



**UNVEILING THE SECRETS OF ASHWAGANDHA (*WITHANIA SOMNIFERA* DUNAL): A COMPARATIVE STUDY OF MODERN PHARMACOLOGY AND TRADITIONAL AYURVEDIC WISDOM**

VINITA KHATRI<sup>1\*</sup> DILIP JANI<sup>2</sup> SUMAN SINGH<sup>3</sup>

<sup>1\*</sup>Assistant Professor, Department of Dravyaguna, Gokul Ayurvedic College, Patan, Gujarat, India

<sup>2</sup>Professor and Head, <sup>3</sup>Assistant Professor, Upgraded P.G. Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat, India

Corresponding Author Email: [vinitakhatri31@gmail.com](mailto:vinitakhatri31@gmail.com) Access this article online: <https://jahm.co.in>

Published by Atreya Ayurveda Publications under the license CC-by-NC-SA 4.0

Submitted on- 17-12-24

Revised on- 15, 28-01-25

Accepted on-03-02-25

**ABSTRACT:**

Since ancient period Ayurvedic herbs are being used for the benefit of mankind. Their application is well understood through their Ayurvedic properties and ideology. Nowadays, selected specific chemical constituents are being extracted and used for many purposes. Current flow of industries towards phytochemicals, pharmacological screening, invitro, in-vivo etc. experiments to explore Ayurvedic herbs extracts is being adopted mostly by botanist, researchers, pharma companies etc. **Objective:** Screening of pharmacological activities of Ayurvedic herbs has mushroomed. *Ashwagandha*- *Withania somnifera* plant has been vastly explored for its numerous pharmacological activities through various models. This literary study was carried out to enhance understanding of mode of action, through correlation of these activities with Ayurvedic properties of *Ashwagandha*. **Methodology:** Ayurvedic lexicons like Nighantus along with research articles related to *Ashwagandha*'s pharmacological activities were thoroughly screened. **Key findings:** Vast spectrum of properties and activities of *Ashwagandha* is described in an Ayurvedic texts. Moreover, this herb is also screened for relevant activities, which can be used to link ancient and modern science. **Conclusion:** By understanding and applying both the sciences – *Ayurveda* as well as cotemporary science, we can get detailed clear picture about mechanism of *Ashwagandha* in various disease conditions. Therefore, this study was carried to check the relevance of these pharmacological studies with Ayurvedic ideology and to justify drug more precisely on clinical application basis.

**Key-words:** *Ashwagandha*, Ayurvedic ideology, Pharmacological screening, *Withania somnifera*.

## INTRODUCTION

The ongoing growing pattern of recognition of medicinal plants is due to several reasons, including escalating faith in herbal medicine, as conventional medical system couldn't cover wide range of diseases. Moreover, its high prices and side-effects are also causing many needy to return to herbal medicines which have fewer side effects and cost. Medicinal plants are the "backbone" of traditional medicine, which indicates that the increase in demand of herbal medicines in the form of traditional medicine, there will be more demand of medicinal plants. Currently, more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis[1]. This can be demanded by prominent industries producing herbal formulations, pharmaceuticals, cosmeceuticals, nutraceuticals, other confectionary items, etc.

*Ashwagandha* - *Withania somnifera* Dunal colloquially known as Indian ginseng of family Solanaceae is a branched erect undershrub medicinal plant widely used in Indian traditional system of medicine like *Ayurveda*, Unani and Siddha science ancient decades and nowadays in various nutraceutical products. The plant species is native to India and both wild and cultivated varieties are found throughout India. Its roots are an ingredient of various widely used Ayurvedic medicaments, such as *Agurvadi Taila*[2], *Trayodashanga Guggulu*[3], *Phala Ghrita*[4] etc. *Ashwagandha Mula* is widely used in the *Ayurveda* as single drug or compound formulation with other medicinal drugs. *Wide range of formulations* of this herb are

available in different dosage forms like powder, tablet, *Arishta*, decoction, Ghrite, Taila etc.

As possessing these much of wide spectrum utility, *Ashwagandha* leads scientists toward more exploration on scientific basis with modern tools of analysis. Though, Ayurvedic documentation is time-tested, fruitful and written by *Apta* (Unbiased minded scholars), But with advanced technologies, to understand herbs on the level of chemical compounds and genetic material, they are being more explored for further research and drug delivery system, pharmacokinetics, pharmacodynamics, toxicity, efficacy, dose dependent effect, specific target achieved results etc. are analyzed through pharmacological screening. Moreover, few years back plants were mostly used as drug as a whole through modifying their dosage forms. But, nowadays, plant originated single chemical components are getting their popularity with the upsurge of extract industries. To assess their potency and efficacy towards specific disease condition and disease target, these molecules are being validated for their pharmacological activities.

*Ashwagandha* one among Ayurvedic medicinal plant, widely explored for screening of its pharmacological viz. Anti-inflammatory, Analgesic effect, Anti-bacterial, Muscle relaxant activity, Anti-fungal activities, Immunomodulatory action, Antidepressant effect, Anti-arthritis etc. These activities might be co-related to ancient Ayurvedic description of *Ashwagandha* in terms of *Rasapanchaka*, *Karma* and *Rogaghnata*. So, here in this literary study, co-relation and justification is

discussed upon pharmacological activities and Ayurvedic parameters of *Ashwagandha*. This discussion might give insights upon mode of action, action pathway, target receptors etc. regarding *Ashwagandha*.

### Material & Methods

In this review study, various Nighantus, Dravyaguna texts were reviewed thoroughly. Along with these, articles from peer-reviewed journals, webpages etc. were also accessed with keywords like *Ashwagandha/Withania somnifera* Dunal/Pharmacological activities/Mode of action etc. From these data mining process, all the specific

data denoted to pharmacological activities, *Karma, Rogaghnata*, properties of *Ashwagandha* were collected, segregated, and arranged as per observations and results given below.

