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Review Article

**THERAPEUTIC APPLICATION OF ASPARAGUS RACEMOSUS
IN DEPRESSION: A REVIEW****Akshaya. P^{1*}, Mrs. Anusree. S², Mrs. Rupitha. N S³, Ms. Liya S Saji⁴, Dr. Kiran K J⁵,
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Abstract:

Asparagus racemosus also known by the name *Shatavari* is one of the well-known drugs in Ayurveda, belonging to family *Asparagaceae*. This herb is highly effective in problems related with female reproductive system. *Asparagus racemosus* is a well-known Ayurvedic rasayana which prevent ageing, increase longevity, impart immunity, improve mental health. Depression is a mental health condition that causes a persistent feeling of sadness and loss of interest in activities. *Asparagus racemosus* contains numerous steroidal saponins, alkaloids, flavonoids, tannins. Due to the presence of these chemical constituents the plant shows neuroprotective, antitussive, immunomodulatory, nootropic, anti-amnesic, anti-ulcer, antiparasitic, antidiabetic, anticancer, aphrodisiac, antibacterial, anti-inflammatory, antidiarrheal, antioxidant, hepatoprotective, hypocholesterimic, anti-rolithiatic, anti-sebum wound healing effects.

Keywords: *Asparagus racemosus*, *Asparagaceae*, *Quercetin*, *Rutin*, *Shatavari*.

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INTRODUCTION:

Ayurveda is gaining popularity worldwide. It has a very rich tradition of herbal medicines. The Ayurveda is totally natural remedy and its major base is herbal medicines. Now days Ayurveda started to become a mainstream healthcare system. Modern medicine is giving relief to the patients but at the cost of heavy side effects. So, people are attracted towards Ayurvedic drugs specially herbs and herbal preparations from Ayurveda system. In last decade over the counter sale of herbal medicines has drastically increased.^[1]

Asparagus racemosus (family Asparagaceae) also known by the name Shatavari is one of the well-known drugs in Ayurveda.^[2] Use of *A. racemosus* is mentioned in the ancient literature of Ayurveda (Charaka samhita). Traditionally, *A. racemosus* is indicated in epilepsy, depression, brain tonic, helps in regulating cardiac disorders and hypertension. It is extensively used in male genital dysfunctions, oligospermia, spermatogenic irregularities and other male disorders such as painful micturition. It is also explored in Ayurvedic formulations for digestive discomfort, indigestion, amoebiasis, piles and debility. In females, prescribed by the doctors in habitual abortions, weakness of the uterus, excessive bleeding during menstruation. Recent reports and experiments disclosed Shatavari as antidiarrhetic, antispasmodic, aphrodisiac, anti- dysenteric, demulcent, diuretic, galactagogue, nutritive, mucilaginous, refrigerant, stomachic properties and works as a tonic for human beings. It is also known to reinforce the immune system and protect vital organs like heart, brain and other organs of the body.^[3]

DEPRESSION:

Depression is a type of serious neurological disorder, characterized by disturbances in sleep and appetite as well as deficit in cognition and energy. Depression can be potentially life- threatening condition that has

affected millions of people across the globe and can occur at any age groups from childhood to later life. It is known to exert a huge burden upon the society. The distinctive symptoms exhibit as a triad form that include: low or depressed mood, “anhedonia” (reduced ability to experience natural rewards), and low energy or fatigue. Major depressive disorder is a complex and frequent psychiatric condition that poses significant challenges to both the patients who experience it and the physicians who treat them. The goal of therapy is for patients to achieve remission, which requires identifying and measuring symptoms at the outset and throughout treatment to document both response and resistance to treatment. The life time prevalence of depression is between 10-20% in general population worldwide, with a female to male ratio about 5:2. is a major contributor to the overall global burden of diseases.^[4]

PLANT PROFILE:

Kingdom : Plantae
Order : Asparagales
Family : Asparagaceae Subfamily :
Asparagoideae Genus : *Asparagus*
Species : *Asparagus racemosus* L

VERNACULAR NAMES:

