

"Shalparni (*Desmodium gangeticum*): Exploring The Therapeutic Landscape - A Review Of Traditional Uses And Modern Research Findings"

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Abstract :- The Fabaceae family contains important medicinal plant *Desmodium gangeticum*, a erect or climbing shrub that is mostly utilized in Indian traditional medicinal system and other subcontinental nations. Its main ingredients, gangetin, hordenine, and desmodin, are responsible for its wide range of pharmacological actions, which include immunomodulatory, anti-inflammatory, anti-diabetic, antioxidant, and cardioprotective properties. The properties of the plant's roots, bark, and aerial parts can be used to cure a variety of conditions, including lumbago, fever, diarrhea, and cough. Geographically, *Desmodium gangeticum* mostly found in subtropical and tropical climates; is cultivated extensively for traditional use in various places, especially in the lower Himalayan regions and the Gangetic plains. Its natural habitat is in Asia, Tropical Africa, and Australia, its medicinal virtues are the main reason for its great demand.

Keywords:- Desmodium, Gangeticum, Shalparni, Herbal, Plant

INTRODUCTION:-

Desmodium gangeticum (D. gangeticum) (L.) DC. (Family: Fabaceae), also known as Shalaparni, is a significant species of the genus Desmodium. It has been used as traditional medicine for a long time in India and other subcontinental countries due to its large therapeutic potential. Pharmacological investigations demonstrate the potential of D.gangeticum extract and its active ingredients, gangetin, hordenine, and desmodin, as anti-inflammatory, immunomodulatory, anti-diabetic, antioxidant, and cardioprotective medications. [1] It is an undershrub found in the central and eastern Himalayas, South India, and Sri Lanka. It can grow upright or suberect. The hill tribes of Upper Assam utilize the leaves in place of tea.[2]

- Taxonomic Classification
- Kingdom: Plantae
- Subkingdom: Tracheobionata
- Super-division: Spermatophyta
- Division: Magnoliopsida
- Class: Magnoliopsida
- Family: Fabaceae
- Genus: Desmodium
- Species: gangeticum[3]

Characteristics:-

Table No 1:- Characteristic Features of Shalparni plant [3]

Characteristic	Description
Plant Type	Perennial erect or ascending shrub
Height	2 to 4 feet tall
Stem	Angular and woody, with several prostrate branches
Leaves	Small (3-14 x 2-7 cm), ovate-oblong or rounded, covered with many gray trichomes.
Flowers	Small (4-7 cm), purple or white
Calyces	4-5 cm in length, pubescent
Seeds	Tiny, pale yellow, kidney-shaped
Roots	Lateral roots are yellow and have a silky texture
Flowering-Fruiting Season	March to December



Fig no.1:- Shalparni plant image[15]

Shalparni Plants have Various parts of following Medicinal Values –

1. Root: Antipyretic, diuretic, and astringent (used for irritable bowel syndrome and diarrhea). Medications include dysentery, anticatarrhal (for post-natal care, persistent fever, cough, biliousness, vomiting), diuretic, anthelmintic, laxative, and nervine tonic. *Desmodium* spp. Roots have carminative, mild purgative, stomachic, emmenagogue, and diuretic properties.
2. Leaves are galactagogue. A poultice of leaves is used to treat lumbago.
3. Bark Used for diarrhea.
4. The plant contains Pterocarpanoids such as gangetin, gangetinin, desmodin, and numerous alkaloids in its roots.
5. Aerial Portion: Provides indole-3-alkylamines and their derivatives. Gangetin has strong anti-inflammatory efficacy at 50 and 100 mg/kg p.o. in rats [4] *Desmodium gangeticum* is mostly adulterated with *Desmodium triquetrum* (L.) DC. *Desmodium pulchellum* (L.) Benth. *Desmodium velutinum* (Willd.) DC. *Desmodium triangulare* (Retz.) Merr. [5]