### Observation & Result[5-17]

References of *Ashwagandha* can be obtained from majority of Nighantus. These details help to know/understand about character/nature of plant as well as its clinical applications. Details mentioned are about *Rasa, Guna, Virya, Vipaka, Karma, Doshaghnata, Rogaghnata* etc., which are tabulated as below:

**Table No. 1: Rasapanchaka and Doshaghnata of Ashwagandha in various Nighantu**

No.	Text	Rasa				Virya	Vipaka	Guna			Doshaghnata	
		Katu	Tikta	Kashaya	Madhura			Ushna	Ushna	Laghu	Snigdha	Vatahara
1.	Dha.Ni.		+	+		+		+			+	+
2.	Sho.Ni.										+	
3.	M.D.										+	
4.	M.Ni.		+	+		+		+			+	+
5.	K.Ni		+	+		+		+			+	+
6.	Bha.Ni.		+	+		+		+			+	+
7.	R.Ni	+	+			+		+			+	
8.	R.V.Ni.										+	
9.	Ma.Ni.		+	+		+		+			+	+
10.	P.Ni.		+			+		+			+	
11.	Ni.Aa.	+	+	+		+	Katu	+			+	+
12.	D.G. Vig.	+	+		+	+	Madhura		+	+	+	+
13.	API		+	+		+	Madhura		+		+	+

**Table No. 2: Rogaghnata of Ashwagandha observed in various Nighantu**

<i>Roga- ghnata</i>	Dha.Ni.	Sho.Ni.	M.D.	M.Ni.	K.Ni.	Bha.Ni.	R.Ni.	L.Ni.	Ma.Ni.
<i>Shwitra</i>				+	+	+			+
<i>Vrana</i>	+				+		+		
<i>Visha</i>	+				+				
<i>Kasa</i>		+	+		+		+	+	
<i>Shopha</i>				+	+	+			+
<i>Kandu</i>					+				
<i>Krimi</i>					+				
<i>Shvasa</i>		+	+		+		+	+	
<i>Kshata</i>					+				
<i>Kshaya</i>	+	+	+	+	+	+	+	+	+
<b>Total</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>10</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>

**Table No. 3: Karma of *Ashwagandha* observed in different *Nighantu***

<i>Karma</i>	Dha.Ni.	Sho.Ni.	M.D.	M.Ni.	Ka.Ni.	Bha.Ni.	R.Ni.	Ra.Ni.	L.Ni.	Ma.Ni.	P.Ni.
<i>Kantiprada</i>	+										
<i>Viryaprada</i>	+								+		
<i>Balya</i>	+	+	+	+	+	+	+	+	+	+	+
<i>Vrishya</i>					+			+			
<i>Rasayani</i>				+	+	+		+		+	+
<i>Pushtikrita</i>					+						
<i>Shukrala</i>				+		+				+	+
<b>Total</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>

**Table No. 4: Ayurvedic documentation of *Ashwagandha***

<i>Rasa</i>	<i>Tikta, Kashaya</i>
<i>Guna</i>	<i>Ushna, Laghu, Snigdha</i>
<i>Virya</i>	<i>Ushna</i>
<i>Vipaka</i>	<i>Madhura</i>
<i>Karma</i>	<i>Kantiprada, Viryaprada, Balya, Vrishya, Rasayani, Pushtikrita, Shukrala</i>
<i>Doshagnata</i>	<i>Vata-Kaphahara</i>
<i>Rogagnata</i>	<i>Shwitra, Vrana, Visha, Kasa, Sopha, Kandu, Krimi, Shvasa, Kshata, Kshaya</i>

### Reported pharmacological activities

With current advancement in assessment of any drug action through animal experiments, in-vivo studies, in-vitro studies etc. pharmacology science is being explored widely. *Withania somnifera* is also well explored plant in this field. Withaferin-A, Withanolide A-D, Withanone are some major chemical compounds of *Withania somnifera*, which are being experimented for their actions pharmacologically. Some of them are listed beneath:

**Table No. 5: Pharmacological activities of *Ashwagandha***

Aphrodisiac activity <sup>[18]</sup>	Anti-inflammatory <sup>[19]</sup>	Analgesic <sup>[20]</sup>
Anti-bacterial <sup>[21]</sup>	Muscle relaxant <sup>[22]</sup>	Anti-fungal <sup>[23]</sup>
Immunomodulatory <sup>[24]</sup>	Antidepressant <sup>[25]</sup>	Anti-arthritis <sup>[26]</sup>
Anxiolytic <sup>[27]</sup>	Adaptogenic <sup>[28]</sup>	Chemo-preventive <sup>[29]</sup>
Chondroprotective <sup>[30]</sup>	Muscle strengthening <sup>[31]</sup>	Antitussive activity <sup>[32]</sup>
Anti-oxidant <sup>[33]</sup>	Antiparkinsonian <sup>[34]</sup>	Anti-stress <sup>[35]</sup>
Hypotensive <sup>[36]</sup>	Neuroprotective <sup>[37]</sup>	Sedative <sup>[38]</sup>
Thyrotropic <sup>[39]</sup>	Anti-malarial <sup>[40]</sup>	Nephroprotective <sup>[41]</sup>
Anti-granuloma <sup>[42]</sup>	Hypoglycemic <sup>[43]</sup>	Anti-pyretic <sup>[44]</sup>
Cardioprotective <sup>[45]</sup>		

After reviewing these many Ayurvedic properties as well as its reported pharmacological activities, it can be inferred that there may be some basic similarities in the actions explained through Ayurvedic ideology and conventional science. These activities are co-related with some justification mentioned below:

**Table No. 6: Comparative correlation of the Pharmacological activities by two sciences**

Sr. No.	Titles	Details
1.	<b>Pharmacological activity</b>	<b>Cardioprotective activity:</b> Hydro-alcoholic extract with dose 25/50/100 mg/kg orally for 4 weeks given to Isoprenaline induced myocardial necrosis in Wistar albino male rats with compare to Vitamin E. Augmentation of endogenous antioxidants, maintenance of the myocardial antioxidant status and significant restoration of most of the altered hemodynamic parameters may contribute to its cardioprotective effect.
	<b>Direct/Indirect Classical References</b>	As such direct references regarding <i>Hridya</i> property are not found in Ayurvedic compendia, but conceptually <i>Kashaya Rasa</i> , <i>Laghu Guna</i> , <i>Rasayana</i> , <i>Pushtikrit</i> , <i>Vranahara</i> , <i>Shophahara Karma</i> might help in cardiac disorders.

