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AYURVEDIC, PHYTOCHEMICAL AND PHARMACOLOGICAL ASPECT ON *Ashwagandha (Withania somnifera* Linn.*)*: A REVIEW ARTICLE

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ABSTRACT

Withania somnifera Linn. member of *Solanaceae* family popularly known as *Ashwagandha*, Indian ginseng, or winter cherry has been used in *Ayurveda,* Indian system of traditional medicine. *Withania sominifera* having small white flowers mainly in rainy and winter seasons that can be develop into fruit during the winter seasons. Plants products can be obtained from the roots, leaves, and branches, by using many different biological techniques. *Ashwagandha* having effective property can also use in blends and supplements which are designed to show many multiple effects. *Ashwagandha* has long been revered as a superb rejuvenator, a general health tonic, and a treatment for a variety of ailments. It has sedative, diuretic, anti-inflammatory, and generally positive effects on energy and endurance. It also functions as an adaptogen and has potent anti-stress and immuno-stimulatory effects. *Ashwagandha* is used as a suppressor in HIV/AIDS patients as well as to treat ulcers, emaciation, diabetes, conjunctivitis, epilepsy, sleeplessness, senile dementia, leprosy, Parkinson's disease, mental disorders, rheumatism, arthritis, intestinal infections, bronchitis, and asthma. *Ashwagandha* is known to increase the production of bone marrow, semen, and acts anti-aging. *Ashwagandha* anti-tumor and anti-inflammatory agents are approved in several studies. Its steroidal is much higher than that of hydrocortisone which is a common treatment in cancer cases.

KEYWORDS: *Ashwagandha, Withania somnifera, Ayurvedic* aspect, Pharmacological activities.

INTRODUCTION

Withania somnefera Linn. (Dunal), often known as *Ashwagandha*, is a well-known herbal medication in the Ayurvedic medical system. Even before 3000 BCE, India employed *Ashwagandha* as an ayurvedic medicine called "*Rasayana*" (as a tonic). According to *Ayurveda*, it has been used for centuries as a traditional medicine to treat inflammation, weakness, impotence, and pulmonary tuberculosis.[1] It is commonly known as *Ashgandha*, Indian ginseng, winter cherry is an important medicinal plant in the *Solanaceae* family that has been used in *ayurvedic* and indigenous medicine for many years.[2] It got local names like *Asgandh* (Hindi), *Ashwagandha* (Bengali), *Ghodakun, Ghoda* (Gujrati), *Pulivendram* (Telugu), *Amukkura, amkulang* (Tamil) etc. *Ashwagandha* in Sanskrit means "horse's smell" probably originated from the odour of its root, which resembles that of sweaty horse. The species name *somnifera* means "sleep-making" in Latin, attributed to sedating properties.[3] *Ayurveda*, the science of life has emergence from *Atharva veda*. The *Ayurvedic* drugs play important role for achievement of this target. It is found throughout the dry part of India in waste places is also cultivated to certain extent and used in folk and traditional medicine. The most frequent form of *Ashwagandha* is a *churna*, a fine powder that can be combined with water, ghee, or honey. It boosts the central nervous system's (CNS) performance and enhances memory.[4] The herb exhibits excellent immune-modulatory effects when taken as a decoction or extract because it activates natural killer cells, lymphocytes, complement systems, non-specific macrophages, and granulocytes. Additionally, it inhibits the development of diverse effector molecules made by activated cells (para-immunity), providing defence against a variety of pathogens such as bacteria, fungi, viruses, etc.[5] The *W. Somnifera* popularly known as '*rasayana'* in *ayurveda* is widely used in various *ayurvedic* preparations to improve strength and stamina. The plant was traditionally used to promote youthful vigor, endurance, strength, health; to enhance the production of vital fluids, muscle, blood, lymph, semen and to increase the capability of individual to resist environmental stress. The similarity between these restorative properties and those of ginseng roots has led to *Ashwagandha* roots being called "indian ginseng". It is also used as a general energy-enhancing tonic known as *medharasayana* to promote learning and to enhance memory. *Ashwagandha* is one of the main ingredients in 74 ayurvedic, 9 siddhas, 3 unani and 126 herbal formulations. Roots have been regarded as a useful internal medicine in rheumatism, dyspepsia and found to be fully diuretic.[6]

(A)

(B)

(C)

(D)

(E)

Figure 1: *Withania somnefera* Linn.: Whole plant (A), root (B), Flower (C), Fruit (D), Dry root of *Ashwagandha* (E).

