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ASHWAGANDHA RASAYANA SHORT REVIEW WITH RESPECT TO UNDERNUTRITION (APATARPANJANYA KARSHYA)

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ABSTRACT

Withania somnifera (Ashwagandha) is a very revered herb of the Indian Ayurvedic system of medicine as a *Rasayana* (tonic). It is used for various kinds of disease processes and especially as a rejuvenating tonic. Considering these facts many scientific studies were carried out on its adaptogenic/anti-stress activities. It has a Cognition Promoting Effect and was useful in children with memory deficit and old age people loss of memory and rejuvenating effect. It has GABA mimetic effect and was shown to promote the formation of dendrites. It has an anxiolytic effect and improves energy levels and mitochondrial health. It is an anti-inflammatory and anti-arthritic agent and was found useful in clinical cases of Rheumatoid and Osteoarthritis. Premature ageing associated with chronic nervous tension may be related to increased oxidative stress, which can be abolished by the potent antioxidant property of *ashwagandha* extract. The antioxidant effect of active principles of *W. somnifera* may explain, at least in part, the reported anti-stress, cognition-facilitating, anti-inflammatory and anti-ageing effects. *Ashwagandha rasayan* is known as "*Sattvic Kapha Rasayana". Ashwagandha* is commonly available as a *churna*, a finely sieved powder that can be mixed with water, ghee (clarified butter) or honey. It enhances the function of the brain and nervous system and improves memory. It improves the function of the reproductive system promoting a healthy sexual and

reproductive balance. Being a powerful adaptogen, it enhances the body's resilience to stress and improves the body's defence against disease by improving cell-mediated immunity. It also possesses potent antioxidant properties that help protect against cellular damage caused by free radicals.

Keywords: *ashwagandha, Rasayan*a, undernutrition, adaptogen, malnutrition, *apatarpanjanya Karshya*.

INTRODUCTION

Ashwagandha (*Withania somnifera*, fam. Solanaceae) is commonly known as "Indian Winter cherry" or "Indian Ginseng". It is one of the most important herbs of Ayurveda (the traditional system of medicine in India) used for millennia as a *Rasayana* for its wide-ranging health benefits. *Rasayana* is described as a herbal or metallic preparation that promotes a youthful state of physical and mental health and expands happiness. These types of remedies are given to small children as tonics and are also taken by the middle-aged and elderly to increase longevity. *Ashwagandha* has been used as a *Rasayana*. The root of *Ashwagandha* is regarded as tonic, aphrodisiac, narcotic, diuretic, anthelmintic, astringent, thermogenic and stimulant. The root smells like a horse ("*ashwa*"), that is why it is called *Ashwagandha* (on consuming it gives the power of a horse). It is commonly used in emaciation of children (when given with milk, it is the best tonic for children), debility from old age, rheumatism, vitiated conditions of vata, leucoderma, constipation, insomnia, nervous breakdown, goitre etc. The paste formed when roots are crushed with water is applied to reduce the inflammation at the joints. It is also locally applied in carbuncles, ulcers and painful swellings. The root in combination with other drugs is prescribed for snake venom as well as in scorpion-sting. It also helps in leucorrhoea, boils, pimples, flatulent colic, worms and piles. The maximum benefit appears when fresh Ashwagandha powder is used. The leaves are bitter and are recommended in fever, painful swellings. The flowers are astringent, depurative, diuretic and aphrodisiac. The seeds are anthelmintic and combined with astringent and rock salt remove white spots from the cornea. "*Ashwagandharishta"* prepared from it is used in hysteria, anxiety, memory loss, syncope, etc. The pharmacological significance of Ashwagandha, *W. somnifera* has been traditionally used as it has rejuvenating and life-prolonging properties. It is used in making a tonic to calm the mind, reduce weakness, increase stamina and improve sleep. It stimulates the activation of the immune system, increases the production of vital fluids, lymph, blood, semen, cells and provides antioxidant protection

Origin and Distribution:

Ashwagandha grows as a stout, evergreen and tomentose shrub prolifically grows in drier parts of Asia, Africa, Congo, South Africa, Egypt, Morocco and Jordan. It wildly grows in all drier parts of subtropical India and occurs in Madhya Pradesh, Uttar Pradesh, Punjab plains and northwestern parts of India like Gujarat and Rajasthan. The bright red fruit is harvested in the late fall and seeds are dried for planting in the following spring. It is a fairly easily grown plant, requires a warm sheltered position in full sun and a well-drained moderately fertile soil for cultivation.

