Original Article

Screening of Antibacterial Activity of Aqueous Bark Extract of *Bombax ceiba* against some Gram Positive and Gram Negative Bacteria

Digge V.G[1], Kuthar Sonali S[2], Hogade Maheshwar G[3], Poul B.N[4] and Jadge Dhanraj R[5]

[1]Shivlingeshwar college of Pharmacy, Almala, (Maharashtra) India
[2]Mahatma Basveshwar College of Pharmacy, Latur, (Maharashtra), India
[3]Department of Pharmacognosy, Vilarao Deshmukh Foundation, Group of Institutions, VDF School of Pharmacy, Latur-413531 (Maharashtra), India
[4]Maharashtra College of Pharmacy, Nilanga, (Maharashtra), India
[5]Dayanand College of Pharmacy, Latur (Maharashtra), India

Address for Correspondence

Mahatma Basveshwar College of Pharmacy, Latur, (Maharashtra), India
E-mail: sonalipharma11@gmail.com

ABSTRACT

Objective: To evaluate the antibacterial activity of aqueous extracts of the bark of *Bombax ceiba.*
Methods: To evaluated for their antibacterial activity using the Pour plate method. It was tested against six medically important bacterial strains, namely Gram-positive Bacteria (*Bacillus subtilis, Bacillus aureus* and *Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli*, K *pneumoniae*, *and Pseudomonas aeruginosa)*.
Result: The potency of the microorganisms to the aqueous extracts of *Bombax ceiba* was compared with standards drug i.e. Gentamicin. The aqueous extract was more significant against Gram-positive bacteria than against Gram-negative bacteria. The 100 µg/ml showed the best antibacterial activity as compared to the standard.
Conclusion: The aqueous extracts of *Bombax ceiba* which contains Tannins due to the presence of tannins shown significant antibacterial activity.

Keywords: Antimicrobial activity, Gram positive & Gram negative bacteria, Aqueous extract of *Bombax ceiba*.

INTRODUCTION

Presently about 70-80 percent of the world population use herbal drug, mainly in developing countries, for primary health care because of better cultural acceptability, better compatibility with the human body and fewer side effects. Therefore, last few years have seen a majorly increases in their use in the developed world. Today number of drug resistance has introduced due to the frequently use as a antimicrobial drugs and

also commonly used in the treatment of infectious disease. In addition to this problem, antibiotics are sometimes having side effects on the host including hypersensitivity, immune-suppression and allergic reactions. In this case the scientists to search for new antimicrobial compounds. Hence, there is a constant require for new and effective therapeutic agents. Hence, there is a need to develop alternative antimicrobial drugs for the treatment of infectious diseases from medicinal plants. Several screening studies have been carried out in different parts of the world. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world[1].

Pharmacological evaluation involves testing of the microbial susceptibility to chemotherapeutic agents. Determination of antimicrobial effectiveness against specific pathogens is essential for proper therapy. Sensitivity of organisms to antimicrobials may be quantified by the minimum concentration require to inhibit their growth by the minimum concentration require to kill them within a particular period of time.Since it is easier to measure and apply to both bactericidal and bactriostatic drugs, MICs are frequently used[2-4].

Bombax ceiba belonging to Family Bombacaceae, commonly known as salmali. It is widely distributed throughout India, in forest up to an altitude about 1500 m, also raised in plantation and found to be Malaya. In India, it is distributed from Rajasthan, and Andhra Pradesh. In Ayurveda, *Bombax ceiba* stem bark was reported to contain lupeol and β-sitosterol. In another studies, the presence of flavonoides, glycoside, sterol and terpenoids and absence of alkaloids and saponins was reported in the stem bark. Stem bark are considered as acrid, demulcent, diuretic, inflammation, slightly astringent and tonic. It is applied on swelling, boil and burning sensation and applied on face in facial complaints such as freckles, acne vulgeris and other cutaneous as well as pigmentation disorder. The crude extract during the present research work were subjected to antibacterial activity for possible preliminary pharmacological screening [5-8].

Therefore, there is a need to find out or develop the alternative drugs which are obtained from medicinal plants for the treatment of antimicrobial and infectious diseases. Several screening studies have been carried out in different parts of the world. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world[9,10].

MATERIAL AND METHODS

Plant collection and authentication

In the present study, the bark of *Bombax ceiba* were collected from the local areas of Ramling Mudgad, Dist- Latur (Maharashtra). The bark was authenticated by Dr. Harsha Hegde, Scientist, RMRC, Indian Council of Medical Research, Belgaum, Karnataka, India.

Preparation of the crude extracts

The bark of *Bombax ceiba* were dried at room temperature (25-35°C) and prepared the powdered with the help of an electric grinder. The coarse material was macerated with distilled water and 10 % of chloroform and keep for 7 days. After seven days filter through muslin cloth and filtrate transfer in evaporating dish and keep on water bath. The extracts were dried at 50°C in a water bath. The percentage yields obtained of the extracts was 21.20%.

Preparation of test Samples

Aqueous extracts of *Bombax ceiba* was prepared in sterile distilled water (1mg/ml). Further test dilutions were made ranging from 10µg/ml to 100µg/ml in sterile distilled water[11].

Preparation of bacterial suspension

The bacterial suspension was prepared by transferring a loopful of inoculum into 1ml sterile saline solution from the stock culture maintained at 4^0C in 10ml nutrient broth[12].

Preparations of plates

Nutrient agar medium was sterilized at 15lb/cm^2 pressure for 20 min in an autoclave about 15 ml of medium was poured in each Petri plates under sterile conditions[13].

Test bacteria

The Bacterial culture employed in this study are *Bacillus subtilis, Bacillu aureus, Staphylococcus aureus*, *Escherichia coli*, K *pneumoniae and Pseudomonas aeruginosa* obtained from the Department of Biotechnology, Swami Vivekanand Mahavidyalaya, Udgir (MH) India.

