



REVIEW ON PHARMACOLOGICAL SCREENING OF *ASPARAGUS RACEMOSUS* WILLD. IN RELATION TO AYURVEDIC LITERATURE

Unadkat Kinjal Parsotam ^{1*}, Jani Dilip Khemji ², Chaudhari Ditiksha Ashokbhai ³

¹ P.G. Scholar, Post Graduate Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat, India

² Professor and Head, Post Graduate Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat, India

³ P.G. Scholar, Post Graduate Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat, India

*Corresponding Author Email : unadkatkinjal1@gmail.com

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ABSTRACT

Shatavari is a well reputed drug in traditional Ayurvedic medicine. Its effectiveness of therapy is well known globally. In Ayurveda shatavari is known as the Queen of the herbs and is the first choice of herb for female health. It is a climbing plant which grows in tropical regions of India and is widely distributed across the world and its distribution ranges from tropical Africa, Java, Australia, Sri Lanka, Southern parts of China and India, but it is mainly cultivated in India. It is mentioned in the various classical texts for the treatment of diseases such as Shotha (inflammation), Gulma (abdominal pain), Atisara (diarrhoea) etc and also is Rasayana (rejuvenative), Balya (gives strength), Shukrakaraka (increases sperm), Stanyakara (increases breast milk) etc. It is described in Bruhatrayi including Charaka Samhita (2000 BC), Sushruta Samhita (600 BC) and Ashtang Hradaya (600 AD), Dhanvantari Nighantu (8th -10th AD), Raj Nighantu (14th AD), Kaiyadeva Nighantu (15th AD), Bhavprakash Nighantu (16th AD) etc. Therapeutically proven activities of Shatavari are – antinatal, anti-abortifacient, anticancer, anti-diarrheal, anti-depressant, anti-epileptic, antioxidant, anti-tussive, antiulcer, cardio-protective, diuretic, hepato-protective, immune-stimulant, neurodegenerative etc. It indicates the importance of the drug that it was screened for various activities. Here a review on the therapeutically proven pharmacological actions of Shatavari correlation with Ayurvedic classics documented thousands of years ago. It has been done to explore the importance of the drug mentioned in the classics. It reflects the correlation of the same activity noted by two different aspects.

Keywords: Shatavari, *Asparagus racemosus*, Comparison screening, Ayurved

INTRODUCTION

Ayurveda is the most ancient and well documented system in traditional medicine. The aim of Ayurveda is to bring homeostasis in the tissues in order to maintain health. There are more than 2000 herbs directly or indirectly mentioned for various therapeutic activities. Out of which Shatavari is one of the widely used herb for various clinical applications. Acharya Charaka put Shatavari in Balya¹ (strength promoter) Mahakashaya, Vayasthapana² (promotes longevity) Mahakashaya and Shukrajanana³ (reproductive tissue promoting) Mahakashaya. Acharya Sushruta has mentioned Shatavari as Shukradoshavinashana⁴ (purifies the sperms). Acharya Vagbhatta has mentioned Shatavari in Jeevana Panchmoola⁵ (Enlivening or anti-aging group of drugs) where in Sharangdhara samhita Shatavari is stated as Shukrala⁶ (semenagogue). Being an important plant in Ayurveda it is having detailed information in the literature. The Nirukti (original meaning) of word Shatavari is “Shatam Avrunoti Iti”⁷ it means the herb which has hundreds of roots. The Latin name of Shatavari is *Asparagus racemosus*. It belongs to family Asparagaceae. *Asparagus racemosus* is commonly known as Shatavari in Sanskrit, Satawar in Hindi and Ekalkanto in Gujarati, Flax hemp is an English name. Shatavari has many synonyms like Atirasa (very juicy), Narayani

