WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Shatavari (Asparagus Racemosus): A Comprehensive Review of its Traditional Uses, Phytochemistry, and Modern Pharmacological Potential

[1]Dr. Ashim Aryan, [2]Dr. Sandhya Maravi ,[3]Dr. Rajesh Sharma

[1,2]PG Scholar (Ayu), Dravyaguna Department, A & U Tibbia College & Hospital, Karol Bagh New Delhi
[3]Professor (Ayu), HOD, Dravyaguna Deparment, A & U Tibbia College & Hospital, Karol Bagh New Delhi

ABSTRACT

Shatavari, botanically known as Willd, is a highly revered medicinal plant belonging to the family *Asparagaceae*. Native to India, Nepal, and the Himalayas, it is a cornerstone of Ayurvedic medicine, often dubbed the "Queen of Herbs" for its broad-spectrum therapeutic applications. The term "Shatavari" translates to "one hundred roots" or "one who possesses a hundred husbands," signifying its traditional use as a female reproductive tonic, galactagogue, and overall vitality enhancer. This comprehensive review synthesizes current knowledge concerning its ethnobotanical history, detailed phytochemistry, and validated pharmacological activities. Key chemical constituents, particularly the steroidal saponins (shatavarins I-IV), are responsible for its adaptogenic, immunomodulatory, anti-inflammatory, and antioxidant effects. Modern scientific inquiry has substantially corroborated its traditional claims, highlighting its efficacy in managing menopausal symptoms, improving lactation, protecting the gastric mucosa, and supporting neurological health. The review places a special emphasis on the detailed descriptions and therapeutic roles of *Shatavari* found within the ancient Ayurvedic texts, the (*Charaka, Sushruta, and Ashtanga Hridaya*) and various (lexicons), revealing a profound consistency between classical knowledge and modern biomedical findings. Ongoing research continues to explore its potential in cancer therapy and diabetes management. This article provides a structured overview of bridging the gap between historical traditional practice and evidence-based modern pharmacology, and underscores its importance as a significant resource in natural product drug discovery.

Keywords: ; Shatavari, Adaptogen, Galactagogue, Steroidal Saponins, Women's Health, Ayurveda,Immunomodulator,

1. Introduction

The plant kingdom has historically served as the primary source of medicine for human populations, and many contemporary pharmaceuticals owe their origins to natural compounds. Among the countless medicinal plants, *Asparagus racemosus (Shatavari)* holds a position of distinction in the traditional medical systems of India, particularly Ayurveda. For millennia, *Shatavari* has been employed as a *Rasayana* (rejuvenative and tonic) herb, focusing primarily on supporting the female reproductive system and maintaining systemic vitality .(1)

The plant is a thorny, woody climber with fasciculated tuberous roots, which are the main part used medicinally. It thrives in diverse tropical and subtropical environments, from sea level up to an altitude of 1,500 meters. Its therapeutic efficacy is attributed to its rich and complex chemical profile, which includes alkaloids, polysaccharides, mucilage, and, most importantly, a unique class of steroidal saponins known as shatavarins (2,3)

The purpose of this comprehensive review is to methodically collate and evaluate the vast body of literature on *Asparagus racemosus* .The review will trace the plant's journey from ancient traditional texts to modern laboratory research, providing a critical assessment of its phytochemistry, mechanism of action, validated clinical uses, and future research directions.

2. Nomenclature, Botany, and Distribution

2.1. Taxonomy and Nomenclature

- **Family:** Asparagaceae (formerly Liliaceae)
- **Genus:** Asparagus .
- **Species:** racemosus Willd.

- **Synonyms (Ayurvedic)**: The nomenclature in classical texts reflects its physical characteristics and actions . Key synonyms mentioned in the *Charaka Samhita* and *Nighantus* include:
  - *shatamuli* (One with a hundred roots)
  - *Atirasa* (Very juicy)
  - *Bahusuta* (One with many progeny/shoots)
  - *Narayani*(Originating from Lord Vishnu, indicating its supreme benefit)
  - *Vira* (Valiant or heroic, promoting strength)

2.2. Morphological Characteristics

- **Roots:** Tuberous, succulent, fasciculated (in clusters), light creamy colour, approximately meter in length, and are the pharmacologically active part .(5)
- **Stems:** Woody, branched, and armed with sharp recurved spines.
- **Leaves:** Modified into needle-like photosynthetic structures called cladodes.

