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NOTE

Antimicrobial Activity of Ethanolic Extract of Leaves of *Tabebuia rosea* (Bertol.) DC.

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Tabebuia rosea (Bertol.) DC. is commonly grown as an ornamental tree for its grand and majestic pink or purple flowers which offer different shades of colours. The wood is valuable and used in the manufacture of furniture. The preliminary phytochemical screening of the leaves revealed the presence of saponins, tannins, flavonoids and alkaloids. *In vitro* antibacterial studies on the ethanolic extracts of leaves were carried out on *Staphylococcus aureus, Staphylococcus epidermidis, Klebsiella pneumoniae*, *Escherichia coli* and *Candida albicans* by using agar disc diffusion method. The microbial strains were exposed to concentration of 100 µg/disc, with ethanol as solvent. The results of present antimicrobial assay revealed that the extract showed good inhibitory activity against all the tested pathogens compared with standard antibiotics like ciprofloxacin and ketoconazole. The inhibitory activities were found to be dose dependent.

Key Words: *Tabebuia rosea*, Antimicrobial, *Candida albicans*.

Man has used plants to treat common infectious diseases and some of the traditional medicines are still included as part of the habitual treatment of various maladies[1,2]. Scientific interest in medicinal plant has burgeoned in recent times due to increased efficiency of new plant derived drugs and rising concerns about the side effects of modern medicine. The continuing emergence of drug resistant organisms and the increasing evolutionary adaptations by pathogenic organisms to commonly used antimicrobials have reduced the efficacy of antimicrobial agents currently in use. Therefore, the search for new drugs from plants continues to be a major source of commercially consumed drugs. Even most synthetic drugs have their origin from natural plant products[3].

Tabebuia rosea (Bertol.) DC. commonly known as 'pink trumpet tree' can grow up to 15 m and well known for its beautiful flowers. The timber is widely used for general construction and carpentry in many European countries. The fruits are green, long and bean pod-like with a length of 20-40 cm (8-16 inch). The fruits turn dark brown when ripe and contain flat, heart-shaped seeds with tiny wings. The graceful beauty is a treat for the eyes, but the tree has medical uses as well. Tea made from the leaves and bark is known to have a fever-reducing effect[4]. This study aimed at investigating the phytochemical and antimicrobial properties of the ethanolic leaf extract from this ornamental plant against four bacterial and one fungal strains in order to validate or otherwise prove the claims of the herbalists who use it as an antimicrobial remedy. This study will also hopefully expose new frontiers by improving on the current applications of the plant extract. It has been suggested that aqueous and ethanolic extracts from plants used in allopathic medicine are potential sources of antiviral, antitumoural and antimicrobial agents[5,6]. The selection of crude plant extracts for screening programs has the potential of being more successful in initial steps than the screening of pure compounds isolated from natural products[7].

Mature and healthy leaves of *Tabebuia rosea* (Bertol.) DC. were collected from the medicinal garden of Mohamed Sathak A.J College of Pharmacy, Sholinganallur, Chennai and were identified by Prof. P. Jayaraman, Ph.D, Director, Plant Anatomy Research Center (PARC), Chennai.

Preparation of plant extract: The leaves were washed in tap water, shade dried for 10 days and made into a fine powder of 40 mesh size using the laboratory mill. The coarse powder of shade dried leaves of *Tabebuia rosea* (Bertol.) DC. (200 g) was extracted with 500 mL of ethanol by cold maceration in a narrow mouthed bottle with occasional shaking for three days. It was filtered and the solvent was removed by distillation under reduced pressure. The dried extract was redissolved in ethanol to yield solutions containing 100 µg/disc concentration.

Test organisms: The extract was tested on the following two gram positive bacteria: *Staphylococcus aureus*, *Staphylococcus epidermidis* and two gram negative bacteria including *Klebsiella pneumonia*, *Escherichia coli*. A fungal strain, *Candida albicans* was also tested.

Phytochemical investigation: Phytochemcial analysis of the extract was conducted following the procedure of Indian Pharmacopoeia (1985). By this analysis, the presence of several phytochemicals like flavonoids, tannins, saponins and alkaloids were confirmed.

Antimicrobial screening: The leaf extract (100 µg/disc) was tested for antimicrobial activity using agar disc diffusion assay according to the method of Bauer *et al.*[8]. The strains of microorganisms obtained were inoculated in conical flask containing 100 mL of nutrient broth. These conical flasks were incubated at 37 ºC for 24 h and were referred to as seeded broth. Media were prepared using Muller Hinton Agar (Himedia, Mumbai, India), poured on petri dishes and inoculated with the test organisms from the seeded broth using cotton swabs. Sterile discs of 6 mm width had been impregnated with 20 µL of test extract and introduced onto the upper layer of the seeded agar plate. The plates were incubated overnight at 37 ºC. Antibacterial and antifungal activity was assigned by measuring the inhibition zone formed around the discs. Ciprofloxacin (10 µg/disc) and ketoconazole (50 µg/disc) were used as standards.

The preliminary phytochemical analysis of the leaf extract revealed the presence of tannins, flavonoids, saponins and alkaloids as presented in Table-1. The results obtained from the disc diffusion assay showed that there has been an increasing effect on bacterial and fungal growth. The extract showed good inhibitory activity on almost all the bacteria and fungi used. It has been found that among all the tested organisms, the gram positive bacterial strain, *Staphylococcus epidermidis* and fungal strain *Candida albicans* were found to be more susceptible to the plant extract by showing inhibition zone of 19 mm and 19 mm, respectively. The gram negative strain *E. coli* was least susceptible with the inhibition zone of 16 mm. The antimicrobial activity in terms of zone of inhibition was presented in Table-2. The observed activity may be due to the presence of potent phytoconstituents in the leaf extracts.

TABLE-1
PHYTOCHEMICAL PROFILE OF THE LEAF EXTRACT

Phytochemical	Presence/Absence
Sugar	–
Tannin	+
Alkaloid	+
Flavonoid	+
Saponin	+
Steroid	–

Antibiotics provide the main basis for the therapy of microbial infections. However, the high genetic variability of microbes enables them to rapidly evade the action of antibiotics by developing antibiotic resistance. Thus, there has been a continuing search for new and more potent antibiotics[9]. According to World Health Report of Infectious diseases 2000, overcoming antibiotic resistance is the major issue of the WHO for the next millennium. Hence the last decade witnessed an increase in the investigation of plants as a source of human disease management[10]. *Tabebuia rosea* showed notable antimicrobial activity and so this plant can be used to discover bioactive natural products that may serve as leads for the development of new pharmaceuticals that address hither unmet therapeutic needs. Such screening of various natural organic compounds and identifying active agents is the need of the hour, because successful prediction of lead molecule and drug like properties at the onset of drug discovery will pay off later in drug development.

TABLE-2
ANTIMICROBIAL ACTIVITY OF ETHANOLIC LEAF EXTRACT OF *Tabebuia rosea*

Strains	Organism used	Diameter of zone of inhibition (mm)		
		100 µg/disc	Standard	Control
		(Ciprofloxacin 10 µg/disc)		
Bacterial strains	*S. aureus*	15	39	Nil
	S. epidermidis	19	39	Nil
	E. coli	16	38	Nil
	K. pneumoniae	18	38	Nil
		(Ketoconazole 50 µg/disc)		
Fungal strain	*C. albicans*	19	37	Nil

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