(originated from Narayana- Lord Vishnu), Shatamooli (has hundreds of roots), Sukshmapatra (has tiny leaves). It has various medicinal properties which are mentioned in Ayurvedic texts. It is actually considered to be the most important and helpful herb for women. It nourishes and purifies the blood and the female reproductive organs, promotes female fertility. Shatavari nourishes the womb and ovum and prepares the female organs for pregnancy and prevents threatened miscarriage. It also promotes lactation. Through all most of its parts are used in traditional system of medicines, roots are the most important which are used medicinally. In Ayurveda, a solution for ill health can be achieved by applying suitable Dravya (substance) with respect to its Rasapanchaka (five attributes of dravya beginning with rasa) and these are considered as foundation of Dravyagunavijnana (branch of Ayurveda deals with the substance used for health benefits in all their aspects like properties, actions, uses etc). There are many references of *Asparagus racemosus* in Ayurveda as well as screened pharmacological actions in modern pharmacology. Thus, a comparison of actions of *Asparagus racemosus* according to Ayurveda and modern pharmacology is necessary to understand the conceptual aspects of properties of a drug. Here a due note is made to explain how rationale the Ayurvedic explanation of drug action in compare with screened activities.

Table 1: The Ayurvedic documentation regarding Shatavari

| No. | Category | Conceptual Documentation |
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| 1. | Name of the plant | Shatavari (<i>Asparagus racemosus</i> Roxb.) |
| 2. | Rasa (Taste) | Madhura ^{8-16,18,19} , Tikta ^{9-11,15,16,18,19} , Kashaya ¹² |
| 3. | Guna (Properties) | Guru ^{13-15,19} , Snigdha ^{13, -15,19} |
| 4. | Veerya (Potency) | Sheeta ^{8-13, 15,16,18,19} |
| 5. | Vipaka (End product of digestion) | Madhura ¹⁹ |
| 6. | Karma (Actions) | Balya ^{8,10,12,13-15,18} , Vrushya ^{8-12,16} , Rasayana ^{8,9,11-16,18} , Aayushya ¹⁰ , Hradya ¹⁰ , Vayasthapana ¹⁰ , Garbhaprada ¹⁰ , Medhada ^{10,14,15} , Agnida ^{10,14,15} , Pathya ¹² , Varnavardhini ¹² , Ojavaradhini ¹² , Chakshushya ^{12,14} , Shukrakara ^{13-15,18} , Stanyakara ^{13-15,18} , Pushtida ^{14,15} , Netrya ¹⁵ , Sara ¹⁷ |
| 7. | Doshagnata | Vatahara ^{8,9,11-18} , Pittahara ^{8,9,11-18} , Kaphahara ^{10, 16} , Tridosahara ¹⁰ , Raktavikarahara ^{9,11,13-15,17} |
| 8. | Rogagnata (Indicated diseases) | Kshayahara ^{9,11} , Grahanighna ¹⁰ , Arshaghna ¹⁰ , Retodosahara ¹⁰ , Kshatakshina ¹⁰ , Khalityanashini ¹⁰ , Vibandhaghi ¹² , Shothahara ¹³⁻¹⁵ , Gulmahara ^{14,15} , Atisarahara ^{14,15} , Mehahara ¹⁷ |

Table 2: Comparative correlation of the pharmacological activities by two different aspects

