Review Article

Therapeutic potential of *Withania somnifera* (Linn) Dunal (Ashwagandha) in historical perspective and pharmacological evidence

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Abstract

Withania somnifera widely known as *Aswagandha,* highly acclaimed medicine in ancient medical systems such as Ayurveda, Unani, Siddha and Chinese traditional medicine. The pharmacological importance of *Withania somnifera* is described in the different classical Ayuvedic narrative such as Charaka Samhita, Sushruta Samhita, Astangahridaya, Chakaradatta and various Nighantus. The plant used for the treatment of various ailments and works as nonspecific basis for better health and finer longevity. Nowadays it is scientifically proved that the plant possesses antioxidant activity, protect from anxiety and depression, nootropic effect, cardiovascular protection, anti-bacterial activity, anti-inflammatory properties, aphrodisiac, anti-venom, anti-fungal, anti-viral, sedative effects, hypoglycemic, thyro-protective, anti-diabetic and different cancer. This study aims to review and relist the various therapeutic applications of this plant and its importance in Ayurveda as per ancient classical texts.

Keywords: Aswagandha, *Withania somnifera*. Indian Ginseng

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Introduction

Withania somnifera (Linn.) Dunal ordinarily known as Indian Ginseng and Indian winter cherry is a rejuvenating herb and a celebrated medicinal plant in classical medical practice for more than 3000 years. In Sanskrit, 'Ashwa' means horse and 'gandha' means smell. Therefore Ashwagandha' means "smell of a horse" and thus indicate that the herb imparts the vigor and strength of a stallion. The Latin meaning of *somnifera* is 'sleep-inducing'; indicate sedative property of the herb. In Indian traditional medical practices used this herb to boost the overall health and nourish the immunity of a person after a recovery from an illness [1]. *Withania somnifera* is one among the foremost medicinal herb in Ayurveda material medica and the Acharya Charaka incorporated the plant in *Balya* and *Brimhana-gana* [2]. From its ancient use to its modern perspective, it has been proven to be effective and safe for wide range of disease condition.

Vernacular names of *Withania somnifera*

English: Winter Cherry; **Sanskrit**: Ashwagandha; **Tamil**: Amukkura, Amukkuram-kilangu; **Hindi:** Punir, asgandh; **Malayalam**: Amukkuram; **Bengali**: Ashvagandha; **Gujrati:** Ghodakun, Ghoda, Asoda, Asan; **Telgu**: Pulivendram, Panneru-gadda, panneru, **Kannada** : Viremaddlinagadde, Pannaeru, aswagandhi, Kiremallinagida; **Konkani** : Fatarfoda; **Punjabi**: Asgand, isgand; **Marati**: Asgund, Asvagandha ; **Rajasthani**: Chirpotan

Distribution and Botanical illustration of *Withania somnifera*

This plant is an evergreen, small woody and tormentors shrub grown both in humid and dried areas mainly the tropical region of Asia, South Africa, Africa, Egypt, Congo, Jordan and Morocco [3]. It is commonly cultivated in Europe, South Australia and in India for medical and industrial purpose. In India it is cultivated in sub-tropical regions of Haryana, Gujarat, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, and Uttar Pradesh [4]. The plant height is almost 30-150 cm, covered with white to brown wooly pubescence. The leaves are oval shaped

having almost 10 cm length and 2.5-5 cm wide, margins are arranged in an alternate manner. The flowers are usually yellow to green in colour, contains axillary fascicles, giving rise to bright red-coloured berries. The fruits are orange to red, contains plenty of seeds.