Figure 1. *A. racemosus.*

2.3. Habitat and Distribution

A.racemosus is indigenous to the tropical and subtropical regions of India, Sri Lanka, Nepal, and the Himalayas. Due to increasing global demand and destructive harvesting of the roots, the plant is now considered endangered in many parts of its natural habitat, emphasizing the need for controlled cultivation and conservation .(6)

3. Traditional Uses in Ayurvedic and Classical Systems

Shatavari's therapeutic profile is defined by its *Rasa Panchaka* (five fundamental properties) and its roles described in the *Samhitas* (ancient medical encyclopedias) and *Nighantus* (lexicons of materia medica) .(7)

3.1. Ayurvedic Properties (Rasa Panchaka)

Property (Guna)	**Description**	**Action (Karma)**	**Effect**	**References**
Rasa (Taste)	Madhura(Sweet), Tikta(Bitter)	Madhura is nutritive,Tikta is cleansing.	Balances Vata and Pitta, nourishes and Rakta Dhatus.(8)	Bhavaprakash(9)

Property (Guna)	**Description**	**Action (Karma)**	**Effect**	**References**
Guna (Quality)	Guru(Heavy),Snigdha (Unctuous/Oily)	Imparts moisture and strength.	Nourishing, soothing for dry tissues, anti- properties .(10)	Ch.sam.(27/109)11
Veerya (Potency)	Sheeta (Cold)	Cooling action.	Pacifies Pitta Dosha, relieves burning sensation (Daha), and is anti-inflammatory .(12)	All Nighantus
Vipaka (Post-Digestive Taste)	Madhura(Sweet)	Formative and anabolic effect.	Promotes tissue building (Brumhana) and increases semen (Shukrala) .(9)	Bhavaprakash(9)
Dosha Karma (Effect on Tri-Dosha)	Vata-Pittahara	Balances vitiated Vata and Pitta.	Vata is calmed by Snigdha - Guna; Pitta is calmed by Sheeta Veerya.	All texts (13)

3.2. References in Brihattrayi (Great Triad)

The three primary Ayurvedic classics describe Shatavari extensively, validating its deep historical significance.(14)

3.2.1. Charaka Samhita (C.S.)

Acharya Charaka emphasizes the *Rasayana* and *Vajikaran* (aphrodisiac) properties of *Shatavari*. It is explicitly grouped under three important therapeutic categories (*Mahakashayas*) (11.15)

1. *Balya Mahakashaya* (Ch.S.Su. 4/9): Group of herbs that promote strength and general debility (Tonic).
2. *Vayasthapana Mahakashaya* (Ch.S.Su. 4/23): Group of herbs that promote longevity and anti-aging (Rejuvenative).
3. *Shukrajanana Mahakashaya*: Group of herbs that promote sperm production and quality.

Shatavari is utilized in multiple key formulations, including *Brahma Rasayana* and *Amlak Ghrita*, and is advised in conditions like *Jwara* (fever), *Raktapitta* (bleeding disorders), and *Rajayakshama* (tuberculosis/chronic wasting diseases) [16]. Its inclusion in *Garbhasthapana* Dravya further highlights its traditional role in preventing miscarriage and supporting pregnancy (C.S. Sha. 8/20) [15].