2.	<b>Pharmacological activity</b>	<b>Anti-inflammatory activity:</b> Collagen-induced arthritic rats, root powder (600/800 mg/kg), compared to methotrexate, significantly decreased the severity of arthritis by effectively suppressing the symptoms of arthritis and improving the functional recovery of motor activity and radiological score.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Shophahara, Kashaya-Tikta Rasa, Laghu Guna, Madhura Vipaka, Vata-Kaphahara</i>
3.	<b>Pharmacological activity</b>	<b>Analgesic activity:</b> 10/20/40 mg/kg, Male Wistar mice, centrally acting analgesic, extract orally, assessed through hot plate of the analgesiometer.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Ushna Virya, Snigdha Guna, Madhura Vipaka</i>
4.	<b>Pharmacological activity</b>	<p><b>1. Anti-bacterial activity:</b> Aqueous methanolic extract of roots, fruits and leaves, agar well diffusion method and five pathogenic Gram-negative bacteria: <i>Escherichia coli</i>, <i>Salmonella typhi</i>, <i>Citrobacter freundii</i>, <i>Pseudomonas aeruginosa</i> and <i>Klebsiella pneumoniae</i>. The leaf extracts displayed the highest activity against <i>S. typhi</i> (32.00 ± 0.75 mm zone of inhibition), whereas the lowest activity was against <i>K. pneumoniae</i> (19.00 ± 1.48 mm zone of inhibition). The lowest minimum inhibitory concentration value was 6.25 mg/ml, which was against <i>S. typhi</i>, followed by 12.5 mg/ml against <i>E. coli</i>.</p> <p><b>2. Anti-fungal activity:</b> Withaferin-A, leaf extracts, minimum inhibitory concentrations (MIC) less than 1.0 mg/mL against one or more of the tested <i>Fusarium</i> pathogens.</p> <p><b>3. Anti-malarial activity:</b> Swiss albino mice, 600 mg/kg.</p>
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Krimighna, Tikta-Kashaya Rasa, Ushna Virya, Rasayana</i>
5.	<b>Pharmacological activity</b>	<b>Muscle relaxant activity:</b> Aqueous extract, Albino mice, (50/100/150 mg/kg), Compared to diazepam, highly significant reduction in the time spent by the animals on revolving rod in rota rod test when compared to baseline (p <0.0001). As compared with diazepam, aqueous extract (150mg/kg) showed almost equal reduction in the time spent by the animals on revolving rod in rota rod test.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Snigdha Guna, Ushna Virya, Vata-Kaphahara</i>

6.	<b>Pharmacological activity</b>	<b>Immunomodulatory activity:</b> Methanol extract, mice, (20 mg/dose/animal; i.p.), enhance the total WBC count.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Rasayani, Balya, Madhura Vipaka</i>
7.	<b>Pharmacological activity</b>	<ol style="list-style-type: none"> <li><b>Anti-depressant activity:</b> Rats, glycowithanolides, (20/50 mg/kg), Orally once daily for 5 days, compared to imipramine, forced swim-induced 'behavioural despair' and 'learned helplessness' tests.</li> <li><b>Anxiolytic activity:</b> Using rats as model of experiment, glycowithanolides, (20/50 mg/kg) was given orally once daily for 5 days, compared to benzodiazepamine lorazepam, in elevated plus-maze, social interaction and feeding latency in an unfamiliar environment tests. It reduced brain levels of tribulin, an endocoid marker of clinical anxiety.</li> <li><b>Adaptogenic activity:</b> Adult male Wistar rats, (25/50 mg/kg po), compare to panax ginseng, in chronic stress.</li> <li><b>Anti-parkinson activity:</b> Hydroalcoholic extract, Wistar rats, (30/100 mg/kg), significantly (P&lt;0.001) reduces vacuous chewing movements and orofacial bursts due to neuroprotection by abating cholinergic activity.</li> <li><b>Anti-stress activity:</b> Wistar rat, Aqueous suspension (360 mg/kg bw) and compound X (20 mg/kg bw), withstand the multiple stress of cold-hypoxia-restraint stress.</li> <li><b>Neuroprotective activity:</b> Cell-line study, Extract, significantly protected the human neuroblastoma cell line SK-N-SH against A<math>\beta</math> peptide and acrolein in various cell survival assays.</li> </ol>
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Pushtikrit, Vata-Kaphahara, Madhura Vipaka, Ushna Virya, Balya, Rasayani</i>
8.	<b>Pharmacological activity</b>	<ol style="list-style-type: none"> <li><b>Anti-arthritic activity:</b> Rats, Powder (600/800 mg/kg), compared to methotrexate, significantly decreased the severity of arthritis by effectively suppressing the symptoms of arthritis and improving the functional recovery of motor activity and radiological score.</li> <li><b>Chondroprotective activity:</b> Broilers chicks, crude extract, showed normal articular surface with regenerated chondrocytes. Proved to increases serum calcium and decrease serum phosphorus and alkaline phosphatase level and thereby prevented osteoporosis.</li> </ol>
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Snigdha Guna, Madhura Vipaka, Ushna Virya, Shophahara, Kshatahara, Balya</i>