Phytochemistry of *Withania somnifera*

The phytochemicals profile of Withania somnifera always fascinating to researches because of its wide range of therapeutic applications. The roots enrich with amino acids, alkaloids, dulcitol, glycosides hentriacontane, starch, steroids, reducing sugar, volatile oil, and withaniol [5]. Anahygrine, anaferine, cuscohygrine, Isopelletierine, pseudotropine, pseudo-withanine, tropine, somnine, somniferine, somniferinine, withananinine withananine are the basic alkaloids which isolated from roots. In addition, visamine, withasomnine and withanine are also extracted from roots of the plant. Alanine, aspartic acid, cysteine, glycine, glutamic acid, tyrosine and tryptophan are the amino acids extracted from roots [6]. The leaves of the plants contain 12 variants of withanolides and 5 unidentified alkaloids. Withaferin A is the main withanolide and in addition to that presence of free amino acids, condensed tannins, chlorogenic acid, flavonoids, glucose, and glycosides also present in leaves. As well the green berries contain flavonoids, condensed tannis and proteolytic enzymes. Furthermore, the shoots specifically tender shoots are ample source of crude protein, calcium, flavonoids, phosphorous, condensed tannins and scopoletin (a coumarone) [7].

Pharmacological properties according to classical Ayurvedic texts and Indications

In Ayurvedic medical system a drug has four key properties, namely 'rasa, guna, veerya, and vipaka'. Rasa constitute the taste of the drug, Guna means the properties and effects it has on the body following consumption. Veerya represents potency of the drug i.e., whether it has a catabolic or anabolic effect on the body and vipaka means post digestive effect on metabolism. Based up on these factors, mechanism of a drug inside a biological system can be understood in terms of doshas (bio forces that control the body of an organism, whose balance and imbalance regulates health and ill health) [8]. The pharmacodynamics of Withania somnifera is rasa- tikta (bitter), kashaya (astringent) and kath (pungent) in taste, guna(qualities) srigdha (oiliness, untuousness) –laghu (light for digestion), veerya – ushna (hot in potency) and - vipaka- kathu (undergoes pungent taste conversion after digestion) and it exhibits karma – rasayana (rejuvinator), balya (improve strength) and vajeekarara (sex-stimulation)[9]. Classical Ayurveda highlighted this herb Withania *somnifera* as *Balaprada* and *balya* (that improves strength and immunity), *vajikari* (useful in premature ejaculation in some case of erectile dysfunction), act as *vrushya* (aphrodisiac), improve life expectancy, anti-aging, elixir (*rasayani*), improve body nourishment (*pushtiprada*), useful in cough and cold (*kasam hanti*), useful in *vata* disorder, *anilam hanti* (neurological and neuromuscular disorder like paralysis), *vranam hanti* (useful for wound healing), *shophahara* (bring down inflammation), *kanduhara* (relives itching, useful in pruritis), *vishahara* (anti-toxic, useful in detox programs), *shivitrahara* (useful in leucoderma on internal usage and external application), *krumihara* (useful in internal worm infection), *shwasahara* (useful in asthma and chronic respiratory disease, *kshatahara* (useful in injury healing), *kshayahara* (useful in treating muscle wasting, emaciation, post tubular treatment and to improve muscle mass and strength), *atishukrala* (improve semen quality and quantity), ama (helps to clear impurities). *Withania somnifera* also advisable for *apasmara* (epilepsy), *arsha* (piles), *arbuda* (tumour), *asthibhanga* (bone fracture), *bhagandara* (fistula-in-ano), *gridhrasi* (sciatica), *guhya-vrana* (ulcer in genitalia), *gandamala* (cervical lymphadenitis), *hanugraha* (lockjaw), *hrudgraha* (cardiac failure), *karshya* (emaciation), *kilasa* (vitiligo), *katigraha* (stiffness in lumbo-sacral region), *kushtha* (diseases of skin), *murchha* (syncope), *janustabdhata* (stiffness of the knee), *pramehapidika* (diabetic carbuncle), *shosha* (cachexia), *unmada* (mania/psychosis), *vatarakta* (gout), *yonidosha* (disorders of female genital tract) and *vidradhi* (abscess)[10].

