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Research Article

ANTIMICROBIAL ACTIVITY OF TABEBUIA ROSEA (FLOWERS)

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ABSTRACT

A large number of medicinal plants are claimed to be useful in treating skin diseases in all traditional system of medicine. The present study was carried out to investigate the antimicrobial effect of the sample isolated from the ethylacetate fraction of flowers of Tabebuia rosea. This compound was shown to possess antimicrobial activity against bacteria and fungi, viz. Four bacterial strains were S. typhi, E. coli, E. facecalis, B. cereus and two fungal strains C. lunata and C. albicans by using disc diffusion method. The anti bacterial activity of the compound isolated from ethyl acetate fraction is almost comparable with standard solvent control Chloromphenicol. The anti fungal activity is almost comparable with standard solvent control Fucanazole.

Keywords: Antimicrobial effect, *S. typhi*, *E. coli*, *E. facecalis*, *B. cereus*, C. *lunata* and C. *albicans*, flowers of *Tabebuia rosea*.

INTRODUCTION

Plants are a potential source of antimicrobial compounds and several researchers throughout the world are investigating the antimicrobial activity of medicinal plants, which are utilized in the traditional or alternative healthcare systems[1,2]. Plants produce large amounts of compounds known as phytochemicals and each plant synthesizes a vast variety of these phytochemicals. Phytochemicals not only maintain the plant's physiological activities, but also protect it against foreign agents such as bacteria, fungi, insects and animals that feed on them[3]. Presently, multiple pharmaceutical agents contain natural compounds, including drugs that contain variations of these natural molecules[4]. Many plants have been used as the base or as precursors for developing several synthetic or semi-synthetic drugs[5]. Many infectious diseases have been known to be treated with herbal remedies throughout the history of mankind. Natural products, either as pure compounds or as standardized plant extracts, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases[6].

PLANT DESCRIPTION

The Tabebuia genus includes approximately 100 species and is the largest genus in the Bignoniaceae family. This plant family is distributed from the southwestern United States to the northern regions of Argentina and Chile[7]. Where almost one-half of its genus and species are located[8]. Tabebuia rosea is one of the medicinally important plants belonging to the family Bignoniaceae. The herbal products obtained from

the bark of tabebuia trees are called "taheebo", "lapacho", and "ipe roxo". Tabebuia rosea (Bertol.) DC. commonly known as "Pink Trumpet Tree" can grow up to 15 meter and well known for its beautiful flowers. Tea made from the leaves and bark is known to have a fever-reducing effect[9]. Tabebuia is reported to be an astringent, anti-inflammatory, antibacterial, antifungal, diuretic, and laxative [10, 11, 12, 13].

MATERIALS AND METHODS

Collection of Flowers

Fresh flowers of Tabebuia rosea were collected from Jail Corner, Trichy district, Tamil Nadu, India, during the month of May and identified by Dr. S. John Britto, Director, The rapinat Herbarium and Centre for Molecular Systematics (Authentication No. SS 001 dated: 06/11/2015). St. Joseph's College (Campus), Trichy, Tamil Nadu, India.

Extraction and fractionation

Fresh flower (1kg) of Tabebuia rosea collected at Jail corner, Trichy district, Tamil Nadu, India were extracted with 90% ethanol (5x500ml). The combined alcoholic extract was concentrated in vacuo and the aqueous extract was successively fractionated with petroleum ether (60-800C) (6x250ml), Peroxide free diethyl ether (4x250ml) and ethyl acetate (8x250ml). Petroleum ether fraction and diethyl ether fraction did not yield any isolable material. Ethyl acetate fraction on concentration yielded a dry powder which was dissolved in DMSO to get various concentrations and were used for further study.

ANTIMICROBIAL PROCEDURE

Screening of antibacterial activity

Identification of bacterial strain:

Four bacterial strains were used throughout investigation. All the bacterial cultures were obtained from Microbial Type Culture Collection (MTCC), Institute of Microbial Technology, Chandigarh, India. The young bacterial broth cultures were prepared before the screening procedure.

