

RESEARCH ARTICLE

Antibacterial activity of *Ficus benghalensis* var. *krishnae* (C. DC.) C. DC. against pathogenic bacterial strains

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ABSTRACT

Medicinal plants have been used as an alternative source and remedy from centuries for treating human diseases because they contain numerous active constituents of therapeutic value. The methanolic and DMSO extracts of various plant parts viz. prop roots, stems, leaves, and fruits of *Ficus benghalensis* var. *krishnae* (C.DC) C.DC. has been studied for antibacterial activity against the pathogenic bacteria *Bacillus subtilis*, *Escherichia coli*, and *Pseudomonas aurignosa*. Ampicillin antibiotic disc was used as standard. Various selected parts of *F. benghalensis* var. *krishnae* in methanolic and DMSO extract were observed positive minimum inhibition zone against *Escherichia coli*, *Pseudomonas aurignosa* and *Bacillus subtilis*.

Key words: Antibacterial activity, *Ficus benghalensis* var. *krishnae*, Pathogenic Bacterial Strain.

INTRODUCTION

Ficus is a genus of about 800 species and 2000 varieties of woody trees, shrubs and vines in the family Moraceae occurring in most tropical and sub-tropical forests worldwide (Hamed, 2011). *F.benghalensis* is the world's largest tree in terms of its spread (Riffle 1998) with some old trees covering over an acre of ground. The tree's name "banyan" refers to the merchants who set up shop under the spreading trees (Riffle 1998). The *F. benghalensis* is used from the traditional medicine for eye-disease, constipation, toothache, inflammation, leucoderma, headache, fever, rheumatic affections, asthma cigarettes, antidote for snakebites and relieve stomachache. (Kubo, *et al* 1990; Trease, *et al* 1988, Kirtikar, *et al* 1994; Apichart, *et al* 1995).

Medicinal plants have been used as an alternative source and remedy from centuries for treating human diseases because they contain numerous active constituents of therapeutic value (Nostro *et al.*,2000). The development of microbe resistance antibiotics has led the researches to investigate the alternative sources for the treatment of resistant strains (Hammer *et al.*, 1999). Presently 80% of the world population believes on plant derived medicines and serves as first line of defense in maintaining health and combating many diseases (Veale *et al.*, 1992). However, their scientific study has been made possible only after the development of microbiology. Natural

antimicrobials can be derived from roots, stems, leaves, flowers and fruits of plants, various animal tissues etc (Gordon, 2001). Over 50% of clinical drugs have originated from natural products (Suffness and Douros, 1982). In general, bacteria have the genetic ability to transmit and acquire resistance which is utilized as therapeutic agents (Cohen, 1992). Secondary metabolites compounds exhibit inhibitory effect against bacteria (Sato *et al.*, 1996).

Many workers worked out some exercises on *F. benghalensis* var. *krishnae*, Joshi *et al.* (2012) performed phytopharmacognostic study on *Ficus krishnae* L. while Sidhu *et al.* (2014) tested antihyperglycemic activity of petroleum ether leaf extract of *Ficus krishnae* L. on alloxan-induced diabetic rats. Thus, in the present study, extracts of plants parts of *F. benghalensis*.var. *krishnae* have been investigated for their antimicrobial activities against various pathogenic bacteria.

MATERIALS AND METHODS

Collection of plant material

The plant parts of *F. benghalensis*. var. *krishnae* were collected from Civil lines, Nagpur. Fresh and healthy part such as leaves, stem, fruit and prop root were used for extraction. All these plant parts were thoroughly washed with tap water and then with distilled water to remove the soil and dust particles and further shade-dried. Dried materials of plant parts were blended into fine powder with the help of electric grinder and store in airtight zip lock bags.

Test organisms

The human pathogenic bacteria viz, *Bacillus subtilis*, *Escherichia coli*, and *Pseudomonas aurignosa* were used for antibacterial activity. The above bacterial culture was maintained in nutrient agar slant at 40°C for further studies.

