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# Comparative, Phytochemical Analysis and Antimicrobial Evaluation of *Desmodium gangeticum* Leaf and *Desmodium triflorum* Leaf

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**ABSTRACT**

The species of *Desmodium* is a medicinal plant with an enormous source of therapeutic properties that help in the alteration /modification of disease. The present study evaluated that Shalparni (leaf) has good and potent antimicrobial activity. The plant has dashmoola of Ayurveda which is the most important ingredient of Dashmoolarista of Ayurveda phytochemical research concluded that the plant is a rich source of alkaloid flavonoids pterocarpans however it has lot more therapeutic value other than antimicrobial activity.

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## INTRODUCTION:

Herbal medicine is a plant-derived product that help in the treatment of the disease. These are also a source of the type of dietary supplements.[1] They are belief to be more efficacious with less side effect. herbs are the science of Pharmacognosy which consist of the stem leaves, flowers and fruits which have active phytoconstituents used for the treatment of particular disease. Herbs are a natural blessing to the human beings for their wellness. [2]

***Desmodium gangeticum-***

*Desmodium gangeticum* belong to the family of Fabaceae and subfamily Leguminosae it is a perennial herb has a huge diversity across the globe. It is a leading mixture of 10 ingredients one of which is Dashmula kwath of Ayurvedic medicine [3]. In India 49desmodium species were reported and out of which are found in the state of Gujarat. *Desmodium gangeticum* act as antipyretic medicine special in case of typhoid fever that come along the way of chillness and also help in optimizing the flaming sensation in feet, face, eye. Shalparni is packed with an array of minerals but particularly rich in calcium, phosphorus, magnesium, vitamin A,C phosphorus is a mineral that keeps bones healthy and act as a vasodilator for blood vessels in the cardiovascular system Vitamin C is an essential nutrient involved in the repair of tissue. Due to its antioxidant property it helps in scavenging free radicals which causes damage to cell [4]. Its root has been reported for its expectorant property and aerial parts contain alkaloid which is a derivative of tryptamine which have anticholinesterase activity.

**Taxonomical Hierarchy of *Desmodium gangeticum***

Scientific Name- *Desmodium gangeticum*(5)

Common Name – Shalparni

Family- Fabaceae

Domain Eukaryota

Kingdom- Plantae

Phylum-Spermatophta

Class- Dicotyledona

**Taxonomical Hierarchy of *Desmodium triflorum* [6]**

Scientific name –***Desmodium triflorum***

Common Name -Creeping tick trefoil

Family- Fabaceae

Domain Eukaryota

Kingdom- Plantae

Phylum-Spermatophta

Class- Dicotyledona

**MATERIALS AND METHODS:**

The leaves of *D.gangeticum* and *D.triflorum* were collected from the botanical garden of FRI, Dehradun, and authentication was done in Forest Research Institute, Dehradun.

**Drying and Preparation of Extract:**

The leaves of *D. gangeticum* and *D.triflorum* were left in contact with the menstruum (Ethanol, methanol, water and hexane) for longer period in a closed vessel which is occasionally shaking, the menstruum is strained, the marc is pressed to obtain the remaining liquid into two solutions are mixed and clarifying by filtering or by standing.

**PHYTOCHEMICAL SCREENING:**

The qualitative determination of *Desmodium gangeticum* and *Desmodium triflorum* were carried out for the estimation of phytoconstituents as per standard procedure.

**Test for Alkaloids:**

1. **Mayer's test**: crude drug + few drops of Mayer's reagent were added through the side of the test tube a creamy or white precipitate indicate that the test is positive for both desmodium species.

2. **Hager's test**: crude drug +few ml of Hager's reagent were added a yellow precipitated confirm the test for both desmodium species.

3. **Wagner's test:** crude drug+few drops of Wagner reagent were added by side of the test tube a reddish-brown confirms for the desmodium species. [7]

**Test for Carbohydrate:**

**Benedict test**: crude drug+ few ml of Benedict reagent was added and the mixture was heated on boiling water bath for 2min a red-colored ppt indicate the presence of sugar for both desmodium species.

**Test for saponin glycoside**: the extract sample was diluted with water made up the volume for 25ml the suspension was shaken in a graduated cylinder for a 15min foam layer to indicate the presence of saponins.[7-8]

**Test for tannin**: crude drug + ferric chloride solution was added and brownish color indicates the presence of tannins the test is positive of *desmodium gangeticum.*

**Test for terpenoids**: crude drug +2ml of chloroform and concentrated sulfuric acid to form a layer a reddish-brown coloration of the interface shows the presence of terpenoids.

**Test for steroids**: Extract +concentrated sulphuric acid form a layer of red colour to indicate the presence of steroids.