GEOGRAPHICAL DISTRIBUTION, CULTIVATION, AND COLLECTION:-

In India, Shalparni holds a significant presence in the tropics and subtropics, particularly thriving in the lower Himalayan regions and Gangetic plains (Singh, 2012; Kalkame et al., 2016). Its cultivation for traditional purposes is prevalent in the plains and lower Himalayas. Shalparni, native to the Asian tropics and Australia, thrives in a variety of tropical regions spanning Asia, Tropical Africa, and Australia, including India, Sri Lanka, the Himalayas, Thailand, Myanmar, Indochina, Malaysia, China, and Taiwan (Schrire, 1988). With a diploid chromosome count of 2n=22 (Sanjappa and Bhatt, 1985), Shalparni primarily relies on self-pollination (Nandanwar and Manivel, 2014). Growing naturally in forests up to 1500 meters above sea level, Shalparni typically takes the form of a shrub, reaching heights of up to 1 meter, and displaying leaves that are ovate or lanceolate in shape. Its flowering cycle, occurring twice annually from May to June and September to October, yields flowers in a spectrum of white, purple, or lilac hues, arranged in elongated terminal and axillary racemes measuring 10-30 cm, with 2–6 flowers at each node (Lakhani and Nanavati 1962).

Additionally, it ranks among the 70 most traded medicinal plant species, with demands exceeding 1000 metric tons, sourced from tropical forests (Ved and Gorya, 2008).[\[6\]](#)

Climate and Soil Requirements: *Desmodium gangeticum* thrives in tropical and subtropical climates. It prefers well-drained soils with good organic matter content. Propagation: *Desmodium gangeticum* can be propagated through seeds or vegetative methods like stem cuttings or root divisions. In vitro micropropagation techniques have also been used successfully. Planting Plant the seeds or seedlings in well-prepared soil during the appropriate season. Maintain proper spacing between plants to allow for healthy growth. Watering Adequate watering is essential, especially during the initial stages of growth. However, it is important to avoid waterlogging, as *Desmodium gangeticum* prefers well-drained soil Pest and Disease Management: Monitor the plants regularly for any signs of pests or diseases. Use appropriate measures like organic pesticides or cultural practices to manage any infestations. Weed Control: Regular weeding is necessary to prevent weed competition and ensure the healthy growth of *Desmodium gangeticum* plants. Pest and Disease Management: Monitor the plants regularly for any signs of pests or diseases. Use appropriate measures like organic pesticides or cultural practices to manage any infestations. Harvesting: The timing of harvesting depends on the part of the plant being used for medicinal purposes. Proper harvesting techniques ensure the quality of the medicinal components. Post-Harvest Handling: After harvesting, the plant parts can be dried and stored properly to maintain their medicinal properties. Conservation: Efforts should be made to conserve the genetic resources of *Desmodium gangeticum* through exploration, collection, and regeneration of accessions, as mentioned in the study.

PHYTOCONSTITUENTS:-

Table No 2:- Phytoconstituents of Shalparni Plant [8]

Phytoconstituent Type	Specific Constituents	Location/Part Found
Indole-3-alkylamines	-	Aerial parts
Phytosterols	Stigmasterol, Lupeol	Various parts
Alkaloids	N, N-dimethyl tryptamine, 5-methoxymethyl tryptamine, 5-methoxyamine oxide, Hordenine, Candicine, β -Phenylethylamine, Hypaphorine	Aerial parts
Pterocarpan	Tangential	Root
Amino glucosyl glycerol-lipid	-	Seed
Flavones	4-O-alpha-L-rhamnopyranosyl-(1-6)- β -D-glucopyranoside, Kaempferol, Salicylic acid, Uridine triacetate, 5-methyl genistein-7-O- β -D-glucopyranoside acid	Various parts
Other Phytoconstituents	3,4-dihydroxy benzoic acid, Kaempferol, Gallic acid	-
Phospholipids	-	-
Flavonoid glycosides	Rutin, Quercetin-7-O- β -D glycopyranoside, Kaempferol-7-O- β -D glycopyranoside	Various parts
Sterols	β -Sitosterol, Phenolic acids (Salicylic acid, Caffeic acid, Chlorogenic acid, Gallic acid), 3,4-dihydro benzoic acid	Various parts
Terpenoids	β -Amyrone	-