3.2.2. Susruta Samhita (S.S.)

Sushruta, focusing more on surgery, uses *Shatavari* primarily for its cooling, soothing, and tissue-building properties, especially in injury and post-operative care. Key applications include:

- *Vidarigandhai gana* (S.S.Su.38/4): Classified in the group that is (pacifying Vata and Pitta) and diuretic.
- *kantakpanchamula* (S.S.Su38/74): Used in this group to treat *Raktapitta* (bleeding disorders) due to its cold potency.
- *Sutika Roga* (S.S.Chi. 15/33): Used in formulations like to treat post-partum complications, confirming its role as a post-natal tonic .
- *Arsha* (Piles): Used in *Kalka* (paste) form to treat Piles (S.S.Chi. 6/13), likely due to its soothing, anti-inflammatory, and constipative properties.

3.2.3. Kashyap Samhita (K.S.)

The , focusing on Pediatrics and Gynecology , gives paramount importance to Shatavari. A dedicated section, , details its use for maternal health and lactation. It explicitly states that Shatavari is (congenial for menstruation and progeny), solidifying its central role in women's health .

3.3. Descriptions in Nighantus (Lexicons)

Nighantus are later Ayurvedic texts that catalog and define the properties of herbs. They offer a consolidated and concise view of Shatavari’s actions .

Nighantu	Key Property Described (Karma)	Key Synonym/Observation	Reference
Dhanwantari Nighantu (8th-10th Cent. AD)	Vata-Pittahara	Shatapadi(hundred legs), Pivari	Classified in Guduchyadi Varga.(19)
Bhavaprakasha Nighantu (16th Cent. AD)	Rasayana,Vrushya(Aphrodisiac), (Promotes intellect, digestive fire, and strength)	Pushpaprajakari (Promotes menstruation and conception) .(9)	Guduchyadi Varga
Raja Nighantu (14th Cent. AD)	Tridoshaghn(Balances all three) (Beneficial for the heart)	Explicitly lists its three tastes: , and (Astringent) .(20)	Guduchyadi Varga

Madanpala Nighantu:

Places Shatavari in the Abhayadi Varga and lists synonyms, emphasizing its use in Rasayana (rejuvenation), enhancing virya and bala, and reducing vata and pitta.

Dhanwantari Nighantu:

Also describes Shatavari with properties including sweet and bitter taste (rasa), heavy and unctuous nature (guna), and cold potency (virya), making it helpful in pacifying vata and pitta.

Dhanvantari Nighantu (10th– 13th Cent.A.D)

In the begining of nighantu, author pays homage to lord Dhanawantari and again he mentions its name as Dravyavali. At the end of Dravyavali author desires to describe the drugs of Dravyavali with their synonyms and after thathe has described their properties and actions along with synonyms. In this nighantu Shatavari has been described in Guduchyadi Varga. In Guduchyadi varga of this nighantu synonyms of 'Shatavari' ie. Shatapadi, Pivari, Indivari, Vari, Rishyaprokta, Dwipishatru, Dwipika, Urdhwakantaka are mentioned. It has Tikta,Madhura rasa; Shita virya; Vatapittashamaka properties. It has beenindicated in Kshaya, Raktavikara,Shukravardhaka and as Rasayana .

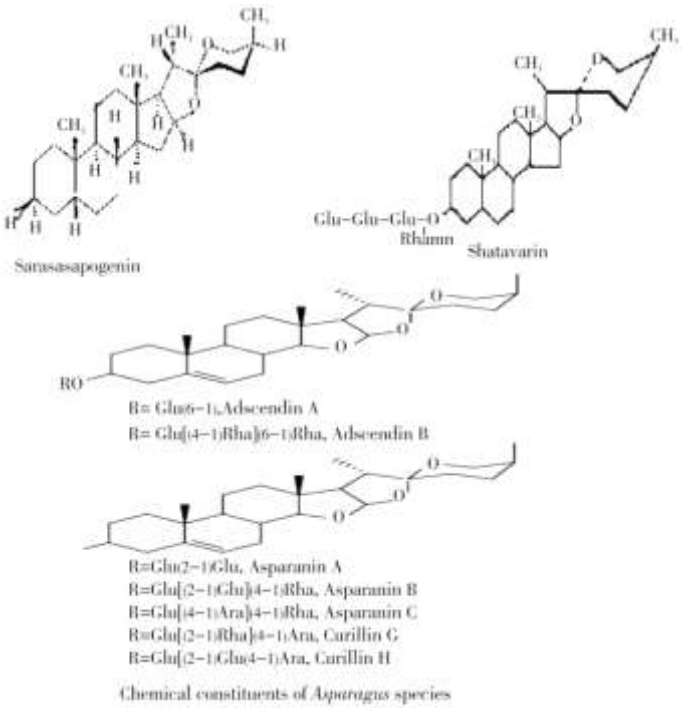
4. Phytochemistry: The Chemical Fingerprint (Expanded)

