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# A REVIEW ON *WITHANIA SOMNIFERA* (L.) DUNAL- AS AN IMPORTANT AYURVEDA PLANT

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## *ABSTRACT*

*Withania somnifera (L.) Dunal is a well-known and important medicinal plant widelyused in several indigenous systems of medicine for the treatment of various ailments,viz. asthma, bronchitis, inflammatory diseases, ulcer and stomach problems. Steroidallactones have been reported as the major phytoconstituents of this species. Different pharmacological experiments in a number of in vitro and in vivo models haveconvincingly demonstrated the ability of W. somnifera to exhibit anti-inflammatory, anti-oxidative, antimicrobial, anti-anxiety, aphrodisiac, immunomodulation, anti- diabetic, anti-ulcer, anticancer, central nervous system depressant and hepatoprotective activities, lending support to the rationale behind several of its traditional uses. The species is also used to treat some neurological disorders like Parkinson's and Alzheimer's. The phytochemicals such as withaferin A, withanolide A and withanolide D isolated from this plant are potential bioactive molecules. Due to the remarkable biological activity of W. somnifera and its constituents, it will be appropriate to develop them as a medicine and make them more potent by chemical modifications and biotransformation. This review has covered botany, chemistry andpharmacology of the plant besides its traditional and folkloric uses.*

***Keywords:*** *Withania somnifera; Steroidal lactones; Withanolides; Ayurveda.*

## INTRODUCTION

Plants plays a dominant role in the discovery of new therapeutics and have been used in traditionalmedicine for thousands of years (Muthu *et al.,* 2006). They have always been a rich source of largevariety of lead compounds. Pharmacological screening of natural products has led to the discoveryof a number of drugs. Among the worldwide list of twenty-six species, the genus *Withania* is represented in India by *Withania somnifera* and *W. coagulans* (Chadha, 1976). Recently we have reported a third species *Withania ashwagandha* from Indian germplasm using multidisplinary approaches (Mir *et al.,* 2010; Kumar *et al.,* 2011). Within the family Solanaceae, *Withania* belongsto subfamily Solanoideae, tribe Physaleae and sub-tribe Withaninae of which it is the type genus (Olmstead *et al.,* 2008). The generic name *Withania* commemorates the celebrated English 'Paleobotanist', 'Henry Thomas Maire Witham' with an orthographic variation of the final 'm' into an 'n' to which the commemorative termination –ia has been added. The specific epithet *somnifera* is a compound of two Latin words 'somnus' meaning sleep and 'fero' (ferere) meaning'to bear'. Thus, the specific epithet alludes to sleep inducing properties of the plant.

*Withania somnifera* is an erect, branched, greyish, stellate-tomentose under-shrub, 30-150 cm highwith long tuberous roots. Leaves are simple, petiolate with the leaf blade varying in shape from elliptic-ovate to broadly ovate, entire along margins, acute to obtuse at apex, cuneate or oblique atbase, 4-10 cm long and 2-7 cm broad. Flowering is seen betwwn march to July.

(https://www.tradeindia.com/fp2076129/Ashwagandha-Withania-somnifera-.html) Figure Showing Habit, Flower, Fruit, Branches, Seeds and Isolated dried Roots of *Withaniasomnifera* (L.) Dunal.

**Classification of *Withania somnifera* L.:**
**Kingdom:** Plantae **Division:** Angiosperms**Class:** Dicotyledon
**Sub-class:** Gamopetalae **Series:** Bicarpellatae **Order:** Polymoniales **Family:** Solanaceae **Genus:** *Withania* **Species:** *somnifera*
(According to Bentham and Hooker).
**Ethnobotany:**
In Ayurveda, *Withania somnifera* is widely claimed to have aphrodisiac, sedative, rejuvenativeand lifeprolonging properties.

**Pharmacological effects of *Withania somnifera* L.:**
Anti-oxidant effects:
Free radical damage of nervous tissue may be responsiable for neural loss in cerebral ischemia andmay be involved in aging and nuero-degenerative diseases, e.g., epilepsy, schizophrenia, Parkinson's, Alzheimer's and other diseases (Sehgal *et al*, 2012). The active compounds of *Withania somnifera* L., sitoindosides and withaferin A, are reported to increase levels of endogenous superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPX), and ascorbic acid, with a concomitant decrease in lipid peroxidation (Mirjalali *et al*, 2009). A decreasein the activity of these enzymes is known to lead accumulation of free radicals and resulting in degenerative effects.
Anti-microbial activity:
The anti-bacterial properties of this plant were reported first time by Kurup (1956) against
*Salmonella aurens*.
Anti-inflammatory property:
Ashwagantha act as an anti-inflammatory agent through inhibition of complement, lymphocyteproliferation and delayed type hypersensitivity (Rasool and Varalakshmi, 2006). The extracts of the plant have shown anti-inflammatory effects in a variety of rheumatological conditions (Al- Hindavi *et al*, 1992).