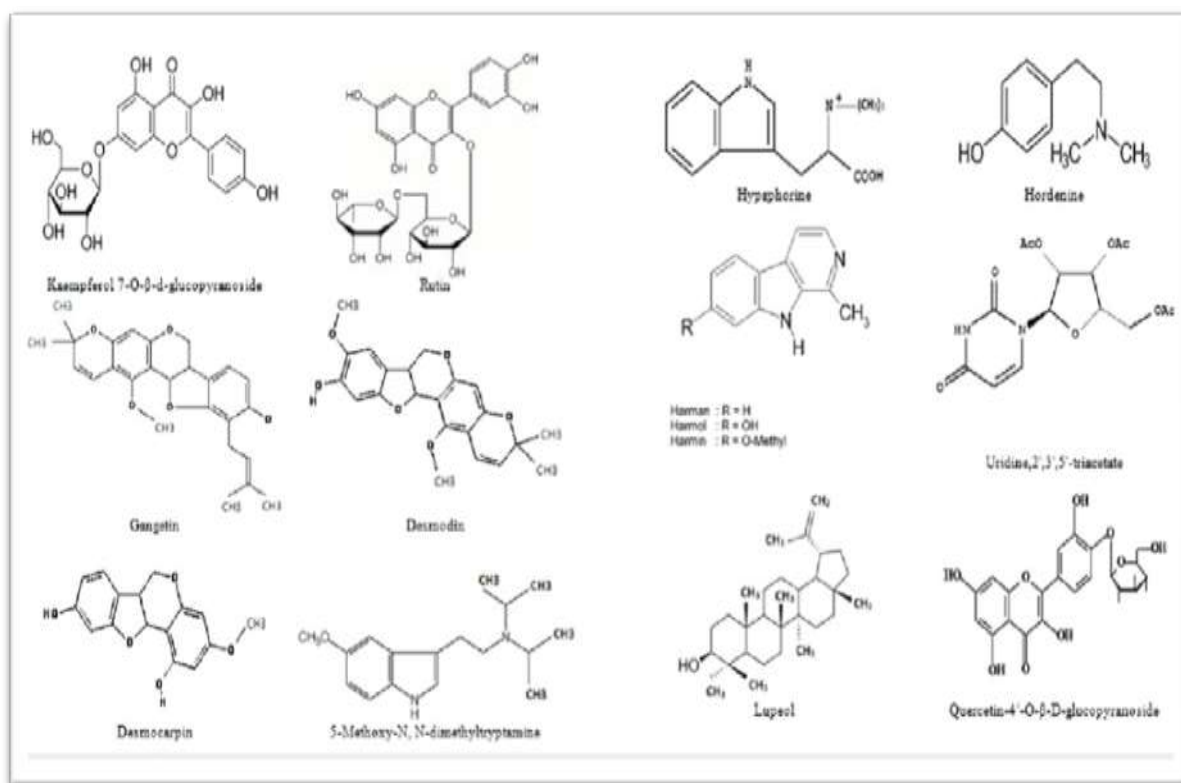


Fig 2– Compounds Isolated from *D. gangeticum*[8]

USES :-

1. **Cardio-Protective:** *Desmodium gangeticum* exhibits the capability to scavenge free radicals generated during ischemia and ischemia-reperfusion, thus safeguarding mitochondrial respiratory enzymes.

This leads to cardioprotection and holds potential for both preventing and treating Leishmania infection. Pre-administration of DG root extract before reperfusion enhances antioxidant levels in myocardial tissue homogenate and mitochondria, along with cardiac-specific marker proteins in myocardial tissue and perfusate. While DG methanol root extract mimics the action of Ach, the myocardial protection offered by the extract *surpasses* that of Ach due to the presence of antioxidants in the crude extract.[9]

