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## Phytochemical and biological effects of *Asparagus racemosus*: A review

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### Abstract

*Asparagus racemosus* Willd. Is an important medicinal plant of tropical and subtropical India. Its medicinal usage has been reported in the Indian and British Pharmacopoeias and in indigenous systems of medicine. *Asparagus racemosus* is a useful traditional medicinal plant. Today it is a widespread belief on the percentage of the general public that natural substances are inherently superior to man-made substances and have run a mainstream role in the wellness maintenance system for the prevention of diseases. The major bioactive constituents which impart the medicinal value of the herb are a group of steroidal saponins, sarsasapogenins, flavonoids, kaempferol, quercetin, rutin and polyphenols. The tuberous roots of this herbaceous plant are widely applied in the pharmaceutical as well as on biotechnological scale, in preparation of various herbal preparations because it possesses outstanding potential, and defence system.

**Keywords:** *Asparagus racemosus*, chemical compounds, plants, bioactivities

### Introduction

The genus *Asparagus racemosus* has about 300 species around the globe. The genus is thought to be medically important because of the presence of steroid saponins and sapogenins in various parts of the plant. Out of the 22 species of *Asparagus* recorded in India; *Asparagus racemosus* is the single most commonly used in traditional medicine. Use of *Asparagus racemosus* was mentioned in the ancient literature of Ayurveda. It is used to rectify the gynecological problems like irregularities in menstrual cycle and sexual dysfunction. Even till today the containing *Asparagus racemosus* are used to adjust the menstrual irregularities by Ayurvedic practitioner many formulations containing *Asparagus racemosus* are presently available in the marketplace for work. Therapeutic usage of the *Asparagus* is due to the phytoestrogenic components present in it. *Asparagus racemosus* is a widely occurring medicinal plant belonging to the family of Liliaceae. This species is found abundantly in subtropical and tropical zones such as India, Asia, Australia and Africa. The phytochemical constituents of the plant vary depending on its geographical zone of availability. It has been successfully used as herbal medicine and also served as food. All the parts of this plant have therapeutically importance for treatment of stomach ulcer, liver disorders, inflammation, stress-related immune disorders, dyspepsia, can also act as galactagogue and decreases apoptosis. *A. racemosus* is frequently used in ayurvedic drug preparations as it is known to treat conditions such as ageing, to boost immunity, improve longevity, vigor, mental function. *A. racemosus* also finds its application in curing neurological disorders, hepatopathy, tumors and dyspepsial. Various therapeutic property of root of *A. racemosus* is well documented in ancient ayurvedic literature [1]. The therapeutic property is owing to the presence of various pharmacological properties such as antioxidant property, anti-inflammatory property antiseptic and antimicrobial property. The major phytochemical constituents present in the roots of *A. racemosus* is steroidal saponins. This review aims at exploring the pharmacological properties of *A. racemosus* [2, 3]. This review gave phytochemical content and bioactivities of the plant.

### Phytochemicals

The root extract of *A. racemosus* was screened for phytochemical constituents to determine the presence of alkaloids, flavanoids, tannins, phytosterols, glycosides. The ethanolic root extract of *A. racemosus* revealed the presence of alkaloids [4, 5], flavanoids, tannins, phytosterols, glycosides, carbohydrates, proteins and fats. The trace elements like copper, zinc, manganese, cobalt, potassium, calcium and selenium can also be found [6], fruits and flowers of shatavari contains flavanoids which are nothing but glycosides of quercetin, rutin and hyperosides [7].

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Kaempferol is another component along with that of sarsapogenin which can be isolated of the woody portions of the tuberous roots [8]. Some of the essential fatty acids like gamma linoleic acids, disogenin are also obtained from this plant [9].

### Biological activities

#### Antibacterial activity

Methanolic and ethanolic root extract shows antibacterial activity against *Escherichia coli*, *Shigella dysenteriae*, *Vibrio cholerae*, *Bacillus subtilis*, *Staphylococcus aureus*, *Shigella sonnei*, *Shigella flexneri*. Owing to its antibacterial property Shatavari can be utilized in place of synthetic antibacterial drugs [10].