Sanskrit : Shatavari
Hindi : Satavari, Shatawar or Satmuli
Bengali : Shatamuli
Marathi : Shatavari or Shatmuli
Gujarati : Satawari
Rajasthan : Norkanto or Satawar
Telugu : Toala-gaddalu
Tamil : Shimaishadavari or Inli-chedi
Malayalam : Chatavali
Kannada : Majjigegadde or Aheruballi
Madhya Pradesh: Narbodh or atmooli
Synonyms : Shatavari, Vara, Narayani, Shatvha, Keshika, Madhura. [5,6]



Fig 1: *Asparagus racemosus*

Fig 2: *Asparagus racemosus* leavesFig 3: *Asparagus racemosus* stemFig 4: *Asparagus racemosus* flowerFig 5: *Asparagus racemosus* root**PHYTOCHEMICAL COMPOSITION OF *Asparagus racemosus*:**

Shatavari is known to possess a wide range of phytochemical constituents which are mentioned below. ^[7,8,9,10]

Phytochemical category	Key compounds
Steroidal saponins	Shatvarins(Shatvarin I to VI)
Oligospirostanoside	Immunoside
Policyclic alkaloid	Asparagamine A
Isoflavones	8-methoxy-5, 6, 4-trihydroxy isoflavone-7 0-beta-D-glucopyranoside
Furan compound	Racemofuran
Cyclic hydrocarbon	Racemosol, Dihydrophenantherene
Carbohydrates	Polysaccharides, Mucilage
Flavonoids	Quercetin, Rutin, Hyperoside
Sterols	Sitosterol, 4,6-dihydroxy-2-0 benzaldehyde and Undecanyl cetanoate
Trace minerals	Zinc, Manganese, Cobalt, Calcium
Flavonoid	Kaempferol
Essential fatty acids	Gamma linoleinic acids, vitamin A, diosgenin, quercetin 3-glucourbnides.

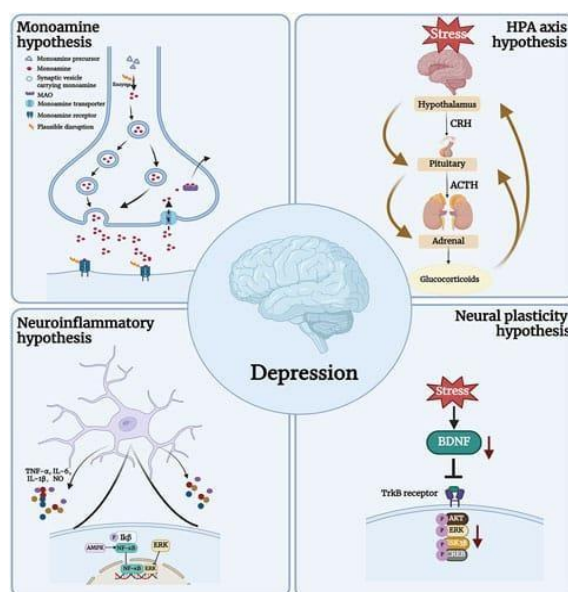
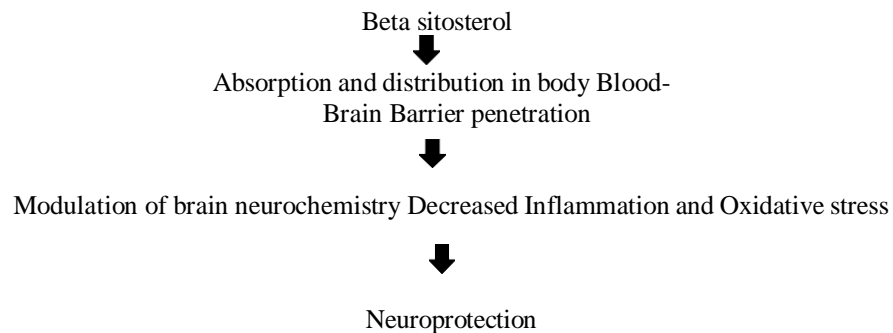
***Asparagus racemosus* IN DEPRESSION:**