| No. | Pharmacological activity | Direct or indirect classical reference | Ayurvedic interpretation |
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| 1. | Antenatal tonic: In a clinical trial, containing a group of 450 patients with a capsule Sujat containing <i>A. racemosus</i> extract, it was accessed that regular use of this capsule during antenatal period increases the foetal weight and decreases the occurrence of perinatal death ²⁰ . | Stanyakara ^{13-15,18} , Garbhaprada ¹⁰ , Retodosahara ¹⁰ | The direct reference indicates regulation of not only the lactation but also entire Artavaha / Rasavaha Srotatasa (All parameters subject to the female health). |
| 2. | Anti-abortifacient activity: The polycyclic alkaloid asparagamine A (28) have been accessed to possess an anti-oxytocin action and showed the anti-abortifacient effect ²¹ . | Garbhaprada ¹⁰ | There is a reference found in Ayurveda claiming this activity. Moreover, the drug is supportive, nutritive and rejuvenative to all biochemical necessary for foetus and mother growth subject to the condition it should be taken as per conceptual designing. |
| 3. | Anti-aflatoxigenic activity: The essential oil constituents which were obtained from the bio-deteriorated <i>A. racemosus</i> that were tested individual as well as in combination. Among 14 constituents, thymol and eugenol showed potent fungicidal activity since both caused blocking of the growth of spores and the rest of essential oil constituents showed moderate antifungal activity ²² . | Rasayana ^{8,9, 11-16,18} | There is no direct reference claiming the actions on fungus, however it can be taken under its Rasayana activity which may show the effect. |
| 4. | Antibacterial activity: Methanolic extract of the root of <i>A. racemosus</i> at doses 50, 100 and 150 mg/mL was reported significant anti-bacterial activity against <i>E. coli</i> , <i>Shigella dysenteriae</i> , <i>Shigella sonnei</i> , <i>Shigella flexneri</i> , <i>Vibrio cholerae</i> , <i>Salmonella typhi</i> , <i>Salmonella typhimurium</i> , <i>Pseudomonas putida</i> , <i>Bacillus subtilis</i> , <i>Staphylococcus aureus</i> with the comparison of the drug Chloramphenicol ²³ . | Rasayana ^{8,9, 11-16,18} | There is no direct reference claiming the actions on bacteria but having Tikta rasa and also it can be taken as Rasayana, it can perform the activity. |
| 5. | Anti-cancer property: The root extract of <i>A. racemosus</i> showed protective effect in the mammary cell carcinoma ²⁴ . | Rasayana ^{8,9,11-16,18} , Balya ^{8,10,12-15,18} | There is no direct reference of the drug on any growth related with cancer. But conceptually the drug is most suitable to regulate various female hormones which can be indirectly reducing the cancerous effect. The drug can be claimed as an immunity booster and may be useful in this indication. |
| 6. | Anti-diarrheal activity: The ethanol and aqueous extracts of <i>A. racemosus</i> exhibited the inhibitory activity against gastro-intestinal tract motility after charcoal meal administration and PGE2 induced entero pooling with reference drug loperamide in castor oil induced diarrheal rats ²⁵ . | Atisarahara ^{14,15} | There is direct reference of the drug on anti-diarrheal activity. |
| 7. | Antidepressant activity: The methanol extract of <i>A. racemosus</i> exhibited anti-depressant activity with the test tail suspension test (TST) and forced swim test (FST) in mice and the extract decreased immobility periods significantly in TST, FST with comparable to fluoxetine and imipramine used as reference drugs ²⁶ . | Medhada ^{10,14,15} , Vatahara ^{8,9,11-18} | Shatavari is strongly Vatanuloman, pittahara moreover the best regulator of hormonal activity, in that sense it is useful for action as an antidepressant. |
| 8. | Antiepileptic effect: The different extracts of <i>Asparagus racemosus</i> on seizure induced in rat models by maximal electroshock (MES) and | Vatahara ^{8,9,11-18} | In Ayurveda epilepsy is termed as Apasmara which occurs due to Vadosha and drug has Vatanashna properties so the drug may be useful in the activity. |

