Short Communication

Antimicrobial studies of leaf extracts from *Desmodium heterocarpon* (L.) DC

Shefali Arora[1], VandanaYadav[1], Pankaj Kumar[1] and Deepak Kumar[2]
[1]*Departmant of Chemistry, University of Petroleum and Energy Studies, Dehradun - 248 007, Uttarakhand*
[2]*Department of Pharmaceutical Chemistry, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun - 248 007, Uttarakhand*

ABSTRACT

The methanolic leaf extract of *Desmodium heterocarpon* (L) DC was tested for antimicrobial activity against the bacterial strains of *Escherichia coli, Klebsiella pneumoniae, Salmonella typhi, Bacillus subtillis, Staphylococcus aureus* and the fungal strains of *Aspergillus niger, Penicillium chrysogenum. Saccharomyces cerevisiae* and *Candida albicans.* The results have shown that methanol extract showed very good strong antibacterial activity against *Salmonella typhi* and excellent antifungal activity against all the test fungal strains as it showed more inhibition zone than the standard drug ketoconazole. **[Medicinal Plants 2014; 6(3): 206-208]**

Keywords : *Desmodium heterocarpon*, antibacterial activity, antifungal activity

The genus *Desmodium* belongs to family Papilionaceae and its species are widely distributed in the temperate and subtropical regions of the world. Some *Desmodium* species were shown to contain elevated amounts of tryptamine alkaloids and chemical investigations have revealed the presence of isoflavones, glucosyl flavonoids, coumarono-chromones, pterocarpans, triterpenoid, saponins, tetrahydroiso-quinolones, phenylethylamines, indole-3-alkyl amines, lipids, glycolipids, and alkaloids (Zappia *et al*., 2009; Zhao *et al*., 2007; Mishra *et al*., 2005). However, no phytochemical studies of *Desmodium heterocarpon* have been found in literature to date. Various species of *Desmodium* have wide range of pharmacological activity such as anti-inflammatory, analgesic, antipyretic, febrifuges, remedies for dysentery and liver diseases, ulcers, catarrh, abscesses and eye diseases, abdominal tumors, asthma, fever, nasal polyps, menstrual disorder and convulsions (Zhu *et al*., 2011; Kurian *et al*., 2011; Ma *et al*., 2011; N'gouemo *et al*., 1996; Allen and Allen, 1981; Friis and Vollesen, 1998; Barreto, 2002; Gouemo, 1996; Lazier, 1981; Ohashi and Edinburgh, 2000). The present paper deals with the studies on antimicrobial properties of the leaf extract of *Desmodium heterocarpon*.

The leaves of *Desmodium heterocarpon* were collected from outside the campus of University of Petroleum and Energy Studies (2013) Dehradun during the month of November-December. Collected plant material was authenticated by Dr. S.K Srivastava Botanical Survey of India, Northern Regional Center, Dehradun. The plant material was washed with water to remove mud and other undesirable material and dried under shade.

The air-dried leaves (50 g) of *Desmodium heterocarpon* were crushed and powdered separately. The powdered leaves were extracted with different solvents of increasing polarity viz. petroleum ether, chloroform, acetone and methanol.

The bacterial cultures used in the study were *Escherichia coli, Klebsiella pneumonaie, Bacillus cereus, Staphylococcus aureus* and *Salmonella typhi.* These bacteria were obtained from the Department of Microbiology, Dolphin Institute of Biomedical and Natural Sciences, Manduwala, Dehradun and checked

Corresponding author : Shefali Arora
e-mail : shefali.arora@ddn.upes.ac.in

Received : 7 March, 2014; Accepted : 5 May, 2014
doi: 10.5958/0975-6892.2014.00011.2

Table 1. Antibacterial activity of leaf extracts of *Desmodium hetrocarpon* and standard drug chloramphenicol

S. No.	Test organism	Inhibition Zone in mm				
		Petroleum ether	Chloroform	Acetone	Methanol	Standard drug (chloramphenicol)
1.	*E. coli*	-	-	-	-	25
2.	*K. pneumonia*	-	-	-	-	16
3.	*B. cereus*	-	15	19	19	26
4.	*S. typhii*	-	12	17	23	25
5.	*S. aureus*	-	-	19	22	34

for purity by conventional biochemical methods. These bacterial cultures were maintained on nutrient agar slants at 37º C for about 18-24 hours and then stored at 4º C as stock cultures. Fresh culture were obtained by transferring a loop full of culture into nutrient broth and then incubated at 37º C overnight. To test antibacterial activity, the well diffusion method was used. The medium used for antibacterial activity were Mueller-Hinton Agar (MHA) and Nutrient Broth (NB). Chloramphenicol was tested as Standard drug for different strains of bacteria and zone of inhibition was recorded in millimeter.

Antifungal activity of extracts

The test fungi used were *Aspergillus niger, Penicillium chrysogenum, Saccharomyces cerevisiae* and *Candida albicans*. These cultures were obtained from the standard cultures maintained in the Microbiology Department of Dolphin Institute of Biomedical and Natural Sciences, Manduwala, Dehradun. These cultures were maintained on Sabouraud Dextrose Agar (SDA) at 25º C for about 72-96 hours and then stored at 4º C as stock cultures. Fresh cultures were obtained by transferring a loop full of culture into Sabouraud dextrose broth and then incubated at 25º C for 72 hrs. To test antifungal activity, the well diffusion method was used. The medium used for antifungal activity was Sabouraud Dextrose Agar (SDA) and incubation period was 72 hours at 25ºC; rest of the method was same as that of antibacterial activity. Ketoconazole was tested as Standard drug for different strains of fungus and the zone of inhibition was recorded in millimeters.

