CIBTech Journal of Microbiology ISSN: 2319-3867 (Online)
An Online International Journal Available at http://www.cibtech.org/cjm.htm
2013 Vol. 3 (1) January-March, pp.32-37/Patil and Biradar
Research Article

PRELIMINARY PHYTOCHEMICAL SCREENING AND ANTIMICROBIAL ACTIVITY OF *DOLICHANDRONE FALCATA* (DC) SEEM

[*]Jayshree U. Patil and S. D. Biradar
Department of Botany, Dnyanopasak College Parbhani 431401(M.S.)
**Author for Correspondence*

ABSTRACT
Plant parts of *Dolichandrone falcata* (DC) Seem were extracted with different solvents such as methanol, ethyl acetate, alcohol, acetone, water. The antimicrobial assay of *D. falcata* extracts were evaluated on bacterial and fungal strains like *Pseudomonas aeruginosa*, *Bascillus subtilis, Candida albicans, Vibrio cholerae and Salmonella typhi.* Phytochemical screening was performed for alkaloids, terpenoids, tannins, saponins steroids, cardiac glycosides and flavonoids. Various solvent extracts were examined using agar disk diffusion method against bacterial and fungal microorganisms.

Key Words: *Antimicrobial Activity; Dolichandrone falcate*

INTRODUCTION
Plants are the richest source of organic chemicals on the earth. Most of the medicinal plants were using in Indian traditional medicine to cure various diseases. The indigenous system of medicine namely ayurveda, unani and siddha have been in existence in several centuries. In India about seventy percent population residing in the villages and these people depend on herbal medicine to cure ailments. Nature has bestowed a rich botanical wealth with its diversity in varied topography and changed agro climatic conditions in different parts of country (Chaudhari, 1980). The world is looking towards India for new drugs to manage various challenging diseases because of its rich biodiversity of medicinal plants and abundance of traditional knowledge to cure different diseases (Cohen and Alcorn, 1991). In Marathawada Wadwal-Nagnath of Chakur Tahsil in Latur district has numerous medicinal plants, rustics of the area using the *Dolichandrone falcata* for curing diseases like allergy, inflammatory problems, cancer etc. therefore present study was planned to screen phytochemicals and assess the antimicrobial efficacy.

Plant Morphology
Dolichondrone falcata is a small deciduous tree with bluish-gray bark, peeling in irregular woody scales. Leaves are pinnately compound, 3-6 inches long. Leaflets are 5-7, obovate or round elliptic, sometimes with a small blunt point. Leaflet blade is about 1.2 cm long and wide. Flowers are white, borne in mostly 1-3 flowered corymbs. Flower stalk is 1/2 inch long. Sepal tube is 1.2-2 cm, split on one side to the base, petals are frilly. Capsules are nearly quadrangular, curved like a sickle. The capsules look like curved sheep horns so locally it is termed as medhshingi. Flowering during May-June.

Uses
The *Dolichandrone falcata of* family Bignoniaceae is a traditional medicinal plant used in ayurvedic medicine for fish poison and to procure abortion (Kirtikar, 1999). Leaf juice is also used for the treatment of diabetes.

MATERIALS AND METHODS
Plant materials were collected from Wadwal-Nagnath of Latur district during September 2010. The identification is done with the help of standard floras (Naik, 1979; Naik *et al.*, 1998; Singh and Karthikeyan, 2001). The plant is shade dried, powdered and stored in airtight container.

Preparation of Extract
Powder obtained was subjected to successive soxhlet extraction with increasing order of polarity i.e. Acetone (56 to 60^0 c), distilled water (60-70^0 c**)** Alcohol (60^0 to 80^0 c), Ethyl acetate (60^0 to 80^0 c), Methanol (65.5^0 c – 70.5^0 c) (Daniel, 1991).

Test-Micro-organism

The micro-organisms such as *Bacillus substilis* MTCC (1091), *Pseudomonas aeruginosa* MTCC (708), *Candida albicans* MTCC 3971), *Vibrio cholerae and Salmonella typhi* were obtained from stock cultures and maintained on Mullar Hinton agar and potato dextrose agar slant for bacteria and fungi respectively and stored at 6^{o}c until used. To prepare suspension, the slants were incubated at 37^{0}c for 24 hours and inoculum was prepared by MacFarland turbidity standards.