Asparagus racemosus contain various phytochemical constituents, which possess potent antidepressant activity. It have many nutritional as well as therapeutic activities. Depression can be potentially life-threatening condition that has affected millions of people across the globe and can occur at any age groups from childhood to later life. It is known to exert a huge burden upon the society. The distinctive symptoms exhibit as a triad form that include: low or depressed mood, “anhedonia” (reduced ability to experience natural rewards), and low energy or fatigue.^[2]

Plant part	Phytochemical category	Key compounds
Root	Sterols	Sitosterol, 4,6-dihydroxy-2-0 benzaldehyde and Undecanyl cetanoate
Root	Trace minerals	Zinc, Manganese, Cobalt, Calcium
Woody portion of tuberous root	Flavonoid	Kaempferol
Flower and Fruits	Flavonoid	Quercetin, Rutin, Hyperoside

Sitosterol:

Sitosterol is a sterol that is present in root. It possesses potent antidepressant activity. The antidepressant effects of beta-sitosterol and its derivatives are mediated by the increased level of serotonin and nor epinephrine in the central nervous system, potentially also involving the GABAergic system. Beta-sitosterol has also been shown to have adaptogenic properties, meaning it can help the body cope with stress, which may contribute to its antidepressant effect.^[11]



Zinc:**Antidepressant effect.**

Zinc is a vital trace mineral that is present in root. Its antidepressant effects are thought to involve, neurotransmitter modulation by increased Serotonin (5-HT), increased Dopamine (DA) and modulation of NMDA receptor there by reducing the inflammation that may further leads to increasing neurogenesis and enhances synaptic plasticity.^[12]

Zinc



Increased zinc level in brain Modulation of Neurotransmitters Decreased Inflammation
Increased neurogenesis and synaptic plasticity



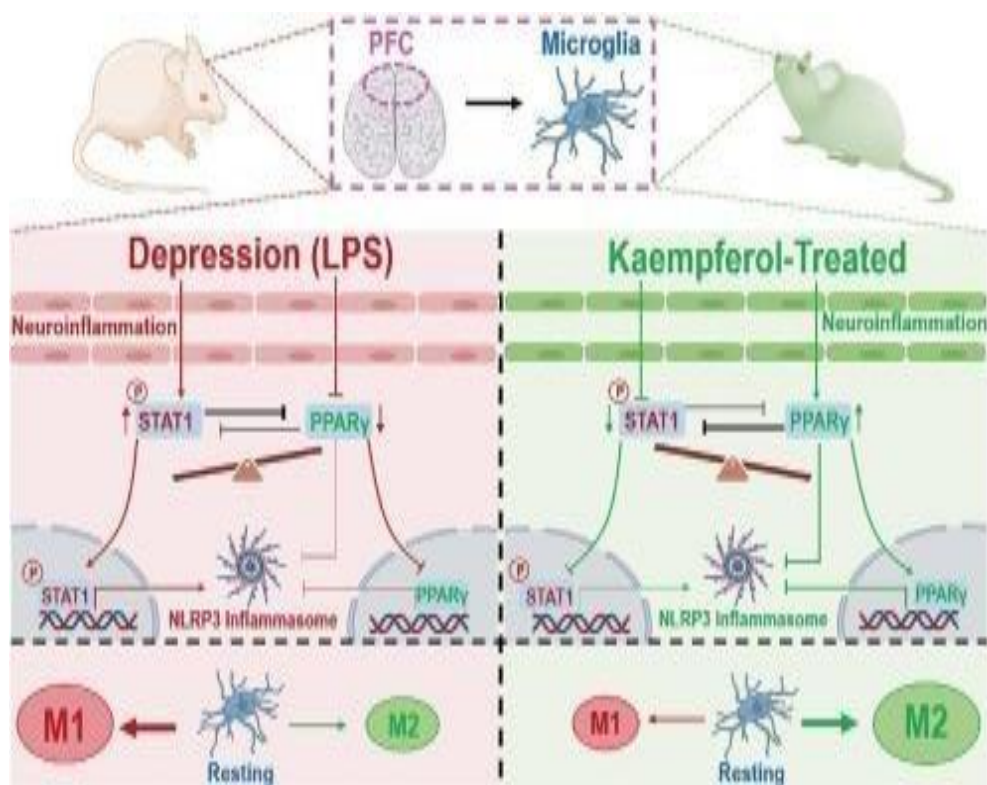
Antidepressant effect.