The extensive pharmacological activity of Shatavari is directly linked to its complex and diverse phytochemical composition, concentrated primarily in the tuberous roots. The plant is a repository of hundreds of bioactive compounds, chief among them are the steroidal saponins .(21)

Phytochemicals

Shatvari is known to possess a wide range of photochemical constituents which are mentioned below. Some of the structures have been drawn in (Figure 2),

Figure 2. Photochemical constituents structures.



Chemical constituents of *Asparagus* species

a. Steroidal saponins, known as shatvarins. Shatvarin I to VI are present. Shatvarin I is the major glycoside with 3-glucose and rhamnose moieties attached to sarsapogenin.

b. Oligospirostanoside referred to as Immunoside.

c. Polycyclic alkaloid-Aspargamine A, a cage type pyrrolizidine alkaloid.

d. Isoflavones-8-methoxy-5, 6, 4-trihydroxy isoflavone-7-0-beta-D-glucopyranoside.

e. Cyclic hydrocarbon-racemosol, dihydrophenantherene.

f. Furan compound-Racemofuran.

g. Carbohydrates-Polysacharides, mucilage.

h. Flavanoids-Glycosides of quercitin, rutin and hyperoside are present in flower and fruits.

i. Sterols-Roots also contain sitosterol, 4, 6-dihydryxy-2-O (-2-hydroxy isobutyl) benzaldehyde and undecanyl cetanoate.

j. Trace minerals are found in roots-zinc (53.15), manganese (19.98 mg/g), copper (5.29 mg/g), cobalt (22.00 mg/g) along with calcium, magnesium, potassium zinc and selenium.

k. Kaepfrol-Kaepfrol along with Sarsapogenin from woody portions of tuberous roots could be isolated.

l. Miscellaneous-Essential fatty acids-Gamma linoleinic acids, vitamin A, diosgenin, quercetin 3-glucourbnides.

4.1. Steroidal Saponins (Shatavarins and Immunosides)

This group constitutes the most characteristic and therapeutically significant compounds.

- **Key Saponins:** Over distinct saponins have been identified. The most crucial are **Shatavarins I, II, III, and IV** (based on sarsasapogenin and similar structures) and the furostanolic saponins, which are precursors to diosgenin (a natural progestin precursor) .
- **Mechanism Link:** These steroidal backbones provide a structural basis for the plant's documented **estrogenic and progesterone-like activities** by weakly binding to estrogen receptors, thereby normalizing hormonal fluctuations, particularly in menopausal and post-partum states .
- **Immunoside and Schidigerasaponin D5:** These specific saponins are believed to contribute significantly to the potent immunomodulatory and adaptogenic effects, supporting the traditional status .

4.2. Other Significant Phytoconstituents

Alkaloids: Asparagamine A is a key polycyclic alkaloid. Research indicates this compound possesses significant anti-oxytocic action, providing a strong pharmacological rationale for the traditional use of Shatavari in preventing threatened and recurrent abortions (Garbhaprada action) .(25)

- **Flavonoids:** Including Rutin and Quercetin, these compounds are potent antioxidants, protecting cellular integrity and contributing to its anti-inflammatory properties .(26)
- **Phytosterols:** β -Sitosterol and Stigmasterol are plant sterols known for their hormone-balancing effects, particularly in managing symptoms related to low estrogen.
- **Mucilage and Polysaccharides:** The roots are rich in mucilage, a demulcent agent, which physically explains its effectiveness in protecting and soothing the digestive, respiratory, and urinary tract membranes from irritation and inflammation .(27)

5. Modern Pharmacological Activities and Mechanisms (Detailed)

Modern science has systematically explored and validated the multidimensional claims of the Samhitas,translating traditional Karma (actions) into specific biomedical pathways.

