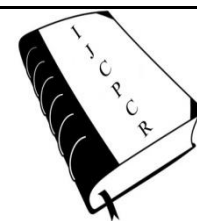




International Journal of
**Current Pharmaceutical & Clinical
Research**



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**INVESTIGATION OF ANTIBACTERIAL POTENTIAL OF HYDRO
ALCOHOLIC EXTRACT OF WHOLE PLANT OF *ABUTILON
INDICUM* (L.) SWEET**

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ABSTRACT

This study was done with hydro alcoholic extract of whole plant of *Abutilon indicum* (L.) Sweet ((Family: Malvaceae) for its antibacterial activity. This plant extract was preliminarily screened for its phytochemical constituents such as alkaloids, saponins, tannins, amino acids, flavanoids, carbohydrate and glycosides. Hydro alcoholic extract of whole plant of *Abutilon indicum* was investigated for its antibacterial activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Salmonella typhi* using agar disc diffusion technique in dose dependent manner. Among these various organisms, appreciable antibacterial activity was exhibited in *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Salmonella typhi* at the dose of 80mg/ml compared with strains of *Klebsiella pneumonia* and *Pseudomonas aeruginosa*. Amikacin was used as a standard drug.

Key words: *Abutilon indicum*, whole plant, antibacterial activity, agar disc diffusion method.

INTRODUCTION

Plants are prospective source of antimicrobial agents in different countries. About 60 to 90% of populations in the developing countries used plant derived medicine. Traditionally, crude plant extracts are used as herbal medicine for the treatment of human infectious disease [1-3]. Plants are rich in a variety of phytochemicals including tannins, terpenoids, alkaloids, and flavonoids which have been found *in vitro* to have antimicrobial properties [4,5].

Man has used plants to treat common infectious diseases and some of these traditional medicines are still included as part of the habitual treatment of various diseases[6]. Medicinal plants are rich sources of antimicrobial agents[7]. According to World Health Organization (WHO) medicinal plants would be the best source to obtain a variety of drugs and 80% of World population is dependent on traditional medicine and a major part of traditional therapies involves the use of plant

extracts or their active constituents[8]. Hence the ethnobotanical approach is currently being applied to the search for new drugs using plants, which are being used by traditional societies. *Abutilon indicum* belongs to the family Malvaceae, in Tamil it is known as Thuthi. Traditionally, the plant is used for treatment of inflammation, piles, gonorrhoea and as an immune stimulant. In general, its root and bark are used as aphrodisiac, anti-diabetic and diuretic. Seeds are used in the treatment of cough, urinary disorders and as a laxative in piles. More importantly, the juice from its leaves has been used to formulate an ointment for quick ulcer healing properties. Besides, it is widely used in folk medicine for treating fever, cough, lung disease, urine output, deafness, ringing in the ears, mumps and pulmonary tuberculosis[9]. The present study is aimed to investigate the antibacterial activity of the leaves of *Abutilon indicum* (L.) Sweet (Figure.1).

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Fig.1. *Abutilon indicum* (L.) Sweet

MATERIALS AND METHODS

Preparation of hydro alcoholic extract

The whole plant of *Abutilon indicum* was collected from the Tiruchengode, Tamilnadu in the month of December 2017. The plant was then authenticated by the Dr. S. Senthil kumar, Head of the Department of Botany, Vivekanandha College of Arts and Science for Women, Elayampalyam, Tiruchengode and were washed thoroughly with distilled water, shade dried, and crushed into powdered form with the help of grinder. The plant material was dissolved in extraction solvent (ethanol : water, 70:30 v/v) and placed for 72 hours at room temperature in a shaker. Then, the mixture was filtered using Whatman filter paper No. 1. The extraction was repeated 3 times and the filtrate was collected in a beaker. Then, the filtered extract was concentrated using rotary evaporator at 40°C under vacuum[10].

Preliminary phytochemical screening

The extract was subjected to preliminary qualitative tests to identify the phyto constituents present in the whole plant[11]. The results were tabulated in Table 1.

Antibacterial activity

The antibacterial activity of hydro alcoholic extract of whole plant of *Abutilon indicum* was tested against *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Salmonella typhi* in dose dependent manner. The antibacterial sensitivity pattern for these isolates was studied by agar disc diffusion method (Kirby Bauer Method)[12].