Preparation of inoculums:

Stock cultures were maintained at 4^0C on slopes of nutrient agar. Active cultures of experiment were prepared by transferring a loop full of cells from the stock cultures to test tube of Muller-Hinton Broth (MHB) that were incubated without agitation for 24 hrs at 37^0C. The cultures were diluted with fresh Muller-Hinton broth to achieve optical densities corresponding to 2.0x106 colony forming units (CFU/ml).

Antibacterial susceptibility test:

The disc diffusion method (Bauer et al., 1966) was used to screen the antibacterial activity. In-vitro antibacterial activity was screened by using Muller Hinton Agar (MHA) obtained from Himedia (Mumbai). The MHA plates were prepared by pouring 15 ml of molten media into sterile petriplates. The plates were allowed to solidify for 5 minutes and 0.1% inoculum suspension was swabbed uniformly and the inoculums were allowed to dry for 5 minutes. The compound of concentration 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml were loaded on 6 mm sterile disc. The loaded disc were placed on the surface of medium and the compound was allowed to diffuse for 5 minutes and the plates were kept for incubation at 37^0C for 24 hrs. At the end of incubation, inhibition zones formed around the disc were measured with transparent ruler in millimeter. Standard antibiotic chloromphenicol of concentration 1mg/ml was used as positive control[14].

SCREENING OF ANTIFUNGAL ACTIVITY

Culture Media

The media used for antifungal test was Sabouraud's dextrose agar/broth of Hi media Pvt. Bombay, India.

Inoculum

The fungal strains were inoculated separately in Sabouraud's dextrose broth for 6 h and the suspensions were checked to provide approximately 105 CFU/ml.

Determination of antifungal activity

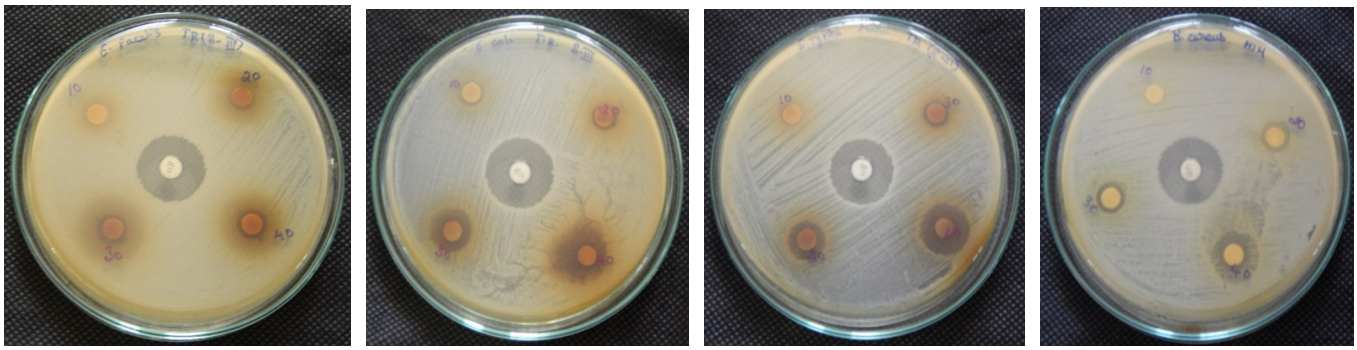
The agar well diffusion method (Perez, 1993) was modified. Sabouraud's dextrose agar (SDA) was used for fungal cultures. The culture medium was inoculated with the fungal strains separately suspended in Sabourauds dextrose broth. A total of 8 mm diameter wells were punched into the agar and filled with sample solution and solvent blanks (hydro alcohol, and hexane). Standard antibiotic (Fucanazole, concentration 1 mg/ml) was used as positive control and fungal plates were incubated at 37oC for 72 hrs. The diameters of zone of inhibition observed were measured.