In modern science through scientific proof the herb works on a nonspecific basis and possesses antioxidant activity, anti-inflammatory activity, antibacterial activity, antidiabetic activity, aphrodisiac, liver tonic and effective to reduce obesity. Moreover, the animal experiment and clinical evaluation supported it is effective to treat against

certain mental stress such as anxiety, cognitive and neuron disorders and acts as an adjunct for the cancer patient treating with radiation therapy as well as chemotherapy [11,12]. The herbal medicine also used as skin ointment and to improve reproductive fertility in Japan. In addition, the United States has taken patent on *Withania somnifera* formulation that helps to relives pain associated with arthritis. Moreover, the Aswgandha thailam (oil formulation of *Withania somnifera*) combined with Almond oil and Rose water act as an excellent skin toner[13].

The root of *Withania somnifera* is well a popular antibacterial and antifungal agent. It also used as overall tonic for stabilizing the health and as medicine to control fever [14]. It helps to manage body weight, expand life span, and maintains genuine nourishment of tissues, specifically bones and muscle tissues [15]. One of the exceptional hallmarks of this medicinal plant is enhancing the Ojas. Ojas is the most ultrafine and purified level of the physical body and is the ultimate result of healthy nutritional diet which is correctly digested. The ojas is accountable for fine immune system, lustrous complexion, healthy mental health, physical strength [16]. As well it is capable to treat various neuron degenerative disorders such as Parkinson's disease and Alzheimer's disease [17], emerging evidence suggests that it possess anti-cancer activity [18], anti-tumor, anti-inflammatory, antioxidant and rejuvenating properties [19, 20].

Ayurvedic formulations of *Withania somnifera*

Withania somnifera it is used as single herbal as well as polyherbal formulation and the roots are the major constituent of over 200 Ayurvedic formulations [21]. Among vast variety of rasayana herbs *Withania somnifera* hold prominent position known as "Sattvic Kapha Rasayana" herb [22] and is also recognized as the Queen of Indian herbs [23].

Withania somnifera is major ingredient in Awagandhadi-churna, Aswagandha-rasayana, Aswgandha-ghrita, Ashwagandha-rishta, Aswagandha- taila, Madhyamanarayana-taila, Brihat Ashvagandha-ghrita, Brihachchagaladya-ghrita, Saraswata-churna, Pramehamihihira-taila [24]. Nagabala-ghrita, Aswgandha rishata, Aswgandha-taila, Madhusnuhi-rasayana [25]. Aswgandha churna, Brihat Ashwagandha-ghrita, Chyawanprash, Balaaswgandhadithailam, Manasamitravada, Brahmivati and Ajaaswgandha dilehyam are other common *Withania somnifera* formulations mentioned in traditional textbooks.

***Withania somnifera* reference from classical Ayurvedic texts**
Charaka Samhita (1000 BC- 4th Century AD)

Sl No	Formulation	Indication	Charaka Samhita reference
1	*Agurwadi Taila*	*Jwara*	C.Ci. 3/266
2	*Amrta Ghrita*	*Antidote, Udara*	C.Ci. 23/244
3	*Brmhaniyamahakasaya*	-	C.S.Su 4/2
4	*Bilva Taila*	*Vata roga*	C.Si. 4/4
5	*Basti*	*Vata roga*	C.Si. 12/2
6	*Baladya Yapana*	*Vata roga*	C.Si. 12/6
7	*Balya*	*Mahakasaya*	C.S.Su 4/7
8	*Dhuma*	*Arsa*	C.Ci. 14/51
9	*Ghrita*	*Fumigation*	C.Ci. 14/5
10	*Ingudi Tvagadi Dhuma*	*Kasa*	C.Ci. 18/75
11	*Errand Basti*	*Asmari*	C.Si. 3/39
12	*Lehya*	Hiccup	C.Ci. 17/117
13	*Lepa*	*Rajayaksma*	C.Ci. 8/175
14	*Lepa*	*Udara Roga*	C.Ci. 13/108
15	*Lepa*	*Granthi visarpa*	C.Ci. 21/ ½ 123
16	*Lepa*	*Antidote unmada*	C.Ci. 23/70
17	*Lepa*	*Pilla Kanda*	C.Ci. 23/80
18	*Lepa*	*Urustambha ,thic Utsadana*	C.Ci. 27/50
19	*Lepa*	*Vataroga*	C.Ci. 29/73
20	*Madhura Skandha*	-	C.S.Vi. 8/140-146
21	*Mulasava*	*Dipan , Pachan*	C.S.Su 25/49
22	*Kusthadilepa*	*Kustha*	C.S.Su 3/7-8
24	*Rasana Taila*	*Vataroga*	C.Ci. 28/166
25	*Taila*	*Sirah kampa*	C.Si. 9/87
26	*Vajikarana Ghrita*	*Bajikarana*	C.Ci. 2-1/34
27	*Vrsamuladi Taila*	BoneFracture, Osteoporosis	C.Ci. 28/170