Antimicrobial Screening of Extracts

The agar well diffusion method was used to test the antimicrobial activity of the extracts. The cultures were prepared and incubated at 37^{0}c for 24 hours. The antimicrobial activity was observed on basis of inhibition zone that was compared with standard antibiotic. 0.2 ml broth culture of the test organism was put in a sterile petriplate and 18 ml of sterile agar was added. After solidification of agar, wells were punched and filled with respective solvent extracts. Streptomycin is used as the standard antimicrobial agent at a concentration of 10 mcg/ disk. The plates were kept in sterilized inoculation chamber for 2 h to facilitate diffusion of the antimicrobial agents into the medium. The plates were then incubated at 37^{0} c for 24 hours and the diameter of zone of inhibition of microbial growth was measured in the plates in millimeters.

RESULTS

Phytochemical Screening

The preliminary phytochemical screening of leaf extracts of *D. falcata* reveals that alkaloids are present in methanol and acetone extracts. Saponin is obtained in aqueous, alcohol and ethyl acetate extract. Terpenoids found in aqueous and alcohol extracts. Tannins present in aqueous, methanol, alcohol and ethyl acetate extracts. Steroids present in aqueous, methanol, alcohol and ethyl acetate extract **.**Cardiac glycosides obtained in methanol, alcohol, acetone and ethyl acetate extract. Flavonoids are present in aqueous, methanol and alcoholic extracts (Table1).

Table 1: Phytochemical screening of various extracts of leaf

Chemical composition	Aqueous	Methanol	Alcohol	Acetone	Ethyl acetate
Alkaloid	--	+	--	+	--
Saponin	+	--	+	--	+
Terpenoid	+	--	+	--	--
Tannin	+	+	+	--	+
Steroids	+	+	--	+	--
Cardiac glycoside	--	+	+	+	+
Flavonoid	+	+	+	--	--

The preliminary phytochemical screening of bark extracts of *D. falcata* reveals that the presence of alkoloids in methanol, alcohol and ethyl acetate extract. Saponins are present in aqueous and alcohol extracts. The terpenoids are obtained in aqueous, methanol, acetone and ethyl acetate extracts. Tannins are found in aqueous, methanol, alcohol and ethyl acetate extract. Steroids are absent in all extracts. Cardiac glycosides are present in all extracts except water. Flavonoids are found in aqueous, methanol, alcohol and acetone extract (Table 2).

The preliminary phytochemical screening of fruit extracts of *D. falcata* reveals that the presence of alkaloids in methanol and alcohol extract. Saponins are present in aqueous, alcohol and ethyl acetate. Terpenoids found in aqueous and ethyl acetate extract. Tannins are obtained in methanol, alcohol and ethyl acetate extracts. Steroids are present in methanol and acetone extract. Cardiac glycosides are present in all extracts except water. Flavonoids are found in aqueous, methanol and acetone extract (Table 3).

Table 2: Phytochemical screening of bark extract

Chemical composition	Aqueous	Methanol	Alcohol	Acetone	Ethyl acetate
Alkaloid	--	+	+	--	+
Saponin	+	--	+	--	--
Terpenoid	+	+	--	+	+
Tannin	+	+	+	--	+
Steroids	--	--	--	--	--
Cardiac glycoside	--	+	+	+	+
Flavonoid	+	+	+	+	--

Table 3: Phytochemical screening of fruit extracts

Chemical composition	Aqueous	Methanol	Alcohol	Acetone	Ethyl acetate
Alkaloids	--	+	+	--	--
Saponins	+	--	+	--	+
Terpenoids	+	--	--	--	+
Tannins	--	+	+	--	+
Steroids	--	+	--	+	--
Cardiac glycosides	--	+	+	+	+
Flavonoids	+	+	--	+	--

+: present; --: absent

Antimicrobial Assay

The acetone leaf extract exhibited more activity against *Salmonella typhi.* The ethyl acetate leaf extract exhibit more activity against *Candida albicans.* Whereas the leaf extracts were inactive against *Vibrio cholerae*, *Bacillus subtilis* and *Pseudomonas aeruginosa*, as compared with standard antibiotic Streptomycin (Table 4).

Table 4: Antimicrobial assay of leaf extract

S. No.	Organisms	Zone of inhibition (mm)					
		Plant extract					
		EAL	ACL	DTL	ALL	MTL	Control
1.	*S.typhi*	05	11	--	07	07	08
2.	*V.cholerae*	09	--	--	--	04	10
3.	*B. subtilis*	05	05	--	06	05	11
4.	*C.albicans*	11	09	09	06	07	09
5.	*P.aeruginosa*	14	06	03	--	10	14

Leaf Extract: EAL: Ethyl acetate; ACL: Acetone; DTL: Distilled water; ALL: Alcohol; MTL: methanol

The acetone, distilled water bark extracts are more active against *Salmonella typhi.* The methanol bark extract exhibited activity against *Vibrio cholerae* and *Pseudomonas aeruginosa.* The alcohol bark extract exhibited activity against *Candida albicans.* While bark extract does not exhibit any activity against *Bacillus subtilis* as comparable to antibiotic Streptomycin (Table 5).