Preparation of plant extract

The 10 gm of fine powder of leaf, stem, fruit and prop root of selected taxa were extracted using 60 ml of solvent of methanol and DMSO (Dimethyl Sulphoxide). The contents were kept in orbital shaker for 48 hours. The extracts were filtered out and dried in hot air oven at 40°C and stored in refrigeration at 4°C for further use.

Preparation of sterile disc

Whatmann's filter paper was punched into 5mm disc and sterilized with the help of autoclave. Each sterilized disc was concentrated individually with each plant extracts. Precaution was taken to prevent the flow of solvent extract from the disc to the outer surface and allow drying in air. After sometime another dose of extracts were applied on discs, dried again and stored at 4°C.

Assay of Antimicrobial activity using Disc Diffusion method

2.8 gm of nutrient agar was dissolved in 100 ml of distilled water with the help of microwave oven and autoclaved it. About 15ml of nutrient medium was poured into each sterilized petriplates. After solidification, 500ul of fresh culture of pathogenic bacteria with phosphate buffer saline (PSB, P^H 7.0 to 7.2) were swabbed on the petriplates. The discs were kept on agar plates using sterile forcep. The plates were incubated for 24 hours at 37°C. After incubation the inhibitory zones were formed and the diameter around the disc was measured in mm.

Standard antibiotic disc

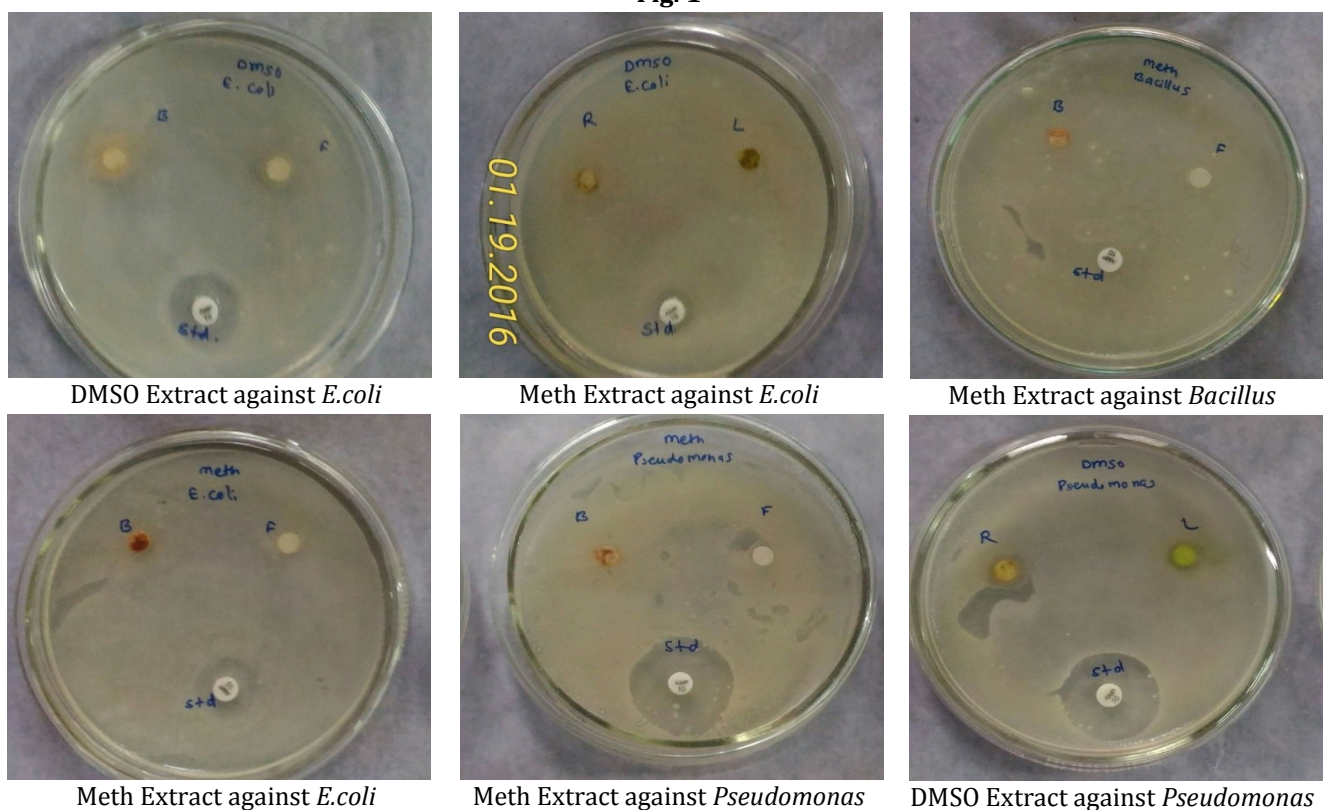
The antibacterial activity of plant extracts against pathogenic bacteria was compared with commercially available antibiotic. The antibiotic disc of ampicillin was placed on nutrient medium agar petriplates. The plates were incubated at 37°C for 24 hours and inhibition zone were measured in mm as per Daniyan and Muhammad (2008) methodology. The entire tests were done in triplicate.