SANSKRIT NAME: *Ashgandha*

Latin name: *Withania somnefera* Linn.

Family: *Solanaceae*

Kula: *Kantakari kula*

Gana: *Charaka – Balya, Bruhaniya, Madhur Skandha*[7]

VERNACULAR NAME[7]

Languages	**Vernacular names**
Sanskrit:	*Ashwgnadha, vaji, hayahaya, varahkarni, Baladamarutaghni*
Hindi:	*Asgandh, punir*
English:	Winter cherry
Marathi:	*Askandha, kanchuki, tilli*
Gujarati:	*Asan, asana, asado, asundha, ghadaasoda*
Bengaali:	*Ashvaganda, asvagandha*
Malayalam:	*Amukkiram, pevetti*
Odiya:	*Ashgandha*
Tamil :	*Amukkira, asubam, asuvagandi, asvagandhi*
Hindi:	Asgand nagaori
Sanskrit:	Ashvagandha, ashvakandika, gandhapatri
Arabic:	Kaknaj-e-hind
Telugu:	Asvagandhi, penneru, dommadolu
Urdu :	Asgand, asgand nagori.

Synonyms of *Ashwagandha*

Synonym	*Bha.ni*[8]	*Mad.ni*[9]	*Dha.ni*[10]	*Kai.ni*[11]	*Sho.ni*[12]	*Raj.ni*[13]
Ashwagandha	-	-	+	+	+	+
Ashwavarohaka	-	+	+	+	+	-
Balada	+	-	-	-	-	+
Balya	-	+	+	+	+	+
Elaparni	-	-	-	-	+	-
Gokarna	-	+	-	+	-	-
Gandhapatri	-	-	-	-	-	+
Hayagandha	-	-	-	+	-	+
Hayapriya	-	-	-	-	-	+
Varahakarni	+	+	+	+	+	+
Kamarupini	-	-	-	-	+	+
Kanjuka	-	-	+	-	-	-
Kushtagandhini	-	-	-	-	+	-
Marutaghni	-	-	-	-	+	-
Pivara	-	-	-	-	+	+
Pita	-	-	-	+	-	-
Pushtida	-	-	-	-	-	+
Thuragi	-	+	+	+	+	+
Vajigandha	-	-	+	-	-	+

Etymology of synonyms[14]

1. *अश्वगंधा (भा.प्र.)- अश्वस्येव गन्धोऽस्या:, अथवाऽश्वस्येव गंध उत्साह: (कामवेग:) यस्या: सेवेनन सा |*

Ashwagandha– Having smell like that of horse, its increases sexual potency likes that of horse after consuming.

2. *अश्वकन्द: (नि.)- अश्वस्य गन्धयुक्त:, अश्वस्येव कामशक्तिप्रद: कन्द: मूलमस्या:|*

Asvakanda- Root of part used, also emits horse's smell.

3. *अश्वावरोहक: (सो.)- अश्वमवरोहयति अध:करोति पुंस्त्वशक्तौ इति |*

Asvavarohika- promotes sexual potency like that of horse.

4. *वराहकर्णी (भा.)- वराहकर्णवत् पत्राण्यस्या: |*

Varahakarni –Its leaves resembling pig`s ear.

5. *कामरुपिणी (रा.)- कामस्येव रूपं भवत्यस्या: |*

Kaamaroopini- it progresses libido.

6. *गंधपत्री (रा.)- पत्राणामप्यश्वगंधित्वात् |*

Gandhapatri- having a smell like a horse.

7. *मारुतघ्नी (सो.)- मारुतं वातविकारं हंति |*

Marutaghni- useful in vata diseases.

8. *बलदा (भा.)- बलं ददानत.बलवर्धनीत्यर्थ:|*

Balada, Balya- encourage strength.

9. *पुत्रदा (नि.)- पुत्रं ददाती शुक्रवर्धकत्वात्|*

Putrada- be responsible for male progeny.

10. *वृषा (कै.)- वृषवत् शुक्रवर्धनी वाजीकरी च |*

Vrisha- it is vrishya by nature.