Susruta Samhita (100 BC- 4th Century AD)

Sl no	Formulations	Indications	Susruta Samhita reference
1	*Agada (antidote)*	Poison of *visvambhara*	S.Ka. 8/5
2	*Ami pama*	*Urdhvabhaga Dosahara*	S.Su. 39/3
3	*Anupana (with mamsa rasa)*	*Balavardhaka pustikaraka*	S.Su. 46/432-2
4	*Bala Taila*	*vatavyadhi*	S.Ci. 15/33
5	*Bhutikadi*	*Vataroga*	S.Ci 37/20
6	*Basti*	*Guda Rakta Srava*	S.U. 45/40
7	*Churna*	*Atikrsa*	S.S.Su. 14/40
8	*Citrakadi Taila*	*Vataroga*	S.Ci 37/16
9	*Churna*	*Yaksma*	S.U. 41/41
10	*Churna*	*Coupha*	S.U. 41/43
11	*Dasamuladi Ghrita*	Complication	S.U. 41/49
12	*Dhum*	*Karnaroga*	S.U. 21/7
13	*Kalka and Taila*	*Karnapali vriddhi*	S.Su. 16/22
14	*Kalka*	*Vrana ropaka*	S.Su. 36/24
15	*Kalka*	*Vatarakta*	S.Ci. 5/10
16	*Kwatha*	*Revatigraha*	S.U. 31/3
17	*Lepa*	*Karnapali vriddhi*	S.Su. 16/20
18	*Lepa*	*Kaphaja sopha*	S.Su. 36/6
19	*Lepa*	*Vrana ropaka*	S.Su. 36/31
20	*Lepa*	*Kaphajavisarpa*	S.Ci. 17/14
21	*Lepa*	*Paripotaka in karnapali Roga*	S.Ci. 25/14
22	*Lepa*	*Yaksma*	S.U. 41/42
23	*Phala Ghrita*	Pregnancy to infertile women	S.U. 62/27
24	*Sampakadi Basti*	Duodenal *roga,* increase blood	S.Ci 38/43
25	*Taila*	*Aroga Timira*	S.U. 17/34
26	*Taila*	*Rukhamandika roga*	S.U. 35/4
27	*Vacadi Taila*	*Vataroga*	S.Ci 37/12

Astanga Hirdaya (7th Century AD)

Sl no	Formulations	Indications	Susruta Samhita reference
1	*Anuvasana Vasti*	*Vataja Roga*	A.H.Ka. 4/54
2	*Bala Taila*	*Grbha Vyapada*	A.H.Sa. 2/50
3	*Basti*	*Duodenal roga*	A.H.Ka. 4/7
4	*Churna*	*Unmantha*	A.H.U. 18/45
5	*Dhupana*	*Arsa*	A.H.Ci. 8/19
6	*Ghrits*	*Balapustikara,kasa ojahksaya*	A.H.Ci 3/122-123

