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Review Article

Invitro evaluation of silver nanoparticle of *asparagus racemosus* for it's anti diabetic activity

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Abstract

Asparagus racemosus is an important medicinal plant that is found in tropical and subtropical zones in India belonging to the family Lilliacea. Its medicinal usage has been reported in the Indian and British Pharmacopoeias and in traditional systems of medicine such as Ayurveda, Unani, and Siddha. The dried root extract is used as a drug. *Asparagus racemosus* has been described to use as an antioxidant, antidyspepsia, antitussive, immune stimulant. Also used in the treatment of kidney disorder, chronic fever, liver cancer, stomach ulcer, increase milk secretion, and epilepsy. The major active constituents of *Asparagus racemosus* are steroidal saponins, isoflavones, polysaccharides, racemose, asparagamine, vitamins, mucilage, and folic acid. It is a commonly known Ayurvedic preparation useful to prevent aging, increase longevity, impart immunity and improve mental functions.

Introduction

Asparagus racemosus (Shatavari) is a widely occurring medicinal plant that belongs to the family Lilliacea. *Asparagus racemosus* is regularly used in Ayurvedic preparations. It is used to treat conditions like aging, boost immunity, and improve longevity, vigour, mental activities. *Asparagus racemosus* also helps to cure neurological disorders, hepatopathy, tumours, and dyspepsia [1]. This species is found richly in subtropical and tropical areas such as India, Asia, Australia, and Africa [1]. The antioxidant property, anti-inflammatory property, antiseptic and antimicrobial property are the various pharmacological properties present in *Asparagus rasemosus*. The major phytochemical constituents that existed in the roots of *Asparagus racemosus* is steroidal saponins [2, 3]. The part of the plant is mostly used in the preparation of the Ayurvedic Rasayana including Chyawanprash and outstanding adaptogenic preparation [4-5].

In the Indian medicinal system, *Asparagus racemosus* has a major role. Its root juice and root paste have been used as some ailments and as a health tonic [6, 7]. The genus Asparagus includes about 300 species around the world and is common at low altitudes in the shade and tropical climates throughout Asia, Australia, and Africa [8]. Literature review shows that root extract of *Asparagus racemosus* has antiulcer activity [9], antioxidant and anti-diarrhoeal, anti-diabetic, and immune-modulatory activities [10]. Shatavari (*Asparagus racemosus*) is a creeping plant that grows in India.

Shatavari has been mentioned in Ayurvedic. Shatavari is known for its phytoestrogenic properties and is

extensively used in struggling with menopausal symptoms and increasing lactation [11-12]. It has been used in the traditional systems of medicine like Ayurveda, Siddha, and Unani, as a general health tonic. The word Asparagus is derived from Greek and it denotes 'stalk' or 'shoot' [13-14]. It is considered both as a general as well as a female reproductive tonic [15]. The genus is considered to be medicinally important because of the presence of steroidal saponins and sapogenins in various parts of the plant [16-17].

Traditional Uses

Traditionally *Asparagus racemosus* is used for the treatment of diarrhoea and dysentery [18]. It is used as a health tonic [19] and it also promotes strength, breast milk, and semen [20]. The *Asparagus racemosus* is used for cough, dyspepsia, edema and chronic fevers [18].

In Ayurvedic medicine, *Asparagus racemosus* is used for female revolution and female problems such as infertility, menopausal symptoms, amenorrhea, dysmenorrhoea, menstrual disorders, miscarriage or habitual abortion, pelvic inflammatory disease, and sexual weakness [21, 22].

It includes other benefits such as headache, toothache, arthritis, stomach ache, and peptic ulcers [23, 24]. The *Asparagus racemosus* root has been referred to as an diuretic, constipation, bitter-sweet, emollient, cooling effect, nervine tonic, galactagogue, aphrodisiac, diuretic, carminative, stomachic, and tonic [25]. Useful effects of the root of *Asparagus racemosus* are suggested in bronchitis, hyperacidity, nervous disorders, hyperdipsia, inflammations, cardiac debility, neuropathy and certain infectious diseases [26].

Decoction of *Asparagus racemosus* root also has been used in blood and eye diseases, cough and bronchitis [27].

Chemical Constituents

The root extract of *Asparagus racemosus* is consisting of various phytochemical constituents such as flavonoids, alkaloid, phytosterols, tannins, glycosides, carbohydrates, fat, and proteins [28,29].