Calcium:

Calcium is an essential trace mineral which is found in root of *Asparagus racemosus*. It has antidepressant activity. When calcium level increase either through dietary intake or supplements, it influences voltage gated calcium channel in neurons. This leads to an increase in intracellular calcium, which activates various calcium dependent signaling pathways. These pathways regulate the release of key neurotransmitters such as serotonin dopamine and nor epinephrine, all of which are important for mood regulation. By enhancing neurotransmitter release and promoting synaptic plasticity, calcium helps improve mood, cognitive function and emotional stability, contributing to its potential antidepressant effects.^[13]

Kaempferol:

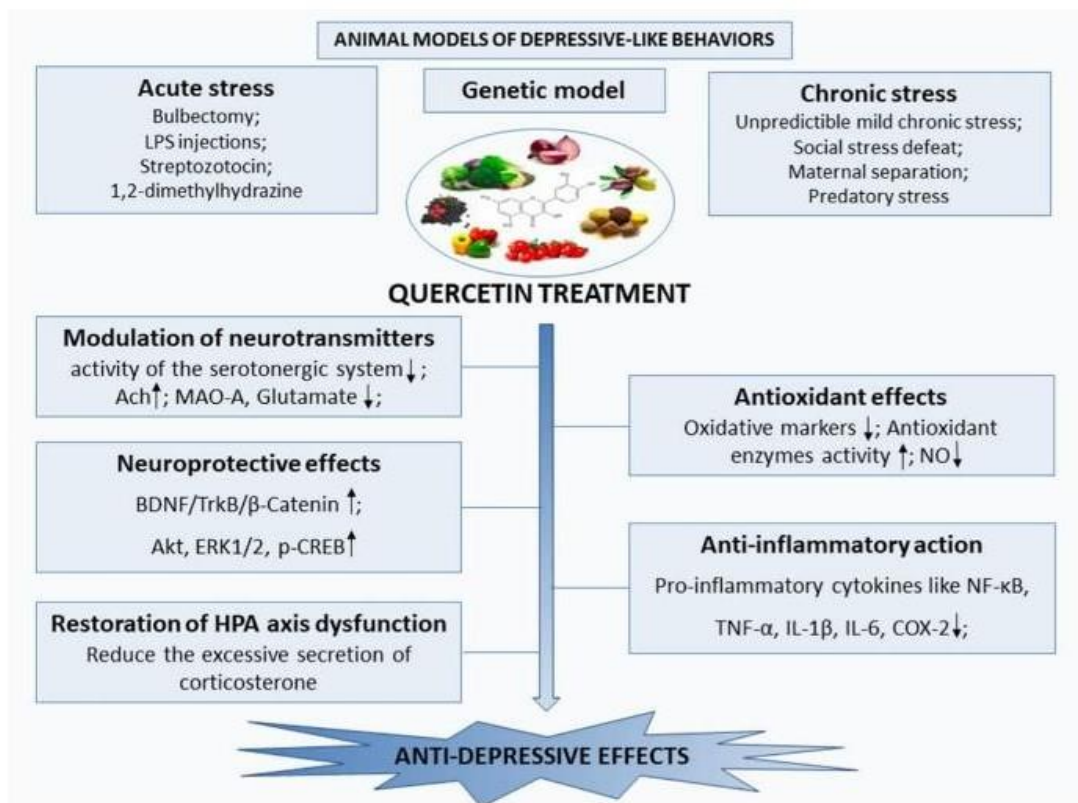
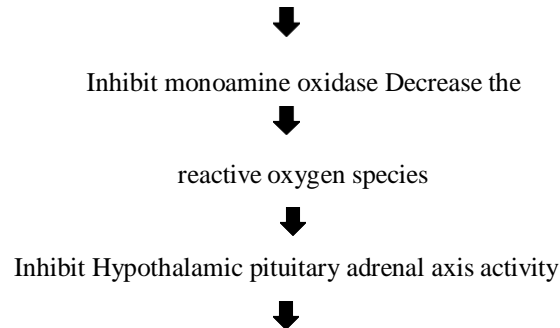
Kaempferol, a natural flavonoid found in woody portion of tuberous root of *Asparagus racemosus*, exhibits antidepressant effects through several biological pathways. It acts by modulating monoamine neurotransmitters such as serotonin, dopamine, and norepinephrine, which are essential for mood regulation. Kaempferol also reduces oxidative stress and neuroinflammation in the brain by enhancing antioxidant enzyme activity and suppressing pro-inflammatory cytokines. Moreover, it supports neurogenesis and synaptic plasticity by upregulating brain derived neurotrophic factor (BDNF), particularly in the hippocampus. This combined effect may contribute to antidepressant activity of kaempferol.^[14]



