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Therapeutic Potentials of *Asparagus Racemosus* Willd. (Satavari)

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ABSTRACT

Numerous new diseases are spreading in the world and allopathic drug therapy is not sufficient to combat all these diseases. So there is a need to find cure of various ailments by herbal therapy. Herbal drugs are now shaping the future of therapy of various diseases. Allopathic drugs are effective but they have numerous side effects, sometimes their adverse effects may outweigh the benefits in curing diseases in human beings. So the current approach is now directed towards developing technologies for developing herbal therapies which could cure diseases with no or minimal side effects. In the present review *Asparagus racemosus* Willd. has been discussed. This plant could prove to be a milestone in herbal therapy because of its wide spectrum of pharmacological actions and uses. The review discusses about *Asparagus racemosus* Willd ., its chemical constituents and therapeutic potentials.

Keywords: *Asparagus racemosus*, Satavari, Steroidal saponins, Flavonoids, Polyphenols, Vitamin C.

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INTRODUCTION

The genus *Asparagus* includes about 300 species around the world. It is medicinally important because of the presence of steroidal saponins and sapogenins in various parts of the plant. *Asparagus racemosus* is used commonly in traditional medicine in India[1]. *Asparagus racemosus* Willd. (family Asparagaceae; Liliaceae)[2] is found throughout tropical Asia, Africa and Australia. In India, it is found in Himalayas upto an altitude of 1300 to 1400 m and all tropical parts of India[3]. It's synonyms are as follows: Satavari, Satawar or satmuli in Hindi; Satavari in Sanskrit; Kairuwa in Kumaon; Shatavari in Marathi; Shatamuli in Bengali; Satawari in Gujrati; Narbodh or Satmooli in Madhya Pradesh and Norkanto or Satawar in Rajasthan[2]. Satavari leaves are green and needle-like[3]. It is a spinous under-shrub, with tuberous, short rootstock bearing numerous succulent tuberous roots which are 30-100 cm long and 1-2 cm thick. Their color is silver white or ash coloured externally and white internally. Stem of Satavari is woody, climbing, whitish grey or brown coloured and has small spines. The flowering season of the plant is during February-March[2]. Its flowers are white and fragrant[3]. The fruits are in form of red berries and can be seen the end of april[2]. Ayurveda has classified Satavari as a potent adaptogen[4]. Its roots are used as galactogouge, tonic and diuretic[3]. The roots are also used in the treatment of dysentery, tumors, inflammations, neuropathy, bronchitis, hyperacidity, certain infectious diseases[5], conjunctivitis[6], rheumatism, nervine disorders[3]. Paste or juice of Satavari roots is used in the treatment of peptic ulcer[7]. Satavari roots also have antitussive activities[8].

Chemical Constituents

Major active constituents of *Asparagus racemosus* are steroidal saponins (Shatavarin I- IV) that are present in the roots. Flowers and fruits of Satavari contains quercetin, rutin (2.5% dry basis) and hyperoside. Diosgenin and quercetin-3 glucuronide are present in the leaves[2]. A new antioxidant compound from *Asparagus racemosus* has been named 'racemofuran'[9]. 'Asparagamine' found in Asparagus racemosus has remarkable anti-oxytocic activity[10]. Sarsasapogenin and kaempferol have been isolated from the woody portion of tuberous roots of *Asparagus racemosus*[11]. When Quantitative analysis was done on *Asparagus racemosus* root extract, it revealed the presence of flavanoids (36.7±3.9 mg/100 ml, polyphenols (88.2±9.3 mg/100 ml) and vitamin C (42.4±5.1 mg/100 ml)[12]. In a study it was found that *Asparagus racemosus* root contains 4.6 to 6.1% protein; 36.8 to 47.5% carbohydrates; 3.1 to 5.2 mg/g phenols; 4.8 to 5.1 mg/g tannins and 6.5 to 7.4% ash. The study also found that *Asparagus racemosus* root contains phenolic compounds such as ferulic acid, rutin, quercetin, kaempferol

and flavonoids[13]. The mineral content of *Asparagus racemosus* was investigated using Atomic Absorption Spectrophotometer. Elements such as calcium, magnesium potassium, iron, zinc, manganese and cobalt were detected in varying amounts in root, stem, leaves, twigs, flowers and seeds of *Asparagus racemosus*[14].