9.	<b>Pharmacological activity</b>	<b>Chemopreventive activity:</b> Hydroalcoholic extract, in mice oral 400 mg/kg, may be due to its antioxidant and detoxifying properties.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Rasayani, Balya, Tikta-Kashaya Rasa, Ushna Virya</i>
10.	<b>Pharmacological activity</b>	<b>Muscle-strengthening activity:</b> Hydroalcoholic extract in Male Sprague Dawley rats, 500 mg/kg, strengthened the skeletal muscle by reducing inflammation, oxidative stress and apoptosis, and increasing ATP availability to the muscle.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Madhura Vipaka, Ushna Virya, Balya, Rasayana, Pushtikrit, Vatahara</i>
11.	<b>Pharmacological activity</b>	<b>Anti-oxidant activity:</b> Hydroalcoholic extract, Albino mice, (30/100 mg/kg), sitoindosides VII-X and withaferin-A are having potent antioxidant effect.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Rasayani, Balya, Pushtikrit, Madhura Vipaka, Ushna Virya, Snigdha Guna.</i>
12.	<b>Pharmacological activity</b>	<b>Hypotensive activity:</b> Ethanol extract, mongrel dogs, 120-240 mg/kg, cholinergic, histaminergic, dopaminergic or gabaergic pathways might be responsible for modulation the hypotensor effect.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Madhura Vipaka, Snigdha, Ushna Virya, Balya, Rasayani</i>
13.	<b>Pharmacological activity</b>	<b>Sedative activity:</b> Male Wistar rats, 100 mg/kg i.p., shortened sleep latency, decreased waking, increased NREM and total sleep time, GABAergic mechanism in the sleep promoting effect.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Madhura Vipaka, Ushna Virya, Snigdha, Rasayani</i>
14.	<b>Pharmacological activity</b>	<b>Thyrotropic activity:</b> Extract 1.4 g/kg bw, female mice, could enhance serum T4 concentration.
	<b>Direct/Indirect References</b>	<b>Classical</b> <i>Ushna Virya, Laghu Guna, Rasayana</i>
15.	<b>Pharmacological activity</b>	<b>Nephroprotective activity:</b> Crude powder, 700/1400 mg/kg bw orally, wistar albino rats, showed reduction in elevated blood urea, serum creatinine and uric acid.

	<b>Direct/Indirect References</b>	<b>Classical</b>	<i>Rasayani, Vata-Kaphahara, Sophahara</i>
<b>16.</b>	<b>Pharmacological activity</b>		<b>Anti-granuloma activity:</b> Ethanol extract of aerial parts, albino male Wistar rats, 10 mg/kg i.p., suppressed granulation-tissue formation in a significant manner.
	<b>Direct/Indirect References</b>	<b>Classical</b>	<i>Tikta-Kashaya Rasa, Ushna Virya, Vata-Kaphahara, Vranahara, Shophahara</i>
<b>17.</b>	<b>Pharmacological activity</b>		<b>Hypoglycemic activity:</b> cellular models, Methanol extract, leaf and root extracts increased glucose uptake in myotubes and adipocytes.
	<b>Direct/Indirect References</b>	<b>Classical</b>	<i>Tikta-Kashaya Rasa, Laghu Guna, Ushna Virya, Vata-Kaphahara</i>
<b>18.</b>	<b>Pharmacological activity</b>		<b>Anti-pyretic activity:</b> Withaferin-A, cross breed Swiss Albino mice, (20/30mg/kg b.wt. i.p.), might have some inhibitory effect on prostaglandin biosynthesis
	<b>Direct/Indirect References</b>	<b>Classical</b>	<i>Tikta-Kashaya Rasa, Laghu Guna, Ushna Virya</i>
<b>19.</b>	<b>Pharmacological activity</b>		<b>Aphrodisiac activity:</b> Rats, extract 300 mg/kg b.w. orally, Serum testosterone levels significantly increased, improves sexual function in male rats via activating Nrf2/ HO-1 pathway while inhibiting the NF-κB level.
	<b>Direct/Indirect References</b>	<b>Classical</b>	<i>Snigdha Guna, Madhura Vipaka, Viryaprada, Balya, Vrishya, Rasayani, Pushtikrita, Shukrala</i>
<b>20.</b>	<b>Pharmacological activity</b>		<b>Anti-tussive activity:</b> Guinea pigs, polysaccharide arabinogalactan extract 50 mg/kg orally, compared with codeine, polysaccharide arabinogalactan has a distinct antitussive activity consisting of cough suppression and that this action involves the mu-opioid receptor pathways.
	<b>Direct/Indirect References</b>	<b>Classical</b>	<i>Tikta-Kashaya Rasa, Ushna Virya, Laghu-Ruksha Guna, Vata-Kaphahara, Kasahara, Shwasahara, Kshayahara, Kshatahara, Shophahara</i>

## DISCUSSION

The present study is comparing the screening action of *Ashwagandha* with the Ayurvedic actions. The comparison is useful for understanding the screening more correctly by using Ayurvedic mode

of action which is stated herewith. This Ayurvedic mode of action will explore more doors for futuristic research as using a specific chemical composition for typical action in future. However, it will be very wide study and to identify a specific action of a

chemical composition is not so easy. It is also to be noted that there are many actions of this herb apart from screened one which are expressed in the form of concepts like *Rasa*, *Guna*, *Virya* and *Vipaka* Concept.

Various pharmacological activities of *Ashwagandha* are discussed below with Ayurvedic terminologies:

**A. Cardioprotective activity:**

*Hridaya* is a root of *Pranavaha* and *Rasavaha Srotas*. It is made up of *Shonita* and *Kapha*. Activities of herbs acting on cardiovascular system may be related to regulating blood flow, healing, cardiac-stimulating, cardiac-suppressing, removing excess LDL, VLDL, HDL etc. *Ashwagandha* may work on heart at various conditions. Like with *Vranahara Karma*, *Shophahara Karma*, through *Kashaya Rasa* removing bad cholesterol and may stimulate heart properly. Through *Rasayana* and *Pushtikrit Karma* may give strength to heart muscles.

