



IN VITRO ANTIBACTERIAL ACTIVITY OF MEDICINAL PLANT AGAINST BACTERIAL PATHOGENS

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ABSTRACT

Four plants were screened for potential antibacterial activity. In evaluating antibacterial activity aqueous method and solvent method were used. The plants screened were *Morus alba*, *Madhuca indica*, *Aloe vera*, *Azadirachta indica* belonging to the different family which shows better antibacterial activity. Antibacterial activity of these medicinal plant extract were analysed by in vitro agar diffusion method against the two bacterial pathogenic strains that is *Escherichia coli* and *Bacillus anthracis*. Present study supports, the traditional medicines to cure many disease like Diarrhea, Intestinal tract infection, Throat infection, fever and skin diseases. The results of present studies are used for future references.

KEYWORDS: Antibacterial agent, Medicinal plant, Bacterial pathogen.

INTRODUCTION

Nature has a great source of medicinal plant from ancient time and numbers of modern drugs have been isolated by choosing important and useful plants. In India the pre-historic also has medicinal importance in the Ayurveda. In the daily life the disease can be treated various medicinal plants those described in Veda.^[6]

Now days, infectious diseases spread widely in the developing countries including India.^[5] Productions of antibodies are defense against foreign agents. An antibiotic are resistant by developed micro-organisms and many immense clinical problems just like infectious disease were treated by using antibiotics. The viable antibacterial drugs are commonly used for the treatment of communicable diseases.^[8] The micro-organisms play a key role in a preparation of antibacterial drugs. Several studies force to the researcher in finding a new antibacterial substances from various medicinal plant sources like *Morus indica* (Mulberry), *Madhuca indica*, *Aloe vera* and *Azadirachta indica* plants belonging to family Moraceae, Sapotaceae, Xanthorrhoeaceae, Meliaceae respectively,^[8] Antibacterial agent effective against multi resistance pathogens of which causing many diseases. In present study was carried on the extract of four different plants out of which the *Azadirachta indica* mainly used in cardiovascular disease, eye disorders, diabetics, skin diseases and mostly for antibacterial activity. The *Morus indica* mainly used in respiratory and cardiovascular system and also stimulate the nervous system.

The bacteria cause serious infections in the humans as well as animals. *E.coli* cause the intestinal infections include diarrhea, abdominal pain and fever as well as *Bacillus anthracis* cause anthrax like diseases.

MATERIALS

Selection of medicinal plants for antibacterial study

Four medicinal plants were used for antibacterial activity viz., *Morus indica*, *Madhuca indica*, *Aloe vera*, *Azadirachta indica*. Healthy, disease free leaves of plants selected from Lokmangal Agriculture College Botanical Garden, Wadala.

Test Micro-organisms

Authentic pure cultures of human pathogenic bacteria like *Escherichia coli*, *Bacillus anthracis* were obtained from Department of Microbiology, Lokmangal Biotechnology College, Wadala and used for antibacterial activity.

Preparation of plant extract

50 grams of selected fresh leaves was macerated with 20ml of sterile distilled water in Mortle- pistle for about 10-15min. The macerate was first filtered through double layer muslin cloth. After filtration filtrate used for detection of antibacterial activity.

METHODS

Determination of antibacterial activity by agar diffusion method

Antibacterial activity of aqueous extract of all the selected medicinal plant extracts was determined by the agar diffusion method on nutrient agar medium.

The microbial strains like *Escherichia coli* and *Bacillus anthracis* were maintained on sterile nutrient agar at 3-4°C. A loop of inoculum was transferred into 5ml of nutrient broth and incubated at 2 hours at 37°C. 1ml of these sample was spread on nutrient agar plate. Then, 3 wells were made in sterile nutrient agar plate using cork borer. Then 50 µl of aqueous plant extract of all the leaves were placed in the wells made in nutrient agar plate. The treatment also includes 50µl of sterilized distilled water as a negative control and the standard antibiotic streptomycin (5µg/ml) is used as a positive control. All the plates were incubated for 24 hours at 37°C and zone of inhibition around the wells measured in millimeter (mm).^[5]

RESULT

The antibacterial activity of aqueous extract of selected medicinal plants against human pathogenic bacteria both gram positive and negative bacteria.

Activity was analysed at 50 µl of aqueous extract with 4 medicinal plants species viz., *Morus indica*, *Madhuca indica*, *Aloe vera* and *Azadirachta indica* showed antibacterial activity. The *Madhuca indica* does not show much significant activity.