RESULT AND DISSCUSION

The prop root extract of methanol showed equal antibacterial activity against *Escherichia coli* and *Pseudomonas aurignosa* (15mm) but no antibacterial activity against *Bacillus subtilis*. The methanolic leaf extract showed higher antibacterial activity against *Pseudomonas aurignosa* (15mm), in *E coli* (9mm) and lower in *Bacillus subtilis* (6mm). The methanolic stem extract showed maximum antibacterial activity against *Escherichia coli* (7mm) and in *Bacillus subtilis* and *Pseudomona saurignosa* (6mm). The methanolic fruit extract showed equal antibacterial activity against both *Escherichia coli* and *Pseudomonas aurignosa* (7mm) and no response were observed against *Bacillus subtilis*. The DMSO prop root extract showed

Table1: Minimum Inhibition Zones (MIC) Diameter (in mm) of Methanol and DMSO extract of different parts of *Ficus benghalensis* var. *krishnae*

Plants parts	Plant extracts	<i>E. Coli</i>		<i>B. subtilis</i>		<i>P. aurignosa</i>	
		Std	Sample	Std	Sample	Std	Sample
Prop Root	Methanol	20	15	8	NO	27	15
	DMSO	17	20	9	10	25	10
Leaf	Methanol	20	9	8	6	27	15
	DMSO	17	6	9	7	25	10
Stem	Methanol	20	7	5	6	28	6
	DMSO	20	20	5	6	28	9
Fruits	Methanol	20	7	5	NO	28	7
	DMSO	20	9	5	6	28	NO

Fig. 1

maximum antibacterial activity against *Escherichia coli* (20 mm) and equal in both *Pseudomonas aurignosa* and *Bacillus subtilis* (10 mm). The DMSO leaf extract of showed higher antibacterial activity against *Pseudomonas aurignosa* (10 mm), in *Bacillus subtilis* (7 mm) and lower in *E. coli* (6 mm). The DMSO stem extract showed higher antibacterial activity in *Escherichia coli* (20 mm) and *Pseudomonas aurignosa* (9 mm) and lower in *Bacillus subtilis* (6 mm). The DMSO fruit extract showed higher antibacterial activity against *Escherichia coli* (9 mm), lower in *Bacillus subtilis* (6 mm) and no antibacterial activity

against *Pseudomonas aurignosa*. The standard antibacterial drug ampicillin showed higher inhibition zone against *Pseudomonas aurignosa* and lower against *Bacillus subtilis* when taken as average of standards in respective bacteria (Table 1, Fig. 1).