The major bioactive constituents of asparagus are a group of steroidal saponins. This plant also contains vitamins and folic acid. Other primary chemical constituents of Asparagus are arginine, asparagines, resin, essential oil, and tyrosine. In roots, leaves and fruits of Asparagus species Sarsasapogenin and Shatavari I–IV are present [30]. The isolation and description of a polycyclic alkaloid called asparagines a new 9, 10-dihydrophenanthrene derivative named racemosus and kaempferol were also isolated from the ethanolic root extract of *Asparagus racemosus* Oligofurostanosides and spirostanosides [31, 32].

Pharmacological Review

Antidiabetic Activity

In the extracts of ethanolic root of *Asparagus racemosus* shows significant anti diabetic activity. It was studied in animal models to prove rapid increase in the level of insulin release. To find the efficiency of *Asparagus racemosus* in *invitro* anti diabetic activity to decrease the serum glucose level [33, 43 and 44].

Diuretic Activity

The anti diuretic activity was evaluated by using aqueous root extract of Asparagus racemosus at a dose of 800 mg/kg, 1600 mg/kg and 3200 mg/kg has been tested for acute toxicity. As per the study revealed significant diuretic activity in dose of 3200 mg/kg dose without any acute toxicity [34].

Antibacterial Activity

Different concentrations (50, 100, 150 µg/ml) of the methanol extract of the roots of *Asparagus racemosus* Wild showed considerable *invitro* antibacterial efficacy against *Escherichia coli, Shigella dysenteriae, Shigella sonnei, Shigella flexneri, Vibrio cholera, Salmonella typhi, Salmonella typhimurium, Pseudomonas putida, Bacillus subtilis* and *Staphylococcus aureus*. The effects produced by the methanol extract were compared with chloramphenicol [35].

Hepatoprotective Activity

Alcoholic extract from the roots of *Asparagus racemosus* has been showed significant decrease in the elevated levels of alanine transaminase, aspartate transaminase, and alkaline phosphate in rats with carbon tetrachloride-induced liver injury indicating that *Asparagus racemosus* has hepatoprotective activity [36].

Anticancer Activity

Asparagus racemosus was a medicinal plant shown to have anticancer activity against different cancers. It has been evaluated that the anticancer activity of *Asparagus rasemosus* root extract in human lung adenocarcinoma cell line A549. In comparison with chloroform and the methanol extract, it is found that methanol extract has a significant cytotoxic effect [37].

Anticandidal Activity

The *invitro* effect of *Asparagus racemosus* roots extract and tubers on *Candida Albicans, Candida tropicalis, Candida krusei, Candida Gillette, Candida paraphimosis,* and *Candida* sterile isolated from patients with vaginal *candidacies*. The extract of *Asparagus racemosus* showed

high anticandidal activity against all *Candida* strains. The inhibitory effect of extracts on all the tested *Candida* bacteria was equivalent to that of standard antibiotic used [38].

Antidyspepsia Activity

It is a condition in which characterized by inability to digest. The activity was analyzed in healthy volunteers. Shatavari root was compared with metoclopramide, which is a synthetic dopamine used in patients to increase gastric emptying rate. It was found that the emptying rate did not differ in any way. It has been observed that extract can be used for treatment and side effects of metoclopramide [39].

Galactogouge Effect

The alcoholic extract of *Asparagus racemosus* root has a significant effect on lactating mothers to increase milk production and has been observed with the growth of mammary glands, alveolar tissue, and acini. The growth of lobuloalveolar tissue and lactation in oestrogen-sensitive rats has been attributed to the effects of corticosteroids or released prolactin [40].

Antipyretic Activity

The antipyretic activity of *Asparagus racemosus* root was estimated by using aqueous and ethanol extract by brewer's yeast induced pyrexia method and the result showed the antipyretic effect. In this evaluation *Asparagus racemosus* has an antipyretic activity [41].

Antiurolithiatic Activity

The rats treated with ethanolic extract of *Asparagus racemosus* root at doses 800 mg/kg and 1 600 mg/kg significantly reduced the serum concentrations of calcium, phosphorus, urea and creatinine [42].

Conclusion

Asparagus racemosus is an important medicinal plant of Indian flora. Now a day, it is used in many Ayurvedic medicines, as syrup especially for women as a tonic. It possess various pharmacological activities such as anti diabetic, antimicrobial, antiurolitheatic, antipyretics, diuretic, galactogouge effect, anticancer activity, anticandidial activity, hepatotoxicity and antidyspepsia activity. It is also used traditionally for treating gonorrhea, piles, diabetes, increasing lactation, anthelmintic, rheumatism, cough, diarrhoea, dysentery, gastric troubles and headache. The Western world has now to accept these traditional treatments after analyzing the chemistry of this plant. In this review the general introduction, phytochemicals, pharmacological propreties and uses of *Asparagus racemosus* are briefly explained.