**• Diameter of zone of inhibition for water extract
Antibacterial activity of plant extract against E.coli**

Medicinal plants	Positive control Streptomycin (5µg/ml)	Negative control Water	Plant extract (Sample)
	Zone of Inhibition in mm		
<i>Morus indica</i>	20	0	16
<i>Madhuca indica</i>	25	0	6
<i>Aloe vera</i>	32	0	14
<i>Azadirachta indica</i>	35	0	18

Antibacterial activity of medicinal plant against E.coli

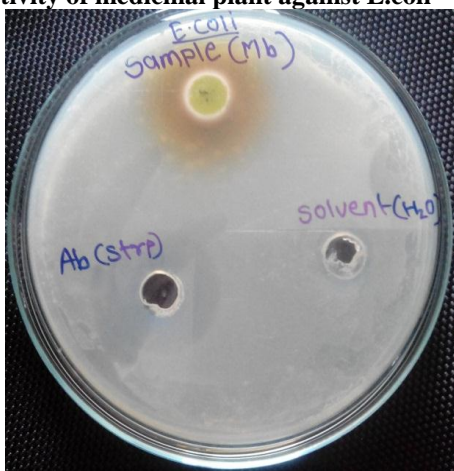


Fig.1 *Morus indica* against *E.coli*



Fig.2 *Madhuca indica* against *E.coli*



Fig.3 *Aloe vera* against *E.coli*

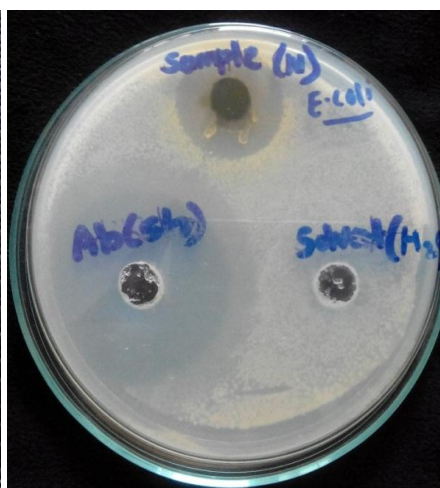
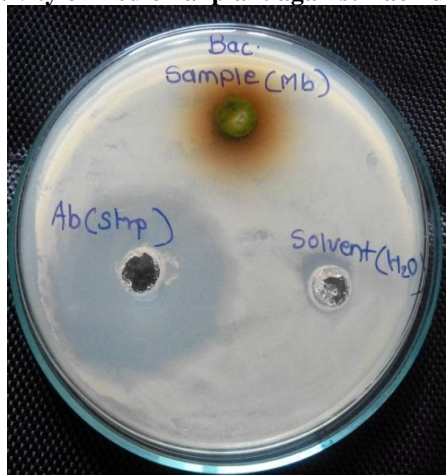
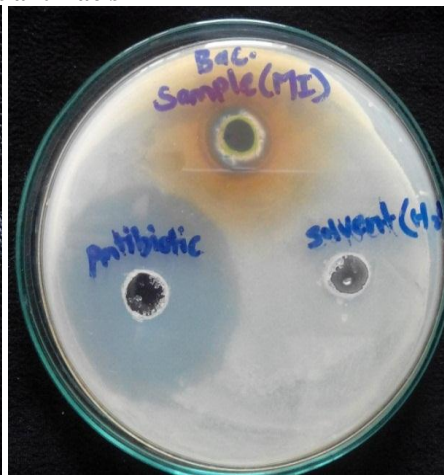


Fig.4 *Azadirachta indica* against *E.coli*

Antibacterial activity of plant extract against *Bacillus anthracis*

Medicinal plants	Positive control Streptomycin (5µg/ml)	Negative control Water	Plant extract (Sample)
	Zone of Inhibition in mm		
Morus alba	30	0	12
Madhuca indica	25	0	6
Aloe vera	34	0	20
Azadirachta indica	50	0	16

Antibacterial activity of medicinal plant against *Bacillus anthracis*Fig.1 Morus indica against *B. anthracis*Fig.2 Madhuca indica against *B. anthracis*Fig.3 Aloe vera against *B. anthracis*Fig.4 Azadirachta indica against *B. anthracis***DISCUSSION**

Antibacterial activity of medicinal plants shows different results respect to the bacteria. Due to these antibacterial properties of medicinal plants shows variant characteristics from other plant organism. The effects of plant extract on bacteria have been studied by many researchers in all over the world.^[9,10] In the present work, the four different plants were used for antibacterial activity that is Morus indica, madhuca indica, Aloe vera and Azadirachta indica. Plants are known to have beneficial therapeutic result in traditional Indian system of medicine.^[9] In the present study antibacterial activity was found to be best on leaves extract of medicinal plant against bacterial pathogens *E. coli* and *Bacillus anthracis*.

This implied that the Gram negative bacteria were more susceptible to the extract than the Gram positive bacteria.^[5] The antibacterial activity of Morus indica, Madhuca indica, Aloe vera and Azadirachta indica against *E. coli* shows zone of inhibition 16, 6, 14 and 18 mm respectively; out of these four plants Azadirachta indica it shows the greater antibacterial activity. *Bacillus anthracis* shows zone of inhibition 12, 6, 20 and 16 mm respectively. Whereas, Streptomycin (5µg/ml) as a positive control and water as a negative control for both the bacteria. In the screening for antibacterial activity shows very less activity to the Madhuca indica.

CONCLUSION

The antibacterial activity exerted by the *Morus indica*, *Mdhuca indica*, *Aloevera* and *Azadirachta indica* plants against Gram positive and Gram negative bacteria was demonstrated by agar diffusion method using aqueous extract and concluded that the aqueous extract show exhibited antibacterial activity comparable with the standard antibiotic streptomycin.

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