The similar findings has been suggested by (Uma *et al*, 2009) on *Ficus religiosa* L. and *Ficus bengalensis* L. as a potent antimicrobial agent from the various solvent extracts against enterotoxigenic *Escherichia coli* *in vivo*.

CONCLUSION

Ficus benghalensis var. *krishnae* is an Indian traditional plant which also has medicinal property. The present study revealed that the antimicrobial activity of methanol and DMSO extracts of plant parts has showed measurable antimicrobial activity against *Escherichia coli*, *Pseudomonas aurignosa* and *Bacillus subtilis*. Hence the development of proper procedures and formulations for effective use of sustainable vegetative parts of this plant as antimicrobial agents is more required in the future.

REFERENCES

- Apichart S and Chatriwat S (1995) Ecdysteroids from *Vitexnegundo*. *Phytochemistry* 32, 303-306.
- Cohen ML (1992) Epidemiology of drug resistance: Implications for a post-antimicrobial era. *Science*, 257: 1050-1055.
- Daniyan SY and Muhammad HB (2008) Evaluation of the antimicrobial activities and phytochemical properties of extracts of *Tamaridus indica* against some diseases causing bacteria. *African Journal of Biotechnology* Vol. 7(14), pp.2451-2453.
- Gordon DM (2001) Geographical structure and host specificity in bacteria and the implications for tracing the source of coliform contamination. *Microbiology*, 147: 1079-1085.
- Hamed MA (2011) Beneficial effect of *Ficus religiosa* Linn. on high fat-induced hypercholesterolemia in rats. *Food Chem.* 129: 162-170
- Hammer KA, Carson CF and Riley TV (1999) Antimicrobial activity of essential oils and other plant extracts. *J. Applied Microbiol.*, 86: 985-990.
- Joshi MK, Gorwadiya HC, Pandya DJ (2012) Phytopharmacognostical study on makkhan katori *Ficus krishnae*. *International Journal of Biomedical Research*, 3(11): 427
- Kirtikar KR and Basu BD (1994) *Indian Medicinal Plants* 2nd edn., 3, p.1943. Periodical Experts. Delhi.
- Kubo I and Ayafor T (1990) Structure of a novel phytoecdysteroid from *Vitex fisherii*. *Journal of Chemical Ecology* 16, 2581-2588.
- Nostro A, MP Germano VD Angelo, A Marino and MA Cannelli (2000) Extraction methods and bioautography for evaluation of medicinal plant antimicrobial activity. *Lett. Applied Microbiol.*, 30: 379-384.
- Riffle RL (1998) *The Tropical Look*. Timber Press, Inc., Portland, Oregon.
- Sato M, Fujiwara S, Tsuchiya H, Fujii T and Inuma M (1996) Flavones with antibacterial activity against cariogenic bacteria. *J. Ethnopharmacol.*, 54: 171-176.
- Sidhu MC and Tanu Sharma (2014) Antihyperglycemic Activity of Petroleum Ether Leaf Extract of *Ficus krishnae* L. on Alloxan-induced Diabetic Rats. *Indian J Pharm Sci.* 76(4): 323-331.
- Suffness M and J Douros (1982) Current status of the NCI plant and animal product program. *J. Natural Product*, 45: 1-16.
- Trease GE, Evans WC (1989) *Pharmacognosy* 13th ed. London: ELBS.
- Trease, GE and Evans CW (1988). *Pharmacognosy Bailliere Tindall*. 12th edn. p.183 London.
- Uma B, Prabhakar K and Rajendran S (2009) In vitro antimicrobial activity and phytochemical analysis of *Ficus religiosa* L. and *Ficus bengalensis* L. against diarrheal enterotoxigenic E. coli, *Ethnobotanical Leaflets* 13: 472-74.
- Veale DJH, Furman KI and Oliver DW (1992) South African traditional herbal medicines used during pregnancy and childbirth. *J. Ethnopharmacol.*, 36: 185-91.