**B. Anti-inflammatory activity:**

*Ashwagandha* works on the pathogenesis of *Shopha*. *Kashaya-Tikta Rasa*, *Laghu Guna*, *Madhura Vipaka* of *Ashwagandha* might normalize the *Samprapti-Ghataka* of *Shopha*, which are *Kapha*, *Pitta*, *Vata* and *Rakta*. Due to its *Vata-Kapha Doshagnata*, it may act more efficiently on *Vataja* or *Kaphaja Shopha*.

**C. Analgesic activity:**

*Vedana* is a chief complaint of vitiated *Vata Dosh*. It can be counteracted through using opposite qualities' herb *Ashwagandha* having *Ushna Virya*, *Snigdha Guna*, *Madhura Vipaka*, *Vatahara* properties.

**D. Anti-bacterial activity/ Anti-fungal activity/ Anti-malarial activity:**

Concept of *Krimi* in *Ayurveda* can be correlated with infection or infestation. *Krimighna* activity can be correlated with activities such as antibacterial, antifungal, antiviral etc. As per treatment protocol of *Krimi*, *Prakritivighata* can be achieved through *Katu*, *Tikta*, *Kashaya*, *Ushna Dravya*. Thus, *Tikta-Kashaya Rasa*, *Ushna Virya* of *Ashwagandha* might break pathogenesis of *Krimiroga*. *Krimi Utapatti* is often seen with manifestation of fever and suppressed Immunity. *Ashwagandha* with its *Rasa* and *Virya* acting upon fever and through *Rasayana Karma* might work upon immunization.

**E. Muscle relaxant activity:**

Correlation of muscle in *Ayurveda* can be done with *Snayu*, which is *Upadhatu* of *Meda Dhatu* and *Mulasthan* of *Mamsavaha Srotas*. All the joints of the human body tightened by a large number of *Snayu*, are able to sustain weight. Their relaxation-contraction activity is mainly through *Vata Dosh*. Generally, due to aggravated *Vata Dosh*, muscles become affected and produce stiffness, which can be relieved through *Vatashamaka* applications. This can be termed as *Mamsagata Vata*. *Ashwagandha* with *Ushna Virya*, *Snigdha Guna*, *Madhura Vipaka* might act as muscle relaxant.

**F. Immunomodulatory activity:**

As per *Ayurveda* science, immunity is correlated to *Vyadhikshamatva*. Herbs which are boosting immunity, protecting from ailments, maintaining health can be consider under this category. *Ashwagandha* through its *Rasayana* and *Balya* properties might help in maintaining health and

immunity against various ailments.

**Anti-depressant activity/ Anxiolytic activity/ Adaptogenic activity/ Anti-parkinson activity/ Anti-stress activity/ Neuroprotective activity:**

All these activities are screened on CNS. They are mostly related with the nervine disorder. All the nervine functions can be correlated with the functions of *Vata Dosh*. Reverting-back the *Vata Dosh* to its normalcy can normalise functions of CNS. *Ashwagandha* through its *Vata-Kaphahara* property, *Madhura Vipaka*, *Ushna Virya*, *Pushtikrit Karma* might alleviate *Vata Dosh* and normalise its functions. Nerve cell damage in the brain causes dopamine levels to drop leading to Parkinson disorder, affecting movements. *Ashwagandha* might provide nourishment to the nerves through *Balya* and *Rasayani Karma*. All these properties can lead to calmness of mind removes anxiety.

**G. Anti-arthritic activity/ Chondroprotective activity:**

Arthritic condition can include pain, inflammation and degeneration of cartilaginous or bony tissues. This can be concluded under Ayurvedic terminologies viz. *Vedana*, *Shoph* and *Kshata*. *Snigdha Guna*, *Madhura Vipaka*, *Ushna Virya*, *Shophahara*, *Kshatahara* – these properties of *Ashwagandha* might help in relieving *Sopha*, *Vedana* and helps in regeneration of cartilaginous or bony tissues.

**H. Chemopreventive activity:**

Any kind of cancerous growth can be correlated with Ayurvedic terminology – *Arbuda*, for better understanding of its disease presentation and treatment protocol. Major Doshika involvement in

the pathogenesis of *Arbuda* is *Kapha-Vata Dosh*. Excessive, uncontrollable cell division due to *Vata Dosh* and Bulk/stable/rigid formation due to *Kapha Dosh* leads to *Arbuda* formation. *Ashwagandha* through its properties brings equilibrium in vitiated *Dosh* and through its specific *Karma* nourishes *Dhatu* and increases strength.

**I. Muscle-strengthening activity:**

Correlation of muscle in *Ayurveda* can be done with *Snayu*, which is *Upadhatu* of *Meda Dhatu* and *Mulasthana* of *Mamsavaha Srotas*. All the joints of the human body tightened by a large number of *Snayu*, are able to sustain weight. Loosening in structure and loss of strength in muscles may be due *Vata Vriddhi*. *Ashwagandha* through its properties and *Karma* may nourishes muscles and gives them strength.

**J. Anti-oxidant activity:**

Oxidation releasing Free radicals, leading to aging, Antioxidant activity screening, focused with free radicals scavenging activity which might be present in most of the plant materials with varied range, *Vata Dosh* functions *Dharana* and maintain health, *Vriddhi* lead to damage of cells, *Ashwagandha* nourishes all *Dhatu*, maintains *Vata Dosh*, provides optimum health through mentioned properties.

**K. Hypotensive activity:**

Hypertension is a condition in which the force of the blood against the artery walls increases. In modern science, hypotensive effect can be understood through varied pathways. In Ayurvedic science, hypertension can somewhat be correlated to *Siragata Vata* or *Vyana Vayudushti*. *Ashwagandha*

can directly work on vitiated *Vata Dosha*. Moreover, it might strengthen *Sira* and *Hridaya*.