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Conflict Of Interest

The authors have declared no conflict of interest.

References

1. Garde GK, Vagbhat S. Marathia translation of vagbhat's astangahridya. Uttarstana: AryabhushanaMudranalaya; 1970. Pp: 40-48.
2. Kamat JP, Boloor KK, Devasagayam TP, Venkatachalam SR. Antioxidant properties of Asparagus racemosus against damaged induced by gamma radiation on rat liver mitochondria. J Ethano pharmacology. 2000; 71:425-435.
3. Acharya SR, Acharya NS, Bhangale JO, Shah SK, Pandya SS. Antioxidant and hepatoprotective action of Asparagus racemosus Willd root extracts. Indian J Exp Biol. 2012; 50(11):795-801.
4. Ali M. Rasayana therapy in classical literature of Ayurveda: A review. Bulletin India Institute History Med. (Hyderabad), 1998; 28:95-110.
5. Gautam M, Saha S, Bani S, Kaul A, Mishra S et al. Immunomodulatory activity of Asparagus racemosus on systemic Th1/Th2 immunity: implications for immune adjuvant potential. J Ethnopharmacol, 2009; 121: 241-2477.
6. Krtikar KR, Basu BD. Indian MateriaMedica, India, 1975; 3: 2499-2501.
7. Goyal RK, Singh J, Lal H. Asparagus racemosus an update. Ind. J Med Sci. 2003; 57:408-414.
8. Gaur RD. Srinagar: Garhwal; the Flora of the District Garhwal North West Himalaya. 1999, 170.
9. Sairam KS, Priyambada NC, Goel RK. Gastroduodenal ulcer protective activity of Asparagus racemosus an experimental, biochemical and histological study. J Ethnopharmacol. 2003; 86(1):1-10.
10. Kamat JP, Boloor KK, Devasagayam TP, Venkatachalam SR. Antioxidant properties of Asparagus racemosus against damaged induced by gamma radiation on rat liver

mitochondria. J. Ethanopharmacol. 2000; 71:425-435.

11. Sabin PB, Gaitonde BH, Jetmalani M. Effects of alcoholic extracts of Asparagus racemosus on mammary glands of rats. Indian J Exp Biol. 1968; 6:55-57.
12. Mitra SK, Gopumadhavan S, Venkataranganna MV, Sarma DNK, Anturlikar SD. Uterine tonic activity of U3107, an herbal preparation, in rats. Indian J Pharmacol. 1999; 31:200-203.
13. Goyal RK, Singh J, Lal H. Asparagus racemosus - an update. Ind J Med Sci 2003; 57 (9):408-14.
14. Hasan N, Ahmad N, Zohrameena S, Khalid M, Akhtar J. Asparagus racemosus: for medicinal uses & pharmacological actions. Ind J Adv Res 2016; 4(3):259-67.
15. Sharma K, Bhatnagar M. Asparagus racemosus (Shatavari): A versatile female tonic. International journal of pharmaceutical & biological Archives, 2011; 2(3): 855-63.
16. Sharma A, Sharma V. Chemical Characterization of Medicinally Important Liliaceous Plant Asparagus recemosus. RJPBCS, 2013 July-September; 4(3): 920-6.
17. Sahrawat AK, Kumar P, Sharma, Sahrawat A. Asparagus racemosus- Wonder Plant. IJAR, 2014; 2(4): 1039-45.
18. K Nadkarni, Indian MateriaMedica, Bombay, India: Popular Prakashan Ltd; 153- 5 (1976).
19. G.S. Pandey and K.C.B.P ChunekarBhavprakashNighantu. ChaukhambhaBharati Academy: Varanasi, India; 392-393 (1998).
20. V. B. Dash, MateriaMedica of Ayurveda. New Delhi, India: B. Jain Publishers Pvt.: 61, (1991).
21. D. Frawley, Ayurvedic Healing: A Comprehensive Guide. Salt Lake City, UT: Passage Press; 200-11 (1989).
22. D. Chopra, and D. Simon, The Chopra Cente Herbal Handbook. New York, NY: Three Rivers Press; 219, 73-75 (2000).
23. M.K Kaul, Medicinal Plants of Kashmir and Ladakh. New Delhi: Indus Publishing Company; 49 (1997).
24. R. K Goel, T. Prabha, M.M. Kumar, M. Dorababu, H. Prakash and G. Singh, teratogenicity of *Asparagus racemosus* Wild. Root, a herbal medicine. Indian Journal of Experimental Biology. 44(7): 570–573 (2006).
25. R, N Chopra, I.C. Chopra, K.L. Handa and L.D. Kapur, .Indigenous drugs of India. Calcutta: Academic Publishers; pp. 496. (1994).
26. P.C Sharma, M.B. Yelne and T.J. Dennis. Data base on medicinal plants used in Ayurveda. Delhi: Documentation & publication Division, Central Council for Research in Ayurveda & Siddha; I: pp.418-30 (2000).
27. A.C. Dey, Indian medicinal plants used in Ayurvedic Preparations. Bishan Singh Mahendra Pal Singh, Dehradun, pp. 136-137, (1980).
28. Dalvi SS, Nadkarni PM, Gupta KC. Effect of Asparagus racemosus (Shatavari) on gastric emptying time in normal healthy volunteers. J Postgrad Med. 1990;36:91-94.
29. Kar DK, Sen S. Sarsasapogenin in callus culture of Asparagus racemosus. CurrSci 1985; 54:585.
30. Sekine T, Fukasawa N, Kashiwagi Y, Ruangrungsi N, Murakoshi I. Structure of asparagamine A: A novel polycyclic alkaloid from Asparagus racemosus Chem Pharm Bull 1994;42:1360-2.
31. Sekine T, Fukasawa N, Murakoshi I, Ruangrungsi N. A 910-dihydrophenanthrene from Asparagus racemosus. Phytochemistry 1997:44:763-4.
32. Chemical constituents of Asparagus J. S. Negi, P. Singh, [...], and V. K. Bisht. Pharmacogen Rev. 2010 Jul-Dec; 4(8): 215–220. doi: 10.4103/0973-7847.70921.
33. Chawla A, Chawla P, Mangalesh R. *Asparagus racemosus* (Wild): Biological Activities & its active principles. Indo-Global J Pharm Sci. 2011; 2:113-120.
34. Kumar MCS, Udupa A, Sammodavardhana K, Rathnakar U, Shvetha U and Kodancha G: Acute toxicity and diuretic studies of the roots of *Asparagus racemosus* wild in rats. West Indian Med J 2010; 59:3-5.
35. Evaluation of antibacterial activity of *Asparagus racemosus* Wild root. Subhash C Mandal, A Nandi, M Pal, and BP Saha Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives 14 (2), 118-119, 2000.
36. Zhu X,Zhang W, Zhao J, Wang J, Qu W. Hypolipidaemic and hepatoprotective effects of ethanolic and aqueous extracts from *Asparagus*