2. **Anti-Diabetic:** *Desmodium gangeticum* aerial parts extracted with 50% aqueous alcohol showed antidiabetic effects in vitro and in vivo. In vitro studies suggest that *Desmodium gangeticum* acts on remaining cells in streptozotocin-induced diabetes, potentially leading to insulin production and decreasing fasting blood glucose levels in vivo. *Desmodium gangeticum* extract's substantial antidiabetic and lipid-lowering action may be due to the presence of chlorogenic acid, as revealed by HPLC analysis.[10]
3. **Anti-Anaphylactic:** Water extract from *Desmodium adscendens* leaves and stems was tested for anti-anaphylactic activities on guinea pigs. The extracts were concentrated at 5%, 10%, and 20% levels, and each animal received 30 mL of liquid daily for three weeks. The extract reduced anaphylactic contractions in a concentration-dependent manner when administered orally.[10]
4. **Anti-tussive:** *D. gangeticum* inhibited SO₂-induced cough reflexes in mice, providing 52.51% protection.[11]
5. **Anti-histaminic:** activity was tested in vitro on guinea pig ileum contractions generated by histamine. *D. gangeticum* inhibited histamine-induced guinea pig ileum contraction by 41.33% at a dosage of 100 ng/ml bath solution. Another study found that *D. gangeticum* inhibited histamine-induced contraction of guinea pig ileum by 41.86%.[11]
6. **Anti-Ulcer:** DG extract was administered in graduated doses of 50, 100, 200, and 400 mg/kg body weight. The highest effective dose was 200 mg/kg body weight, resulting in a protection index of 68.27%. The standard treatment, OMZ, provided 83.86% protection. Therefore, a dose of 200 mg/kg body weight was chosen for further testing. All of the models that the DG ethanolic extract was used to produce demonstrated a strong anti-ulcer effect. A 200 mg/kg body weight dose of DG demonstrated protection indices of 68.27, 38.2, 40.63, and 63.1% in the CRU, ASP, PL, and HST-caused ulcer models, respectively. In comparison, a 10 mg/kg dose of standard medication OMZ showed protection indices of 83.86, 56.35, 70.31,

and 84.21% in the aforementioned models. The alcohol-induced ulcer model showed that DG was the most protective at 200 mg/kg body weight, with a protection index of 88.87%, while SUC exhibited 92.64% protection at 500 g/kg body weight. The protection index varies depending on the model.[\[12\]](#)