**L. Sedative activity:**

Sedative activity can be carried to assess sleep promoting effect of a drug. This activity can be correlated with *Nidrajanana Karma*. *Withania somnifera* name itself indicates its sleep provoking action. Though, sleep may be altered due to various reasons viz. disturbed physical-mental health, stress etc. However, all these reasons are mostly having one common factor. That is vitiated *Vata Dosha*, which disturbs sleep and leads to many more other disease conditions. *Ashwagandha* with its wide range of properties helps in pacifying *Vata Dosha*, removes stress and induces sound sleep.

**M. Thyrotropic activity:**

Thyroid gland plays major role in the metabolism, growth and development of the human body. Thyroid hormone T4 regulate the rate at which body uses calories. It affects each cell and all the organs. Thus, it seems to be related with *Agni* in context to *Ayurveda*. Decreased *Agni* (*Jatharagni* and/or *Dhatwagni*) might leads to condition of decreased formation and/or secretion of thyroid hormone T4. *Ashwagandha* with its given properties may increase the *Agni* at cell level and normalizes *Dhatu*.

**N. Nephroprotective activity:**

Function of urinary system majorly becomes affected by *Apana Vayu*. Normal function of urinary system can be assessed through some parameters like blood urea, serum creatinine, uric acid etc. *Ashwagandha* through its *Rasayani* and *Vata-Kaphahara* property maintains function of urinary

system. Moreover, in inflammatory conditions also it helps through *Shophahara* activity.

In a very well-known Ayurvedic text named Siddha Bhaishajya Manimala, *Ashwagandha Kwatha* is mentioned for *Mutrakriccha* (painful micturition) as a single herb.

**O. Anti-granuloma activity:**

Granuloma is a small area of inflammation, occurring due to cell growth. Excessive or abnormal cell growth at the site of injury or inflammation can be suppressed by *Ashwagandha*. Due to its *Vata-Kaphahara* property, it normalizes cell division and promotes proper healing.

**P. Hypoglycemic activity:**

Hypoglycemic effect can be achieved in diabetic condition. Diabetic condition is roughly correlated with the *Prameha-Madhumeha* in *Ayurveda*. *Ashwagandha* through its properties eliminates the major cause of glycemia – *Kapha Dosha, Kleda*; normalizes *Dhatu* formation.

**Q. Anti-pyretic activity:**

Though, pyrexia can be correlated with the condition of *Jwara*. But apart from raised temperature, *Jwara* shows *Mandagni* as root cause of its pathogenesis. So, as the treatment purpose, kindling of digestive fire can be achieved through all the properties of *Ashwagandha*. Moreover, *Ashwagandha* is also indicated in *Jirna Jwara*. In that condition it might provide nourishment to the debilitated *Dhatu*.

**R. Aphrodisiac activity:**

*Ashwagandha* is very well-known plant for its aphrodisiac action since time immemorial. It is also being widely used for same purpose even

nowadays. It is having *Shukra Dhatugamitva* and along with its other properties it nourishes *Shukra Dhatu* and removes impotency.

#### **S. Anti-tussive activity:**

Anti-tussive activity acts on respiratory track. There are various ailment conditions like, *Kasa*, *Kaphayukta Kasa*, *Kshata*, *Shopha* etc. related to *Pranavaha Srotas*. *Ashwagandha* might act on all the conditions consisting upper and lower respiratory track through its *Vatakaphahara* property, as most of the respiratory diseases involves *Vata* and *Kapha Dosha*.

The eternal science *Ayurveda* has its own principles, philosophy, methods and ideology regarding drug action which is entirely different from modern pharmacological study. The amalgamation of *Ayurveda* and conventional system can be useful for applied application of both the systems. Utilization of experimental tools and conceptual *Ayurveda* aspects will help to strengthen the medical science. The co-relation with current pharmacological methods may be surely commenting that the properties and activities said by the Acharyas thousands of years ago can be carried out by the researches of today's era too by implementing various models, instrumentation, chemicals, technologies etc.

#### **CONCLUSION**

In this study, *Ayurvedic Sutras* were correlated to the conducted pharmacological screening of *Ashwagandha*. Proper understanding of *Ayurveda* principles and its micro-division will help to select the proper experimental model for screening. This activity will reduce unwanted expenditure on

screening and beneficial for more accurate results. Moreover, if clubbed with the drug discovery methodologies, there are enormous chances for new drug identification or drug-delivery system. In ancient *Ayurvedic compendia*, several properties and actions are mentioned regarding *Ashwagandha*. Most of them are screened pharmacologically and have given significant result. Though, there are some remaining activities like, *Kantiprada*, *Shwitrahara*, *Kandughna*, *Shvasahara* etc., which need to be screened pharmacologically. So, this kind of *Ayurvedic documentation* opens-up the field of research regarding this. Moreover, some activities have been screened with significant results, but are not documented in *Ayurvedic texts*. Such kind of researches add on the knowledge considering *Ayurvedic herbs applications*. Through this, further clinical studies can be carried out on large scale for the benefit of mankind.