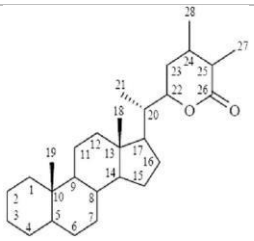
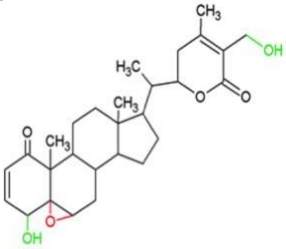
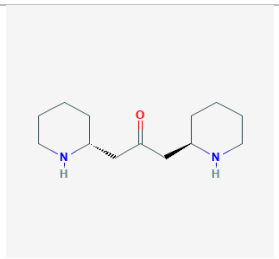
It is an erect branching shrub that attains a height of 30-150 cm, covered in a woolly pubescence. The ovate leaves are up to 10 cm long and 2.5-5 cm wide, margins entire and arranged alternately. The flowers are green or yellow, born in axillary fascicles, giving rise to red globose fruits when mature. Roots are 20-30 cm long and 6-12 mm in diameter, with few (2-3) lateral roots of slightly smaller size, straight and are unbranched. The outer surface is buff to greyish yellow with longitudinal wrinkles and in the centre soft, solid mass with scattered pores. It has a characteristic odour, taste bitter and is acrid. Whole plant, leaves, roots, stem, green berries, fruits, seeds and bark are used for therapeutic purposes, while roots are mostly utilized

Phytochemical Composition:

Two new steroidal lactones of the withanolide-type, 5beta, 6alpha, 14 alpha, 17beta, 20beta-pentahydroxy-1-oxo-20 S, 22R-with a-2, 24-dienolide (1)and alpha,

7alpha-epoxy-5alpha,14alpha, 17 alpha, 23beta-tetrahydroxy-1-oxo-22R-with a-2, 24-dienolide (2), were isolated from the fruit of Withania somnifera, together with two known coumarins, scopoletin (3)and aesculetin (4), a known triterpene, viz. Beta-amyrin (5), and two known phytosterols, viz. stigmasterol (6) and sitosterol (7).

Five new withanolide derivatives (1, 9-12) were isolated from the roots of Withania somnifera together with fourteen known compounds (2-8, 13-19). On the basis of spectroscopic and physiochemical evidence, compounds 1 and 9-12 were determined to be (205,22R)-3 alpha,6 alpha-epoxy-4 beta,5 beta, 27-trihydroxy-1-oxowitha-24-enolide (1), 27-0-beta-D-glucopyranosyl-pubesenolide 3-0-beta-D-glucopyranosyl (1+6)-beta-D-glucopyranoside (withanoside VIII, 9), 27-0-beta-D-glucopyranosyl (1+6)-beta-D-glucopyranosyl-pubesenolide 3-0-beta-D- glucopyranosyl (1+6)-beta-D-glucopyranoside (withånoside ix, 10), 27-0-beta-D- glucopyranosyl-pubesenolide 3-0-beta-D-glucopyranoside (withanoside X, 11), and (20R,22R)-1 alpha,3 beta,20,27-tetrahydroxywitha-5,24-dienolide 3-0-beta-D- glucopyranoside (withanoside XI, 12). Of the isolated compounds, 1, withanolide A (2), (205,22R)-4 beta, 5 beta, 6 alpha,27-tetrahydroxy-1-oxowitha-2,24-dienolide (6), withanoside IV (14), withanoside VI (15) and coagulin Q (16).