5.1. Female Reproductive Health: Galactagogue and Estrogenic Action

The traditional stanyada (galactagogue) and Garbhaprada (fertility promoter) actions are well-supported by studies:

- **Galactagogue Mechanism:** The steroidal saponins, particularly shatavarins, have been shown to increase serum prolactin levels, a key hormone for milk production. Additionally, the herb's and (heavy and unctuous) qualities ensure deep nourishment, providing the raw materials (Dhatus) required for quality milk formation (Stanyajana) .(28)

- **Estrogenic/Hormonal Activity:** Extracts show binding affinity to uterine and mammary estrogen receptors. This phytoestrogenic property helps manage symptoms of estrogen deficiency, such as vaginal dryness, hot flashes, and mood disturbances, directly supporting its use in menopause and post-hysterectomy care .(29) The ability to normalize the Hypothalamic-Pituitary-Ovarian (HPO) axis links its adaptogenic function to its fertility-enhancing claim (Bandhyatwa treatment) .

5.2. Gastrointestinal Protection and Anti-ulcer Activity

The Sheeta (cold) and Madhura (sweet/demulcent) properties confer significant benefits to the GI tract:

- **Cytoprotective Action:** Shatavari has demonstrated potent anti-ulcerogenic activity across various experimental ulcer models (e.g., aspirin-induced, stress-induced). The mechanism involves not just reducing acid secretion, but crucially, **enhancing intrinsic protective factors** such as promoting mucus secretion, prolonging mucosal cell lifespan, and stabilizing the mast cells responsible for inflammatory response .(31,32,)
- **Anti-diarrheal/Anti-dysentery:** The presence of tannins and flavonoids contributes to its traditional use in (diarrhea) and (malabsorption). Studies show a reduction in gastrointestinal motility, slowing the transit of intestinal contents and reducing fluid secretion .(33)

5.3. Adaptogenic and Neuroprotective Roles

Shatavari is one of the premier Ayurvedic adaptogens, helping the body restore homeostasis, which aligns with its classification as Rasayana .

- **Anti-Stress Mechanism:** Research indicates that the saponins modulate the expression of heat shock proteins (Hsp70) and HPA axis components, normalizing biochemical and physiological stress parameters. It reduces stress-induced gastric ulceration and adrenal gland hypertrophy .
- **Neurocognitive Enhancement (Medhya):** Its rich antioxidant profile protects neural tissue from oxidative stress. It is also found to increase GABA (Gamma-Aminobutyric acid) levels and cholinergic activity, which support its traditional use in managing anxiety, stress, depression, and enhancing intellect (property) .Medhya Property(35)

5.4. Immunomodulation and Anti-Inflammatory Effects

- **Immunostimulation:** Polysaccharides and saponins in Shatavari significantly enhance the activity of macrophages and lymphocytes. This action, categorized as Oja Vardhana (increasing vitality/immunity), involves increasing antibody production and regulating cytokine release, helping the body fight infections and recover from chronic illness .(36)
- **Anti-inflammatory Action:** The plant exhibits significant anti-inflammatory effects by inhibiting key inflammatory enzymes (COX and LOX) and suppressing the production of pro-inflammatory cytokines, validating its use in conditions like Shotha (inflammation) and Vatarakta (Gout) .(37)

6. Safety, Toxicity, and Standardization

6.1. Safety Profile and Traditional Context

Shatavari is designated as a Rasayana, implying safety for long-term consumption across all ages and genders. This is supported by its general toxicity studies, which classify it as non-toxic and well-tolerated even at high doses in animal models. Its **demulcent and nourishing** nature makes it a suitable herb for individuals with a Pitta or Vata-Pita constitution who require cooling and unctuous support .(38)

