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REVIEW ARTICLE

Halavu Makkala Taayi (*Asparagus racemosus* Willd.): a medicinal plant of Karnataka, India

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Abstract

Asparagus racemosus, locally known as Halavu Makkala Taaye and commonly known as Shatavari, revered as the "Queen of Herbs" for its diverse medicinal properties. In Ayurveda, Shatavari is highly valued for its role in addressing various health concerns, particularly reproductive health in both genders, hormonal balance, and digestive discomfort. Its ethnomedicinal uses span a wide range, including lactation enhancement, kidney stone management, and treatment of skin issues. Pharmacologically, shatavari exhibits a spectrum of properties such as immunomodulation, antidepressant effects, and antioxidant activity, attributed to its bioactive constituents like saponins and flavonoids. Despite its medicinal benefits, Shatavari faces threats from habitat loss and unsustainable harvesting practices, urging conservation efforts. Nevertheless, shatavari cultivation offers economic opportunities, contributing to the agricultural economy. The present review gives a glance on its importance for future works.

INTRODUCTION

Out of several species of '*Asparagus*' grown in India, *Asparagus racemosus* is most commonly used in indigenous

medicine. It is also known as Shatavari, holds great importance in Ayurveda due to its potential in preventing and treating numerous ailments, a member of the

family Asparagaceae. It is highly valued for its medicinal properties. It is a perennial herbaceous plant, occurs widely in various regions around the world including tropical Africa, Java, Australia, Sri Lanka, Southern parts of China, and India. However, it is primarily cultivated in India (Sachan et al. 2012). Its tuberous roots, rich in bioactive compounds, are prized for their medicinal properties, particularly in women's health. Shatavari is esteemed for its ability to support reproductive health, hormonal balance, and fertility. Shatavari, known for its healing qualities, has been a fundamental component of Ayurvedic medicine for generations, valued for its capacity to enhance energy, increase longevity, and support overall health (Sharma and Sharma 2013). It is widely utilized in the treatment of male genital dysfunctions, oligospermia, irregularities in spermatogenesis, and various other male disorders including painful micturition. Additionally, it is investigated for its potential benefits in Ayurvedic formulations for digestive discomfort, indigestion, amoebiasis, piles, and debility. In females, doctors may prescribe it for habitual abortions, weakness of the uterus, and excessive bleeding during menstruation (Singla and Jaitak 2014). This medicinal plant is also known for its saponin content, serves as a precursor to many active pharmacological steroids. In addition to its rejuvenating properties, it offers various medicinal benefits such as antioxytotoxic, spasmotic to uterus, hypertensive, hypoglycemic, anticoagulant, antiviral, anticancer, and antidiarrheal activities. In Ayurvedic medicine, it is considered a tonic specific to females. The root extract of *A. racemosus* has antiulcer, antioxidant, anti-

diarrheal, anti-diabetic and immunomodulatory activities (Joshi 2016). Shatavari is also potential in skin-nourishing and rejuvenating properties have led to its incorporation into various cosmetic and skincare formulations. Shatavari extracts are utilized in creams, lotions, serums, and a variety of beauty products aimed at moisturizing, toning, and rejuvenating the skin. Its natural anti-inflammatory and antioxidant effects make it especially desirable in anti-aging and skincare items (Sahrawat et al. 2014). Now a days there is a high demand of *A. racemosus*. The cultivation of Shatavari contributes to the agricultural economy in regions where it is grown commercially. Farmers and agricultural enterprises involved in Shatavari cultivation can generate income from selling both the roots and aerial parts of the plant (Singla and Jaitak 2014). In natural habitat this medicinal plant faces several threats like urbanization, agriculture, and infrastructure development, leads to the loss and fragmentation of natural habitats. Unsustainable harvesting practices, due to its high demand for its medicinal properties, can deplete wild populations of Shatavari (Sharma and Bhatnagar 2011). Climate Change and competition from invasive plant species also reducing its population and habitat suitability. Unregulated harvesting and illegal trade of Shatavari, often driven by high market demand, pose significant threats to wild populations, leading to exploitation and depletion of resources (Bopana and Saxena 2007). This review will discuss the morphology, ethno-medicinal properties, pharmacological values, and bioactive compounds present in *A. racemosus*.

