Review Article

A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF *DESMODIUM GANGETICUM*

Lolita prima fernandes*, Ashok shenoy and AR Shabaraya

Department of Pharmacology, Srinivas College of Pharmacy, Valachil,

Post- Farangipete, Mangalore- 574 143, Karnataka, India.

ABSTRACT

Shalparni (*Desmodium gangeticum*) is under the category of the most important herbs in Ayurveda. It is one of the herb amongst Dashmoola which is the group of 10 herbs. This herb is packed with innumerable Ayurvedic properties. This herb has the anthelmintic, anti-catarrhal, carminative, diuretic, expectorant, febrifuge, nervine tonic, anti-diarrheal, stomachic properties. Moreover, use of this herb is quite good to resolve the complications like enteric fever, respiratory complications and piles.

Key Words: *Desmodium gangeticum*, Anti-inflammatory, Anti-diabetic.

INTRODUCTION

World health organization has listed over 21,000 plant species used around the world for medicinal purposes. In India, about 2500 plant species belonging to more than 1000 genera are being used in indigenous system of medicine which symbolizes the rich tradition for herb and herbal remedies.[1] From the ancient time different cultures around the world have used herbs and plants as a remedy in different diseased condition and maintain health. Many drugs prescribed today in modern medicinal system are derived from plants. Synthetic drug is known for its toxicity which sometimes needs serious medical attention. So in the recent past the practice of herbalism has got popularity around the globe including the developed countries due to its potency and apparent safety profile.

Medicinal plants play a key role in human health care. About 80% of the world population relies on the use of traditional medicine, which is predominantly based on plant material. Scientific studies available on medicinal plants indicate that promising phytochemicals can be developed for many health problems.[2] More over some of the pathological condition where the scientific drugs become crippled but traditional herbal therapy can be a satisfying option which demands an ample amount of research.[3] The attempt is made to present an overview of phytochemical and pharmacological activities of the plant *Desmodium gangeticum.*

Desmodium gangeticum belongs to family to Fabacceae, is a tree distributed throughout the world. *Desmodium gangeticum* generally called as Shalparni. It known with different names in different languages. Salpan, Salpani (Hindi), Salpani (Bengali), Selman (Gujarati), Pullati, Orila (Malayalam), Radbhal (Marathi), Prisniparni (Sanskrit), Pulladi, Orilai (Tamil) and Gitanaram, Kolakuporna (Telugu), Shalwan (Urdu), Murelehonne (Kannada)[4]

AVAILABILITY[5]

A common shrub: 2-4 ft high, found almost throughout India ascending to 5000ft. from Himalayas. It is very variable and is met with in its various forms in forest and waste land.

PLANT

It is slender, suberect, diffusely branched under shrub, 2-3 ft high; stem woody, branches slender, irregularly angled and clothed with upwardly directed short soft grey hairs.

LEAVES

Leaves unifoliate, alternate, stipules, stipulate, petioles 1-2cm long; stipules 6-8 mm long, linear subulate, striate at the base, blade ovate or ovate lanceolate, acute the margins somewhat waved, glabrous and green above, paler and clothed with dense, soft, whitish appressed hairs beneath, reticulately veined, base rounded, truncate or sub cordate; main nerves 8-12 pairs.

FLOWER

Flowers small with minute setaceous bracts on short upwardly directed pedicels. Calyx tube short, companulate, finely downy, and cleft to the middle into two lips; upper lip two cleft, the lower three partite; teeth short and triangular, corolla exerted 4mm long, violet or white; standard 3mm broad, orbicular, cuneate at base; wings obliquely oblong, more or less

adhering to the keel; keel petals obtuse, incurved.

SEEDS

Seeds compressed reniform without a strophiole. Dry seeds when mechanically injured and kept for germination could break the seed dormancy giving 22% germination.

ROOTS

The root bark is yellowish white in colour and has a leathery texture. It is easily peelable. The outer skin is very soft. The middle bark has a slight yellowish tint and the inner bark appears lighter coloured than the parts outside. The wood itself is small but possesses a slightly mucilaginous sweetish taste. The tap root is poorly developed and the lateral roots are very strong, nearly uniformly cylindrical, light yellow and smooth.