Therapeutic Actions of Asparagus Racemosus Wild

- **Effect on Male Reproductive System**

Satavari has been studied for its effect on the male reproductive system. In a study it was found that rats fed with *Asparagus racemosus* root powder (0.5g/kg rat feed) for 21 consecutive days exhibited significantly high testes weights as compared to controls[15].

- **Effect on neurodegenerative disorders**

Asparagus racemosus is a known nervine tonic in the Ayurvedic system of medicine. 'Mentat', a herbal preparation containing *Asparagus racemosus* has been found to be effective in the treatment of alcohol abstinence induced withdrawal symptoms like tremors, convulsions, hallucinations and anxiety in ethanol administered rats[16].

- **Anti-diarrhoeal effect**

Satavari was found to be extremely effective in the treatment of *Atisar* (diarrhoea), *Pravahika* (dysentery) and *Pittaj shool* (gastritis)[17]. Ethanolic and aqueous extracts of the roots of *Asparagus racemosus* exhibited anti-diarrhoeal activity against castor oil induced diarrhoea in rats[18].

- **Adaptogenic effect**

In Ayurveda *Asparagus racemosus* is described as a 'rasayana' herb. A study was conducted on a model of cisplatin induced alterations in gastrointestinal motility, and in this study gastric emptying halftime was observed. It was found that *Asparagus racemosus* reversed the effects of cisplatin on gastric emptying, and it also normalized cisplatin induced intestinal hypermotility[4].

- **Anti-ageing effect**

A polyherbal formulation Geriforte, containing *Asparagus racemosus* can be used as an antiageing drug. It arrests age related increase in acid phosphatase activity in liver, stimulates cytochrome c oxidase level in the brain and *in vitro* uptake of testosterone by reproductive organs in males[19]. It is also known to induce cellular regeneration, prevent arteriosclerosis, increase hormone utilization, enhance protein, carbohydrate metabolism[20,21]. Geriforte also produces a feeling of well being, increasing mental activity, lessening fatigue, increasing appetite and sexual function[22].

- **Anti-allergic effect**

The alcoholic extract of the roots of *Asparagus racemosus* at a dose of 50 mg/kg p.o. produced antiallergic activity as evidenced by inhibition of passive cutaneous anaphylaxis in mouse by 57% and in rat by 53%[23].

- **Anti-helmintic effect**

In *invitro* studies it was found that the aqueous extract of the root of *Asparagus racemosus* was lethal or inhibitory, to hatching of *Meloidogyne javanica* and *M. arenaria*[24].

- **Anabolic action**

A decoction of Satavari roots in a dose of 100 mg/kg body weight, administered to rats for a varying period of 4 weeks to 8 months, showed growth promoting effects in rats[25].

- **Enzyme activity**

Asparagus racemosus's aqueous extract has amylase and lipase activities. Optimum pH of amylase activity was found at 4 to 5 and for lipase 7.4[26]. The leaves of the seedling as well as the old plants show cholinesterase activity *in vivo*[27].

- **Phytoestrogenic effect**

Hormonal replacement therapy is recommended primarily for the treatment of menopausal symptoms but it has risks of its own as it can cause diseases like cancer[28,29]. So currently the interest in plant-derived oestrogens or 'phytoestrogens' has increased due to the realization that hormone replacement therapy is neither as safe nor as effective as previously thought[30]. *Asparagus racemosus* is well known for its phytoestrogenic properties[31]. In a study Rao demonstrated the inhibitory action of *Asparagus racemosus* on mammary carcinogenesis in rats. In this study rat fed on a 2% *Asparagus racemosus* diet showed a significant ($p<0.05$) decline in both tumor incidence and mean number of tumors per tumor bearing animal. It was concluded that *Asparagus racemosus* root extract exerted a mammotropic and/or lactogenic influence on normal as well as on oestrogen-primed animals thereby rendering the mammary epithelium refractory to the carcinogen[32]. Satavari has been found to produce galactogenic effect in buffaloes[33]. The galactogenic effect was confirmed by a clinical trial[34]. Also an increase in milk secretion was observed in women suffering from deficient milk secretion after administration of *Asparagus racemosus* in the form of Ricalex® tablets, manufactured by Aphali Pharmaceuticals[35]. In a study, capsules containing *Asparagus racemosus* proved to be effective in the treatment of dysfunctional uterine bleeding (DUB)[36]. Thus due to its phytoestrogenic actions *Asparagus racemosus* Wild. can be a boon to women.

