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A REVIEW ON POTENTIAL PROPERTIES AND THERAPEUTIC APPLICATION OF *ASPARAGUS RACEMOSUS* WILD

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ABSTRACT

Asparagus recemosus Wild is commonly known as *Satavar,* belonging to the family *Asparagaceae* or *Liliaceae*. The genus Asparagus includes about 300 species around the world. Out of the 22 species of Asparagus recorded in India; *Asparagus racemosus* is one of the most common variety used in traditional medicine. Its medicinal usage has been reported in Indian and British pharmacopoeias and in traditional systems of medicine such as Ayurveda, Unani and Siddha. *Satavar* is a climbing perennial herb possesses many medicinal properties such as emollient, cooling, nervine tonic, galactogogue, aphrodisiac, diuretic, rejuvenating, carminative, immunostimulant, antiseptic, gastroprotective etc. and used in gynecological and nervous disorders, dyspepsia, tumors, inflammation, neuropathy, hepatopathy etc. This review paper highlights the potential properties and therapeutic application of *Satavar* in various diseases as mentioned in classical Unani text in a scientific manner.

KEYWORDS: *Asparagus recemosus* Wild, *Satavar*, Potential Properties, Therapeutic Application Unani System of Medicine.

INTRODUCTION

Asparagus recemosus is an important medicinal plant of tropical and subtropical India[1-3] and has been used from thousands of years for its therapeutic and tonic properties.[4] *Satavar* is known as "queen of herbs" as it promotes love and devotion[5-7] and it is highly effective in problems related with female reproductive system.[3,5,7,8] Shatavari may be translated as "100

spouses", implying its ability to increase fertility and vitality. It is considered both as a general as well as a female reproductive tonic.[5] The dried roots of the plant are used as drug, which act as tonic, diuretic and galactogogue, the drug has ulcer healing effect probably via strengthening the mucosal resistance or cytoprotection.[7] The genus is considered to be medicinally important because of the presence of steroidal saponins and sapogenins in various parts of the plant.[3,8]

Scientific classification

Kingdom : Plantae

Clade : Angiosperms

Clade : Monocots

Order : Asparagales[7,8]

Family : Asparagaceae,[7,8] Liliaceae[7,9-11]

Subfamily : Asparagoideae

Genus : *Asparagus*

Species : *recemosus*[7,8]

Botanical Name: *Asparagus recemosus* Wild.[1-3,8-11]

Synonyms: Golden asparagus, sparrow grass[12]

Vernaculars: Unani Tibbi Name: *Satavar*,[13] **Arabic:** *Sheqaqul*,[2] **Persian:** *Satavari*,[14] **Urdu:** *Satavar*,[2,13] **English:** Wild asparagus,[14] **Hindi:** *Bojhidan*,[2] *Shakal*,[14] *Shatavar*,[13] *Satavar*,[10,15] *Dudhali*,[15] **Sanskrit:** *Shatavari*,[2,13,14] *Shat padi*, *Narayeni*,[2,13] *Shatmuli*,[2,13,14] *Abhiru*,[2] **Kannada:** *Callagadda*,[13] *Majjigedadde*, *Aheriballi*,[2] **Telugu:** *Challagaddalu*,[13,14] **Tamil:** *Kilavari*,[2,13] *Halaru-makkal*, *Jayebem.*[14]

Figure: *Satavar* plant and roots.[16]