S. No	Active Ingredient	Structure	Molecular formula	Location	Pharmacological Importance
1.	Withanolide (steroidal lactones)		22-hydroxyergostan-26- oic acid-26,22-lactone	Roots and Leaves	It is an important hormonal precursor; it can convert into human physiological hormones when the body requires it.
2.	Withaferin A		4β,27-dihydroxy-1-oxo- 5β,6β-epoxywitha-2-24-dienolide	Root	It has antibiotic and anti-tumour properties.
3.	Withanolide A		C28H38O6	Roots and Leaves	Prevent neurodegeneration, Anticancer agent
4.	Withanolide D		C28H38O6	Root	Significant antitumor and radiosensitizing withanolides
5.	*Anaferine*		*C13H24N2O*	*Roots and seeds*	*Useful drug to mediate excitotoxicity and to treat multi-neurodegenerative diseases.*

Pharmacological evaluation:

Pharmacological significance of *Withania somnifera*:

Activity	Role
Anti-stress	Excessive neuronal activity leads to insomnia. *W. somnifera* produces an inhibitory compound like GABA which inhibits numerous nerve cells in the brain that helps to induce sleep and reduce anxiety.
Anti-inflammatory	It produces steroid which is much more effective than hydrocortisone sodium succinate.
Antineoplastic agent	It decreases the level of nuclear factor kappa B due to which intercellular tumour necrosis factors get suppressed and hence apoptotic signal gets activated in cancerous cell lines. It reduces tumour size.
Antioxidant	Brain and nervous tissue generate reactive oxygen species hence more susceptible to free radical damage *W. somnifera* has free radical scavenging enzymes, catalase which may be responsible for diverse pharmacological properties.
Immunomodulatory	It prevents diseases related to the effect on the immune system by increasing the hemolytic antibody response of erythrocytes which indicate the immune response.
Hemopoietic effect	Its activity is to stimulate stem cell proliferation and indicate to reduce the leucopenia induced by cyclophosphamide.
Rejuvenation	It increases the level of haemoglobin and RBC and improves the hair melanin pigment. It also improves sexual performance and uses as a general health tonic.

Adaptogenic Activity:

Adaptogenic substances are defined as "substances meant to put the organism into a state of nonspecific heightened resistance to resist stresses and adapt to extraordinary challenges". In ayurvedic perspectives, the adaptogenic activity can be due to stable *(sthira)*, heavy *(guru)* and cold *(sheeta)* potency. These qualities lead to stability, increased endurance and can slow the responses. *Kapha dosha* possesses all three qualities, while *vatadosha* shows the contrary characteristics. Adaptogens can be a drug with pro-*kapha* and *vata* stabilizer activity. The substances that have similar properties can be used as rasayana with adaptogenic activities.

Isolation of biologically active fractions and compounds from the roots of Withania somnifera and to test their adaptogenic activity on stress indices using the cold-hypoxia-restraint (C-H-R) model. Bioactivity-guided fractionation of an aqueous extract of the roots of Withania somnifera led to the isolation of a new species of withanolide 1-oxo-5beta, 6beta-epoxy-with a-2-ene-27-ethoxy-olide. Structure elucidation was carried out using proton nuclear magnetic resonance, infrared (IR), ultraviolet (UV), and mass spectroscopic analysis. Stress-related indices were evaluated, namely serum creatine phosphokinase (CPK) activity, serum lactate dehydrogenase (LDH) activity, serum corticosterone levels, and serum lipid peroxidation (LPO) levels. There was a significant decrease in a serum CPK, LDH, and LPO levels in animals pretreated with (1) fraction-I (20 mg/kg body weight), (2) 1-oxo- 5beta, 6beta-epoxy-with a-2-ene-27-ethoxy-olide (2.5 mg/kg body weight) in comparison to control when subjected to C-H-R stress. The results show that a new species of withanolide, 1-oxo- 5beta, 6beta-epoxy-with a-2-ene-27-ethoxy-olide (compound-1) could prove to be an effective agent to counteract C-H-R stress. Withania somnifera (WS) is similar to the properties ascribed to adaptogens like Panax ginseng (PG) in contemporary medicine. A new withanolide-free hydrosoluble fraction was isolated from the roots of Withania somnifera and was evaluated for putative antistress activity against a battery of tests to delineate the activity of fraction.