6.2. Dosage and Dosage Forms

The Brihattrayi and Laghu (Lesser Triad, e.g.Sharandhra Samhita) frequently recommend various formulations, which reflect the belief in the lipid-solubility of its active ingredients .(39)

- **Swarasa (Fresh Juice):** Typically 10-20 mL per day.
- **Churna (Powder):** The most common form, typically 3-6 grams per day, often taken with milk (kshira) or (ghee) to enhance absorption (Anupana).
- **Ghrita (Medicated Ghee):** Formulations like **Shatavari Ghrita** are highly cited in the Samhita for reproductive disorders, using the property Sanskaranuvartan of Ghee to absorb and enhance the lipophilic saponins .(40)
- **Taila (Medicated Oil):** Used externally for Abhyanga (massage) and internally for (enema), particularly for Vata disorders.

7. Commercial Importance, Conservation, and Future Outlook

The extensive traditional and scientifically validated uses of Shatavari have elevated its global commercial importance, particularly in the nutraceutical and herbal supplement markets. This success, however, poses a significant threat to its natural populations.

7.1. Conservation and Quality Control

The plant is listed as endangered or vulnerable in several parts of India due to root harvesting and habitat loss .

(6). Efforts for sustainable cultivation, clonal propagation, and in vitro conservation are critical. Furthermore, quality control based on the total saponin content is essential to ensure therapeutic consistency in commercial products, especially since different parts of the plant, including Shaka (leaves) and Ankura (sprouts), are used traditionally but differ in chemical profile (1,41).

7.2. Research Gaps and Novel Potential

Despite the wealth of preclinical data, high-quality, large-scale randomized controlled trials (RCTs) are scarce, especially for menopausal and adaptogenic claims. Future research should focus on:

- **Metabolic Syndrome:** Investigating its effects on insulin resistance and lipid profiles, expanding its potential role beyond Madhumeha (diabetes).
- **Bioavailability and Delivery:** Exploring nanotechnological approaches to enhance the poor bioavailability of saponins.
- **Standardization Markers:** Identifying additional specific marker compounds beyond total saponins (e.g., Asparagamine A) for stricter quality control.

8. Conclusion

Shatavari (*Asparagus racemosus*) is a quintessential example of an Ayurvedic herb whose traditional roles as a Rasayana ,female tonic, and adaptogen are consistently and profoundly supported by centuries of textual references within the Brihattrayi and Nighantus . Its rich profile of steroidal saponins, particularly the shatavarins, provides the pharmacological basis for its validated activities: enhancing lactation, protecting the gastric mucosa, modulating the immune response, and countering the effects of stress. The deep integration of Shatavari into the classical therapeutic framework—from promoting fertility to treating complex diseases like Rajayakshama and Vatarakta —underscores its unparalleled value in holistic medicine. Sustained, rigorous clinical research, coupled with critical conservation efforts, will ensure that this 'Queen of Herbs' continues to benefit global health in the integrative medical systems of the future.