RESULTS AND DISCUSSION

In the present study, Tabebuia rosea flowers were screened for antimicrobial activity and compared with standard drug. It is evident from the data presented in Table I that the compound isolated from the ethyl acetate fraction of

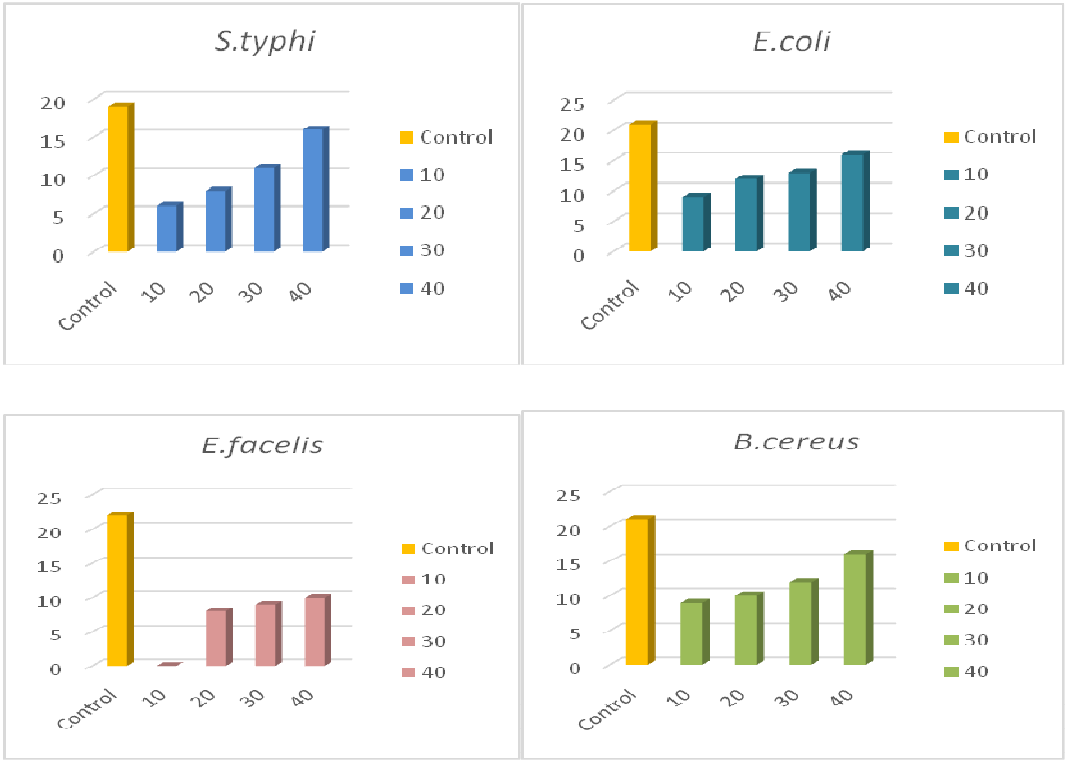
Table 1: Antibacterial activity of the compound isolated from the ethyl acetate fraction of flowers of Tabebuia rosea

S. No	Organisms	Zone of inhibition (mm)				
		Standard	Sample Concentration (mg/ml)			
		C	10	20	30	40
1	*S.typhi*	19	6	8	11	16
2	*E.coli*	21	9	12	13	16
3	*E.faecalis*	22	9	8	9	10
4	*B.cereus*	21	9	10	12	16