11. *हयाह्वया (भा.)- अश्वनाम्ना प्रख्याता*

Hayahvaya- provides horse strength, it's known by the title of horse.

MORPHOLOGICAL DESCRIPTION[15]

It grows as a short shrub (35-75cm) with a central stem from which branches extend radially in a star pattern (stellate) and covered with a dense matte of wooly hairs (tomentose). The flowers are small and green, while the ripe fruit is orange-red and milk- coagulating properties. The plants long, brown, tuberous roots are used for medicinal purposes.

TAXONOMY

Kingdom : Plantae

Subkingdom : Tracheobionta

Superdivision : Spermatophyta

Division : Magnoliophyta

Subclass : Magnoliopsida

Order : Solanales

Family : Solanaceae

Genus : Withania

Species : *Withania somnifera*

DISTRIBUTION OF *W. SOMNIFERA*[15]

The herb *W. Somnifera* can be seen as a wild plant in the north-western regions of India extending from the mountainous region of Punjab, Himachal Pradesh and Jammu to an altitude of 1,500 m. Today, this economically and medicinally significant herb is being

widely cultivated (more than 4,000 ha) in drier parts of India such as Manasa, Neemuch and Jawad Tehsils of the Mandsaur district (Madhya pradesh); Punjab; and Chittorgarh district of Rajasthan.

PROPERTIES AND ACTION[15]

***Rasa**: Tikta, Katu, Madhura**Guna:** Laghu, Snigdha **Virya**: Ushana*

***Vipaka**: Madhura*

***Dosha**: Kaphavatashamaka*

***Karma**: Rasayana, Vatakaphaghna, Balya, Vajikarna, Shukrala*

Raspanchaka* of *Ashwagandha* according to various *nighantus

Sr.No.	Name of thetexts	*Rasa*	*Guna*	*Veerya*	*Vipaka*	*Karma*
1.	***Bhav-Prakasha ni.***[8]	*Kasaya,tikta*	*Laghu Snigdha*	*Usna*	*- Katu*	*Vatapittasamaka*
2.	***Madanapal ni.***[9]	*Tikta, Kasaya*	*Laghu- Snigdha*	*Usna*	*- Katu*	*Kapha-Vatasamaka*
3.	***Dhanwantari Ni.***[10]	*Kasaya,katu*	*Laghu- Snigdha*	*Usna*	*- Katu*	*Vata-Kaphasamaka*
4.	***Kaiyyadeva ni.***[11]	*Kashaya,tikta*	*Laghu- Snigdha*	*Usna*	*- Katu*	*Vata samaka*
5.	***Raj ni.***[13]	*Katu*	*Laghu- Snigdha*	*Usna*	*- Katu*	*Vata samaka*
6.	***Nighantu adarsha***[16]	*Tikta, kasaya*	*Laghu- Snigdha*	*Usna*	*- Katu*	-
7.	***Priya ni.***[17]	*Tikta*	*Laghu -Snigdha*	-	*- Katu*	-

KARMA[18]: it acts as *kaphavatashamak*a (mitigates *vata* and *kapha)*, *shukravardhaka, rasayna, vataghna, kaphaghna, switraghna, shothaghna, vrishya, mastisshkshamak, anulomana, krimighna, raktashodhaka, shwashara, vajikara, garbhashayashothahar, kushthaghna, bruhana, shothahara* (anti-inflammatory), *balya* (strengthening), *deepana* (appetizer), *paachana* (digestant), *vatanulomana* (carminative), *vruna ropana* (wound healing), *kasa swasahara* (cures cough anbreathlessness), *mutrala* (act as diuretic), *rasayana* (rejuvenator), *vajikara* (aphrodisiac).

Bheda-(varities)[19]

There are two types of *ashwgandha*.

- ***Ashwgandha (Withania somnifera)***
- ***Nagori ashwgandha* (*Withania ashwgandha)***

The roots look different. It is found out that the Nagori *ashwgandha* was cultivated variety and identified as *Withania ashwgandha.*

SUBSTITUTES AND ADULTERANTS[20,21,22]

According to *bhaishajya ratnavali, Ashwagandha* is used as substitute of *meda. Yogaratnakara* speak out it as substitute of *kakoli* and *ksheera kakoli*. *Vangasen*a has same

view like *yogaratnakara. Bhavaprakasha* also protest *Ashwagandha* as substitute of *kakoli* and *ksheera kakoli* but in quality standards of Indian medicinal plants, it is stated that *withania coagulans (stocks)* dunal and growing *withania somnifera* (Linn) dunal are known to be the common substitutes or adulterants.