References

1. Goyal RK, Singh J, Chauhan A. —an update. . 2003;57(9):408-14.
2. Bhatnagar M, Sisodia SS, Bhatnagar R. Antistress and adaptogenic activity of (shatavari) root extract in rats. . 2005;2(2):129-37.
3. Sekine T, Hagiwara H, Ikegami Y, et al. New steroidal saponins from the roots of and their estrogenic activity. . 2004;67(9):1668-75.
4. Rastogi S. (Shatavari): A versatile female tonic - a review. . 2011;6(1):164-8.
5. Sharma S, Kumar A, Khajuria R. Phytochemical analysis of Willd. root extract. . 2011;3(3):362-71.
6. Naidu MM, Misra R, Murthy PS. —A comprehensive review of its traditional uses, botany, and phytochemistry. . 2014;7(9):1001-8.
7. Singh UP. : A Comprehensive Study of Ayurvedic Materia Medica. Vol. II. Varanasi: Chaukhamba Sanskrit Bhawan; 2015.
8. Mishra B. of Shri Bhavamishra. Varanasi: Chaukhamba Bharti Academy; 2010. (Sloka 197-200).
9. Shastri AD. (Vol. 1). 11th ed. Varanasi: Chaukhambha Prakashan; 2014.
10. Rege N, Thatte S, Dahanukar S. Adaptogenic properties of six rasayana herbs used in Ayurvedic medicine. . 1999;13(4):275-91.
11. Sharma PV. (Text with English Translation). Vol. I (Sutrasthana). Varanasi: Chaukhambha Orientalia; 2015. 4/9.
12. Sairam K, Rao CH, Babu MD, et al. Antiulcerogenic effect of Willd. on experimental ulcer models in rats. . 2003;84(2-3):215-9.
13. Mandal S, Patra A, Rout G. Willd.: Biological and pharmacological potential. . 2013;2(5):1-6.
14. Naithani E, Choudhary D, Singh V. A comprehensive study of Shatavari (Willd.) in : A review. . 2019;10(5):26-31.
15. Shastri AD. (Text with Ayurveda Dipika Commentary of Chakrapanidatta). 5th ed. Varanasi: Chaukhamba Prakashan; 2009. 8/20.

16. Siddhpura MJ, Umretia DJ. Shatavari (Willd) and its formulations - a critical review through . . 2020;13(1):56-62.
17. Gupta AK, Tandon N. (Text with English Translation). Vol. II (Chikitsasthana). Varanasi: Chaukhambha Sanskrit Bhawan; 2008. 15/33.
18. Sharma H, Majumdar SK, Singh R. : A Compendium of Ayurveda (English Translation). New Delhi: Chaukhamba Publications; 2002. 5/8.
19. Sharma PV. . 2nd ed. Varanasi: Chaukhamba Orientalia; 2008. .
20. Pandey G. . 4th ed. Varanasi: Chaukhamba Krishnadas Academy; 2012. .
21. Shah S, Desai A, Trivedi H, et al. : An overview of its phytochemical profile and pharmacological properties. . 2012;14(2):29-33.
22. Joshi J, Sharma S, Sharma M. Pharmacological and phytochemical evaluation of (Shatavari): A review. . 2017;7(6):100-5.
23. Goudar KS, Ganachari MS, Bhat R. Estrogenic activity of root extract in female albino rats. . 2010;2(3):216-20.
24. Dhiman K, Kumar N, Behl T, et al. A review of the traditional uses, pharmacological activity, and phytochemistry of (Shatavari). . 2021;27(38):3884-900.
25. Chaurasia S, Tiwari N. Anti-abortifacient activity of the polycyclic alkaloid asparagamine A isolated from the roots of . . 2012;50(3):193-8.
26. Wiboonsin S, Sukketsiri W, Thongdon-A A, et al. Antioxidant activity and total phenolic content of root extracts. . 2216;6(9):160-5.
27. Gokhale AB, Sutar MP, Datar AG. Study of the mucilaginous component of root. . 1999;36(4):240-2.
28. Mishra N, Joshi R, Singh R, et al. Clinical evaluation of (Shatavari) as a galactagogue in lactating mothers. . 2019;7(5):1841-4.
29. Joglekar SN, Kulkarni AP, Ganu J. Effect of (Shatavari) extract on post-menopausal syndrome in Sprague-Dawley rats. . 2011;10(2):49-53.
30. Kamani R, Singh K, Pal D. (Shatavari): A review on its ethnomedicinal and pharmacological properties for female reproductive health. . 2017;5(2):112-9.
31. Dahanukar S, Karandikar S, Desai M. (Shatavari): A review of its antacid and antiulcer activity. . 1988;87:44-6.
32. Devi M, Devi H, Singh TB. Gastroprotective activity of in experimental ulcer models. . 2014;7(2):168-71.
33. Venkatesh A, Suresh V, Swetha G. Antidiarrhoeal activity of root extract in Wistar rats. . 2012;1(1):212-6.
34. Singh GK, Garabadu D, Muruganandam AV. Antistress and anti-depressant activity of in stressed rats. . 2012;69(1):103-7.
35. Wiboonsin S, Sukketsiri W, Thongdon-A A, et al. Neuroprotective effects of root extract on scopolamine-induced amnesia in rats. . 2017;10(11):340-4.
36. Bhat R, Saravanan D, Shivananda BG. Immunomodulatory activity of the polysaccharide fraction from root. . 2012;16(2):109-12.
37. Tawar M, Gupta V, Singh R. Anti-inflammatory activity of isolated compounds from in carrageenan induced paw edema in rats. . 2014;21(7):937-44.
38. Singh VP, Singh P, Sharma R. Subacute oral toxicity of in female Sprague-Dawley rats. . 2008;70(6):790-3.
39. Sharangdhara A. : Text with English Translation. Varanasi: Chaukhamba Orientalia; 2004. 9/110.
40. Arya C, Singh Y, Sharma P, et al. Shatavari Ghrita as a hormonal modulator: A critical review. . 2021;9(2):1705-10.
41. Sharma U, Singh A, Sharma G. Comparison of phytochemicals and antioxidant properties in different parts of . . 2017;17(4):1-8.
42. Chaturvedi S, Shukla P. Conservation status and strategy of Willd. - A threatened medicinal herb. . 2016;4(3):228-32.
43. Senthilkumar G, Devi A, Prakash S, et al. Antihyperglycemic and anti-hyperlipidemic activity of in streptozotocin-induced diabetic rats. . 2015;8(2):1-10.
44. Yadav R, Chaudhary J, Yadav S. A review on (Shatavari). . 2011;2(2):50-6.
45. Sharma PV. (Text with English Translation). Vol. I (Sutrasthana). Varanasi: Chaukhamba Orientalia; 2015. 38/4.
46. Hebbar JV. Shatavari (): Uses, research, side effects. . 2015 [cited 2025 Oct 7]. Available from: https://www.easyayurveda.com/2015/01/04/shatavari-asparagus-racemosus-uses-research-side-effects/.
47. Kumar V, Bhardwaj A. Pharmacological properties and traditional uses of : A review. . 2212;5(6):3471-4.
48. Prakash A, Sharma V. Potential immunomodulatory activity of in experimentally induced immunosuppression. . 2008;15(3):198-204.
49. Singh R, Tawar M, Gupta V. Estrogenic and anti-osteoporotic activity of isolated compounds from in ovariectomized rats. . 2014;21(7):937-44.

