nutr 2021;12:744-65. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/33150931/)]
30. Lopresti AL, Drummond PD, Smith SJ. A Randomized, Double-Blind, Placebo-Controlled, Crossover Study Examining the Hormonal and Vitality Effects of Ashwagandha (Withania somnifera) in Aging, Overweight Males. Am J Mens Health 2019;13:1557988319835985. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/30854916/)]
31. D'Cruz M, Andrade C. Potential clinical applications of Ashwagandha (Withania somnifera) in medicine and neuropsychiatry. Expert Rev Clin Pharmacol 2022;15:1067-80. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/36062480/)]
32. Lopresti AL, Smith SJ, Malvi H, Kodgule R. An investigation into the stress-relieving and pharmacological actions of an ashwagandha (Withania somnifera) extract: A randomized, double-blind, placebo-controlled study. Medicine (Baltimore) 2019;98:e17186. [PubMed abstract (https://pubmed.ncbi.nlm.nih.gov/31517876/)]

Disclaimer

This fact sheet by the National Institutes of Health (NIH) Office of Dietary Supplements (ODS) provides information that should not take the place of medical advice. We encourage you to talk to your health care providers (doctor, registered dietitian, pharmacist, etc.) about your interest in, questions about, or use of dietary supplements and what may be best for your overall health. Any mention in this publication of a specific product or service, or recommendation from an organization or professional society, does not represent an endorsement by ODS of that product, service, or expert advice.

Updated: October 24, 2023