CHEMICAL CONSTITUENTS OF *W. SOMNIFERA*[23]

The chemistry of W. Somnifera has been extensively studied and over 39 active ingredients have been identified, extracted, and isolated by different workers. At present, more than 12 alkaloids, 40 withanolides, and several sitoindosides have been identified. The withanolides are a group of naturally occurring steroidal lactones that imparts distinctive earthy odour and flavour to *Ashwagandha*. With aferin a was the first member of this group isolated from this well-known south-asian medicinal plant. The rf value of major withaferin, withanolides d and withanolides a was reported to be 0.32, 0.50 and 0.86, respectively.the total alkaloid content in the roots of W. Somnifera was reported to vary between 0.13 and 0.31% though much higher yields (up to 4.3%) have been recorded (mirjalili et al., 2009). The w. Somnifera root contains low level of soluble protein (5.6 %).

THERAPEUTIC USES[18]: *Sotha*, *Kshaya*, *Daurbalya*, *Vataroga*, *Klaibya*, and *Vishaghna.*

Indications[18, 24]

External uses

The leaves or root paste are applied to enlarged cervical glands or swelling of other glands because it relieves oedema and pain. Oil massage is performed for *vata* diseases and *vata* weakening. *Ashwagandha* leaf juice is applied on ear discharge as eardrops.

Internal uses

Digestive system- The bark powder is appetizer, carminative and anthelmintic and hence is used in abdominal pain, constipation and worms.

Circulatory system- It has an effect on the heart purifies the blood and reduces oedema so it is used for the weakness of heart, blood disorder and oedema its decoction is used in rheumatoid arthritis.

Respiratory system- It helps with coughing since it is an expectorant and has anti-asthmatic qualities. If phlegm is thin, ash or its alkaline extract is utilised, along with ghee and honey, to treat asthma. For cough and asthma, a small quantity of bark decoction should be used. In

the aforementioned situations, it is additionally utilised as a tonic.

Reproductive system- *Ashwagandha* is well known for having aphrodisiac properties. It is used to treat leucorrhoea brought on by endometritis and semen abnormalities. A healthy tonic, nourishing, and aphrodisiac, 5 gms of *Ashwagandha* powder mixed with ghee and milk. Back pain brought on by pregnancy is entirely cured.

Nervous system- As it is a sedative and nervine tonic, it helps in atomic nerves, fainting, giddiness and insomnia.

Urinary system- It is diuretic and so used in oliguria or anuria. It is used to strengthen *meda dhatu*.

Skin- It is used in vitiligo and other skin diseases other skin diseases; blisters heal when black ashes of the roots are applied on them.

***Satmikaran*-** it increases weight, immunity and is aphrodisiac. Used in debilitating diseases and marasmus.

PHARMACOLOGICAL ACTIVITY

Antiparkinsonian properties[25]

Parkinson's disease is a neurodegenerative disease characterized by the selective loss of dopamine (DA) neurons trigger and/or mediate the loss of nigral DA neurons, however, remain unclear. Neuroleptic-induced catalepsy has long been used as an animal model for screening drugs for Parkinsonism. Administration of haloperidol or reserpine significantly induced catalepsy in mice. WS significantly inhibited haloperidol or reserpine-induced catalepsy and provide hope for treatment of Parkinson's disease.

Antibacterial effect[26]

Both aqueous as well as alcoholic extracts of the plant (root as well as leaves) were found to possess strong antibacterial activity against a range of bacteria, as revealed by in vitro Agar Well Diffusion Method. The methanolic extract was further subfractionated using various solvents and the butanolic sub-fraction was possessed maximum inhibitory activity against a spectrum of bacteria including Salmonella typhimurium. Moreover, in contrast to the synthetic antibiotic (viz. chloramphenicol), these extracts did not induce lysis on incubation with human erythrocytes, advocating their safety to the living cells. Oral administration of the

aqueous extracts successfully obliterated salmonella infection in Balb/C mice as revealed by increased survival rate as well as less bacterial load in various vital organs of the treated animals.