#### Anti-inflammatory potential

Studies shows that the root extracts of Shatavari do possess anti-inflammatory property [11]. Intake of the root extract reduces inflammatory cytokine production, skin thickness, myeloperoxidase activity. Anti-inflammatory activity was also evident histopathologically too.

#### Antioxidant activity

Various studies have proved the antioxidant potential of *A. racemosus*. Studies have proved the role of aqueous Shatavari root extract in protecting the gamma radiation induced damage in liver. The antioxidant potential was well characterized against lipid peroxidation [12].

#### Antidepressant activity

Numerous studies were conducted to assess the antidepressant activity of Shatavari *in vitro* and *in vivo*. Exposure to stress plays an important role in depression. Studies in animal models are done by inducing physical stress which leads to depression. *A. racemosus* root has been reported to have a significant antidepressant activity. Various scientific studies have been done to evaluate its use in psychological disorders like depression. Thus, it is proved that the methanolic extract of Shatavari has promising antidepressant activity, which is probably mediated through the serotonergic, noradrenergic systems and augmentation of antioxidant defenses [13, 14].

#### Cardio protective role

Studies exhibit a significant hypocholesterolemic role of *A. racemosus* extract. Methanolic root extract of Shatavari supplements are potential component in decreasing lipid peroxidation. Extracts also exhibits a decrease in low-density lipoproteins, very low-density lipoproteins and triacylglycerol levels in blood [15, 16].

#### Hepatoprotective role

Root extracts of *A. racemosus* has showed a remarkable hepato-protective activity. Studies conducted on animal models treated with the aqueous extract of the roots of *A. racemosus* has been shown to prevent the incidence of hepatocarcinogenesis. Immunohistochemical picture of the hepatic tissues of wistar rats treated with diethylnitrosamine (DEN) showed the presence of p53+ foci (clusters of cells expressing the mutated p53 protein), whereas expression of p53+ foci was absent in Wistar rats pretreated with the aqueous extract of the roots of *A. racemosus* and also in rats treated with DEN followed by treatment with the aqueous extract of *A. racemosus*. The results of the biochemical

parameters also showed that pretreatment of wistar rats with the aqueous extract of *A. racemosus* has led to the amelioration of oxidative stress and hepatotoxicity brought about by treatment with DEN. These results strongly prove that the aqueous extract of the roots of *A. racemosus* has the potential to act as an effective formulation to prevent hepatocarcinogenesis [17, 18].

#### Hypoglycemic activity

Ethanolic root extracts of *A. racemosus* exhibited a significant hypoglycemic activity. Studies with animal models proves a significant increase in the levels of insulin release. The release of insulin further increased with a subsequent increase in the concentration of glucose in blood. When compared to methanol and aqueous extracts, ethanolic extracts showed a significant hypoglycemic activity. *In vitro* antidiabetic studies also proved the efficacy of asparagus in decreasing the serum glucose levels [19-21].

#### Effect on uterus

Methanolic extracts of Shatavari can be used as uterin sedative. Many research studies, both *in vivo* and *in vitro* has proved that root extracts of *A. racemosus* have been responsible for the competitive block of contraction of rat, guinea pig and rabbits' uteri induced by oxytocin. Shatavari root extracts also possess active components that fight against female infertility, increases libido, decreases inflammation of sex organs, improves conception rate, reduces or prevents abortion, increases lactation and improves the hormonal balance after postpartum [22-24].

#### Conclusion

*Asparagus racemosus* is used in many medicines and have prodigious traditional importance. It is also used in natural form of medicines like Unani, Sidha, Ayurveda. By many experiments and scientific study traditional practices are proven. This plant has great potential in healthcare and trade. Appreciable work has been done to explore the biological activity and medicative application of plant, still there square measure accessible in numerous prospects of pharmacological application that has to be explored. These plants have many medicinal properties like antioxidant, anti-HIV, hepato-protective, cardiac, antibacterial effects.

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