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Pharmacological Review on Indian Sacrificial Grass *Desmostachya bipinnata* (L.) Stapf



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Sanjaya Kumar Y.R.*¹, Deepak Lamba², Bidhan Mahajon³, Veerendra Gupta⁴

*¹Assistant Director (Pharmacology), ²Research Officer (Pharmacology), ³Research Officer (Ayurveda), ⁴Senior Research Fellow (Pharmacology),
Central Council for Research in Ayurvedic Sciences
(Ministry of Ayush), New Delhi, India.*

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ABSTRACT

Desmostachya bipinnata (L) Stapf. is used in traditional Indian system of Medicine and the roots of the grass is known for its cooling, diuretic, astringent and galactagogue properties. They are found to be beneficial in diarrhea, urinary calculi, dysuria and diseases of bladder. The extracts of the *Desmostachya bipinnata* have shown significant analgesic and anti-inflammatory, diuretic, antidiarrhoeal, hepatoprotective, and antioxidant activities in the various disease models through animal experimentation.



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INTRODUCTION

Desmostachya bipinnata known as halfa grass belongs to family Poaceae is a tufted perennial grass with thick scaly root stocks with leaves with length reaching up to 50 cm (1). It also has sacrificial importance due to its use in Yagnas and religious rites (2). It is distributed throughout India in hot and dry places and it found in Egypt and Syria (3). In Ayurveda, *Desmostachya bipinnata* is known as Kusha with properties as Madhura Rasa, Laghu Guna, Sheeta Virya and Madhura vipaka with therapeutic uses in Mutrakricchra, Visarpa, Daha, Ashmari, Trishna, Bastiroga, Pradararoga, Raktapitta. Major Ayurvedic formulations with Kusha as ingredient include Karpuradyarka, Sukumara Ghrita, Ashmarihara Kashya Churna, Trinapancamula Kvatha Churna, Mutravirecaniya Kashaya Churna, Stanyajanana Kashaya Churna (4).



***Desmostachya bipinnata* (L.). Staph**

([Amazon.in/kusha-grass-Desmostachya – bipinnata –plant/dp/B09THYTH8](https://www.amazon.in/kusha-grass-Desmostachya-bipinnata-plant/dp/B09THYTH8))

EXPERIMENTAL PHARMACOLOGY

Safety/toxicity studies:

The aqueous extract of *Desmostachya bipinnata* roots was found to be safe up to dose of 2000mg per kg body weight in Wistar rats upon single oral administration during the experimental trail conducted as per OECD guideline 423 (5). The 90% ethanol and aqueous extracts of *Desmostachya bipinnata* root were found to be safe upto 2000 mg per kg body weight in Swiss mice upon single per oral administration (6). The aqueous, hydroalcoholic,

alcoholic, chloroform and ethyl acetate extracts of *Desmostachya bipinnata* (roots and stem) were found to be safe upon single oral administration at dose of 5000 mg per kg body weight in Swiss mice in acute oral toxicity study carried out as per OECD guideline 423 (7).

Hepatoprotective activity

The administration of aqueous extract of *Desmostachya bipinnata* roots at dose of 200 mg per kg body weight for 7 days exhibited significant hepatoprotective activity in rats in an experimental model of Paracetamol induced hepatic damage by reducing the SGOT, SGPT, Acid Phosphatase, Alkaline Phosphatase and significant elevation of antioxidant enzymes such as Superoxide Dismutase, Glutathione Peroxidase, Glutathione S Transferase and Catalase as compared to the Control group (5). The Ethanol and aqueous extract of *Desmostachya bipinnata* leaves were evaluated for hepatoprotective activity in rats against carbon tetrachloride, Paracetamol and Ethanol induced hepatotoxicity models and the test drug showed significant protection at dose of 200 mg per kg bodyweight with significant reduction in SGOT, SGPT, ALP and total Bilirubin as compared to toxic control (8).

Antidiabetic activity

The hydroalcoholic extract of *Desmostachya bipinnata* whole plant at dose of 500 mg per kg body weight has showed significant reduction in blood glucose levels in male Wistar rats against dextrose induced hyperglycemia (9).

The ethanol extract of *Desmostachya bipinnata* whole plant at dose of 200 mg and 400 mg per kg body weight was found to reduce the elevated blood sugar levels in the alloxan induced experimental diabetes in Wistar albino rat (10).

Antidiarrhoeal activity

In an experimental study, the alcoholic and aqueous extracts of *Desmostachya bipinnata* roots at dose of 400 mg per kg body weight have significantly reduced the cumulative fecal mass in rats in the Castor oil induced diarrhoeal model and the alcoholic extract was found to be more effective. The extracts were also significantly inhibited the gastrointestinal motility by inhibiting the gastrointestinal transit of Charcoal meal in albino mice (6).

In another study, the alcohol extract of *Desmostachya bipinnata* (roots and stem) showed antidiarrhoeal activity by significantly reducing the feces volume in experimental models of

castor oil induced diarrhea and magnesium sulphate induced diarrhea (7).

Antihistaminic activity

The antihistaminic activity of the hydroalcoholic, alcoholic, and ethyl acetate extracts of *Desmostachya bipinnata* (roots and stem) was studied in Guinea pigs and the prior administration of extracts at dose of 500 mg per kg body weight per oral showed significant reduction in the gasping induced by histamine (11).

Antianxiety activity

The aqueous and alcoholic extracts of *Desmostachya bipinnata* leaves showed anti anxiety activity in Wistar rats at doses of 200 and 400 mg per kg body weight in the Elevated plus model and actophotometer models (12).

Antioxidant activity

The hydro alcoholic extracts of *Desmostachya bipinnata* whole plant at concentrations of 50, 100, 200, 300, 400 and 500 mg per microlitre showed significant antioxidant activity in Hydrogen peroxide Radical scavenging assay, DNA protection assay and Spot assay (13).

The methanol extract of leaves of *Desmostachya bipinnata* showed significant antioxidant activity at concentration of 100 to 500 microgram per ml in the DPPH radical scavenging assay (14).

Analgesic, Anti-inflammatory and Antipyretic activities

The analgesic activity of Petroleum ether, Benzene, Chloroform, ethanol and aqueous extracts of *Desmostachya bipinnata* (whole plant) was screened in Wistar rats through tail immersion method and all the extracts showed significant analgesic activity in rats at dose of 300 mg per kg body weight and the chloroform extract exhibited maximum analgesic activity. The extracts were evaluated for antipyretic activity in rats and the extract significantly reduced the elevated body temperature induced by the S/c injection of yeast suspension. The extracts also showed significant reduction in the carrageenan induced paw oedema in rats and maximum anti-inflammatory activity was exhibited by ethanol extract (15).

The hydroalcoholic extract of *Desmostachya bipinnata* roots showed significant anti-inflammatory activity at dose of 300 mg per kg body weight in rats in the carrageenan induced hind paw method (16).

The hydroalcoholic extract of *Desmostachya bipinnata* exhibited significant analgesic and antiinflammatory activities at dose of 400 mg per kg body weight screened by hotplate method and carrageenan hind paw oedema method (17).

Diuretic activity

The hydroalcoholic extract of whole plant of *Desmostachya bipinnata* was screened for diuretic activity in rats and the extract at dose of 500 mg per kg body weight produced significant increase in urine output in Wistar rats (18).

CONCLUSION

The efficacy of *Desmostachya bipinnata* as diuretic, analgesic, antiinflammatory, antidiabetic has been documented through experimental trials and these findings indicate the traditional use of *Desmostachya bipinnata* has logical basis. The benefits of this abundantly available grass need to be used to maximum extent for treatment of ailments in humans.

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