S. typhi **E. coli** **E. faecalis** **B. cereus**

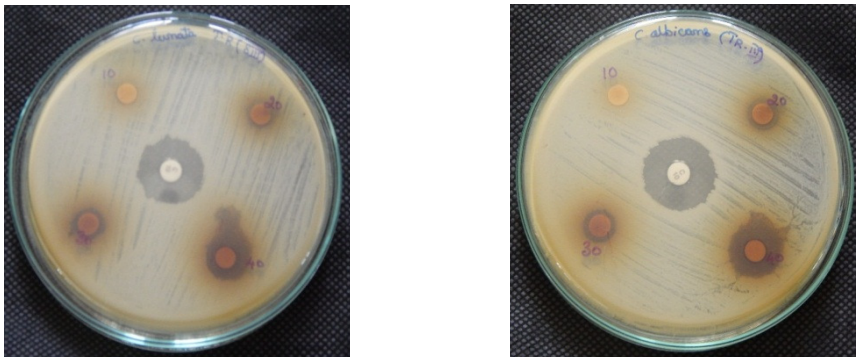
Figure1: Antibacterial activity of the compound isolated from the ethyl acetate fraction of flowers of Tabebuia rosea.



Graph No.1: Graphical representation of anti bacterial activity of the compound isolated from the ethyl acetate fraction of flowers of Tabebuia rosea. (**Standard:** Chloromphenicol, concentration 1 mg/ml)

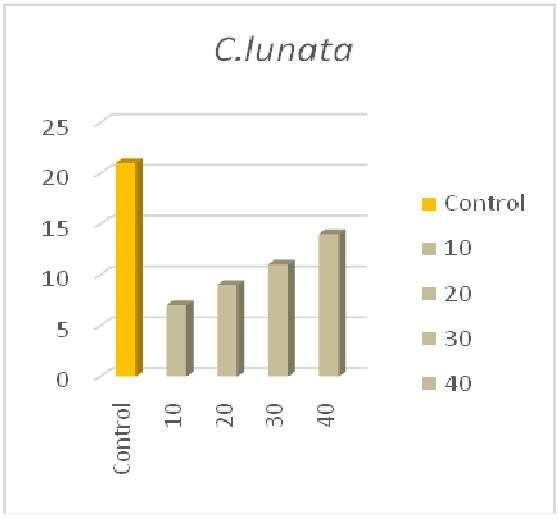
Table 2: Antifungal activity of the compound isolated from the ethyl acetate fraction of flowers of Tabebuia rosea

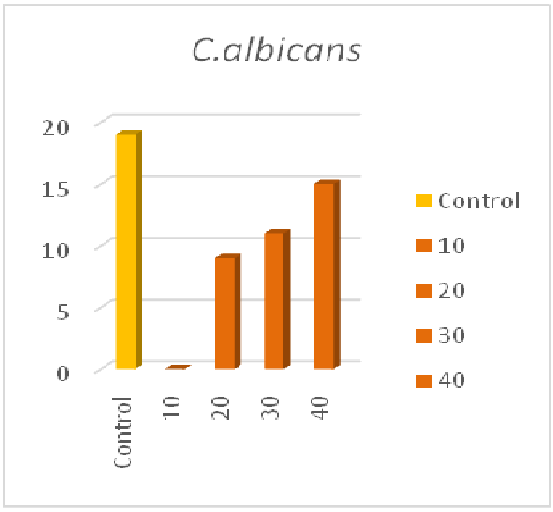
S. No	Organisms	Zone of inhibition(mm)				
		Standard	Sample Concentration (mg/ml)			
		C	10	20	30	40
1	*C.lunata*	21	7	9	11	14
2	*C.albicans*	19	0	9	11	15



C. lunata **C. albicans**

Figure 2: Antifungal activity of the compound isolated from the ethyl acetate fraction of flower of Tabebuia rosea





Graph No.2: Graphical representation of anti fungal activity of the compound isolated from the ethyl acetate fraction of flowers of Tabebuia rosea. (**Standard:** Fucanazole , concentration 1 mg/ml)

Tabebuia rosea flowers possesses antibacterial activity. The disc diffusion method result showed the zone of inhibition for 10 mg/ml as 6 mm, 9 mm , 9 mm and 9 mm, for 20 mg/ml as 8 mm,12 mm , 8 mm and 10 mm, for 30 mg/ml showing 11 mm, 13 mm , 9 mm and 12 mm, for 40 mg/ml as 16 mm, 16 mm , 10 mm and 16 mm, for the test sample against S. typhi, E. coli, E. faecalis and B. cereus respectively when compared with standard drug chloromphenicol showing 19mm, 21 mm , 22 mm and 21mm zone of inhibition respectively.