#### **REFERENCES**

1. Ahvazia M, Khalighi-Sigaroodi F, Charkhchian MM, Mojab F, Mozaffarian VA, Zakeri H. Introduction of Medicinal Plants Species with the Most Traditional Usage in Alamut Region Iranian Journal of Pharmaceutical Research 2012; 11 (1): 185-194.
2. Agnivesha, Charaka Samhita, revised by Charaka and Dridhabala with introduction by Vaidhya-Samrata Sri Satya Narayana Sastri with elaborated Vidyotini Hindi Commentary by Pt. Kashinatha Sastri and Dr. Gorakha Natha Chaturvedi, publisher: Chaukhambha Bharti Academy, Varansi- 2016
3. Vridhha Sushruta, Acharya Sushruta, Sushruta samhita, With commentary *Ayurvedatva-sandipika* by Dr. Ambikadatta Shashtri, Reprint, Chaukhambha Sanskrit sansthan, Varanasi, 2017

4. Chakrapanidutta, Chakradutta, with Hindi commentary 'Vaidyaprabha' by Dr. Indradev Tripathi, edited by Acharya Ramanatha dwivedi, reprint, Chukhambha Sanskrit Bhavan, Varanasi, 2011
5. Dr. Zarkhande oza, Dr. Umapati Mishra, editors, Mahendra Bhaugik, Dhanvantari Nighantu (with Hindi Gunakarmatmaka commentary). Guduchyadi Varga, Ver. 272-273, Reprint. Varanasi: Chaukhambha Surbharati Prakashana; p. 85.
6. Prof. Gyanendra Pandey commentator, Prof. R. R. Dwiwedi editor, Vaidyacharya Shodhala, Sodhala Nighantu (Namasamgraha and Gunasamgraha). Guduchyadi Varga, Ver. 269-270/52, 248/227. 1<sup>st</sup> edition, 2009. Varanasi: Chaukhambha Krishnadas Academy.
7. Acharya Madhava, Madhava Dravyaguna, E-book. designed and developed by National Institute of Indian Medical Heritage (NIIMH), Hyderabad. Vividhaushadhivarga, Ver. 75. New Delhi: Central Council for Research in Ayurvedic Sciences (CCRAS); 2015.
8. Pd. Harihara prasada Tripathi, editor, Madan, Madanapal Nighantu (with Hindi Commentary entitled Hari). Abhayadi Varga 173-174. 1<sup>st</sup> edition 2009, Varanasi: Chaukhambha Krishnadas Academy; p. 36.
9. Prof. P. V. Sharma, Dr. Guruprasad Sharma, editor and translator, Kaiyadeva, Kaiyadeva Nighantu. Aushadhi Varga; Ver. 1044-1046. Reprint 2016. Varanasi: Chaukhambha Orientalia; p. 193.
10. Prof. K.C. Chunekar, Commentator, Late Dr. G.S. Pandey, editor, Bhavamishra, Bhavaprakasha Nighantu. Guduchyadi Varga, Ver. 189-190, 379-380. Varanasi: Chaukhambha Bharati Academy; 2015.
11. Narhari pandit, Raja Nighantu, edited by Dr. Satish Chandra Sankhyadhar, Dr. Deepika Sankhyakadhar, Forward by Prof. K.C. Chunekar. Shatahvadi Varga, Ver. 109-113. Reprint edition, Varanasi: Chowkhambha Orientalia, 2017.
12. Acharya Rajvallabha, Rajvallabha Nighantu, E-book. designed and developed by National Institute of Indian Medical Heritage (NIIMH), Hyderabad. 6<sup>th</sup> Aushadhashraya Pariccheda, Ver.12. New Delhi: Central Council for Research in Ayurvedic Sciences (CCRAS); 2015.
13. Shri Indradev Tripathi Commentator, Pr. Aryadasakumara Singha, Mahaushadhi Nighantu, Bilvadi Varga, Ver. 41-42. 1<sup>st</sup> Edition. Varanasi: Chowkhambha Vidyabhavan; 1971; p. 124.
14. Prof. Priyavrat Sharma, Priya Nighantu. Shatapushpadi Varga, Ver. 110. Reprint, Varanasi: Chaukhambha Surbharti Prakashan; Edition 2004; p. 95.
15. Shri Bapalal Vaidya, Nighantu Adarsha, Vol-2, Kantakaryadi Varga, Reprint. Varanasi: Chaukhambha Bharati Academy; 2016; p. 134-141.
16. Prof. Priyavrat Sharma, Dravyaguna Vigyana. Vol. 2, Reprint. Varanasi: Chaukhambha Bharati Academy; 2019; p. 763-764.
17. Anonymous, The Ayurvedic Pharmacopoeia of India, Part 1, Vol. 1, 1<sup>st</sup> Edition, Govt. of India, Ministry of Health and Family Welfare, Department of AYUSH, New Delhi, 1999.
18. Sahin k, Orhan C, Akdemir F, Tuzcu M, Gencoglu H, Sahin N, Turk G, Yilmaz I, Ozercan I, Juturu V. Comparative evaluation of the sexual functions and NF- $\kappa$ B and Nrf2 pathways of some aphrodisiac herbal extracts in male rats. BMC Complementary and Alternative Medicine (2016) 16:318.
19. Gupta A, Singh S. Evaluation of anti-inflammatory effect of *Withania somnifera* root on collagen-induced arthritis in rats. Pharm Biol, 2014 Mar; 52(3):308-20.
20. Dey A, Chatterjee SS, Kumar V. Analgesic activity of a *Withania somnifera* extract in stressed mice. Oriental Pharmacy and Experimental Medicine 16(4).
21. Alam N, Hossain M, Mottalib MA, Sulaiman SA, Gan SH, Khali MI. Methanolic extracts of *Withania somnifera* leaves, fruits and roots possess antioxidant properties and antibacterial activities. BMC Complement Altern Med. 2012; 12: 175.
22. Panigrahy S. Evaluation of centrally acting skeletal muscle relaxant activity of aqueous extract of *Withania*