Muller Hinton Agar media was prepared and the plates were swabbed with 24 hrs cultures of respective bacteria grown in nutrient broth overnight. Sterile discs of 6mm diameter were impregnated with plant extract at the dose of 20mg/ml, 40mg/ml and 80mg/ml. and discs of Amikacin as positive control. The plates were then incubated at 37°C for 24 hrs. Inhibition was recorded by measuring the diameter of inhibition zone at the end of 24hrs. Each experiment was repeated in triplicates. Results were tabulated in Table 2.

Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) [13,14]

The MIC of the hydro alcoholic extract of whole plant of *Abutilon indicum* was determined by microbroth dilution method using 96-well plates. The MIC value of the extract was determined as the lowest concentration the extract that completely inhibited bacterial growth after 48 hrs of incubation at 37°C. For the determination of MBC, a portion of liquid (5µl) from each well that exhibited no growth were taken and then subculture and incubated 37°C for 24 hrs. The lowest concentration that revealed no visible bacterial growth after sub-culturing was taken as MBC. Results were tabulated in Table 3.

Table 1. Indicates phytoconstituents present in whole plant of hydro alcoholic extract of *Abutilon indicum*

S.NO.	PHYTOCONSTITUENTS	HYDRO ALCOHOLIC EXTRACT
1.	Alkaloids	+
2.	Saponins	+
3.	Glycosides	+
4.	Carbohydrates	+
5.	Tannins & phenolics	+
6.	Flavonoids	+
7.	Proteins and amino acids	+
8.	Fixed oils and fats	-
9.	Lignins	+

‘+’ indicates positive ‘-’ indicates negative

Table 2. Antibacterial activity of hydro alcoholic extract of whole plant of *Abutilon indicum* against bacterial pathogens by agar disc diffusion method

	Zone of inhibition in mm
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Bacterial Species	Standard (Amikacin)	Plant extract		
	30µg/ml	20mg/ml	40mg/ml	80mg/ml
<i>Staphylococcus aureus</i>	12	07	08	10
<i>Bacillus subtilis</i>	11	-	06	08
<i>Escherichia coli</i>	12	06	07	09
<i>Salmonella typhi</i>	14	07	08	10
<i>Klebsiella pneumonia</i>	10	-	-	06
<i>Pseudomonas aeruginosa</i>	11	-	-	07

Table 3. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) for hydro alcoholic extract of whole plant of *Abutilon indicum*

Bacterial species	Plant extract	
	MIC (mg/ml)	MBC (mg/ml)
<i>Staphylococcus aureus</i>	2.3	1.2
<i>Bacillus subtilis</i>	3.1	1.5
<i>Escherichia coli</i>	2.9	1.5
<i>Salmonella typhi</i>	2.4	1.3
<i>Klebsiella pneumonia</i>	3.4	1.7
<i>Pseudomonas aeruginosa</i>	3.2	1.9

RESULTS AND DISCUSSION

The results obtained in this study were tabulated in Table 2 which shows the growth inhibition produced by hydro alcoholic extract of whole plant of *Abutilon indicum* on six species of bacteria.

Hydro alcoholic extract of whole plant of *Abutilon indicum* was found to be highly active against *Staphylococcus aureus*, *Salmonella typhi*, *Escherichia coli* and *Bacillus subtilis* (10mm, 10mm, 09mm and 08mm) respectively at 80mg/ml and moderately active against *Klebsiella pneumonia* and *Pseudomonas aeruginosa* (06mm and 07mm) respectively at 80mg/ml. The comparative study of the antibacterial activity of hydro alcoholic extract of whole plant of *Abutilon indicum* along with positive control revealed that it possesses appreciable antibacterial potential.

The results of MIC showed in Table 3 that the lowest MIC value (2.3mg/ml) and lowest MBC value (1.2 mg/ml) obtained with hydro alcoholic extract of whole plant of *Abutilon indicum*, it seems possible that, this plant

extract was possessed the antibacterial activity. Results of MIC and MBC values were tabulated in Table 3.

CONCLUSION

In this study, hydro alcoholic extract of whole plant of *Abutilon indicum* were assessed for their antibacterial activity. The results revealed that plant extract have potential antibacterial effects on bacterial strains tested, *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Salmonella typhi*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa*. This was confirmed by determination of diameters of inhibition zones, minimal inhibitory concentrations and minimum bactericidal concentrations. This indicated that this plant has potential antibacterial properties and could be used in the development of novel antibacterial agents. Further studies on isolation and chemical structure elucidation of active compounds from this plant extract are necessary for their utilization to treat infections caused by pathogenic and often multidrug resistant bacteria.

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