ETHANOBOTANICAL DESCRIPTION

Satavar is a perennial foliage plant,[11] growing up to 2 meters,[17] with woody terete stems and recurved or rarely straight spines; young stems are delicate, bitter and smooth. Leaves are reduced to minute chaffy scales and spine; cladodes triquetrous, curved in tufts of 2-6. Flowers are white, fragrant, in simple or branched racemes on the naked nodes of the main shoot or in the axils of the thorns[2,3,18] resembles *baid sada* flowers.[15] Fruits are small, red,[13,15] globular[2] and resembles gram,[13,15,19] obscurely 3 lobed, pulpy berries, purplish black when ripe having 1-2 seeds in it,[15] seeds have hard and brittle taste.[13,15,19] The rootstocks are tuberous, bearing numerous fusiform, succulent roots which are 30-100 cm long, 1-2 cm thick,[20] yellowish cream in colour, sweet in taste with mucilage[13,15,19] and these roots are soft in the beginning and becomes hard on ripening.[13] *Satavar* is a root of climber and one bunch yields approximately 10 kg of *satavar*.[15]

Habitat: It grows wild and cultivated through tropical and subtropical parts of India up to 40,000 feet in Himalayas from Kashmir east ward,[2,3,20] including tropical Africa, Java and Australia.[2] They require rich sandy loam soil and sunny position for proper growth.[11]

TEMPERAMENT: Cold 2^0Moist 2^0[21] Cold 2^0Moist 1^0[13]
Cold 1^0Moist 1^0[15,22] Hot 1^0Moist 2^0[14,19]
THERAPEUTIC DOSAGE: 5-7 g,[19] 7-12 g[21]

CHEMICAL CONSTITUENTS

Satavar possess a wide range of phytochemical constituent which are as follows.
Steroidal saponins: The plant contains four saponins, viz. satavarin I to IV,[3,5,8] sarsasapogenin,[8] adscendin (A, B, C), asparanin (A, B, C).

Satavarin I, is the major glycoside with 3 glucose and rhamnose moieties attached to sarsasapogenin.[7] Shatavarin IV is a glycoside of sarsasapogenin having 2 molecules of Asparagus rhamnose and 1 molecule of glucose. Sarsasapogenin and shatavarin I-IV are present in roots, leaves and fruits of asparagus species.[8,20] Recently Shatavarin V, asparginins, curillins, curillosides have also been reported.[5] Other constituents are oligospirostanoside referred to as Immunoside,[5,7] polycyclic alkaloid: Aspargamine.

Isoflavones: 8-methoxy-5,6,4’-trihydroxyisoflavone-7-O-β-d-glucopyranoside.

9,10-dihydrophenanthrene derivative: Racemosol and kaempferol were isolated from ethanolic extract of *Asparagus recemosus*.[5,7,20]

Carbohydrates: Polysaccharides, mucilage.

Flavonoids: Glycosides of quercetin and rutin, hyperosides are present in flower and fruit.

Sterols: The dried roots yield sitosterol; 4,6-dihydroxy-2-O-(2'-hydroxyisobutyl) benzaldehyde and undecanylcetanoate.

Trace minerals: The roots contain Fe, Ca, P, Cu, Na, K, Mg, Mn, Ni, and Zn. Kaepfrol: Kaepfrol and Sarsapogenin derived from woody portion of tuberous root.[5,7] Miscellaneous: This plant also contains Vitamins A, B_1, B_2, C and E and folic acid,[3,5] essential fatty acid, gamma linileinic acid, diosgenin, quercetin 3-glucourbnides[5,7] arginine, tyrosine, resin and tannin.[17]

ACTIONS: Literature search of classical and medicinal plant text has shown various activities of *Satavar* like *Mwallide mani* (ovulation inducing), *Mwallide labn* (galactogogue), *Mugallize mani*[13,21] and *Muqawwie bah* (aphrodisiac)**,** *Dafe jiryan* (prevent spermaturia),[13,21,22] *Dafe sailanur rehm* (prevent leucorrhoea),[13,21] *Muqawwie qalb* (cardiac tonic)**,** *Muhallile warm* (anti-inflammatory) etc.[13] It also acts as emollient, cooling, nervine tonic, constipating, diuretic, rejuvenating, carminative, stomachic, antispasmodic, and antiseptic.[5,7,8,14]

USES: Unani scholars has used *Satavar* in various diseases based on the above activities.