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| | pentylene tetrazole and it was carried out, the methanol extract exhibited significant anticonvulsant effect ²⁷ . | | |
| 9. | Anti-inflammatory activity: ACE at 200 mg/kg (i.p.) inhibited topical oedema in the mouse ear and showed reduction in skin thickness and tissue weight, inflammatory cytokine production and ACE was used at reducing inflammatory damage induced by chronic TPA exposure and evoked a significant inhibition of vascular permeability influence by acetic acid in rat ²⁸ . | Shothahara ¹³⁻¹⁵ | There is direct reference of the drug for the activity. |
| 10. | Antioxidant property: The crude extract and purified aqueous fraction of <i>A. racemosus</i> exhibited antioxidant effect ²⁹ . | Balya ^{8,10,12,13-15,18} | Shatavari is Rasayana in nature. Rasa (body fluids) and Ayana (circulation). Thus, it will act on any pathological condition. |
| 11. | Anti-plasmodial activity: The ethyl acetate extract of <i>A. racemosus</i> (yield value of 7.9% per 100 gm) exhibited dose dependent inhibition of chloroquine resistant strain of Plasmodium falciparum (3D7) with an IC50 value of 29 µg/mL ³⁰ . | Rasayana ^{8,9, 11-16,18} | There is no direct reference claiming the actions on such measures. |
| 12. | Antitussive effect: The methanol extract of roots has been reported to possess antitussive. The activity was tested against sulphur dioxide (SO ₂) induced cough in the mouse model ³¹ . | Kaphahara ²⁷ | The direct reference of the drug on the action. |
| 13. | Antiulcer Activity: The crude extract of <i>Asparagus racemosus</i> exhibited significant reduction in ulcer index and in the volume of gastric secretion with comparable to standard drug Ranitidine in indomethacin treated rats ³² . | Pittahara ^{8,9,11-18} | Having Madhura, Tikta, rasa and Sheetaveerya & Vata-Pittashamaka karma the drug can perform the activity. |
| 14. | Aphrodisiac activity: The use of Lyophilized aqueous extract of roots of <i>Asparagus racemosus</i> in male albino rats showed evidences by weight gains in body and reproductive organs, significant variation in the sexual behaviour of animals as reflected by reduction of mount latency post ejaculatory latency, intromission latency ³³ . | Vrushya ^{8-12,16} , Shukrakara ^{13-15,18} | The direct reference of the drug on the action. |
| 15. | Cardio protective effects: The root extract of <i>A. racemosus</i> showed cardio protective effect evaluated by testing in hypercholesteremic rats and reported that the effect was increased excretion of cholesterol, neutral sterols, bile acid and increase in hepatic bile acid content and these effect was also notified in normocholesteremic animals. Significant increase in plasma HDL-C levels with a concurrent decline in the plasma cholesterol level and an improvement in the atherogenic index of hypercholesterolemic test animals clearly indicated the beneficial role of root administration in hypercholesteremic animals. The reduction in the levels of HDL-C is an indicative of high risk of cardiovascular disease, so improvement in its levels gives cardio protective activity ³⁴ . | Shothahara ¹³⁻¹⁵ , Hradya ¹⁰ | Due to having Shothahara karma it can act as cardio protective. |
| 16. | Diuretic activity: An aqueous extract of the root showed diuretic activity at three dose vials 800 mg/kg, 1600 mg/kg and 3200 mg/kg in comparison with standard drug (frusemide) and control (normal saline) rats after performing acute toxicity tests and result showed that the extract has the action at a 3200 mg/kg dose without any acute toxicity ³⁵ . | No such reference | Having Madhura rasa and Sheetaveerya it increases Kleda and with prominence of Jalamahabhuta it increases water content. |
| 17. | Galactagogue effect: Alcohol extract of <i>Asparagus racemosus</i> exhibited significant effect on lactating mother to increase milk production, growth of the mammary gland alveolar tissue and milk secretion in estrogenic prime rats ³⁶ . | Stanyakara ^{13-15,18} | Stanya is Updhatu of Rasadhatu and Having Madhura rasa, Guru & Snigdha guna, Sheetaveerya, Madhura vipaka it increases Rasa and thus it increases Stanya. |
| 18. | Gastro-intestinal effect: It has been studied that powdered dried roots of <i>Asparagus racemosus</i> promote gastric emptying in healthy volunteers and its action comparable with that of the synthetic dopamine antagonist metoclopramide ³⁷ . | Agnida ^{10,14,15} | Shatavari is mentioned as "Agnida" means promotes Agni (digestion power). Agni plays an important role in digestion and metabolism and performs the activity. |
| 19. | Hepatoprotective activity: Ethanol root extract of <i>Asparagus racemosus</i> decreased the levels of SGPT, SGOT, serum bilirubin and serum alkaline phosphatase in liver injured rats and there were depleted levels of catalase and superoxide dismutase and there was an improvement in the levels ³⁸ . | Raktavikarahara ^{9,11,13-15,17} | In Ayurveda the occurrence of any blood disorder, there is involvement of liver which is the place of Rakta. Sheetaveerya, Madhura vipaka, Madhura rasa are able to pacify Raktadosha. |
| 20. | Hypoglycemic effect: Alcoholic extract of root of <i>A. racemosus</i> was found to have hypoglycemic effect in rabbits ³⁹ . | Mehahara ¹⁷ | The direct reference of the drug on the action. |