Antioxidant Activity:

Antioxidant activity of active principles of Withania somnifera, consisting of equimolar concentrations of sitoindosides VII-X and withaferin A. were investigated for their effects on frontal cortical and striatal concentrations of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX). Antioxidant effect of active principles of W. somnifera may explain, at least in part, the reported antistress, immunomodulatory, cognition-facilitating, anti-inflammatory and anti-ageing effects produced by them

in experimental animals and clinical situations. Glycowithanolides, consisting of equimolar concentrations of sitoindosides VII-X and withaferin A, isolated from the roots of Withania somnifera, have been reported to have an antioxidant effect. This antioxidant defence system is basically of two types.

(i) Primary defence and (ii) Secondary defence

Primary Defence:

(1) Antioxidant nutrients: Antioxidant defences rely heavily on vitamins and minerals from the diet. These include beta carotene (precursor of Vit. A), Vitamin E (α-tocopherol), Vitamin C (ascorbic acid), selenium, zinc, manganese and copper.

(2) Antioxidant scavenging enzymes: This includes Superoxide dismutase (SOD), Catalase, Heme peroxidases and Glutathione peroxidases.

Secondary Defence:

This includes small molecules- the 'Scavengers', which react with radicals to produce another radical compound. When these scavengers produce a lesser harmful radical species, they are called 'antioxidants'. Theα-tocopherol, ascorbate and reduced glutathione (GSH) may act in combination to act as cellular antioxidants. The α-tocopherol, present in the cell membrane and plasma lipoproteins acts as a chain-breaking antioxidant.

From Ayurveda perspective, this anti-oxidant system seems to be regulated by body constituents like the optimum quality of *Rasa dhatu, Kaphadosha* and *Ojas*. *Rasayana* therapy works to improve the quality of these three components. The effect of rasayana therapy is assessed by its capacity to manage oxidative stress and prevent cellular damage. Free radicals and reactive oxygen species (ROS) are formed as a result of metabolism. They are highly reactive and can cause greater damage. Excessive accumulation initiates cellular damage and diseases. The antioxidants scavenge these free radicals and ROS and make them harmless. Malondialdehyde (MDA) is also a highly reactive compound and is considered a marker for oxidative stress. These free radicals are neutralized usually by antioxidant enzymes like Superoxide dismutase (SOD).

Devasagayam's group at Bhabha Atomic Research Center studied the mechanism of actions of ayurvedic antioxidants. They reported that ayurvedic herbs can show antioxidant activity at different levels.

Level 1: Suppression of radical formation
Level 2: Scavenging of primary radicals
Level 3: Scavenging of secondary radicals
Level 4: Reconstitution of membranes
Level 5: Repair of damage.

The methanolic extract of Ashwagandha leaf was found to be appreciably effective in scavenging DPPH radicals (EC50=197.50 μg), metal chelation (EC50=76.09 μg), hydroxyl radical (EC50=790.63μg), superoxide radical (EC50=117.70 μg) and inhibition of lipid peroxidation (EC50=536.43 μg). Seven polyphenols viz. gallic acid (0.17 μg/g), chlorogenic acid (0.70 μg/g), caffic acid (0.57 μg/g), sinapic acid (1.60 μg/g), rutin hydrate (0.17 μg/g), quercetin-3-rhamnoside (1.61 μg/g) and quercetin (0.27 μg/g) were identified and quantified using Reverse Phase-High-Pressure Liquid Chromatography. In conclusion, the study suggests that Ashwagandha leaf extract is of great use for the preparation of antioxidant-rich nutraceuticals. The active principles of Ashwagandha, consisting of sitoindi sides VII-X and withaferin-A have been shown to exhibit significant antistress and antioxidant effects.

The results indicate that at least part of chronic stress-induced pathology may be due to oxidative stress, which is mitigated by WSG, lending support to the clinical use of the plant as an antistress adaptogen."

The phenolic compounds and flavonoids were determined from the extracts of Withania somnifera root (WSREt) and leaf (WSLEI).