7. **Vatarakta (Gout):** Mixing Shalparni or Prisniparni (Urariapicta) or both types of Brihati (Solanum indicum) pounded with milk and a saturating drink helps in managing Vatarakta.[\[7\]](#)
8. **Netraroga (Eye Disorders):** Using the root of Shalparni combined with rocksalt and Maricha (black pepper) as a collyrium, rubbed with sour gruel in a copper vessel, is beneficial for eye ailments, particularly for destroying pilla (conjunctival granulations).[\[7\]](#)
9. **Hemicrania (Migraine):** Applying the juice of Shalparni locally or snuffing with Shalparni juice can alleviate hemicrania.[\[7\]](#)
10. **Easy Parturition:** Application of the paste of Shalparni root on areas such as the navel, pelvis, and vulva helps in expelling the fetus during difficult childbirth.[\[7\]](#)
11. **Pediatric Diseases:** Decocting water with Shalparni, Prishniparni (Urariapicta), and Puga bark (Areca catechu) and mixing it with honey is recommended for pacifying all three doshas and treating various pediatric diseases, including diarrhea.[\[7\]](#)
12. **Effect on CVS:** *Desmodium gangeticum* has been shown in several trials to have cardio-protective properties. Oral administration of *Desmodium*'s water decoction. In diabetic rats, combining *Desmodium gangeticum* roots (0.1 mg/kg) with insulin (40 ~U/g) in a 1:1 (v/v) ratio resulted in considerable recovery of ischemic heart from reperfusion-induced contractile dysfunction. Oral and intraperitoneal treatment of *Desmodium gangeticum* mixed insulin resulted in greater myocardial protection compared to insulin alone. Rat hearts treated orally with *Desmodium gangeticum* mixed insulin showed faster recovery of mean arterial pressure, heart rate, and left ventricular developed pressure compared to insulin or *Desmodium gangeticum* root extract alone. Despite being administered insulin orally by Combining insulin and *Desmodium gangeticum* root extract orally resulted in a slow but extended hypoglycemic effect, but cardio-protection was more significant than intraperitoneal injection. This suggests that the combination of insulin and *Desmodium gangeticum* can effectively penetrate the gastrointestinal tract.[\[10\]](#)
13. **Anti-Bacterial:** Ethanol, methanol, aqueous, and chloroform extracts of *D. gangeticum* were tested for antibacterial activity against *Klebsiella pneumonia*, *Streptococci*, *E. coli*, *S. mutans*, *Pseudomonas aeruginosa*, and *S. typhi*. The antibiotic sensitivity test included amoxicillin, Ciprofloxacin, Kanamycin, Penicillin, and Tetracycline. The methanolic extract inhibited *S. mutants* most effectively (24±2.3 mm), while the aqueous extract inhibited *P. aeruginosa* the least (7±0.08). Tetracycline, kanamycin, and ciprofloxacin were proven to be effective antibiotics against all bacteria. The methanolic extract of *D. gangeticum* had the highest antibacterial activity among all extracts. *D. gangeticum*'s methanolic extract may have antibacterial properties for a variety of infections.[\[11\]](#)
14. **Anti-inflammatory and Anti-Oxidation:** *Desmodium gangeticum* flavonoids and alkaloid fractions were tested for anti-inflammatory and antioxidant properties in rats provoked with carrageenan. The flavonoid fraction of *D. gangeticum* contains antioxidant activity that was significantly higher than that of the alkaloid fraction and the standard drug indomethacin. It increased liver and spleen, catalase (CAT), superoxide dismutase (SOD), and glutathione peroxidase (GPX) activities while decreasing lipid peroxidation.[\[9\]](#)
15. **Anti-Nephrotic Activity:** Soyasaponin I (132) (refer to Fig. 3), a compound derived from *Desmodium styracifolium*, demonstrated efficacy against urolithiasis. Its ability to counteract the formation of calcium oxalate renal stones induced experimentally by ethylene glycol and 1-(OH)D3 in rats was assessed. Administering Soyasaponin I at a dosage of 0.6 mg/kg/day for three weeks notably decreased the occurrence of urinary stones by 29% compared to the control group (81%). The serum calcium (Ca) levels in the Soyasaponin I-treated group significantly rose ($P < 0.01$), while urinary calcium excretion notably decreased. Conversely, urinary citrate excretion, a stone-preventing factor, significantly increased in the Soyasaponin I-treated group, whereas urinary phosphorus excretion increased in both groups. Furthermore, the Soyasaponin I-treated group exhibited a greater increase in urine volume compared to the control group. These findings collectively suggest that Soyasaponin I inhibits the formation of calcium oxalate stones in rat kidneys by promoting urine output, reducing calcium excretion, and enhancing citrate excretion.[\[10\]](#)
16. **Wound Healing Activity:** To explore the wound-healing effects of *Desmodium triquetrum*, researchers utilized various rat wound models, including incision, excision, and dead space wounds. They found that the ethanol extract from *Desmodium triquetrum* leaves, administered at 200 mg/kg, significantly boosted tensile strength (463 ± 7.9) by day 10 post-injury in the incision wound model ($P < 0.005$). In dead space wound models, the extract notably increased both granuloma weight and breaking strength, and histopathological examination revealed enhanced collagen deposition. Additionally, the extract notably expedited epithelialization and wound contraction ($P < 0.05$) (Shirwaikar et al., 2003). Furthermore, a water extract derived from *Desmodium microphyllum* (at a dosage of 60 g whole plant/kg) significantly decreased acute mortality in mice induced by ET-1 and S6b (i.v.) in a dose-dependent manner (Wang et al., (1997).[\[10\]](#)
17. **Inhibition Of Smooth Muscle Contraction:** *Desmodium adscendens* has been shown to effectively relax smooth muscle contractions (Addy and Burka, 1990). From this plant, three triterpenoid glycosides—Soyasaponin I (132), dehydrosoyasaponin I (133), and Soyasaponin III (134)—were isolated and believed to act as potent activators of calcium-dependent potassium channels, making them the most powerful known potassium channel openers (McManus et al., 1993).