Urogenital disorders: *Satavar* is considered as a female tonic, beneficial in female infertility, cures inflammation of sexual organs, prepare womb for conception and prevent miscarriage, and act as postpartum tonic.[5,7,8]

- **Infertility:** *Satavar* acts as ovulation inducing drug, if used in powder form with milk, even ghee prepared from *satavar* act as *mwallide mani.*
- **Oligogalactia:** *Satavar* powder with milk increases the milk secretion, as it acts as galactogogue.
- **Leucorrhoea:** Use of *satavar* juice with honey relieves leucorrhoea,[13] and extract of fresh *satavar* roots is helpful in gonorrhoea.[14,15,19]

- **Spermaturia:** The *satavar* root powder is beneficial in *riqqate* and *jiryane mani*, if used alone or in combination with other medicines.[15,21]
- **Impotency:** Clarified butter and *satavar* juice, each 3200g, milk 32,000g boil together and used with sugar, honey, and long pepper as an aphrodisiac tonic. Use mixture prepared from 3200g of clarified butter and 12,800 g, each of *satavar* juice and cow's milk with other medicines. It increases the semen and helpful in disorders of female reproductive system.[14,23]
- **Urinary symptoms:** Use *sharbat* prepared from *satavar* and *kharkhask* to relieve urinary symptoms.

Gastrointestinal disorders: *Satavar* act as stomachic, hence useful in dyspepsia and gastric weakness if used in powder form.[12] The roots are boiled in milk and used to relieve bilious dyspepsia, diarrhoea and to promote appetite.

Other uses

- Powder prepared from *satavar* roots and *gurmarbuti* leaves are used in diabetic patients.[9]
- The fresh juice of *satavar* root is used with honey as demulcent.
- The boiled leaves of *satavar* smeared with ghee are applied to boils, smallpox to prevent their confluence.[14,23]
- *Satavar* is useful in nervous disorders, epilepsy,[5,7,18,24] dysentery, haemorrhoids, inflammations, nephropathy, hepatopathy, strangury, scalding of urine, throat infections, fatigue, hypertension, cardiac weakness and general debility.[3,5,7,18]

Traditional uses: *Satavar* has been used as galactagogue, aphrodisiac, diuretic, demulcent,[3,12,20] in PMS, amenorrhoea, dysmenorrhoea, menopause, pelvic inflammatory disease and infertility.[3,8,20]

PHARMACOLOGICAL STUDIES

- **Ovulation inducing activity:** Root extract of *A. racemosus* reported to increase the weight of ovaries when administered to immature female rats; thus it enhances folliculogenesis and ovulation in young females.[5] It is effective for ovulation induction, as clinical study conducted on patients with anovulatory infertility showed that the ovulatory rate was 25% & 30%.[25] This effect is attributed to the presence of

phytoestrogens- steroidal saponins in this drug, which exert hormone like action in the body.[20]