Sexual behaviour[27]

Methanolic root extract of WS were orally administered at dose 3000 mg/kg/day of 7 days in rats. Their sexual behaviour was evaluated 7 days prior to treatment, day 3 and 7 of treatment, and day 7, 14 and 30 post-treatment by pairing each male with a receptive female. The WS root extract induced a marked impairment in libido, sexual performance, sexual vigour, and penile erectile dysfunction. These effects were partly reversible on cessation of treatment. This antimasculine effect was not due to changes in testosterone levels but attributed to hyperprolactinemic, GABAergic, serotonergic or sedative activities of the extract. WS roots may be detrimental to male sexual competence.

Antivenom[28]

Venom hyaluronidases help in rapid spreading of the toxins by destroying the integrity of the extra-cellular matrix of the tissues in the victims. A hyaluronidase inhibitor (WSG) is purified from WS. The glycoprotein inhibited the hyaluronidase activity of cobra (Naja naja) and viper (Daboiarusselii) venoms, which was demonstrated by zymogram assay and staining of the skin tissues for differential activity. WSG completely inhibited the activity of the enzyme at a concentration of 1:1 w/w of venom to WSG. External application of the plant extract as an antidote in rural parts of India to snakebite victims appears to have a scientific basis.

Antioxidant effect[29]

The brain and nervous system are relatively more susceptible to free radical damage than other tissues because they are rich in lipids and iron, both known to be important in generating reactive oxygen species. Free radical damage of nervous tissue may be involved in normal aging and neurodegenerative diseases, e.g., epilepsy, schizophrenia, Parkinson's, Alzheimer's, and other diseases. The active principles of WS, sitoindosides VII-X and withaferin A (glycowithanolides), have been tested for antioxidant activity using the major free-radical scavenging enzymes, superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPX) levels in the rat brain frontal cortex and striatum. Decreased activity of these enzymes leads to accumulation of toxic oxidative free radicals and resulting degenerative effects. An increase in these enzymes would represent increased antioxidant activity and a protective effect on neuronal tissue. Active glycowithanolides of WS were

given once daily for 21 days, dose-related increased in all enzymes were observed; the increases comparable to those seen with deprenyl (a known antioxidant) administration. This implies that WS does have an antioxidant effect in the brain, which may be responsible for its diverse pharmacological properties.

Cardiovascular protection[30]

WS may be useful as a general tonic, due in part to its beneficial effects on the cardiopulmonary system, as reported in the following studies. The effect of WS was studied on the cardiovascular and respiratory systems in dogs and frogs.

Anxiety and depression[31]

Anxiolytic and antidepressant actions of the bioactive WSG, isolated from WS roots, in rats were assessed. WSG was administered orally once daily for 5 days and the results were compared by those elicited by the benzodiazepine Lorazepam for anxiolytic activity, and by the tricyclic antidepressant, imipramine. WSG induced an anxiolytic effect was comparable to lorazepam, in the elevated plus-maze, social interaction and feeding latency in an unfamiliar environment, tests. WSG also reduced rat brain levels of tribulin, an endocoid marker of clinical anxiety, when the levels were increased following administration of the anxiogenic agent, pentylenetetrazole. WSG also exhibited an antidepressant effect, comparable with that induced by imipramine, in the forced swim-induced 'behavioural despair' and 'learned helplessness' tests. The investigations supported the use of WS as a mood stabilizer in clinical conditions of anxiety and depression in *Ayurveda*.

Hypolipidemic effect[32]

WS root powder decreased total lipids, cholesterol and triglycerides in hypercholesteremic animals. On the other hand, significantly increased plasma HDL-cholesterol levels, HMG-CoA reductase activity and bile acid content of liver. A similar trend also reported in bile acid, cholesterol and neutral sterol excretion in the hypercholesteremic animals with WS administration. Further, a significant decrease in lipid-peroxidation occurred in WS administered hypercholesteremic animals when compared to their normal counterparts. However, WS root powder was also effective in normal subjects for decreasing lipid profiles.