Moreover, the chloroform: methanol (1:1) extract from *Desmodiumgrahami* Gray demonstrated concentration-dependent inhibition of spontaneous contractions in isolated rat ileum (Rojas et al., 1999, 2003). Additionally, the ethanolic extract of *Desmodium gangeticum*, when administered orally at a dose of 200 mg/kg, exhibited anti-ulcerogenic activity (Dharmani et al., 2005).[\[10\]](#)

- 18. Anti-depressant:** Mice treated with extracts from *Desmodiumgangeticum* leaves showed dosage-dependent antidepressant effect, and the greater dose of extracts was discovered to have the most impact on depression. In a dose-dependent way, the extracts of *Desmodiumgangeticum* substantially reduced the activity of MAO-A in the mouse brain in vivo. However, a mere 400 mg/kg b.wt of extract from *Desmodiumgangeticum* reduced the activity of MAO-B. These findings suggested a possible correlation between the antidepressant properties of extracts and the reduction of MAO activity, namely MAO-A activity, in mice used in immobility tests. The delivery orally. The mice treated with a *Desmodiumgangeticum* extract showed antidepressant action in response to stress caused by FST, potentially through modulating the central neurochemical axis and HPA. The detailed investigation needed in the upcoming study is necessary to fully define the bioactive agents' action processes. Substances that appear at the cellular level when *Desmodiumgangeticum* extracts are administered.[\[14\]](#)

ADVERSE EFFECT:-

Acute toxicity investigations revealed that it was nontoxic (MPI). Curaroid-like alkaloids (MPI). Quarternary beta-carboline alkaloids have anticholinesterase activity comparable to physostigmine and higher potency than tertiary beta-carbolines (MPI). Synergies may compensate for genistein's low concentration.[\[13\]](#)

MARKETED FORMULATION:-

- **Tablet :-**

1) Desmo tablets

Used for respiratory disorders and also shows anti-inflammatory action.



Fig no. 3 :- Minirin Desmopressin Acetate Tablets (0.1mg)[\[16\]](#)

2) GanjhuVir tablets

Used in viral infection (Antiviral) and in conditions like Covid, Dengue, Fever, Immunity

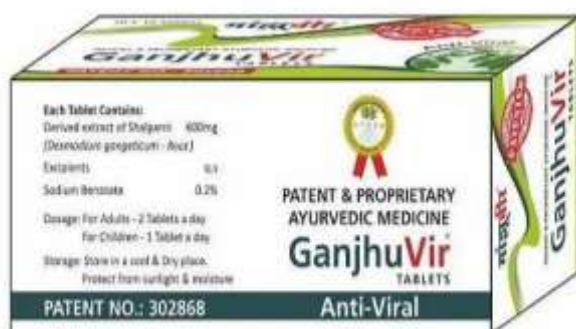


Fig no.4 :- GanjhuVir Tablets (600mg). [\[17\]](#)

- **Salparni oil:-**

To achieve the optimum benefits, this oil is made following an age-old Ayurvedic procedure. A common human experience known as spirituality helps us become more in tune with the present, ourselves, the natural world, or the divine. For as long as there is documentation of them, incense and aromatic essences have been utilized in spiritual endeavors. Aromatic herbs are still used in several religions' religious rites at altars in homes and temples.



Fig no. 5:- Marketed formulation of salparni oil [18]

HOME REMEDIES:-

The root decoction is utilized in burning micturition. Giving a hot infusion of its root reduces bronchial and pulmonary edema.

A decoction is beneficial against pulmonary ulcers. Hemicrania: Snuffing shalparni juice relieves hemicrania.

Applying shalparni root paste to the navel, pelvis, and vulva can help with delayed labor and promote easier delivery. Diarrhea: Take shalparni as a vegetable regularly. For ForVatarakta, consume shalparni, prishnaparni, or both forms of bhakti combined with milk and a saturating drink.[9]

CONCLUSION:-

The thorough analysis of *Desmodium gangeticum* (D. gangeticum) emphasizes the plant's importance in traditional medicine, especially in India and other subcontinental countries. The pharmacological attributes of the plant, ascribed to active components including gangetin, hordenine, and desmodin, comprise an extensive array of therapeutic activities, such as immunomodulatory, antioxidant, anti-diabetic, inflammatory, and cardioprotective effects. The plant's aerial parts, bark, and roots are all useful medical parts for treating conditions like cough, fever, diarrhea, and lumbago. Geographically, *Desmodium gangeticum* is grown in areas such as the lower Himalayas and the Gangetic plains, where it grows well in tropical and subtropical temperatures. Its natural habitat is found in Asia, Tropical Africa, and Australia, which reflects the high demand for it due to its therapeutic qualities.

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