7	*Ghrits*	*Sosanasak*	A.H.Ci. 5/25
8	*Ghrita*	*Gulma, Apasmara*	A.H.Ci. 14/14
9	*Ghrita*	Strength	A.H.U. 3/53
10	*Kalka*	Oedema	A.H.Ci. 17/37
11	*Kwatha*	Cure emaciation	A.H.U. 2/51
12	*Kwatha*	*Karnaroga*	A.H.U. 18/56
13	*Laksadi Taila*	*Unamada,apasmara*	A.H.U. 2/52
14	*Laksadi Taila*	Fever, strength	A.H.U. 2/52
15	*Lehya*	Cure emaciation	A.H.U. 2/49
16	*Lepa*	*Palisoas*	A.H.U. 18/39
17	*Lepa*	*Kustha, Kandu, Pidika*	A.H.Ci.
18	*Lepa*	*Pusti, Varna,Balaprada*	A.H.Ci. 5/79
19	*Sukumarka Taila*	*Rasayana, Vataja, Roga*	A.H.Ci.13/41
20	*Syrup*	*Svasa- Hidhma*	A.H.Ci. 4/39
21	*Vata hara Basti*	*Vataroga*	A.H.Ka

Cikitsa kalika(10th Century AD)

Sl no	Formulations	Indications	Cikitsa kalika reference
1.	*Bala Taila*	*Vataja Vyadhi*	30/283
2.	*Bala Taila*	*Vataja Vyadhi*	30/290-291
3.	*Dasanga Taila*	*Vataja Vyadhi*	30/295-297
4.	*Laksadi Taila*	*Jwaracikatsa*	1/120
5.	*Mahatprasarini taila*	*Vataja Vyadhi*	30/303-304
6.	*Phlaghrita*	*Grahabadha, Vatavyadhi, Bandhyatva etc*	367
7.	*Prasarini Taila*	*Vataja Vyadhi*	30/298-302
8.	*Prthusatavari Taila*	*Vataja Vyadhi*	30/286-287

Cakradatta (11th Century AD)

Sl no	Formulations	Indications	Susruta Samhita reference
1.	*Ashwagandhadi Kasaya*	*Rajayaksma*	10/9
2.	*Ashwagandha Ghrita*	*ViryaVardhaka, Mamsavardhaka*	22/90
3.	*Churna*	*Urah ksata*	10/93-95
4.	*Kamdeva Ghrita*	*Raktapitta*	9/53-63
5.	*Krsnadileha*	*Rajayaksma*	10/14
6.	*Masabaladi kwatha*	*Vatavyadhi*	22/23-24
7.	*Mahabala Taila*	*Vatavyadhi*	22/101-110
8.	*Nagabala Ghrita*	*Rajayaksma*	10/78-82
9.	*Narayana Taila*	*Vatavyadhi*	22/120-130
10.	*Srnga-Arjunadya churna*	*Rajayaksma*	10/26
11.	*Trayodasanga Guggulu*	*Gradhrasi*	22/69-73

Sarangadhara samhita (13th Century AD)

Sl no	Formulations	Indications	Sarngadhara samhita reference
1.	*Ashwagandha churna*	*Vajikarana*	6/157-158
2.	*Baladya Taila*	*Vatavyadhi*	9/117-118
3.	*DhatturadiTaila*	*-do-*	9/200-210
4.	*Kamdeva Ghrita*	*Rakta-Pitta*	9/27-37
5.	*Kandarpa Sundara Rasa*	*Vajikarana*	12/268-274
6.	*Laksadi Taila*	*Visama Jwara*	9/94-98
7.	*Lepa*	*Stanyavrddhi*	11/112-113
8.	*Lepa*	*Linga Vrddhi*	11/115
9.	*Madadi Nasya*	*Pakdaghata*	8/36-37
10.	*Madankamadeva*	*Vajikarana*	12/259-266
11.	*Maharanadi Kwatha*	*Sarva-Vartaroga*	2/20-96
12.	*Mahasalvan Sweda*	*Vanaja Roga*	2/23-27
13.	*Narahyana Taila*	*Vataroga*	9/101-106
14.	*Satavari Taila*	*Vatajaroga*	9/133-141

Bhaisajya Ratnavali (18th century AD)