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| 21. | Immunological activity: The root extract of <i>Asparagus racemosus</i> showed augmentation of humoral and cell mediated immune response providing better protection level against infections ⁴⁰ . | Rasayana ^{8,9,11-16,18} , Balya ^{8,10,12,13-15,18} , Ojvardhini ¹² | There is direct reference of the drug in this indication. Acharya Charaka put Shatavari in Balya Dashemani. Due to having Madhura rasa, Madhura vipaka, Sheetaveerya which are the same Gunas like Oja and it increases Oja. Thus, the drug can perform the activity. |
| 22. | Memory enhancement: Methanolic extract of <i>Asperagus racemosus</i> at the doses of 75 and 150 mg/kg were administrated for seven days in mice and methanolic root extract at dose of 150 mg/kg showed significantly (p<0.05) improved EPM and MWM performance of scopolamine and sodium nitrite treated mice ⁴¹ . | Medhada ^{10,14,15} , Vatahara ^{8,9,11-18} | The direct reference of the drug said as “Medhya” and due to having properties which are Vatanashana are able to control most of psychological disorders. |

DISCUSSION

Shatavari is an all-round tonic and rejuvenative medicine which can be given to a person. Ayurvedic texts claim that Shatavari strengthens a woman to the point where she is being capable of producing thousands of healthy ova. Among the three Ayurvedic Doshas of Vata, Pitta and Kapha, Shatavari efficiently helps in balancing Pitta dosha. The actions like anti-abortifacient, antibacterial and anti-plasmodial are seems to be new for Ayurveda which needs to be studied as per Ayurvedic point of view and the relevance of the same can be identified. On the other hand, the actions like Chakshushya, Gulmahara are not explored by the current pharmacological measures. Moreover, whatever explored based on the experimental studies cannot be completely taken as it is. The Ayurvedic application is purely based on the concepts and overall assessment of the patient. In present circumstances, many researches on pharmacognosy, phytochemistry, pharmacology related to Shatavari has been carried out to explore the exact nature of Shatavari in terms of chemical constituents, properties, etc. But taking all the evidences as it is to evaluate Ayurvedic administration will not be justifiable as the philosophical / conceptual touch is entirely different. This pharmacological correlation on Shatavari is to identify the common area of future exploring the medical system.

CONCLUSION

Indeed, Shatavari is a universal Rasayana. It has numerous activities to fight with the trouble. The role of Shatavari enhancing health is proven by traditional and modern listed activities due to its properties so that it can play an important role to cure of the diseases and improves the health which fulfils the aim of Ayurveda. The correlation about the activity of Shatavari and its traditional uses can be applicable in drug discovery. The review summarizes the information concerning pharmacological activities related in Ayurvedic documented literature. With this kind of review a person can study Shatavari better and it may be applicable with scientific reasoning. It leads to raise the probability of drug interaction means there is necessitate evaluating individual herbal therapy. This will become a novel approach in the treatment of various diseases.

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