- **Galactagogue activity:** Root extract of *A. racemosus* exhibit galactagogue activity, both on clinical and animal studies and can improve lactation inadequacy in lactating mothers.[5,7,20] The alcoholic extract of *satavar* roots administered intramuscularly shown to increase the weight of mammary gland as well as milk production in estrogen primed rats. The activity is attributed to the action of released corticosteroids or an increase in prolactin. The steroidal saponins i.e. Satavarins I-IV may be responsible for the hormone like effect, which directly contributes in the lactogenic effect of *satavar*.[7]
- **Aphrodisiac activity:** Root extract of *A. racemosus* demonstrated aphrodisiac activity on male waster albino rats due to the presence of saponins, carbohydrates, glycosides, and mucilage.[7,26]
- **Uterine relaxant activity:** Root extract of *A. racemosus* possess uterine relaxant activity against oxytocin induced uterine contraction in rats and guinea pigs, this action is attributed to the presence of saponins, which act as uterine sedative and hinder the oxytocin action on uterine musculature both in in vivo and in vitro studies.[5,7,17,20] Further, a glycosides, Shatavarin -I isolated from the roots of *A. racemosus* is responsible to block the oxytocin induced contraction.[7]
- **Hypoglycaemic and hypolipidemic activity:** Ethanolic extract of *A. recemosus* exhibit hypoglycaemic & hypolipidemic activity against streptozotocin induced diabetes in rats due to presence of saponins, polysaccharides, glycosides, alkaloids, triterpenes, mucilage, glycoproteins, peptides, and amino acids.[27]
- **Antioxidant activity:** *A. recemosus* root extract exhibit antioxidant activity on animal studies due to presence of flavonoids, polyphenols, and vitamin C.[3,8,27]
- **Immunomodulatory activity:** Decoction of *A. recemosus* root powder has immune modulatory activity against specific T dependent antigen in immunocompromised animal[7,17] and this effect is attributed to saponins (Satavarin I-IV) present in root.[27] The protection offered by *A. racemosus* against sepsis by altering function of macrophages, indicating its possible immunomodulatory activity.
- **Anti-stress activity:** The aqueous extract of *A. recemosus* root exhibit anti-stress activity in mouse by inhibiting the effect of inflammatory cytokines mainly interleukin and tumour necrosis factor.[7]

- **Anti-inflammatory activity:** The ethanol extract of *A. recemosus* root reported anti-inflammatory activity against carrageenan induced inflammation on rats due to presence of sterols and flavonoids which inhibit the release of prostaglandins.[28]
- **Antibacterial activity:** Shah MA *et al* reported that *A. racemosus* plant extract exhibit antibacterial activity due to isolation of two nor-lignans and two steroidal triterpenes (compound 1 to 4). All compound showed considerable antibacterial activities against *E. coli* and *S. aureus*, while no significant activity was observed against *S. typhi* in *in vitro* study.[29]
- **Antiulcer activity:** *A. racemosus* demonstrated antiulcer activity on clinical trial when root powder 12 g/d in four doses was administered for 6 weeks. The ulcer healing effect was attributed to a direct healing effect, possible by potentiating intrinsic protective factor, by strengthening mucosal resistance, prolonging the lifespan of mucosal cells, increasing secretion and viscosity of mucous and reducing H+ ion back diffusion. It heals duodenal ulcers without inhibiting acid secretion and have cytoprotective action like that of prostaglandin.
- **Antitussive activity:** Methanolic extract of *A. racemosus* roots, at dose of 200 and 400 mg/kg showed significant antitussive activity on sulphur dioxide induced cough in mice.
- **Antineoplastic activity:** *A. racemosus* fresh root extract is reported to reduce the tumor incidence in female rats, and this action is proposed to be medicated by virtue of mammotropic and/ or lactogenic influence of *A. racemosus* on normal as well as on estrogen primed animals, which renders the mammary epithelium refractory to carcinogen.[7]
- **Hepatoprotective activity:** The root extract of *A. recemosus* possess hepatoprotective activity against paracetamol induced liver damage in rats due to presence of various flavonoids.[7,17] Alcoholic extract of *A. racemosus* root significantly reduce the enhanced levels of alanine transakinase, aspartate transaminase and alkaline phosphate in CCl_4 induced hepatic damage in rats.[7]
- **Nephroprotective effect:** *A. recemosus* root extract significantly restored the body weight loss, increased kidney weight, blood uric acid, blood urea nitrogen, blood creatinine, urine volume and urine microalbumin levels due to presence of saponins.[29]

CONCLUSION

Satavar is an important medicinal plant of tropical and subtropical India and has been used from thousands of years for its therapeutic and tonic properties. Phytochemical analysis and

pharmacological studies of various extracts of *Asparagus recemosus* have proved the traditional practices. However, many other indications are mentioned in Unani system of medicine, which needs further scientific studies to prove its efficacy.

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