CHEMICAL CONSTITUENTS

Desmodium gangeticum is rich in flavonoids, alkaloids, pterocarpanoids. The plant contains alkaloids gangetin, gangetinin, desmodin. Leaflets contain pterocarpan, phytoalexin, desmocarpin. Aerial parts contain 5-methoxy-N, N-dimethyltryptamine, N1 N-dimethyltryptamine, their N-oxides, N-rnethyltetrahydroharman. 6-rnethoxy-2-methyl-Beta-carbolinium cation.[6,7] Flavanoids like Genistein, 2'-hydroxygenistein,8-C-Prenyl-5,7,5'trimethoxy-3',4'-methylenedioxyflavone.[8]

PHARMACOLGICAL ACTION

- **ANTIINFLAMMATORY AND ANTI-NOCICEPTIVE**

By Inhibition of inflammatory mediators and Modulation of stimulation threshold of opioid receptor subtypes, neurotransmitters and secondary messengers *Desmodium gangeticum* will show the anti-inflammatory and antinociceptive action.[9]

- **ANTIDIABETIC**

By increasing insulin secretion from the existing beta cells, thus potentiating plasma's insulin effect[10]. 10 and It also had a role on the lipid profile of the rats by causing reductions in cholesterol and triglycerides and increasing the HDL significantly .[11]

- **ANTIAMNESIC**

By improving learning and memory and reversing scopolamine induced amnesia and By reducing acetyl cholinesterase activity (due to indol-3-alkylamines and carbolines) in brain.[12,] Hence, aqueous extract of D. gangeticum can be used to delay the onset and reduce the severity of the symptoms of dementia and Alzheimer's disease.

- **ANTIOXIDANT AND ANTIINFLAMMATORY[13]**

Presence of polyphenols such as caffeic acid and chlorogenic acid, which are reported antioxidants[14], in the flavonoid fraction.

- **CARDIOPROTECTIVE EFFECT AGAINST ISCHEMIA REPERFUSION (IR) INJURY[15]**

By improving the antioxidant function of mitochondria (present in myocardium and cardiac tissues) against IR- mediated oxidative stress and By decreasing TBARS in mitochondrial extracts and tissue homogenates, By recovering activity of mitochondrial respiratory enzymes viz., MDH (malate dehydrogenase), ICDH (isocitrate dehydrogenase), SDH (succinate dehydrogenase), NADH dH (NADH dehydrogenase) and cytochrome c oxidase. Presence of two specific compounds (around 5% of volatile composition) namely p[2(dimethyl amino)ethyl]phenol and (E)-2,4,5- trimethoxy propenyl benzene (asaron)--reported action on cardiac tissue[16]

- **ANTIVIRAL[17]**

Moderate antiviral activity against Peste des Petits Ruminants (PPR) virus.

- **ANTIBACTERIAL[18]**

Nature of biological active components, which may be enhanced by methanol extraction. Maximum active constituents are extracted in methanol, rendering this extract highly potent against different types of bacteria.

- **HEPATOPROTECTIVE[19]**

Improved hepatic function -By restoring the structural integrity of hepatocyte cell membrane. -By regenerating liver cells. -By increasing protein levels**.**

- **GASTROPROTECTIVE[20]**

Increasing regeneration of damaged gastric mucosa.

- **ANTIULCER[21]**

Cytoprotective, anti-secretory and mucin secretion enhancement**.**

- **ANALGESIC AND ANTIPYRETIC ACTIVITY**

It also found to have analgesic and antipyretic activity.

DISCUSSION AND CONCLUSION

Herbal medicine is best for Human health care, even though several differences exist between herbal and conventional pharmacological treatments. Several specific herbals extracts have been demonstrated to be efficacious for specific conditions. Even though public do the carry risk of taking allopathic medicine instead of herbal treatments. It is seen from the literature that Desmodium gangeticum is a very important plant for its large number of medicinal properties as well as medicinally important chemicals like isolation of alkaloids, pterocarpans, phospholipids, sterols, flavones and flavonoid glycosides. The plant shows many pharmacological activities like Anti-inflammatory, Anti-nociceptive, Analgesic, Anti-amnesic, Anti-diabetic, Anti-oxidant, anti-ulcer, batter CVS activities, CNS depressant, Antibacterial, Wound Healing, antipyretic and Several Miscellaneous activities. In view of time duration, the fresh sample is more potent then old sample for pharmacological activities. In view of various solvents like methanol, ethanol, chloroform and aqueous extract, methanol extract is more potent for several activities of Desmodium gangeticum. Thus, Desmodium gangeticum is quite promising as a multipurpose medicinal agent so further clinical trials should be performed to prove its efficacy.