Anti-stress activity:
Anti-stress activity is associated with glycosides (Sitoindosides) present in the plant was reportedby Bhattacharya (2000 and 2003). The studies conducted by (Singh *et al*, 2001) lent

support to theusefulness of Ashwagantha as an anti-stress adaptogen.

Aphrodisiac activity:
Ashwagantha is also used as a tonic in the treatment of spermatopathia, impotence and seminal depletion (Nadkarni, 2002) and the man who used the herb enjoyed higher vigour performance (Boone, 1998). The higher concentrations of inorganic elements like Fe, Mg, K and Ni in the rootsof this plant plays significant role in the diuretic and aphrodisiac activity of the drug (Lohar *et al,*1992).

Anti-arthritic activity:
Ashwagantha powder has been found useful in acute rheumatoid arthritis and reduces the discomfort associated with arthritis (Bector *et al*, 1968). This property has been attributed to the active principle *withaferin A*.

Anti-neoplastic activity:
Ashwagantha is reported to have anti-carcinogenic effects. Research on animal cell cultures has shown that the herb decreases the level of the nuclear factor kappaB, supresses the intracellular tumour necrosis factor, and potentiates apoptotic signalling in cancerous cell lines. It works to reduce tumour size.

Different plant part with uses and system of medicine:

| **PlantPart** | **System of medicine** | **Uses** | **References** |
|---|---|---|---|
| Roots | Ayurveda | Tonic, Alternative pungent, Astringent, Aphrodisiac, Phthisis | Dutta (1877), Kumar *et al*,(1980). |
| | Siddha | Aphrodisiac, Fever, Inflammation. | SPC Chand (1992). |
| | Unani | Asthma, Bronchitis, Leukoderma, Arthritis. | Stewart (1869), Mathani (1973). |
| | Folklare | Abortificant, Cold, Asthma, Tuberculosis,Fever. | Dutta (1877), Kumar *et al.*,(1980). |
| Leaves | Ayurveda | Aphrodisiac, Carbuncle, Ulcers, Painful swelling. | Singh and Kumar(1998), Kumar *et al* (1980). |
| | Siddha | Fever, Chest pain, Sores, Swelling. | SPC Chand (1992). |
| | Unani | External pains, Anti-inflammatory. | UPC Chand (1993). |
| | Folklare | Cure eyesores, Boils, Narcotic, Syphilis. | Shah and Gopal(1985). |
| Seeds | Ayurveda | Diuretic, Narcotic andHypontic. | Dalzell and Gibson(1861). |

| | | | |
|---|---|---|---|
| Fruits | | Anti-helminthic, Ulcers and Tubercular glands. | Kapoor (2001). |

## CONCLUSION

The use of herbal drug is increasing worldwide as they have fewer or no side effects as comparedwith synthetic drugs. Ayurveda claims therapeutic potentials of various plants. A lot of work has been done on this multipurpose drug yielding plant till now. But all this information is fragmentedtherefore; the present review has been an attempt to compile this available information in a comprehensive manner. An extensive research has been done on this plant in past three decades but still there is an urgent need to carry out investigations on the biological activities, efficacies and modes of action of this traditional drug. In India, three species of the genus *Withania* are found, *Withania somnifera, Withania ashwagandha* and *Withania coagulans.* Withanolides are the principal compounds found in all the three species, there are some withanolides specific to each ofthem. Withaferin A is an important phytochemical found in *W. somnifera* and *Withania ashwagandha*, whereas, coagulin L has been found in major amounts in *Withania coagulans*. A unique thio-dimer of withanolide named Ashwagandhanolide has been found in *Withania somnifera.* The plant has been used as an antioxidant, adaptogen, aphrodisiac, liver tonic, anti- inflammatory agent, anticancer, central nervous system depressant, hepatoprotective and astringent and more recently as an antibacterial, antihyperglycaemic, hypolipidaemic and antitumoral, as well as to treat ulcers, senile dementia, Parkinson's and Alzheimer's. It had the greater therapeutic value overall. The variety of activities reported for the extracts, fractions and withanolides isolated from this wonder medicinal plant provide promising evidence for future research. Withanolides could achieve an important place in the world of modern drugs. Isolation on a large scale, chemical transformations and synthesis of the active compounds will definitely enhance their pharmacological value. The pharmacophores of various pharmacologically active withanolides have not yet been identified. All these advantages prove the significance of *W. somnifera* in natural product research. Despite having immense medicinal properties a multipronged strategy is required for making Ashwagandha varieties more competitive. There is aneed to augment the pharmacological properties by selecting and improving chemotypes producing prodigal amounts of the desired withanolide.

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