Antistress Activity:

Withania somnifera's anti-stress properties have been investigated in the study using adult Wistar strain albino rats and cold-water swimming stress test. The results indicate that the drug-treated animals show better stress tolerance. Researchers using Withania somnifera, discovered the animals given the herb an hour before the foot shock, experienced a

significantly reduced level of stress. This research confirms the theory that *Withania somnifera* has a significant antistress adaptogenic effect. Research conducted at the Department of Pharmacology, University of Texas health science centre indicated that extracts of *Ashwagandha* produce GABA-like activity which may account for the herbs anti-anxiety effects. Its function is to decrease neuron activity & inhibit nerve cells from overfiring. This produces a calming effect. Excessive neuronal activity can lead to restlessness & insomnia, but GABA inhibits the number of nerves cells that fire in the brain & helps to induce sleep, uplift mood & reduce anxiety. Two new glycowithanolides, sitoindoside IX (1) & sitoindoside X (2), isolated from Withania somnifera Dunal, were evaluated for their immunomodulatory & CNS effects like antistress, memory & learning.

Increases in muscle mass and strength:

The ability to lift weights is a function of (a) muscle size, (b) energy production and (c) the nervous system's ability to recruit muscles and coordinate them to generate the required force. Muscle size is a function of muscle growth, which is affected by two of ashwagandha's effects: (i) increase in testosterone, which leads to muscle growth and (ii) decrease in the levels of cortisol, which as a catabolic agent detracts from muscle mass. In terms of energy production, ashwagandha (i) can have beneficial effects on mitochondrial energy levels and functioning and reduce the activity of the $Mg2+$-dependent ATPase enzyme responsible for the breakdown of ATP, and (ii) can increase creatine levels that can, in turn, lead to ATP generation. Finally, the effects of ashwagandha on the nervous system as an anti-anxiety agent and in promoting focus and concentration may translate to better coordination and recruitment of muscles.

Principles of Rasayan Chikitsa:

Rasayana Chikitsa is a basic therapy for rejuvenation since it attains longevity, memory, intellect, freedom from disease, youth and excellence of lustre. This review article describes significant information regarding various options of Rasayana Chikitsa as per Ayurveda including herbs, combinations of herbs in the form of the traditional formulation. Rasayana contributes significantly as the treatment component of Ayurveda for curing various diseases and maintaining a healthy lifestyle.

Rasayana therapy provides longevity, good memory, intellect, proper health and youthfulness. It also provides excellent lustre, complexion and voice. The strength of the body and sense organs is increased. Perfection in deliberation, respectability and brilliance is also achieved by Rasayana therapy. [Cha. Sa.Chikitsa Sthana 1/1/7-8] This therapy relieves excessive sleep, drowsiness, exertion, exhaustion, lassitude and emaciation. It restores dosha balance, brings stability, alleviates laxity of muscles and kindles internal digestion. [Cha. Sa.Chikitsa Sthana 1/2/3] The person can achieve blissful health. [Cha. Sa.Chikitsa Sthana 1/1/78-80]

Thus, Rasayana therapy can promote health and prevent diseases of mind and body. [Su.Sa. Chikitsa Sthana 27/3]. It is indicated to prevent recurrence of disease by restoring the equilibrium of body constituents. [Cha. Sa. Sutra Sthana 7/48-49].

DISCUSSION

Rasayana promotes nutrition by direct enrichment of the nutritional quality of *Rasa* by improving *Agni*, i.e., digestion, metabolism and by promoting the patency of *Srotas* (microcirculatory channels in the body). Their antistress actions have made them therapeutically more important. Hence any medicine that improves the quality of *Rasa* should strengthen or promote the health of all tissues of the body. A significant part of Ayurvedic therapeutics is preventive. *Ashwagandha* may be used as a growth promoter and hematinic in growing children. Clinical investigations with the *Ashwagandha* root extracts indicate that it exerts a significant anti-ageing effect in normal healthy but aged subjects. It acts as an antioxidant and protects cells from the damaging effects of oxygen radicals generated during immune activation. The rejuvenating drugs act on the mind, body through three modes- *Rasa*, *Agni* and *Srotas*. The actual pharmacotherapeutics in Ayurveda appears to have been based on the preservation of equilibrium of *Tridoshas* through the