Culture media

The media used in Pour Plate Method was sterile nutrient agar.

Antibacterial assay

Each extracts was tested against three Gram-positive bacteria (*Bacillus subtilis, Bacillu aureus* and *Staphylococcus aureus*) and three Gram-negative bacteria (*Escherichia coli*, K *pneumoniae*., *Pseudomonas aeruginosa*) Antibacterial activity was determined by Pour plate method in Sterile nutrient agar medium plate. The 6.0 mm wells were made each Petri plate. Plate were allowed to stand for 1hr and inoculated with 1ml extract. Respective dilutions ranging from 10 µg/ml to 100 µg/ml was prepared. The applied sample extracts were allowed to diffuse properly by keeping the Petri plates in refrigerators at 4^0C for 4hr.Then the Petri plates were transferred to incubation chamber for 24hr at 37^0C. The diameter zone of inhibition in mm was measured. Greater the diameter more active is plants extracts tasted on the colony of the organisms[14,15].

RESULTS AND DISCUSSION

Aqueous bark extracts of the *Bombax ceiba* was subjected to a preliminary screening for antimicrobial activity against Gram positive & Gram negative bacteria i.e. *Bacillus subtilis, Bacillus aureus, Staphylococcus aureus, Escherichia coli*, K *pneumoniae* and *Pseudomonas aeruginosa.* It was clear from Table-1. The aqueous bark extracts of the *Bombax ceiba* shown significant activity against five organisms tested but the aqueous bark extracts of the *Bombax ceiba* having less activity against *B. Subtilis* organism as compared to the standards drugs. The aqueous bark extracts of the *Bombax ceiba* shown most significant against *S. aureus* as compared to standards drug and it has been shown in Fig-1. The aqueous extract at 100 µg/ml concentration was most significant as compared to the standard drugs 25 µg/ml Gentamicin against all organisms.

CONCLUSION

The study has been shown the aqueous bark extracts of the *Bombax ceiba* significantly determined antibacterial activity. The aqueous bark extracts of the *Bombax ceiba* which contains presence of chemical constituents as alkaloids, glycosides, saponins, cardiac glycosides, tannins, tannic acid and simple phenol compounds. The aqueous bark extracts of the *Bombax ceiba* has been shown better activity due the presence of tannins and tannins are responsible for anthelmintic activity.

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Table 1. Preliminary screening for antibacterial activity of aqueous bark extract of *Bombax ceiba*

Test samples	Conc. (µg/ml)	Zone of inhibition (mm)					
		Gram positive			Gram negative		
		B. subtilis	*B. aureus*	*S. aureus*	*E. coli*	*K. pneumoniae*	*P. aeruginosa*
Aqueous bark Extract	25	10	11	15	14	14	12
	50	14	15	20	16	15	20
	75	18	20	24	23	20	20
	100	21	22	32	28	27	23
Gentamicin	25	15	14	12	15	11	13
	50	22	16	15	20	13	19
	75	24	16	17	21	18	23
	100	29	27	20	26	22	26

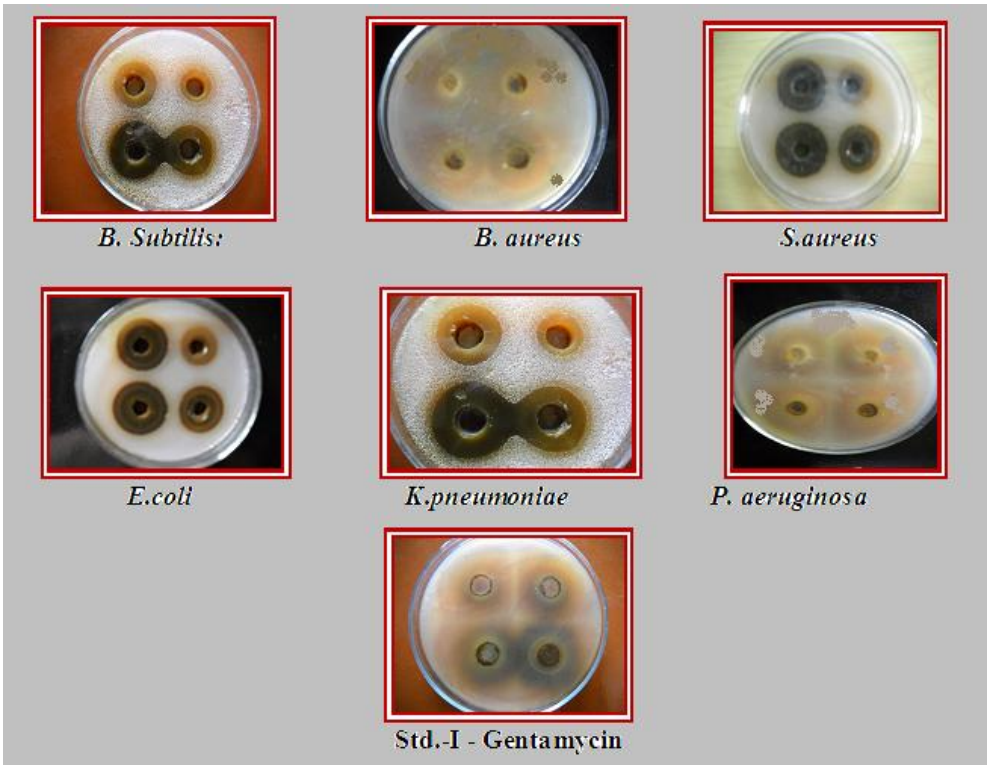

Figure 1. Screening for antibacterial activity of aqueous bark extract of *Bombax ceiba*