- somnifera (ashwagandha) roots in albino mice. Int J Basic Clin Pharmacol 2019;8:157-61.
23. Seepe HA, Ramakadi TG, Lebepe CM, Amoo SO, Nxumalo W. Antifungal Activity of Isolated Compounds from the Leaves of *Combretum erythrophyllum* (Burch.) Sond. and *Withania somnifera* (L.) Dunal against *Fusarium* Pathogens. *Molecules* 2021, 26, 4732.
  24. Davis L, Kuttan G. Immunomodulatory activity of *Withania somnifera*. *J Ethnopharmacol*, 2000 Jul;71(1-2):193-200.
  25. Bhattacharya SK, Bhattacharya A, Sairam K, Ghosal S. Anxiolytic-antidepressant activity of *Withania somnifera* glycowithanolides: an experimental study. 2000; 7(6),463–469.
  26. Gupta A, Singh S. Evaluation of anti-inflammatory effect of *Withania somnifera* root on collagen-induced arthritis in rats. *Pharm Biol*, 2014 Mar;52(3):308-20.
  27. Bhattacharya SK, Bhattacharya A, Sairam K, Ghosal S. Anxiolytic-antidepressant activity of *Withania somnifera* glycowithanolides: an experimental study. 2000; 7(6),463–469.
  28. Bhattacharya SK, Muruganandam AV. Adaptogenic activity of *Withania somnifera*: an experimental study using a rat model of chronic stress. 2003;75(3), 547–555.
  29. Prakash J, Gupta SK, Kochupillai V, Singh N, Gupta YK, Joshi S. Chemopreventive activity of *Withania somnifera* in experimentally induced fibrosarcoma tumours in Swiss albino mice. *Phytotherapy Research*. 2001; 15(3), 240–244.
  30. Arivuchelvan A, Murugesan S. Chondroprotective Effect of *Withania somnifera* in Broilers Treated with High Doses of Enrofloxacin. *Int.J.Curr.Microbiol.App.Sci*. 2020; 9(11): 2091- 2095.
  31. Panda V, Deshmukh A, Hare A, Singh S, Hingorani L, Sudhamani S. Effect of *Withania somnifera* hydroalcoholic extract and other dietary interventions in improving muscle strength in aging rats *Journal of Ayurveda and Integrative Medicine*. Vol. 12, Issue 4, October–December 2021, p. 623-632.
  32. Nosalova G, Sivova V, Ray B, Franova S, Ondrejka I, Fleskova D. Antitussive Activity of *Withania somnifera* and Opioid Receptors. *Adv Exp. Medicine, Biology - Neuroscience and Respiration* (2015) 7: 19–25.
  33. Giri MA, Bhalke RD, Prakash KV, Kasture SB. Evaluation of *Camellia sinensis*, *Withania somnifera* and their Combination for Antioxidant and Antiparkinsonian Effect. *Journal of Pharmaceutical Sciences and Research; Cuddalore*. Vol. 12, Issue 8, (Aug 2020): 1093-1099.
  34. Giri MA, Bhalke RD, Prakash KV, Kasture SB. Evaluation of *Camellia sinensis*, *Withania somnifera* and their Combination for Antioxidant and Antiparkinsonian Effect. *Journal of Pharmaceutical Sciences and Research; Cuddalore*. Vol. 12, Issue 8, (Aug 2020): 1093-1099.
  35. Kaur P, Mathur S, Sharma M, Tiwari M, Sdvastava KK, Chandra R. A biologically active constituent of *Withania somnifera* (*Ashwagandha*) with antistress activity. *Indian Journal of Clinical Biochemist*. 2001;16(2), 195-198.
  36. Ahumada, F., Aspee, F., Wikman, G., & Hancke, J. (1991). *Withania somnifera* extract. Its effect on arterial blood pressure in anaesthetized dogs. *Phytotherapy Research*, 5(3), 111–114.
  37. Singh M, Ramassamy C. In vitro screening of neuroprotective activity of Indian medicinal plant *Withania somnifera*. *Journal of Nutritional Science* (2017), Vol. 6, (54), p. 1.
  38. Kumar A, Kalonia H. Effect of *Withania somnifera* on Sleep-Wake Cycle in Sleep-Disturbed Rats: Possible GABAergic Mechanism. *Indian J Pharm Sci*. 2008, Nov-Dec; 70(6): 806–810.
  39. Panda S, Kar A. *Withania somnifera* and *Bauhinia purpurea* in the regulation of circulating thyroid hormone concentrations in female mice. *Journal of Ethnopharmacology*, 1999; 67(2), 233–239.
  40. Dikasso D, Makonnen E, Debella A, Abebe D, Urga K, Makonnen W, et. Al. Anti-malarial activity of *withania*

somnifera L. Dunal extracts in mice. *Ethiop Med J.* 2006 Jul;44(3):279-85. PMID: 17447395.

41. Akhtar F, Azhar MU, Aslam M, Javed K. Nephroprotective Effect of Asgand Powder (*Withania somnifera* Dunal) on Cisplatin Induced Renal Injury in Rats. *Journal of Drug Delivery and Therapeutics.* 2020; 10(6-s):22-25.
42. Al-Hindawi, M. K., Al-Khafaji, S. H., & Abdul-Nabi, M. H. (1992). Anti-granuloma activity of Iraqi *Withania somnifera*. *Journal of Ethnopharmacology*, 37(2), 113–116.
43. Gorelick J, Rosenberg R, Smotrich A, Hanus L, Bernstein N. Hypoglycemic activity of withanolides and elicited *Withania somnifera*. *Phytochemistry*, 2015;116, 283–289.
44. Evanprince S, Sonal C, Rasool M. Evaluation of analgesic, antipyretic and ulcerogenic effect of Withaferin A. *International Journal of Integrative Biology.* 2009;6(2).
45. Mohanty I, Singh D, Dinda A, Talwar KK, Joshi S, Gupta S. Mechanisms of Cardioprotective Effect of *Withania somnifera* in Experimentally Induced Myocardial Infarction. *Basic & Clinical Pharmacology & Toxicology*; 2004; (94), p. 184–190.

Access this article online - <https://doi.org/10.70066/jahm.v13i1.1534>



#### CITE THIS ARTICLE AS

Vinita Khatri, Dilip Jani, Suman Singh. Unveiling the secrets of *Ashwagandha* (*Withania somnifera* Dunal): A comparative study of Modern Pharmacology and Traditional Ayurvedic Wisdom. *J of Ayurveda and Hol Med (JAHM)*. 2025;13(1):46-61

**Conflict of interest:** None

**Source of support:** None