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ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF STEM BARK OF *ABUTILON INDICUM* (LINN.) SWEET

Chumbhale Deshraj S.[1]*,
Chaudhari S. R.[1], Upasani C. D.[2]

[1]Department of Pharmacognosy, Amrutvahini College of Pharmacy, Sangamner-422 608, Maharashtra, India.
[2]SNJB'S Shriman Sureshdada Jain College of Pharmacy, Chandwad, Nashik – 423 101, Maharashtra, India.

ABSTRACT

Present investigation is an attempt to evaluate antimicrobial potential of stem bark of Abutilon indicum (A. indicum) (Linn.) Sweet (Malvaceae), an important medicinal plant in the Indian system of medicine. The microbial assay is based on the comparison of inhibition of growth of microorganisms. Antibacterial and antifungal activity of methanolic extract of stem bark of A. indicum (10 mg/ml) was evaluated against Staphylococcus aureus, Escherchia coli and Candida albicans and Aspergillus niger respectively. Methanolic extract of A. indicum stem bark showed significant antibacterial activity by showing zone of inhibition of 15.03 ± 0.05 and 12.36 ± 0.55 on nutrient agar medium plate against Staphylococcus aureus and Escherchia coli when compared to zone of inhibition of 22.36 ± 0.55 and 19.06 ± 0.11 of standard amoxicillin at 30□g/disc respectively. The methanolic extract of A. indicum stem bark also showed significant antifungal activity by showing zone of inhibition of 18.04 ± 0.05 and 11.07 ± 0.06 on nutrient agar medium plate against Candida albicans and Aspergillus niger when compared zone of inhibition of 23.11 ± 0.12 and 25.16 ± 0.05 of standard ketaconazole at 30□g/disc.Present investigation has to conclude that methanolic extract of A. indicum stem bark showed significant antibacterial and antifungal activity and its wide antibiotic potential will be useful for further research in therapeutics.

Keywords- *Abutilon indicum* (Linn.) Sweet, stem bark, antibacterial activity, antifungal activity *etc.*

Correspondence Author

Chumbhale Deshraj S.
Department of Pharmacognosy,
Amrutvahini College of Pharmacy,
Sangamner-422 608,
Maharashtra, India.

INTRODUCTION

The plant *Abutilon indicum* (*A. indicum*) (Linn.) Sweet (Malvaceae) commonly known as "Karandi" is an annual herb found in throughout India and also many tropical countries [1]. Traditionally the plant is used to treat various diseases. Although the stem bark are also have been possess medicinal properties, and are used for treating urinary complaints. The bark is also used as an anthelmintic, febrifuge, astringent and diuretic [2, 3]. Literature reports suggested leaves of this plant are reported for antidiarrhoeal, cytotoxic, anthelmintic, antibacterial, antifungal, antioxidant, hepatoprotective, hypoglycemic, anti-inflammatory, anticonvulsant, antiulcer, analgesic and larvicidal activity [4 -16]. Seeds of this plant reported for diuretic activity [17]. Root reported to showed analgesic effect [18]. Aerial parts of this plant having antioxidant and whole plant reported for antidiabetic and anti-arthritic activity [19, 20]. Stem of this plant is reported for analgesic and free radical sacavenging property [21, 22]. But especially stem bark of this plant not reported for phytochemical and biological studies have not been reported for the stem bark of this plant. Therefore present investigation was planned to explore the plant, *Abutilon indicum* (Linn.) Sweet. for its antimicrobial properties.

MATERIALS AND METHODS

Plant material

The plant, *A. indicum* was collected in and around Rajapur, Sangamner, Ahmednagar District (Maharashtra) in July 2008. The plant was authenticated and herbarium deposited in Department of Botany, S. N. Arts, D. J. M. Commerce & B. N. S. Science College, Sangamner, Ahmednagar, Maharashtra under voucher specimen number GSSAI 73.

Preparation of course powder

The stem bark of *A. indicum* were dried under shade and then powdered by a mechanical grinder. The powder was passed through 40 mesh sieve and stored in an airtight container for further use.

Preparation of extract

The air-dried stem bark of *A. indicum* was made into a coarse powder. The dried powder of stem bark was extracted with methanol using a Soxhlet extractor. Then the extract was filtered through muslin and the filtrate was evaporated under reduced pressure and vacuum-dried [23].

Test organisms and inoculums

Gram positive bacterial strains of *Staphylococcus aureus* (ATCC 25923) and gram negative *Escherchia coli* (ATCC 25922) and whereas fungal strains of *Candida albicans* (ATCC 48274) and *Aspergillus niger* (ATTC 60192) were procured from the Department of Microbiology, Amrutvahini College of Pharmacy, Sangamner, Maharashtra.

Standard Drugs

Antibacterial, Amoxycillin of the concentration 30µg/disc and antifungal, Ketaconazole of the concentration 30µg/disc were obtained from Modern Chemicals, Nashik.