officinalis L. by – products in mice fed a high – fat diet.JSci Food Agric.2010;90(7):1129-1135.

37. Shatavari (*Asparagus racemosus* wild): A review on its cultivation, morphology, phytochemistry and pharmacological importance Ramit Singla and Vikas Jaitak* Centre for Chemical and Pharmaceutical Sciences, School of Basics and Applied Sciences, Central University of Punjab, Bathinda-151001, Punjab, India.
38. Uma B, Prabhakar K, Rajendran S. Anticandidal activity of *Asparagus racemosus*. Indian journal of pharmaceutical sciences. 2009 May; 71(3): 342.
39. Effect of *Asparagus racemosus* (Shatavari) on gastric emptying time in normal healthy volunteers S SDalvi *et al*. J Postgrad Med. 1990 Apr;36(2):91–4.
40. Shatavari: Potentials for galactogogue in dairy cows Prakash Chandra Behera, Durga Prasad Tripathy & Subash Chandra Parija* Department of Biochemistry, Department of Pharmacology & Toxicology, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and technology, Bhubaneswar, Odisha-751003. Indian Journal of traditional knowledge vol. 12(1), January 2013, pp. 9- 17.
41. P.A, V. D., and D. P. s. "Antipyretic activity of ethanol and aqueous extract of root of *Asparagus racemosus* in yeast induced pyrexia" . Asian Journal of Pharmaceutical and Clinical Research, vol. 6, no. 7, Aug. 2013, pp. 190-3, https://innovareacademics.info/journals/index.php/ajpcr/article/view/229.
42. NarumallaJ, Somashekara S, Chikkannasetty, Damodaram G, Golla D. Study of antiurolithiatic activity of *Asparagus racemosus* on albino rats. Indian J Pharmacol. 2012; 44(5):576–579.
43. Sharma M, Sharma A, Kumar A. Vital medicine *Asparagus racemosus* wild. Curr Trends biotechnol Pharm. 2012; 6:210-221.
44. Mandal D, Banerjee S, Mondal NB, Chakravarty AK, Sahu NP. Steroidal saponins from the fruits of *Asparagus racemosus*. Phytochemistry. 2006; 67:1316-1321.