50. Patel T, Jain P. Shatavari (): A natural approach to women's health. . 2019;11(1):154-62.
51. Vani J, Rao K. Antioxidant and anti-inflammatory activities of root extracts. . 2015;8(2):221-5.
52. Sharma K, Goel A, Sharma S. as female tonic: a review. . 2010;1(3):1-6.
53. Kulkarni J. (Text with English Translation). Vol. II (Chikitsasthana). Varanasi: Chaukhamba Orientalia; 2007. 12/34.
54. Dwivedi S, Pachauri S. Review on pharmacological screening of Willd. in relation to Ayurvedic literature. . 2215;4(6):1-7.
55. Patil M, Naikwadi S, Kadam V. : An important medicinal herb. . 2011;3(3):16-20.
56. Bhatia V, Jaiswal P. Anti-ulcer properties of aqueous root extract of in albino rats. . 2212;3(2):641-5.
57. Kumar N, Dhiman K, Behl T, et al. Comprehensive review on : traditional use, phytochemistry, and pharmacology. . 2022;27(1):109.
58. Jain PK, Sharma S. Role of in gynaecological disorders. . 2020;11(4):420-5.
59. Chopra RN, Nayar SL, Chopra IC. . New Delhi: Council of Scientific & Industrial Research; 1956.
60. Shrikanta P. Therapeutic significance of Shatavari (Asparagus racemosus Willd.) synonyms review from. 2018;7(11):1552-64.