Sl no	Formulations	Indications	Bhaisajya Ratnavali reference
1.	*Adigyapakwa Taila*	*Khalitya Roga*	83/3,4
2.	*Amritaprash Ghrita*	*Rasayana*	74/299
3.	*Ashwagandha Taila*	*Rasayana*	78/355
4.	*Chandanadi Kwatha*	*Mastiska Roga*	101/2
5.	*Goksuradi Modaka*	*Rasayana*	74/230
6.	*Godhumadia Ghrita*	*Rasayana*	74/279
7.	*Jayantivati*	*Jwara*	5/536
8.	*Jwarabhairava Rasa*	*Jwara*	5/1375
9.	Kamadeva ghrita	*Raktapitta*	13/145
10.	Madanakamadeva	*Dhwajabhanga*	92/20
11.	Shalimali Ghrita	*Khalitya Roga*	88/32
12.	Sindukadi Dhupa	*Arsha*	9/153
13.	Suryavallavha taila	*Sanyu Roga*	82/20
14.	Yaminyadi Churan	*Gadaroga*	78/7

Interpretation of *Withania somnifera* as per Ayurveda.

Withania somnifera known by its name '*hayahwaya-*' (providing horse potency and it has smell like those of house). *Ashwagandha*, *hayagandha* – (root, part used, also emits horse`s smell), *ashwavarohaka*, *vrisha*,- (spermatogenic and aphrodisiac effect of a dravya), *balada,balya-* (promote strength), *elaparni-* (leaves having shape of *ela) gandhapatri-* (having smell like that of horse), *gokarna-* (herb with leaves resembling shape of cow's ear), *hayapriya-* (favorite of horses, *hayahvaya-* provides horse potency), *kaamaroopini-* (increases libido), *kancuka-* (retains semen), *kushtagandhini-* (has smell of plant *kushta)*, *marutaghni-* (useful in *vatika* disorders), *pita-* (having yellow colour), *putrada-* (provides male progeny), *pushtida-* (it is nourishing), *thuragi-* (it has smell of hoarse)[26].

Categorization of *Withania somnifera* as per classical Ayuvedic text

In Chaaka Samhita, Acharya Charaka included *Withania somnifera* under *balyadasaimani* group and *brimhaneeya* group in 4th chapter of *Suthra sthana* as *Balya, brimhana, madhuraskandha*, *virechanopaga* [27]. In Susrutha samhita it is mentioned as *urdhwabhagahara* [28]. Nighantus categorized it as *Withania somnifera* and *Withania ashwagandha*. It is mentioned in all most all Nighantus such as Bhavaprakasha Nighantu, Madanapala Nighantu, Dhanwanthari Nighantu, Kaiyyadeva Nighantu and Raja Nighantu. Accoding to Bhavapakasha Nighantu it is mentioned under *guduchyadi varga* [29], Madanapala Nighantu referred it as *abhayaadi varga* [30]. In Dhanwanthari Nighantu and Shodhala Nighantu it is *guduchyadi varga*[31], Kaiyyadeva Nighantu it is '*oushadi varga* [32] and Raja Nighantu mentioned it as *shatahvadi varga* [33].

Therapeutic uses of *Withania somnifera* as per classical Ayurvedic texts

Withania somnifera is a well-documented medicinal herb in ancient Ayuvedic texts but there is no direct reference in vedas. In vedas it is represented that 'rock like smell' and a word *'Aswasya Varah*' mentioned in the *visha chikitsa* (treatment for poison). *Ashwawal* and *Ashwawar* both words were also used in *Yajurveda* and *Atharvaveda*. *Ashwawati* is described as *Shrivardhaka* and *Rasayana* in Rigveda, Yajurveda, and Atharvaveda. According to Charak Samhita the herb is used for treatment of *Kandu* (itching), *kustha* (skin disorder, *sotha*(inflammation), *sheetajwaran*(fever), *rajayakshma*(pulmonary tuberculosis), *udarroga*(abdominal disorders), *arsha*(piles), *hikka*(hiccough), *shwas*(ashthma), *kaas*(cough), *granthivisarpa* (erysipelas), *visha*(poison), *urustambha* (spasticity of thighs), *vatavyadhi* (neurological disorders), *vatarakta* (gout) *kaphaavritavatavikara*, *vatavikar* (neurological disorders), *anantavata*(trigeminal neuralgia) [34].