**Antibacterial activity of plant extracts (Both Desmodium species)**

The bacterial cultures were obtained from the School of Applied Science Uttaranchal University, Dehradun and maintained on the nutrient agar. The disc diffusion method was used for testing anti-bacterial activity. [9] The media (25 ml) inoculated with a suspension of experimental organism was poured in to sterilized petri dishes and left to gel at room temperature. Whatman's filter paper discs (7 mm diameter) were soaked in 0.2 ml aqueous and alcoholic extracts as well as a 10 ppm solution of Tetracycline. The filter discs were placed equidistantly on inoculated media and diffusion of solution were allowed to occur for 30 minutes at room temperature. Petri dishes were incubated at 37oC for 24 hours. Three plates were employed per treatment and the average zone of inhibition was recorded.

**RESULT:**

*Table.1 Preliminary test for desmodium gangeticum*[8]

| PHYTOCHEMICAL | METHANOL | ETHANOL | HEXANE | WATER |
|---|---|---|---|---|
| ALKALOID | + | + | + | + |
| FLAVONOIDS | + | - | _ | _ |
| TANNIN | + | - | _ | _ |
| STEROID | - | + | + | _ |
| CARBOHYDRATES | + | - | _ | _ |
| TERPENOIDS | + | + | _ | + |
| SAPONIN | + | + | + | + |
| POLYPHENOL | + | + | _ | + |

*Table.2 preliminary test for desmodium triflorum*[9]

| PHYTOCHEMICAL | METHANOL | ETHANOL | HEXANE | WATER |
|---|---|---|---|---|
| ALKALOID | + | + | - | + |
| FLAVONOIDS | - | - | _ | _ |
| TANNIN | + | - | _ | _ |
| STEROID | - | - | - | _ |
| CARBOHYDRATES | - | - | _ | _ |
| TERPENOIDS | + | + | _ | + |
| SAPONIN | - | - | - | + |
| POLYPHENOL | - | - | _ | - |

**ANTI-BACTERIAL ACTIVITY:**

*Table 3. Antibacterial assay of desmodium gangeticum*

| BACTERIAL STRAINS | METHANOL | HEXANE | ETHANOL | WATER | STANDARD DRUGS |
|---|---|---|---|---|---|
| *ESCHERICHIA COLI* | 20.6 | 16.8 | 10.5 | 6.3 | |
| *STAPHYLOCOCCUS AUREUS* | 26.2 | 21.6 | 13.4 | 6.4 | |
| *BACILLUS SUBTILLIS* | 24.5 | 22.5 | 16.2 | 7.1 | |
| *VIBRIO PARAHAEMOLYTICUM* | 18.3 | 14.7 | 9.1 | 6.1 | |

*Table 4. Antibacterial assay of Desmodium triflorium*[12]

| Bacterial strains | METHANOL IZD(in mm) | HEXANE IZD(in mm) | ETHANOL IZD(in mm) | WATER IZD(in mm) | STANDARD DRUGS Tetracycline IZD(in mm) |
|---|---|---|---|---|---|
| *ESCHERICHIA COLI* | 2.6 | 1.8 | 0.5 | 1.1 | |
| *STAPHYLOCOCCUS AUREUS* | 6.2 | 1.6 | 1.4 | 2.4 | 12 |
| *BACILLUS SUBTILLIS* | 2.5 | 2.5 | 1.2 | 2.1 | |
| *VIBRIO PARAHAEMOLYTICUM* | 1.3 | 1.7 | 1.1 | 0.1 | |

**DISCUSSION AND CONCLUSION:**

The study concluded that the leaf extract of *Desmodium gangeticum* possesses a bioactive compound with antimicrobial activity against bacteria which have all the secondary metabolite plant due to which the plant has lots of therapeutic value. The plant sensitivity profile of the unknown bacteria tested is resistant to *Desmodium gangeticum* (leaf) more in comparison to the same species of *Desmodium triflorium* consequently, the plant which has antimicrobial properties have lots of potent value with less side effect.[13] The antimicrobial

activity of specific concentrations of different extracts of two plant *Desmodium gangeticum* and *Desmodium triflorum*. However, the Methanolic extract showed more antimicrobial activity against unknown bacteria because of the presence of different phytoconstituents like alkaloid, sterol, flavonoid, and terpenoid. The methanol extracts showed a significant effect on bacteria with zone of inhibition between 5-9mm at the tested concentration. The presence of alkaloids inhibits the growth of bacteria mainly by inhibiting the DNA synthesis and also terpenoid has a major role in retarding the growth of the bacteria.[14]

In conclusion, the different solvent extract of two different plant shows good and potent result in *Desmodium gangetium* leaf of menthol give potential effect on bacteria so our result support that *Desmodium gangeticum* has maximum antimicrobial property as a comparison to *Desmodium triflorum*.

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