- **Cardio protective effect**

  'Abana, a herbo-mineral formulation containing 10 mg *Asparagus racemosus* extract per tablet, was found to have hypocholesterolaemic effects in rats, thus it demonstrated a significance for use as a cardioprotective agent[37].

- **Anti-microbial effect**

  The methanol extract of the roots of *Asparagus racemosus* have shown considerable antibacterial activity, in *in vitro* conditions against *Escherichia coli, Shigella dysenteriae, Shigella sonnei, Shigella flexneri, Vibrio cholera, Salmonella typhi, Salmonella typhimurium, Pseudomonas putida, Bacillus subtilis* and *Staphylococcus aureus*[38]. The antimicrobial activity of *Asparagus racemosus* may be due to a 9,10-dihydrophenanthrene compound[39]. It has also shown *in vitro* anticandidial activity against *Candida albicans, Candida tropicalis, Candida krusei, Candida guillermondii, Candida parapsilosis and Candida stellatoida,* isolated from vaginal thrush patients. The extract of *Asparagus racemosus* showed activity against all the *Candida* strains. The inhibitory effect of the extract against all the *Candida* strains tested was comparable with that of standard antibiotics used[40].

- **Immunoadjuvant effect**

  In a experiment animals were immunized with diphtheria, tetanus, and pertussis (DTP) vaccine. The animals which were given *Asparagus racemosus* aqueous root extract (100mg/kg body weight) showed a significant increase in antibody titres to *Bordetella pertussis*[41].

- **Anti-ulcer effect**

  Satavari has been shown to reduce alcohol induced damage to the gastric mucosa[4.] In a study it was demonstrated that the methanolic extract of fresh roots of *Asparagus racemosus* provided significant protection against acute gastric ulcers induced by cold restraint stress, acetic acid, pyrolus ligation, and cysteamine induced duodenal ulcers. The effect was attributed to the effect of the *Asparagus racemosus* extract on the mucosal defensive factors rather than the offensive ones during treatment with ranitidine[42]. Satavari root extract was also found effective against ulcers induced by indomethacin and swim stress treatment[43].

- **Anti-tussive effect**

  Methanol extract of *Asparagus racemosus* roots showed significant antitussive activity on sulphur dioxide induced cough in mice with the cough inhibition being comparable to that of 10-20 mg/kg of codeine phosphate[8] in an isolated report.

- **Anti-lithic effect**

  The ethanolic extract of Satavari was evaluated for its inhibitory activity on lithiasis , which was induced by the oral administration of 0.75% ethylene glycolated water to adult male albino Wistar rats for 28 days. Ethylene glycol elevated the urinary concentration of calcium, oxalate and phosphate ions, thereby leading to renal stone formation. The ethanolic extract of Satavari significantly reduced the elevated level of these ions in urine. Satavari also elevated the urinary concentration of magnesium, which is considered to be one of the inhibitors of crystallization. High serum creatinine level observed in the ethylene glycol-treated rats was also reduced after treatment with the Satavari extract[44].

- **Anti-diabetic effect**

  Studies have reported that Shatavari reduced blood glucose levels in rats and rabbits[45].

- **Anti-cancer effect**

  The *in vitro* cytotoxicity of the plant was tested against Ehrlich ascites tumour cells in mice. The plant did not completely inhibit the tumour growth but possibly induced a lag in certain stages of its development[46].

CONCLUSION

In today's modern world there are several diseases which affect human beings. Most of these diseases are lifestyle associated and many are due to stress associated with today's modern society. Allopathic drugs which are used today to cure or prevent the various diseases encountered by people have numerous side effects. So, current research is now diverted towards finding various herbal medicines which will not only cure diseases but also prevent these diseases from affecting the human beings. Latest modern technologies should now be used to find out newer and safer drugs of herbal origin to aid human health. *Asparagus racemosus* is a wonder herb. It has numerous uses which have been discussed in the present review. In India the knowledge regarding herbal drugs and their magical properties have been known since time immemorial. *Asparagus racemosus* is described in Ayurveda as a 'rasayana' herb. 'Rasayan' is a group of plant drugs known to promote physical and mental health, improve defence mechanisms of the body and enhance longevity. This review could be useful in providing a path for newer scientific research in the field of herbal and ethnopharmacological medicines. We should encourage studies on the local knowledge about herbs in various regions of the world and supplement them with the latest technologies possible. The knowledge about herbs which has been passed from generation to generation could help in the development of safe herbal

formulations which are useful in a number of diseases. Thus *Asparagus racemosus* can be developed into a herbal formulation for a variety of health disorders.