As per Sushruta Samhita it is used to treat *karshyaroga*(emaciation), *karnapalivardhan* (expansion of ear pinna), *kaphajsopha*(inflammation), *vranaropana* (woundhealing), *vrana* (wound), *vamankarma* (emesis), *anupanarth* (adjuvants), *kaphajvatarkta* (gout), *sutika roga* (puerperal diseases), *visarpa* (erysipelas), *paripotakaroga*(inflammation of the lobe of the ear), *palivardhnarth*(ear lobule elongation), *anuvasanbasti*(enema prepared by medicated oil), *niruhabasti* (decoction enema), *shosaroga* (emaciation), *shosaroga*(emaciation) and *unmada* (insanity) [35]. Ashtanga Hridaya described the plant is useful for *sutikarog* (puerperal diseases), *unmada*(insanity), *kasa*(cough), *rajayakshma* (pulmonary tuberculosis), *vatavyadhi*(neurological disorders), *gulma*(abdominal lump), *unmada*(insanity), *apasmara*(epilepsy), *balashosa*(marasmus) , *balaamaya*(child disorders), *karnaroga* (ear diseases), *vranaropana*(wound healing), *medhya*(nootropic)) and *vrishya* (aphrodisiac). According to Bhel samhita it is effective for the treatment of *krimi*(worms), *kustha* (skin disorder), *anupanarth* (adjuvant), *yakshma*(pulmonary tuberculosis), *hridroga* (cardiac disorders), *adhyavata*(gout), *urustambha* (spasticity in thighs) and *vatarogas* (neurological disorders) [36].As per Harita samhita it is mentioned for

vishavikara(poisonous disorder), *unmada*(insanity), *apasmara*(epilepsy), *vatavyadhi* (neurological disorders) and *apasmara*(epilepsy) [37]. Chakradatta referred the use of plant for *kshaya* (emaciation), *kshaya*(emaciation), *vatavyadhi*(neurological disorder) , *vatavyadhi* (neurological disorder), *udararoga*(abdominal disorder), *krimi*(worm), *sotha*(edema), *yonivyapada* (vaginal disorders), *balaroga*(child disorders), *balashosa* (marasmus) and *karnapalivardhana* (elongation of ear lobule) [38].

Clinical trials and modern approach in *Withania somnifera*

There are plenty of clinical research which have been proven *Withania somnifera* is safe and effective for several medical conditions. Meta-analysis of clinical trials carried out that, the *Withania somnifera* supplementation enhances the volume of semen, sperm count, and motility rate of sperm in oligospermic males [39] and concentrated *Withania* somnifera root extract helps in improving female sexual function [40]. *Withania somnifera* roots shows increase the overall muscle mass and strength which helps is high resistance in physical workout [41]. It is also reported that the aqueous extract of *Withania somnifera* significantly increased pain threshold force against mechanical pain in healthy human subjects [42]. A double-blind placebo control study on HIV patients with pulmonary tuberculosis the root extract of *Withania somnifera* administration behave as an adjuvant in conjunction with anti-TB drugs to DOTS with higher CD4 & CD8 count [43,44]. In an open-label preliminary feasibility analysis in cancer patients supplement of powder of *Withania somnifera* prevented loss in lean muscle mass, reduce fatigue, and curtail weight loss[45] .Similarly, a randomized, placebo-controlled, double-blind analysis of extract of *Withania somnifera* suggested a promising result in the depression treatment and anxiety [46].Further another study analyzed supplementations of the plant shown to be a ameliorative in post chemotherapy fatigue condition [47]. Furthermore, treatment with standardized *Withania somnifera* both roots and leaves extract significantly improved salivary dehydroepiandrosterone sulfate and testosterone level, but not cortisol and estradiol, in healthy individuals [48].