Table 5: Antimicrobial assay of bark extract

S. No.	Organisms	Zone of inhibition (mm)					
		Plant extract					
		EAB	ACB	DTB	ALB	MTB	Control
1.	*S. typhi*	06	11	10	07	06	08
2.	*V.cholerae*	09	--	--	05	14	10
3.	*B. subtilis*	06	05	12	08	05	13
4.	*C.albicans*	-	09	09	15	09	07
5.	*P.aeruginosa*	09	06	07	06	11	09

Bark Extract: EAB: Ethyl acetate; ACB: Acetone; DTB: Distilled water; ALB: Alcohol; MTB: methanol

Table 6: Antimicrobial assay of fruit extract

S. No.	Organisms	Zone of inhibition (mm)					
		Plant extract					
		EAF	ACF	DTF	ALF	MTF	Control
1.	*S. typhi*	04	--	07	05	05	08
2.	*V. cholerae*	06	--	13	04	12	10
3.	*B.subtilis*	07	03	05	03	10	12
4.	*C.albicans*	10	13	07	10	08	06
5.	*P.aeruginosa*	13	05	05	05	12	11

Fruit Extracts: EAF: Ethyl acetate; ACF: Acetone; DTF: Distilled water; ALF: Alcohol; MTF: Methanol

The distilled water and methanol fruit extract is more active against *Vibrio cholerae.* The acetone, ethyl acetate, alcohol, methanol fruit extract exhibit remarkable activity against *Candida albicans.* Ethyl acetate and methanol fruit extract exhibited activity against *Pseudomonas aeruginosa.* While the fruit extract does not exhibit any activity against *Salmonella typhi* and *Bacillus subtilis* as comparable to standard antibiotic (Table 6).

DISCUSSION

The present work was carried out for preliminary phytochemical screening and antimicrobial activity of *D. falcata.* It reveals that the presence of alkaloids, flavonoids, tannins, saponins, terpenoids, cardiac glycosides and steroids in different extracts of leaves, bark and fruit**.** Similar results were also obtained by Mungle *et al*., (2012).

The ethyl acetate leaf extracts exhibit activity against C*andida albicans,* while fruit extract is active against *Candida albicans* and *P. aeruginosa.* Whereas the bark extract does not show any activity against test organism.

The acetone fruit extract shows inhibitory activity against *Candida albicans.* The leaf and bark extract exhibit activity against *Salmonella typhi***.**

The distilled water fruit extract exhibit activity against *Candida albicans* and *Vibrio cholerae* while bark extract against *Salmonella typhi* whereas the leaf extract does not exhibit any activity against test organism.

The alcohol fruit and bark extract exhibit activity against *Candida albicans* whereas leaf extract does not show any liability activity against test organism.

The methanol fruit extract exhibit inhibitory activity against *Vibrio cholerae, Candida albicans* and *P. aeruginosa.* Whereas the bark extract is active against *Vibrio cholerae* and *P. aeruginosa.* But the leaf extract does not show any activity against test organism.

Antimicrobial assay of present study reveals that the fruit extract of *D. falacata* shows considerable activity against *Candida albicans* and moderate activity against *P. aeruginosa* and *Vibrio cholarae.* The

bark extract of *D. falcata* show good inhibitory activity against *Salmonella typhi* and moderate activity exhibited against *Vibrio cholerae, Candida albicans* and *P. aeruginosa*. The leaf extracts exhibit moderate activity against *Salmonella typhi* and *Candida albicans.*

The presence of phytochemical compounds has been known to show medicinal activity as well as exhibit and regulate some physiological activity (Sofovora, 1993 and Harbone, 1998). Tannin prevents development of micro-organism by precipitating microbial protein and making it into unavailable form (Ogunleye and Ibitoye, 2003). The tannins have been traditionally used on inflamed surface of mouth in the treatment of catarrh and it also has antioxidant properties (Sodipo *et al.,* 1991 and Stephan *et al*., 2009). The importance of steroids as a potent staring material in the synthesis of sex hormone was reported by Okeke (2003). From the phytochemical analysis it was found that steroid, flavonoids and tannins of several plants extracts are being used for the treatment of diabetes (Kokate *et al.*, 2003).

Conclusion

Dolichandrone falcata has highest significance for its valuable secondary metabolites. Plant extracts that inhibit the growth of pathogenic microorganisms without harming the host may have potential application as therapeutic agents. Hence, the present investigation attempted to evaluate antimicrobial activity of crude extracts from leaves, fruits and barks of *D. falcata* against some human pathogenic and non-pathogenic bacterial and fungal strains.