REFERENCES

1. Yadav JP, Kumar s and Siwach P. folk medicines used in gynecological and other related problems by rural population of Haryana. Indian J Trand knowledge 2006;5(3):323-326.
2. Adewusi EA and Afolayan AJ. A review of natural products with hepatoprotective activity. JMPR 2010; 4(13):1318-1334.
3. Gupta M, Biswas TK, Saha S and Debnath PK, Therapeutic utilization of secretory products of some Indian medicinal plants: A review, Indian J Trand knowledge 2006;5(4):569-575.
4. Bhavesh Vaghela, Sandip Buddhadev, Leena Shukla. Pharmacological activities of *desmodium gangeticum*: an overview 2013;4(4):265-266
5. Shri Vijaya Kirubha, Jegadeesan1 M, Kavimani S. Studies on Desmodium gangeticum. J. Chem. Pharm. Res., 2011; 3(6):850-855.
6. Anil JP. Desmodium gangeticum. Indian medicinal plants; Ayurveda, 2012 ;1
7. Khare CP, “Indian Medicinal Plants”, An Illustrated Dictionary, Springer science, New Delhi, 2007; 510-11.
8. Mishra PK, Sing N, Ahmad G., Dube A, Maurya R. Glycolipids and constituents from desmodium gangeticum with antileishmanial and immunomodulatory activities. Bioorganic and medicinial chemistry letters. 2005; 15:4543-4546
9. Rathi A, Rao Ch V, Ravishankar B, De S, Mehrotra S. Anti-inflammatory and anti-nociceptive activity of the water decoction Desmodium gangeticum. J Ethnopharmacol 2004; 95(2-3): 259-263.
10. Govindarajan R, Asare-Anane H, Persaud S, Jones P, Houghton PJ. Effect of Desmodium gangeticum extract on blood glucose in rats and on insulin secretion in vitro. Planta Med 2007; 73(5): 427-432.
11. Rodriguez de Sotillo DV, Hadley M. Chlorogenic acid modifies plasma and liver concentrations of: cholesterol, triacylglycerol, and minerals in (fa/fa) Zucker rats. J Nutr Biochem 2002; 13(12): 717-726
12. Joshi H, Parle M. Antiamnesic effects of Desmodium gangeticum in mice. Yakugaku Zasshi 2006; 126(9): 795-804.
13. . Govindarajan R, Vijayakumar M, Rao Ch V, Shirwaikar A, Kumar S, Rawat AK, et al. Antiinflammatory and antioxidant activities of Desmodium gangeticum fractions in carrageenan induced inflamed rats. Phytotherapy Research 2007; 21(10): 975-979.
14. Foley S, Navaratnam S, McGarvey DJ, Land EJ, Truscott TG, Rice-Evans CA. Singlet oxygen quenching and the redox properties of hydroxycinnamic acids. Free Radic Biol Med 1999; 26(9-10): 1202-1208.
15. Kurian GA, Yagnesh N, Kishan RS, Paddikkala J. Methanol extract of Desmodium gangeticum roots preserves mitochondrial respiratory enzymes, protecting rat heart against oxidative stress induced by reperfusion injury. Journal of Pharmacy and Pharmacology 2008; 60(4): 523-530
16. Percot A, Yalçin A, Erdugan H, Güven KC. Hordenine amount in Phyllophora nervosa (D. C. Grev) (Marine Alga) collected from Sile (the Black Sea) and Dardanelle. Acta Pharmaceutica Sciencia 2007; 49: 127-132

17. Jabbar S, Khan MT, Choudhuri MS, Sil BK. Bioactivity studies of the individual ingredients of the Dashamularishta. Pak J Pharm Sci 2004; 17(1): 9-17.
18. Karthikeyan K, Selvam GS, Srinivasan R, Chandran C, Kuolothungan S. In vitro antibacterial activity of Desmodium gangeticum (L.) DG. Asian Pacific Journal of Tropical Disease 2012: S421-S424
19. Prasad MVV. Hepatoprotective activity of roots of Desmodium gangeticum (Linn.) DC. Asian Journal of Chemistry 2005; 17(4): 2847-2849
20. Mahesh A, Jeyachandran R, Rao DM, Thangadurai D. Gastroprotective effect of Desmodium gangeticum roots on gastric ulcer mouse models. Brazilian Journal of Pharmacognosy 2012; 22(5): 1085-1091.
21. Dharmani P, Mishra PK, Maurya R, Chauhan VS, Palit G. Desmodium gangeticum: a potent anti-ulcer agent. Indian J Exp Biol 2005; 43(6): 517-521.