The *Withania somnifera* was shown to be beneficial in treating many neurodegenerative diseases and increases the longevity in *Drosophila* Alzheimer's disease model [49]. It is also investigated that the plant possesses significant role in ameliorating Parkinson's disease by oppose the oxidative damage and regulate the level of apoptotic proteins Bcl-2 and Bax [50]. The shirodhara procedure (Ayurveda therapy that involves gently pouring liquids over the forehead) with ashwagandha taila (*Withania somnifera* processed in sesame oil) is highly effective in management stress induced insomnia and associated symptoms [51]. It is reported that the extract of *Withania somnifera* attenuate {\alpha}-MSH-stimulated melanin synthesis by modulating MITF expression and that they may be a useful therapeutic agent for treating hyperpigmentation and suitable ingredient of whitening cosmetics [52].

New aspects of *Withania somnifera* to control COVID-19

The COVID-19 pandemic significantly becomes a health warning to the entire globe. Numerous studies, although some *in vitro* and *in vivo* studies, showed the bioactive components from *Withania somnifera* avenge against COVID-19 pandemic. It is reported that Withaferin A, alone or in combination with other drugs, like hydroxychloroquine, dexamethasone is capable to bind with the S-protein of SARS-CoV-2, thereby inhibits the spread of the infection [53]. In another report Withanone from *Withania somnifera* may restrict the entry of Coronavirus by disrupting the interactions between viral S-protein receptor binding domain and ACE2 receptor of host cell [54]. The Withanoside V and Somniferine also inhibit Mpro (Main protease) of SARS-CoV-2 [55]. It is also reported the multiple withanolides from *Withania somnifera*, such as withanolide-D, -G, -M, and -Q were boost immune system and inhibit the COVID infection [56]. So, the *Withania somnifera* may the primary option to control COVID-19 infectivity.

Discussion

The obtainable documentation by ancient Ayurvedic literature explained that the *Withania somnifera* is a potent regenerative herb and a best *rasayana.* In Ayurveda the whole plant is medically valuable, but roots are commonly used in formulations. Various literatures revealed that *Withania somnifera* contains plenty of pharmacologically valuable phytochemicals that attributes the pharmacological activity of the herb. The withanolides are the vital chemical constituents and around 138 withanolides are identified. Various clinical studies underlined its efficiency of this herb to treat against number of diseases. It acts as sedative, diuretic, generally respected for increasing energy anti-inflammatory, anti-stress agent endurance, acts as an-adaptogen that exerts a strong immunostimulatory. Ashwagandha is taken for treating ulcers, cold coughs, emaciation, epilepsy, diabetes, conjunctivitis, insomnia, senile dementia, leprosy, Parkinson's disease, nervous system disorders, epilepsy, rheumatism, arthritis, intestinal infections, bronchitis, asthma, a suppressant in HIV/AIDS patients. In Ayurveda the plant has been mentioned in *Brimhaniyamahakashaya, Balyamahakashaya* and *Madhuraskandha.* It is used as single herb as well as in combination with other herbs. While the *Withania somnifera* has been used successfully in Ayurvedic medical systems for centuries but still there is enough scope for much more scientific research and clinical trials for proving efficacy, mode of action, drug interactions and molding effects in combination with other herbs. Although the data from this review is quite promising regarding the reference of this plant from ayurvedic literature and its modern application.

Conclusion

Since the prehistoric period, herbal based medical system existed around the globe with a perfect and long recorded history. The herbs are considered as one of the most powerful ingredients in Ayurvedic formulations. Recently the Ayurveda and herbal based medicines commanded considerable attention owing to their prospective nutraceutical values. *Withania somnifera* one of the important plants which is well documented in Ayurvedic classical texts, has multiple health benefits. The plant possesses numerous pharmacological activities which is supported by various experimental and clinical studies. The vital phytochemicals attribute the medical properties that can directly and indirectly treat several illnesses that affect human. Diverse clinical and experimental studies are conducted on this herb to evince the scientific basements and documented medical reports in Ayurvedic texts. There must be well categorized evidence and research based classical documentation is essential to prove the medical significance of this plant to treat against various disease conditions.

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Fig. 1 : Ashwagandha Plant