Table 1 showed antibacterial activity of different leaf extracts of *Desmodium hetrocarpon* and it clearly indicates that only methanol extract showed comparable antibacterial activity against *Salmonella typhii*. Similarly, Table 2 showed the antifungal activities where methanol extract showed excellent activity against all the tested fungal strains and petroleum ether extract showed excellent antibacterial activity against *Aspergillus niger, S. cerevisiae* and *Candida albicans*. Furthermore, the chloroform extract showed good antifungal activity against *Candida albicans* and *Sacchromyces cerevisiae* and acetone extract against *Aspergillus niger* and *Penicillium crysogenum*.

Table 2. Antifungal activity of leaf extracts of *Desmodium hetrocarpon* and standard drug Ketoconazole

S. No.	Test organism	Inhibition Zone in mm				
		Petroleum ether	Chloroform	Acetone	Methanol	Standard drug (ketoconazole)
1.	*A. niger*	24	12	28	19	19
2.	*C. albicans*	14	21	-	23	12
3.	*S. cerevesaie*	15	19	-	23	13
4.	*P. crysogenum*	-	-	28	39	21

REFERENCES

Allen ON and Allen EK (1981). The Leguminosae: A Source Book of Characteristics, Uses and Nodulation. University of Wisconsin Press, Madison, WI/Macmillan Publishing, London, pp 812.

Barreto GS (2002). Effect of butanolic fraction of *Desmodium adscendens* on the anococcygeus of the rat. *Braz. J. Biol.,* 62(2): 223-230.

Friis IB and Vollesen K (1998). Flora of the Sudan-Uganda border area east of the Nile. *Kgl. Danske Videnskabernes Selskab*, 1: 11-21.

Gouemo PN (1996). Effects of an ethanolic extract of *Desmodium adscendens* on central nervous system in rodents. *J. Ethnopharmacol.,* 52(2): 77-83.

Hasan AA, Hasan MC and Zafrul Azam ATM (2011). Antimicrobial, Cytotoxic and Antioxidant Activities of *Desmodium heterocarpon. Bangladesh Pharmaceutical Journal*, 14(1): 49-52.

Kretschmer AE, Sonoda RM and Snyder GH (1980). Resistance of *Desmodium heterocarpon* and other tropical legumes to root-knot nematodes. *Tropical Grassland,* 14(2): 115-120.

Kurian GA, Suryanarayanan S, Raman A and Padikkala J (2010). Antioxidant effects of ethyl acetate extract of *Desmodium gangeticum* root on myocardial ischemireperfusion injury in rat hearts. *Chin. Med.,* 5: 3.

Lazier JR (1981). Effect of cutting height and frequency on dry matter production of *Codariocalyxgyroides* (syn. *Desmodium gyroides*) in Belize. Central America. *Tropical Grasslands*, 15: 10-16.

Ma KJ, Zhu ZZ, Yu CH, Zhang H, Liu J and Qin LP (2011). Analgesic, anti-inflammatory, and antipyretic activities of the ethanol extract from *Desmodium caudatum*. *Pharm. Biol.,* 49: 403-407.

Meyer BN, Ferrigni NR, Putnam JE, Jacobsen LB, Nichols DE and McLaughlin JL (1982). Brine shrimp: aconvenient general bioassay for active plant constituents. *Planta Med,* 45: 31-34.

Mishra PK, Singh N, Ahmad G, Dube A and Maurya R (2005). Glycolipids and other constituents from *Desmodium gangeticum* with antileishmanial and immunomodulatory activities. *Bioorg. Med. Chem. Lett.,* 15: 4543-4546.

N'gouemo P, Baldy-Moulinier M and Nguemby-Bina C (1996). Effects of an ethanolic extract of *Desmodium adscendens* on central nervous system in rodents. *J. Ethnopharmacol.,* 52: 77-83.

Ohashi H and Edinburgh RRM (2000). Hylodesmum, a new name for Podocarpium. *J. Bot.,* 57(2): 171-188.

Parker M (1999). Relationships of bradyrhizobia from the legumes *Apiosamericana* and *Desmodium glutinosum. Appl. Environ. Microbiol.*, 65*:* 4914-4920.

Tsail JC, Huang GJ, Chiu TH, Huang SS, Huang SC, Huang TH, Lai SC and Leel CY (2011). Antioxidant activities of phenolic components from various plants of *Desmodium* species. *African Journal of Pharmacy and Pharmacology,* 5(4): 468-476.

Zappia G, Menendez MP, Lima CS and Botta B (2009). A p-quinolisoflavan and two new isoflavanones from *Desmodium canum*. *Nat. Prod. Res.,* 23: 665-671.

Zhao M, Duan JA and Che CT (2007). Isoflavanones and their *O*-glycosides from *Desmodium styracifolium*. *Phytochemistry,* 68: 1471-1479.

Zhu ZZ, Ma KJ, Ran X, Zhang H, Zheng CJ, Han T, Zhang QY and Qin LP (2011). Analgesic, anti-inflammatory and antipyretic activities of the petroleum ether fraction from the ethanol extract of *Desmodium podocarpum*. *J. Ethnopharmacol.,* 133: 1126-1131.