Successive water, acetone, alcohol, ethyl acetate and methanol extracts of *D. falcata* leaf, fruit and bark extracts were tested for the screening of phytochemical constituents. Maximum diversity of chemical constituents was found in methanol, ethyl acetate and alcoholic extracts in leaf, bark and fruit. The methanol and alcohol extracts were found active against most of the tested pathogenic organisms as they showed potential phytochemical constituents. Among the tested species *C. albicans* showed greatest sensitivity against alcoholic bark extract.

Finally it is concluded the fruit extract is active against *Vibrio cholerae, Candida albicans* and *P. aeruginosa* but it is not active against. *Salmonella typhi* and *Bacillus albicans*. The bark extract is effective against *Salmonella typhi*, *Vibrio cholerae, Candida albicans* and *P. aeruginosa* and it is not effective against *Bacillus subtilis.* The leaf extracts shows inhibitory effect against *Salmonella typhi* and *Candida albicans* only. The fruit and bark extract of *D. falcata* shows good zone of inhibition against all test organisms except *Bacillus subtilis.*

The plant products plays an important role in the treatment of diseases without any side effects, there is a need to search new drugs from natural sources. India is a home to a variety of traditional medicine system that relay to a very large extent on native plant species for new drug materials (Ramdas *et al*., 2006). Therefore now there is a need to look back towards traditional medicine which can serve a novel therapeutic agent (Chitravadivu *et al.,* 2009). The pharmacognostical evaluations also give valuable information which is essential to standardize the drug.

ACKNOWLEDGEMENT

Authors are thankful to Dr. P. L. More, Principal Dnyanopasak College, Parbhani for providing necessary facilities and encouragement.

REFERENCES

Chitravadivu C, Manian S and Kalaichelvi K (2009). Qualitative Analysis of Selected Medicinal Plants, Tamilnadu, India. *Middle-East Journal of Scientific Research* **4**(3) 144-146.

Choudhari MM (1980). Tribes of Assam Plains. Guwahati Assam. New vistas in ethnnobotany. In Maheshwari JK (edition) Ethnobotany in South Asia, *Scientific Publisher, Jodhpur* (India).

Cohen JI, Alcorn JB and Potter CS (1991). Utilization and Conservation of genetic resources, International Projects for Sustainable Agriculture Economy Botany **45** 190-199.

Daniel M (1991). Methods of Phytochemistry and plant economic Botany. *Kalyani Publishers, New Delhi*.

Harbone JB (1998). Phytochemical Methods: A guide to Modern Techniques of plant Analysis. *3rd edition Chapman and Hill, London.*
Kirtikar KR and Basu BD (1999). Indian Medicinal Plants with illustration. *Sri Sadguru Publication* **8** 2532.
Kokate CK, Purohit AP and Gokhale SB (2003). Practical pharmacognosy, Nirali Prakashan Pune.
Mungle AN, Bodhankar MM and Chandak KK (2012). Antidiabetic potential of *Dolichandrone falcata* leaves in alloxan induced diabetic rats. *International Journal of Pharmacy and Biomedical Sciences* **3**(1) 319-324.
Naik VN (1979). Flora of Osmanabad, *Venus publishers, Aurangabad.*
Naik VN and Associates (1998). Flora of Marathwada Volume I and II Amrut Prakashan, Aurangabad.
Ogunleye DS and Ibitoye SF (2003). Studies of antimicrobial activity and chemical constituents of *Ximenia. americana*. *Tropical Journal of Pharmacology Research* **2** 239-241.
Okeke AO (2003). Three minute herbal treatment to reduce dental carries with new bouldia laevis based extract. *American Journal of Undergraduate Research* **2** 1-4.
Ramdas K, Ramchandra YL and Padamalatha (2006). Antibacterial activity of the leaf extracts of *Asparagus racemosus.* Geobios **33** 279-280.
Singh NP and Karthikeyan S (2001). Flora of Maharashtra State: Dicotyledons Volume I Botany Survey India, Calcutta.
Sofowora A (1993). Meditional plants and Traditional Medicine in Afrika. Spectrum Books Limited, Ibadan, Nigeria.
Sodipo OA, Akanyi MA, Kolawole FB and Odutuga AA (1991). Soppnin is the active antifungal principle in *Garcinia kola* heckle seed. *Bioscience Research Communication* **3** 171-172.
Stephan UA, Abiodum F, Osahon O and Ewaen E (2009). Phytochemical analysis and antibacterial activity of *Khaya grandifolia* stem bark. *Journal of Biological Science* **9**(1) 63-67.