REFERENCES

1. Bopana N, Saxena S. *Asparagus racemosus*–Ethnopharmacological evaluation and conservation needs. J Ethnopharmacol 2007; 110: 1-15
2. Anonymous. The Wealth of India, Raw materials. N.Delhi: Publication and Information. Directorate CSIR; 1987: 468-472.
3. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. Pune: Nirali Prakashan; 2005: 216-217.
4. Rege NN, Thatte UM, Dahanukar SA. Adaptogenic properties of six rasayana herbs used in Ayurvedic medicine. Phytother Res 1999; 13: 275-291.
5. Goyal RK, Singh J, Harbans L. *Asparagus racemosus* – an update. J Med Sci 2003; 57: 408-414.
6. Sharma P, Singh GA. A review of plant species used to treat conjunctivitis. Phytother Res 2002; 16: 1-22.
7. Sharma PV (1994) Cikitsastana to Siddhidthana, In: Charaka Samhita. (vol. 4), Chaukhambha Orientalia, Delhi.
8. Mandal SC, Kumar CKA, Lakshmi SM, Sinha S, Murugesan T, Saha BP, Pal M. Antitussive effect of *Asparagus racemosus* root against sulfur dioxide-induced cough in mice. Fitoterapia 2000a; 71: 686-689.
9. Wiboonpun N, Phuwapraisirisan P, Tip-pyang S. Identification of antioxidant compound from *Asparagus racemosus*. Phytother Res 2004; 18: 771-773.
10. Sekine T, Fukasawa N, Murakoshi I, Ruangrungsi N. A 9,10-dihydrophenanthrene from *Asparagus racemosus*. Phytochem 1997; 44: 763-764.
11. Ahmad S, Jain PC. Chemical examination of Shatavari (*Asparagus racemosus*). Bull Med Ethnobot Res 1991; 12: 157-160.
12. Velavan S, Nagulendran K, Mahesh R, Hazeena Begum V. In vitro antioxidant activity of *Asparagus racemosus* root. Pharmacogn Mag 2007; 3: 26-33.
13. Mishra A, Niranjan A, Tiwari SK, Prakash D, Pushpangadan S Nutraceutical composition of *Asparagus racemosus* (Satavari) grown on partially reclaimed sodic soil. J Med Arom Plant Sci 2005; 27: 240-248.

14. Choudhary B, Kar A. Mineral contents of *Asparagus racemosus*. Indian Drugs 1992; 29: 623-624.
15. Ghumare BC, Vadlamudi VP, Rajurkar SR. Effect of *Asparagus racemosus* on growth and development of testes in wistar rats. Aryavaidyan 2004; 18: 45-48.
16. Kulkarni SK, Verma A. Protective effects of Mentat (BR-16A) A herbal preparation, on alcohol abstinence-induced anxiety and convulsions. Indian J Exp Biol 1993; 31: 435-442.
17. Nanal BP, Sharma BN, Ranade SS, Nande CV. Clinical study of Shatavari (*Asparagus racemosus*) J Res Indian Med 1974; 9: 23-29.
18. Venkatesan N, Thiyagarajan V, Narayanan S, Arul A, Raja S, Kumar SGV, Rajarajan T, Perianayagam JB. Anti-diarrhoeal potential of *Asparagus racemosus* willd root extracts in laboratory animals. J Pharmacol Pharm Sci 2005; 8: 39-45.
19. Saxena A, Ghosh M, Sharma SK, Garg NK. Effect of Geriforte–an ayurvedic geriatric tonic on ageing rats**.** Arogya–Journal of Health Sciences 1983; IX: 74-78.
20. Lobo E, Kulkarni RD, Desai RR. Special pharmacology of Geriforte. Probe 1975; 4: 266.
21. Sahgal VK, Sood NK. Geriforte: An indigenous geriatric tonic in hyperlipidaemia. Probe 1975; 4: 277.
22. Vagh VT, Kapadia HD, Pavri DN. Clinical evaluation of an indigenous geriatric tonic. Probe 1975; 4: 292.
23. Gupta PP, Srimal RC, Tandon JS. Anti-allergic activity of some traditional Indian medicinal plants. Int J Pharmacog 1993; 31: 15-18.
24. Swarup G, Sharma RD. Effect of root extract of *Asparagus racemosus* and *Tagetes erecta* on hatching of eggs of *Meloidogyne javanica* and *Meloidogyne arenaria*. Indian J Exp Biol 1967; 5: 59.
25. Sharma S, Dahanukar S, Karandikar SM. Effects of long-term administration of the roots of ashwagandha *Withania somnifera* and shatavari *Asparagus racemosus* in rats. Indian Drugs 1986b; 23: 133-139.
26. Vijaya S, Vasudevan TN. The effect of some medicinal plants on activity of digestive enzymes. Indian Drugs 1994; 31: 215-217.
27. Gupta A, Gupta R. A survey of plants for presence of cholinesterase activity. Phytochem 1997; 46: 827-831.
28. Glazier MG. A review of the evidence for the use of phytoestrogens as a replacement for traditional estrogen replacement therapy. Arch Intern Med 2001; 161: 1161-1172.