principle of *Samanya-Vishesha* principle. Modern free radical therapy is also based on homeostasis called as Redox state of the cell, i.e., the dynamic balance between the number of antioxidants and the number of free radicals in our body. Rasayana treatments are important in the preservation of health, prevention of diseases, speedy recovery and rehabilitation from disease conditions. In current practices, antioxidant, immunomodulatory, adaptogenic, anabolic, nutraceuticals, anti-ageing therapies are considered forms of Rasayana therapy.

Ayurvedic pharmacology depends on five principles of *Rasa- Guna- Virya- Vipaka* and *Prabhava. Acharya Charak* has mentioned that any *Dravya* can have similar *Rasa, Virya* and *Vipak*a but a different mode of action which can be explained based on *Prabhava.*

Karshya is considered as one of the *Apatarpana Janya Vikara* which needs to be corrected by *Santarpana* measures. *Ashwagandha Rasayana* which is having *Guru, Snigdha Guna, Sheeta Veerya, Kapha Vardhaka* and *Vata Shamaka* properties (i.e., the qualities equalling to that of *Kapha* and *Medas*) in the management of *Karshya* individuals *Ashwagandha Rasayana* produces the anabolic (*Brimhana*) effect on the different tissues of the body. *Ashwagandha Rasayana* is *Madhura* and *Tikta Rasa, Snigdha Guna, Ushna Veerya* and *Madhura Vipaka*, having *Vata Pitta Shamana* and *Kapha Vardhaka* effect. *Laghu Guna* of *Ashwagandha* (Withania Somnifera) helps in kindling the Agni and may help in proper digestion, absorption and assimilation of the drug.

Thus, it can be inferred that *Ashwagandha* (Withania Somnifera) acts both on *Agni* and *Poshaka Rasa*. Being rich in proteins contains essential amino acids and steroids. It is the anabolic to *Mamsa* according to *Charaka*. It can nourish all the tissues of the body by increasing the *Adya Dhatu* i.e., *Rasadhatu*. The anabolic steroids found to be present in the formulation and the procedure of drug administration might influence protein metabolism. Such anabolic agents if given in conjunction with an adequate diet for conditions characterized by wasting of bones and muscles prove to be beneficial to the patient suffering from *Karshya. Ashwagandha* (Withania Somnifera) is also an "adaptogen," as it increases resistance to physical, chemical and biological stressors, builds energy and general vitality.

Underweight *(Karshya)* patients are prone to infections; hence treatment should be aimed to fulfil their nutritional requirements. The formulation *Ashwagandha Rasayana* is such a nutritious medicament that possesses *Laghu, Snigdha Guna, ushna Veerya*, and *Vata Shamaka* properties. *Ashwagandha* (Withania Somnifera) is the ideal drug that helps in improving the condition of low body weight (*Karshya*). This gives *Sharirika* and also *Manasika Dridhatva*.

CONCLUSION

Rasayana Chikitsa is a basic therapy for rejuvenation since it attains longevity, memory, intellect, freedom from disease, youth and excellence of lustre. This review article describes significant information regarding options of *Rasayana Chikitsa* as per Ayurveda including herbs, combinations of herbs in the form of the traditional formulation. *Rasayana* contributes significantly as the treatment component of Ayurveda for curing various diseases and maintaining a healthy lifestyle.

Ashwagandha Rasayana is effective in improving body weight among lean people. *Rasayana* therapy aims at purifying and nourishing each *Dhatu* right from *Rasa* to *Shukra* and result in the physical and mental quality of an individual. The leanness even though mimics a fit person, in most cases it leads to less bodily resistance and is more chance of infections. *Ashwagandha* (Withania Somnifera) is mentioned as a rejuvenating drug in text and is well known for promoting the strength of the body which provides nutrition to all the *Dhatus* fulfilling the principle of *Rasayana*. *Ashwagandha Rasayana* was found to have a significant effect in improving Haemoglobin. *Ashwagandha Rasayana* is found to be significantly effective in improving body weight and BMI among low body weight (*Krusha*) people. Apart from concentrating on therapeutic aspects of this disease, it should be considered to improve the socio-economic status and also awareness of nutrition education.