Antiinflammatory properties[33]

The effects of WS, as anti-inflammatory in a variety of rheumatologic conditions, have been studied by several authors. In a study, WS root extract (1 g/kg, oral) reduced Freund's

complete adjuvant induced inflammation in rats; phenylbutazone was given as a positive control. The l2- glycoprotein found only in inflamed rat serum was decreased to undetectable levels in the WS group. Phenylbutazone, on the other hand, caused a considerable increase in the l2- glycoprotein in both arthritic and healthy rats.

DOSE[18]

Root powder- 3 to 6 gm

Kshara- 1 to 3 gm

FORMULATION[18,20]

It is used as an ingredient many formulations such as *Ashwagandhadichurna*, *Ashwagandha-ghrita, Ashwagandharishta, Ashwagandha-taila, Brihat-Ashwagandhaghrita, Ashwagandha-rasayana. madhyamanarayana-taila, saraswata-churna, pramehamihira-taila, nagabala-ghrita. Madhusnuhirasayana.*

DISCUSSION

Ashwagandha shows therapeutic significance in multiple disorders due to its varied properties. Its *madhur rasa* increases the rasadidhatu, especially the *mansa dhatu* and *shukra dhatu. Madhura rasa* and *madhura vipaka* increases semen production. Therefore *Ashwagandha* is best for *vajikarana. Madhura* and *snigdha guna* nourishes *rasa* to *shukra dhatu. Agnideepaka karma* is done by *tikta rasa responsible for dhatuposhna* and *dhatuvardhana*. It's especially increases the *dhatugata parthiva* and *jala mahabhuta* part which nourishes the *mansa dhatu.* Eventully by nourishing prakrut *mansa dhatu,* it shows *balya- brihanm* karma. In case of disorders of pranvaha srotas, *Tikta rasa and ushna virya* cause *kaphaghna* and *kaphavilyana karma.* Due to the clearance in pathway of *pranvayu* by dissolving *kapha,* the source of obstruction is removed. *Ashwagandhakwatha siddha ksheera is useful in kshyaja kas- shwasa.*

CONCLUSION

Since ancient times, natural products have been used for the treatment of different types of diseases in several ways. The plant contains different type of phytoconstituents which showed different pharmacological activities. The plant has also received extensive research for its wide range of pharmacological qualities, such as anti-inflammatory, anticancer, anti-anxiolytic, adaptogen, memory-enhancing, and anti-parkinsonian effects. Numerous additional effects, such as immunomodulation, hypolipidemia, antimicrobial activity,

cardiovascular protection, and sexual behaviour, have also been investigated. The current body of literature has a number of limitations, despite the fact that the results of this review are extremely encouraging for the use of Ashwagandha as a multipurpose therapeutic agent. Even though it has been successfully utilised in *Ayurvedic* medicine for millennia, further clinical trials need to be done to back up its medicinal usage. Further research studyon this topic is yet to be done.

REFERENCES

1. Satya Prakash Chaudhary, an ayurvedic review of Ashwagandha from samhitha and nighantus, WJPR, sep., 2015.
2. Umadevi M, *et al*. Traditional and medicinal uses of Withania somnifera, The Pharma Innovation, 2012; 9: 102-110.
3. Pratibha C, Madhumati B, Akash P, Therapeutic properties and significance of different parts of Ashwagandha-A medicinal plant, Int. J. Pure App. Biosci, 2013; 1(6): 94-101.
4. Singh N, et al An overview on Ashwagandha: A Rasayana (Rejuvenator) of Ayurveda, African Journal of Traditional, Complementary and Alternative Medicines, 2011; 8: 208-213.
5. Rizvi Faizi T, *et al* Immunomodulatory effect of Ashwagandha against doxorubicin toxicity, European Journal of Pharmaceutical and Medical Research, 2016; 3(7): 463- 467.
6. pandey g, dravyaguna vijnana, 4th ed. Varanasi: chaukhambha krishnadas academy, 2015; 749.
7. Prof. P. V. Sharma, dravyaguna vijyana, published bychaukhambha bharti academy, varanasi, ed., 2006; ii.
8. Bhavmishra. Bhavaprakash nighantu edited by chunekar kc and pandey cs. 6th edition, chaukhambha bharat academy, Varanasi, 1982.
9. Madanapala, madanapala nighantu by pt. Ramaprasad patiyala with hindi commentary, pub. By khemraj srikrishnadas prakashana bombay, 1998.
10. Mahendra bhaugik, dhanwantari nighantu, edited by prof. P. V. Sharma, published by chaukhambha orientalia, 2009.
11. Kaiyadeva, Kaiyadeva Nighantu, Edited by P.V.Sharma and Guruprasad Sharma, Aushadhi varga, Chaukambha Orientatia, Varanasi, 1st Edition, 1979; 180-181.
12. Sodhala, Sodhala Nighantu; Edited by Priya Vrit Sharma, Aamradi Varga, Oriental Institute, Baroda, 1st Edition, 1978; 117-287.