29. Barrett-Connor E. Hormone replacement therapy, heart diseases, and other considerations**.** Annu Rev Public Health 1998; 19: 55-72.
30. Cornwell T, Cohick W, Raskin U. Review: dietary phytoestrogens and health. Phytochem 2004; 65: 995-1016.
31. Mayo JL. Black cohosh and chasteberry: herbs valued by women for centuries. Clin Nutr Insights 1998; 6: 1-4.
32. Rao. Inhibitory action of *Asparagus racemosus* on DMBA-induced mammary carcinogenesis in rats. Int J Cancer 1981; 28: 607-610.
33. Patel AB, Kanitkar UK. *Asparagus racemosus* wiild-form bordi, as a galactogouge, in buffaloes**.** Indian Vet J 1969; 46: 718-721.
34. Sharma S, Ramji S, Kumari S, Bapna JS. Randomized controlled trial of *Asparagus racemosus* (Shatavari) as a lactogogue in lactational inadequacy. Indian Pediatr 1996; 33: 675-677.
35. Joglekar GV, Ahuja RH, Balwani JH. Galactogogue effect of *Asparagus racemosus*. Indian Med J 1967; 61(7): 165.
36. Nevrekar P, Bai N, Khanna S. EveCare capsules in DUB. Obstet Gynaecol Commun 2002; 3: 51-53.
37. Khanna AK, Chander R and Kapoor NK Hypolipidaemic activity of Abana in rats. Fitoterapia 1991; 62: 271-275.
38. Mandal SC, Nandy A, Pal M, Saha BP. Evaluation of antibacterial activity of *Asparagus racemosus* Willd. root. Phytother Res 2000b; 14: 118-119.
39. Boger DL, Mitscher LA, Mullican MD, Drake SD, Kitos P. Antimicrobial and cytotoxic properties of 9,10-dihydrophenanthrenes: structure-activity studies on juncusol. J Med Chem 1985; 28: 1543-1547.
40. Uma B, Prabhakar K, Rajendran S. Anticandidal Activity of *Asparagus racemosus*. Indian J Pharm Sci 2009; 71: 342-343.
41. Gautam M, Diwanay S, Gairola S, Shinde Y, Patki P, Patwardhan B. Immunoadjuvant potential of *Asparagus racemosus* aqueous extract in experimental system. J Ethnopharmacol 2004; 91: 251-255.
42. Datta GK, Sairam K, Priyambada S, Debnath PK, Goel RK. Antiulcerogenic activity of Satavari mandur–an ayurvedic herbo-mineral preparation. Indian J Exp Biol 2002; 40: 1173-1177.

43. Bhatnagar M, Sisodia SS, Bhatnagar R. Antiulcer and antioxidant activity of *Asparagus racemosus* Willd. and *Withania somnifera* Dunal in rats. Ann NY Acad Sci 2005; 1056: 261-278.
44. Christina AJ, Ashok K, Packialakshmi M, Tobin GC, Preethi J, Murugesh N. Antilithiatic effect of *Asparagus racemosus* Willd on ethylene glycol-induced lithiasis in male albino Wistar rats. Methods Find Exp Clin Pharmacol 2005; 27: 633-638.
45. Hannan JMA, Marenah L, Ali L, Rokeya B, Flatt PR, Abdel-Wahab YH. Insulin secretory actions of extracts of *Asparagus racemosus* root in perfused pancreas, isolated islets and clonal pancreatic ß-cells. J Endocrinol 2007; 192: 159-168.
46. Seena K, Kuttan G, Kuttan R. Antitumour activity of selected plant extracts. Arnala Res Bull 1993; 13: 41-45.