REFERENCES

1. Ravi Butt Tripathi commentary on Astangsangrah Sutrasthan of Vagbhata Chaukhambha Sanskrit Sansthan, 442.
2. Arunadatta and Hemadri commentaries on Astanghridaya of Vagbhata Chaukhambha Sanskrit Sansthan Edition, 2012; 938.
3. Kashinath Shastri & Gorakhnath commentary Chaturvedi Charaka Samhita, Vidyotini Reprint 2012, Varanasi Chaukhambha Bharati Academy, Sutrasthana, 26/71: 356.
4. Kashinath Shastri & Gorakhnath Chaturvedi commentary Charaka Samhita, Vidyotini Reprint 2012, Varanasi ChaukhambhaBharati Academy, Sutrasthana, 26/67; 355.
5. Mishra LC, Singh BB, Dagenais S. Scientific basis for the therapeutic use of Withania somnifera (Ashwagandha): A review. Altern Med Rev, 2000; 5: 334-46.
6. Dandekar Pradnya, Role of Rasayanchikitsa in Promotion of Health, *UJAHM*, 2014; 02 (01): 6-10.
7. Sushruta; Sushruta Samhita Illustrated by Kaviraj Ambikadatta Shastri, Chaukhambha Sanskrit Sansthan Varanasi, 15th edition, Sutrasthan Chapter 15/15, 2007; 63.
8. Mishra R N. *Vayasthapak* - The Ayurvedic Anti-Aging Drugs, *International Journal of Research in Pharmaceutical and Biomedical Sciences*, 2012; 3 (1): 234-249.
9. Vibha Dwivedi, Bipin K. Tripathi, Mousumi Mutsuddi and Subhash C. Lakhotia, Ayurvedic Amalaki Rasayana and Rasa-Sindoor Suppress Neurodegeneration in Fly Models of Huntington‟s and Alzheimer‟s Diseases, *Current Science*, 2013; 12: 105.
10. Kamlesh S. Mahajan, Archana R. Belge, Omprakash W. Talokar, Raman S. Belge Clinical Evaluation of *RutuHaritaki Rasayana* with Special Reference to *Amlapitta. International Journal of Pharmaceutical Science Invention*, 2013; 2 (3): 01-04.
11. A randomised clinical study to evaluate the efficacy of ashwagandha rasayan on Karshya with respect to undernutrition- Sharma Sudhanshu Dutt, Masand Sameet, Sharma Suryanshu Dutt, Sharma Gopal Dutt and Thakur Jyotsna- Volume 6, Issue 15, 743-755- World Journal of Pharmaceutical Research.
12. Therapeutics utilization of Rasayan chikitsa as per principles of Ayurveda- S. N. Tiwari, R. P. Tiwari, S. R. Dwivedi, P. K. Kirar and S. K. Khodre- International Journal of Phytopharmacy Review Article Vol. 5 (1), pp.1-3, Jan-Feb 2015.
13. ANTIOXIDANT AND FREE RADICAL SCAVENGING ACTIVITY OF ASHWAGANDHA (Withania somnifera L.) LEAVES- Ajay Pal, Mukesh Kumar, Vinod Saharan and Bharat Bhushan- Journal of Global Biosciences- Volume 4, Number 1, 2015, pp. 1127-1137.
14. Review on bioactive metabolites of Withania somnifera. (L.) Dunal and its pharmacological significance- Shruti Bhasin, Manali Singh and Dipti Singh- Journal of Pharmacognosy and Phytochemistry 2019; 8(3): 3906-3909
15. medicinal plants: pharmacological evaluation-volume 3-by Nandan. K. Jha, I. K. Pandey-herbal information centre-pg765-811.
16. G. Singh, P.K. Sharma, R. Dudhe, S. Singh. Biological activities of Withania Somnifera. Annuals of Biological Research, 2010, 1(3):56-63

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