Then it is evident from the data presented in Table II that the test sample possesses antifungal activity. The disc diffusion method result showed the zone of inhibition for 10 mg/ml as 7 mm and 0 mm, for 20 mg/ml as 9 mm and 9 mm, for 30 mg/ml as 11 mm and 11 mm, for 40 mg/ml as 14 mm and 15 mm for the test solution against C. lunata, and C. albicans respectively when compared with standard drug Fucanazole showing 21mm and 19 mm of inhibition respectively.

The result indicates that all the test extracts show good inhibitory activity against all these bacterial and fungal strains. The pharmacognostical studies on this plant give an idea about identification, standardization and monograph of the plant. It is also important in long term study of plant to evaluate the medicinal action of this plant.

CONCLUSION

We are continuously searching for new molecules having better antimicrobial action and less side effects, In recent years molecules from natural origin had gained more popularity due to less side effects and better therapeutic action, particularly in antimicrobial field because of rapidly developing resistance to synthetic molecules. Present study indicates that the compound isolated from the ethyl acetate fraction of flowers of Tabebuia rosea shows good pharmacological action. That means Tabebuia species has wide scope to isolate various phytochemical constituent and evaluate their pharmacological screening to get better therapeutic value.

REFERENCES

1. Srinivasan D, Nathan S, Suresh T, Perumalsamy O. Antimicrobial activity of certain Indian medicinal plants used in folkloric medicine. J. Ethnopharmacol. 2001;74:217-220.
2. Hamill FA, Apio S, Mubiru NK, Ziraba RB, Mosango M, Maganyi OW, Soejarto DD, Traditional herbal drugs of Southern Uganda, II: literature analysis and antimicrobial assays J. Ethnopharmacol. 2003;84:57-78.
3. Dixon RA (2001) Natural products and plant disease resistance. Nature 411(6839):843-847.
4. Kinghorn AD (2001) Pharmacognosy in the 21st century*. Journal of Pharmacy and Pharmacology 53(2):135-148.
5. Wessjohann LA (2000) Synthesis of natural-product based compound libraries. Current Opinion in Chemical Biology 4(3):303-309.
6. Rojas R, Bustamante B, Bauer J et al. Antimicrobial activity of selected Peruvian medicinal plants. J Ethnopharmacol 88: 199-204, 2003.
7. Dvorkin-Camiel L, Whelan JS (2008) Tropical american plants in the treatment of infectious diseases. Journal of Dietary Supplements 5(4):349-372.
8. Olmstead RG, Zjhra ML, Lohmann LG, Grose SO, Eckert AJ (2009) A molecular phylogeny and classification of Bignoniaceae. American Journal of Botany 96(9):1731-1743.
9. Gentry AH (1992). A Synopsis of Bignoniaceae Ethnobotany and Economic Botany. Annuals of Missouri Botanical Garden, 79(1): 53-64.
10. Abbott BJ, Hartwell JL, Leiter J, Perdue RE and Schepartz SA (1967). Screening data the cancer chemotherapy national Service Center screening laboratories. XL, Plant extracts. Cancer Res., 27: 190-345.
11. Bastein JW (1983). Pharmacopeia of Qollahuaya Andeans, J. Ethnopharmacol., 8: 91-111.
12. Arenas P (1987). Medicine and magic among the magic the Maka Indians of Paraguayan Chaco, J. Ethnopharmacol., 21: 279-295.
13. Almedia ER, da Silvia Filho AA, dos Santos ER and Lopes CAC (1990). Antiinflammatory action of lapachol, J. Ethnopharmacol., 29: 239-241.
14. Perez C, Paul M and Bazerque, An antibiotic assay by the agar well diffusion method, Acta Biologiae et Medicine Experimentalis, 1990, 15, 113-115.