Preparation of Nutrient agar media

Dehydrated nutrient agar media was used and was prepared in distilled water. The composition of the media was as given as under

Table 1. Composition of Nutrient Agar medium

Sr. No.	Composition	Concentration
01	Agar	15.0%
02	Peptic Digest of Animal tissue	5.0%
03	Sodium Chloride	5.0%
04	Beef Extract	1.5%
05	Yeast Extract	1.5%
06	pH	7.4±0.2 at 25^0 C
07	Distilled water	1000 ml

The medium was autoclaved at 15 lbs per square inch pressure at 121^0 C. Then dehydrated nutrient agar medium (28 g) was accurately

weighed and suspended in 1000 ml of distilled water in a conical flask. It was heated on water bath to dissolve the medium completely. Direct heating was avoided as it may lead to charring of the medium components and render it useless for the purpose [24].

Sterilization of Media

The conical flask containing the nutrient agar medium was plugged with the help of non-absorbent cotton bung. The mouth of the conical flask and the cotton bung were properly covered with aluminum foil. The medium was then sterilized by autoclaving at 15 lbs per square inch pressure for 20 minutes.

Preparation of test organisms

The test organisms were maintained on slants of medium and transferred to a fresh slant once a week. The slants were incubated at 37^0 C for 24 hours. Using 3 ml of saline solution, the organisms were washed from the agar slants on to a large agar surface (medium) and incubated for 24 hours at 37^0 C. The growth from the nutrient surface was washed using 50 ml of distilled water. A dilution factor was determined which gave 25% light transmission at 520 nm. The amount of suspension to be added to each 100 ml agar or the nutrient broth was determined by use of test plates or broth. The test organisms were stored under refrigeration.

Experimental method

Cup and Plate Method method used to screen antimicrobial potential of methanolic extract of stem bark of *A. indicum.* A previously liquefied and sterilized medium was poured into sterilized petri-plates of 100 mm size. Ten plates were prepared and kept for solidify. Five holes were made in each plate with a stainless steel borer having 6 mm in diameter. The methanolic extract of the plant in the concentration of 10 mg/ml were made in 1% Di-methyl Sulfoxide (DMSO). Amoxycillin (Disc-30 µg/disc) and Ketaconazole (Disc-30 µg/disc) were used as a standard. Micropipette was used to deliver the solutions in to holes. The volume of solution added to each hole was kept uniform (0.1 ml in each hole). One strip of amoxycillin and ketaconazole (Standard) was placed aseptically to the center hole of each plate. The plated were then left for standing for 1 hr. for proper diffusion of the drug solutions. They were incubated for about 24 hours at 37^0 C. After 24 hours the plates were examined and the diameter of zones of inhibition was accurately measured [25].

RESULTS AND DISCUSSION

The *in vitro* anti-bacterial and anti-fungal activity of the methanolic extracts of stem bark of *A. indicum* was quantitatively assessed on the basis of zone of inhibition. The results are shown in Table 2 and Table 3.

The methanolic extracts studied in the present investigation exhibited varying degree of inhibition zone against the selected bacterial and fungal pathogens. Present study revealed that the anti-bacterial and anti-fungal efficacy of methanolic extract of *A. indicum* stem bark showed significant antibacterial activity by showing zone of inhibition of 15.03 ± 0.05 and 12.36 ± 0.55 on nutrient agar medium plate against *Staphylococcus aureus* and *Escherchia coli* when compared to zone of inhibition of 22.36 ± 0.55 and 19.06 ± 0.11 of standard amoxicillin at 30µg/disc respectively. The methanolic extract of *A. indicum* stem bark also showed significant antifungal activity by showing zone of inhibition of 18.04 ± 0.05 and 11.07 ± 0.06 on nutrient agar medium plate against *Candida albicans* and *Aspergillus niger* when compared zone of inhibition of 23.11 ± 0.12 and 25.16 ± 0.05 of standard ketaconazole at 30µg/disc.

The results were noted for zone of inhibition. The methanolic extract of stem bark of *A. indicum* possesses zone of inhibition is proportional to its antimicrobial activity of standard antibiotic. The methanolic extract of *A. indicum* stem bark also showed significant antibacterial and antifungal activity by showing significant inhibition against *Staphylococcus aureus* and *Candida albicans.*

Table 2. Antibacterial activity of methanolic extract of* A. indicum *stem bark

Sr. No.	Drug	Concentration	Zone of Inhibition Values* (mm) ± SD	
			Staphylococcus aureus	***Escherchia coli***
1.	Methanolic extract	(10 mg/ml)	15.03 ± 0.05	12.36 ± 0.55
2.	Amoxycillin	(30µg/disc)	22.36 ± 0.55	19.06 ± 0.11

* An average of three determinations

Table 3. Antifungal activity of methanolic extract of* A. indicum *stem bark

Sr. No.	Drug	Concentration	Zone of Inhibition Values* (mm) ± SD	
			Candida albicans	***Aspergillus niger***
1.	Methanolic extract	(10 mg/ml)	18.04 ± 0.05	11.07 ± 0.06
2.	Ketaconazole	(30µg/disc)	23.11 ± 0.12	25.16 ± 0.05

* An average of three determinations

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