Quercetin

Quercetin belongs to the category of flavonoid and it is widely present in the fruit as well as flowers of *Asparagus racemosus*. It possess potent antidepressant activity by inhibiting Monoamine oxidase level it may result in decreased level of reactive oxygen species. Further inhibit the Hypothalamic pituitary adrenal axis activity which leads to decreased lipid peroxidation and increased superoxide dismutase and catalyse level.^[15]

Quercetin



↓

Decrease lipid peroxidation

↓

Increase superoxide dismutase and catalyse level Antidepressant effect.

Rutin:

Rutin belongs to the category of flavonoid and it is widely present in the fruit as well as flowers of *Asparagus racemosus*. It possesses potent antidepressant activity. It acts as a strong antioxidant by reducing oxidative stress by neutralizing reactive oxygen species and increasing the activity of antioxidant enzymes like superoxide dismutase and catalase. Rutin also modulates the monoaminergic system by inhibiting monoamine oxidase A, leading to increased levels of mood-regulating neurotransmitters like serotonin, dopamine, and norepinephrine.

Rutin also helps in regulating the hypothalamic-pituitary-adrenal axis, thereby lowering elevated cortisol levels and improving the body's response to stress. It enhances the expression of brain-derived neurotrophic factor (BDNF), promoting neurogenesis and synaptic plasticity in brain regions such as the hippocampus and prefrontal cortex. Collectively, these actions contribute to its neuroprotective effects and result in an antidepressant effect.^[16]

Hyperoside:

Hyperoside belongs to the category of flavonoid and it is widely present in the fruit as well as flowers of *Asparagus racemosus*. It exerts antidepressant effect through potent antioxidant activity by reducing oxidative stress by scavenging reactive oxygen species and boosting antioxidant enzymes such as superoxide dismutase, catalase, and glutathione. This helps in protecting neurons from oxidative damage.

Hyperoside also modulates the monoaminergic system by inhibiting monoamine oxidase there by increasing the levels of neurotransmitters such as serotonin, dopamine, and norepinephrine which are crucial for mood regulation. It helps in normalizing the activity of the hypothalamic-pituitary-adrenal axis by reducing elevated cortisol levels which is often found in depression and improve the body's stress response. Hyperoside enhances the expression of brain-derived neurotrophic factor (BDNF) by promoting neurogenesis and enhancing synaptic plasticity and neuronal survival in brain regions like the hippocampus. These actions contribute to the antidepressant effects.^[17]

CONCLUSION:

It is a fact that human life cannot exist without nature. In traditional medicine, there are many natural crude drugs that have the potential to treat many diseases and disorders. *Asparagus racemosus* having many nutritional as well as therapeutic activities. The plant contains Steroidalsaponin, Shatavarins, Asparanin A, Diosgenin, Shatavaroside A, Shatavaroside B, Poly cyclic alkaloid, Kaempferol. Due to the presence of these chemical constituents the plant possesses potent antidepressant activity. This review aims to elevate the recognition of medicinal properties of *Asparagus racemosus*. The therapeutic application of *Asparagus racemosus* especially in depression can be effectively explored by proper research studies and can be utilized

for the development of novel plant-based treatments.

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