MORPHOLOGY

It is a much-branched spinus under-shrub with tuberous, short rootstock bearing numerous fusiform, succulent roots. The roots exhibit a silvery white or ash-coloured appearance on the outside, while appearing white on the inside. Initially, the roots possess a relatively smooth texture when they are fresh, but as they dry, they begin to acquire longitudinal wrinkles. The leaves of the Shatavari look like pine needles, uniform and small. Flowers are white, fragrant, and minute, about 3 mm long and occur in solitary or fascicled, 2.5–5 cm long, racemes. 1. Fruits are spherical or indistinctly three-lobed, fleshy berries that turn purplish-black as they ripen, with tough and fragile seeds., up to 6 mm in diameter, with mottled seeds and oily endosperm. Flowering and fruiting occur in October-January (Sharma and Sharma 2013; Figures 1 & 2).

ETHNOMEDICINAL USES

The term "Shatavari" signifies "a woman with a hundred husbands", referring to the rejuvenating impact of Shatavari on the female reproductive system. Roots are known for their effectiveness as antispasmodic, appetizer, stomach tonic, aphrodisiac, galactagogue, astringent, antidiarrheal, antidyenteric, laxative, anticancer, anti-inflammatory, blood purifier, antitubercular, antiepileptic, as well as in treating night blindness, kidney problems, and throat complaints (Hasan et al. 2016). Shatavari is known for its ability to effectively balance the 'Pitta Dosha' among the three Ayurveda Doshas (Vata, Pitta, and Kapha). It possesses the sweet taste of "madhura" and exhibits a bitter nature of "tikta". Additionally, Shatavari acts as a natural coolant (Sharma and

Sharma 2013). *A. racemosus*, when consumed with cow's butter-milk for a period of 3-4 days, has shown effectiveness in treating kidney stones (Singh and Geetanjali 2016). This herb is also utilized in addressing skin issues by using a mixture of *A. racemosus* tubers and *Plumbago indica* leaves, managing lactation problems by combining root powder with milk or honey to enhance milk production, and treating leucorrhoea through root decoction (Mathur et al. 2011). Root extract of *A. racemosus* has been beneficial in managing dysentery, diarrhoea, and overall weakness. Traditionally, the tuberous root of *A. racemosus* was used to address epilepsy by consuming a half cup decoction with milk once a day for 90 days. *A. racemosus* aids in fertility enhancement, stress relief, and hormone regulation. It is also used to treat conditions such as stomach ulcers, kidney disorders, and Alzheimer's disease. Historically, the infusion of Shatavari herb roots has been used as a remedy for spleen disorders, liver issues, and other essential organs, as well as for preventing miscarriages. In India, the roots have been employed for alleviating internal pain, treating tumors, reducing fever, and as a syrup. It is primarily recognized for its phytoestrogenic properties. As the awareness grows that hormone replacement therapy using synthetic estrogens is not as safe or effective as previously thought, the interest in plant-based estrogens has significantly increased, highlighting the importance of *A. racemosus*. This plant has been proven to assist in the management of neurodegenerative conditions and symptoms of alcohol withdrawal. It is commonly prescribed for stomach ulcers, hyperacidity, dry and irritated vaginal

membranes, and upper respiratory tract issues. It is also effective in treating bronchitis. Its root is known for its demulcent, diuretic, anti-inflammatory, antiseptic, antioxidant properties. Regular consumption of *A. racemosus* root can help with infertility, impotence, leucorrhea, menopausal symptoms, hyperacidity, and certain infectious diseases like herpes and syphilis (Kushwah et al. 2018).