13. Indradev Tripathi, Raj Nighantu, Acharya Vishwanath Durvedi, Aamradi Varga, Pub. Krishna Das Academy Varanasi, 1982; 275-276.
14. Sharma p.v. namaroopavijnanam.1sted.varnasi: sathya priya prakashan, 2000; 18.
15. Prof. P. V. Sharma, dravyaguna vijyana, vol.- ii, published bychaukhambha bharti academy, varanasi, ed., 2006; 764.
16. Vaidhya baapaalal -nighantu adarsha 1968, the chaukhamba vidhyabhawan vanarasi.
17. Sharma pv, priya nighantu, chaukambha surabharati prakashana, varanasi, 2004.
18. Prof. P. V. Sharma, dravyaguna vijyana, vol.- ii, published bychaukhambha bharti academy, varanasi, ed.- 2006; 764-765.
19. Bhavmishra. Bhavaprakash nighantu edited by chunekar kc and pandey cs. 6th edition, chaukhambha bharat academy, Varanasi, 1982; 380.
20. Bhisagratna GD, Bhaishajya ratnawali. Bhisagratna Shri Brahma Shankar Mishra editor. Varnasi: Chaukambha Sanskrit Sansthan, 2008; 83.
21. Yogaratnakara Par 1. Kumari DA, editor. Varnasi: Chaukambha Vishwabharati, 2010; 193.
22. Neeraj Tandon, Madhu Sharma. Quality Standards of Indian Medicinal Plants., Medicinal plants unit Indian council of medical research New Delhi, 2010; 9: 359-361.
23. Kapoor L D 1990 Handbook of Ayurvedic Medicinal Plants. CRC, Press, Boca Raton.
24. Gogte VVM. Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants. Dravya Guna Vignyan. New Delhi: Chaukhambha Publication, 2009.
25. A. Kumar, S.K. Kulkarni. Effect of BR-16A (Mentat), a polyherbal formulation on drug-induced catalepsy in mice. Indian J. Exp. Biol., 2006; 44(1): 45-48.
26. M. Owais, *et al*. Antibacterial efficacy of Withania somnifera (ashwagandha) an indigenous medicinal 149 plant against experimental murine salmonellosis. Phytomedicine, 2005; 12(3): 229-235.
27. I. Ilayperuma, *et al*. Effect of Withania somnifera root extract on the sexual behaviour of male rats. Asian J. Androl, 2002; 4(4): 295-298.
28. D.K. Machiah, *et al*. A glycoprotein from a folk medicinal plant, Withania somnifera, inhibits hyaluronidase activity of snake venoms. Comp. Biochem. Physiol. C. Toxicol. Pharmacol, 2006; 143(2): 158-161.
29. S.K. Bhattacharya *et al*. Effect of Trasina, an Ayurvedic herbal formulation, onpancreatic islet superoxide dismutase activity in hyperglycaemic rats. Indian J. Exp. Biol., 1997; 35(3): 297-299.
30. C.L. Malhotra, *et al*. Studies on Withania ashwagandha, Kaul. III. The effect of total

alkaloids on the cardiovascular system and respiration. Indian J. Med. Res., 1981; 49: 448-460.

31. S.K. Bhattacharya, *et al*. Anxiolytic-antidepressant activity of Withania somnifera glycowithanolides: an experimental study. Phytomedicine, 2000; 7(6): 463-469.
32. N.P. Visavadiya, A.V. Narasimhacharya. Hypocholesteremic and antioxidant effects of Withania somnifera (Dunal) in hypercholesteremic rats. Phytomedicine, 2006. (In Press).
33. K. Anbalagan, J. Sadique. Influence of an Indian medicine (Ashwagandha) on acutephase reactants in inflammation. Indian J. Exp. Biol., 1981; 19(3): 245-249.