PHARMACOLOGICAL VALUES

Asparagus racemosus, is highly valued for its various pharmacological properties. that Shatavari possesses immunomodulatory properties, it can help regulate the immune system. This can be beneficial in enhancing the body's defence mechanisms against infections and diseases. The methanolic extract of *A. racemosus* demonstrates notable antidepressant effects, likely achieved by suppressing MAO-A and MAO-B enzymes, as well as interacting with adrenergic, dopaminergic, serotonergic, and GABAergic systems (Dhingra and Kumar 2007). It possesses Antitussive effect; methanolic extract of roots, at dose of 200 and 400 mg/kg showed significant antitussive activity on sulphur dioxide- induce cough in mice (Alok et al. 2013). Methanolic extract of *A. racemosus* roots show anti-oxidant activity. Shatavari contains bioactive compounds with anti-inflammatory properties. It can help reduce inflammation in the body, which is associated with various chronic diseases such as arthritis, inflammatory bowel diseases, and others (Dhingra and Kumar 2007). *A. racemosus* exhibits galactogogue effect. Galactogogue is something that help in enhancing milk supply to breast feeding

mothers. In Ayurveda, extract from the root part of *A. racemosus* is used to stimulate milk supply during lactation. Root extract is known to possess positive ion and chronotropic effects, while high doses have been found to impact heart failure. The antihepatotoxic potential of *A. racemosus* is evident that the alcoholic extract of its root effectively decreases the elevated levels of alanine transaminase, aspartate transaminase, and alkaline phosphate in rats with CCl₄-induced hepatic damage (Alok et al. 2013). Shatavari is considered a tonic for the female reproductive system. It is used to regulate menstrual cycles, alleviate menstrual cramps, and relieve symptoms of menopause. It may also support fertility by promoting healthy ovulation and reproductive function (Mishra and Verma 2017). *A. racemosus* roots have been reported to reduce blood glucose level in rats, and rabbits. Root extract causes a wide-ranging stimulatory effect on physiological insulinotropic pathways. Shatavari may have neuroprotective effects, meaning it can help protect nerve cells from damage. This property holds potential in the management of neurodegenerative diseases like Alzheimer's and Parkinson's (Shaha and Bellankimath 2017).

BIOACTIVE COMPOUNDS

Asparagus racemosus is a valuable traditional medicinal plant with phytochemicals that offer health benefits despite being non-nutritive. It contains various bioactive metabolites like fructo-oligosaccharides, polysaccharides, asparosides, shatavarins, sapogenins, racemosols, isoflavones, glycosides, mucilage, and fatty acids. Saponin, found

in asparagus roots, is a key active component (Shaha and Bellankimath 2017). It contains saponins, flavonoids, alkaloids, triterpenoids, phytosterols, polysaccharides, glycosides, phenolic acids, proteins, essential oils, vitamins, minerals, amino acids, lignans, carotenoids etc. This plant also contains vitamins A, B1, B2, C, E, Mg, P, Ca, Fe, and folic acid. Other primary chemical constituents

are essential oils, asparagine, arginine, tyrosine, flavonoids (kaempferol, quercetin, and rutin), resin, and tannin steroidal glycosides (asparagosides), bitter glycosides, asparagines and flavonoids. Fruits and flowers having racemoside A, B, C steroidal saponin, quercitin, rutin, hyperoside flavonoids (Mishra and Verma 2017).



Figure 1: Flowers of *A. racemosus* in wild



Figure 2: Fruits of *A. racemosus* in wild

GAP AND FUTURE ASPECTS

While the study provides a comprehensive overview of the botanical, ethnomedicinal, and pharmacological aspects of Shatavari (*Asparagus racemosus*), there are notable gaps and potential future directions for research. Despite the extensive traditional medicinal properties, there is a lack of large-scale clinical trials to validate its efficacy and safety. Future research should focus on conducting well-designed clinical studies to establish Shatavari's therapeutic benefits in various health conditions. There is a need for in-depth studies to elucidate the underlying molecular pathways responsible for its therapeutic effects. Investigating the molecular targets and signaling pathways modulated by Shatavari can provide valuable insights into its mode of action. Ecological research is needed on its population dynamics, habitat requirements, and conservation strategies. Future studies should investigate the ecological aspects of Shatavari to inform conservation efforts and sustainable harvesting practices. Addressing these gaps and future aspects can contribute to a deeper understanding of Shatavari's medicinal properties and facilitate its integration into modern healthcare practices.

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