

ASSESSMENT OF ANTIBACTERIAL POTENTIAL OF LEAVES OF *RICINUS COMMUNIS* AGAINST PATHOGENIC AND DERMATOPHYTIC BACTERIA

Tajamul Islam^{1*}, Hamid Bakshi¹, Smitha Sam², Ekta Sharma³,
 Burhan Hameed⁴, Babita Rathore⁵,
 Abishek Gupta¹, Sushma Ahirwar⁶, Manik Sharma¹.



Tajamul Islam

¹Dept. of Microbiology,
 Bhoj College of Science, Bhopal, India-462001.

²Department of Research, Jawaharlal Nehru
 Cancer Hospital and Research Center,
 Bhopal, India -462001.

³Department of Biotechnology,
 Unique college of Science, Bhopal, India-462001

⁴ Benazeer college of Science and commerce,
 Bhopal, India-462001

⁵Mulana Azad national institute of technology,
 Bhopal, India-462001

⁶Department of Applied Aquaculture,
 Barkatullah University Bhopal.

Email: hamid_bakshi@rediffmail.com

ABSTRACT

In the present study, antibacterial activity of various leaf extracts of *Ricinus communis* were screened against dermatophytic and pathogenic bacteria such as *Escherichia coli*, *Staphylococcus aureus*, *K. pneumoneae*, *Streptococcus progens*, using disc diffusion method. All the extract showed significant anti bacterial properties. The acetone extracts revealed maximum zone of inhibition ($P < 0.0001$). These findings established the potential of the selected leaves of *Ricinus communis* as an effective anti bacterial agent. However, further studies are needed to evaluate active compounds and probable medicinal benefits in chemotherapy among humans.

Key-words : Dermatophytic, *Ricinus communis*, chemotherapy, herbal antibiotics, pathogenic

INTRODUCTION AND MATERIALS & METHODS

INTRODUCTION

A wide variety of antibiotics are commonly used for the treatment of infections occurred by bacteria [1]. However, multiple drug resistance has developed due to excessive use of existing antimicrobial drugs in the treatment of infectious diseases. Antimicrobial resistance is harmful to mankind, because most of the infectious bacteria become multiple drug resistance [2]. In concern to drawbacks of convectional medicine, the use of natural products as an alternate to the convectional treatment in healing and treatment of various diseases has been rise in the last few decades [3].

Ricinus communis L. (Euphorbiceae) is a soft wooden small tree, wide spread throughout tropics and warm temperature regions of the world, [4]. In the Indian system of medicine, the leaf, root and seed oil of this plant have been used for the treatment of the inflammation and liver disorders [5], Hypoglycemic [6], Laxative [7]. In the present study we have investigated antibacterial potential of Indian *Ricinus communis* leaf extract against several pathogenic and dermatophytic bacteria.

MATERIALS AND METHODS

Collection and Identification of Plant:

The plants *Ricinus communis* were collected in the month of October 2008 from local regions of the Bhopal (M.P). The plants were brought to the laboratory after proper identification. A voucher specimen of plant has been deposited in the herbarium of the laboratory.

Preparation of Drug:

The leaves of the *Ricinus communis* were air dried, powered and macerated with petroleum ether, acetone and ethanol respectively. After extraction, an excess was evaporated under reduced pressure in vacuum evaporator.

Test organism used:

The test microorganisms *Klebsiella pneumoniae*, *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, were used. The microorganisms were collected from Gandhi Medical College Bhopal.

Antibacterial Assay:

The crude drug extract was dissolved in DMSO and prepared the various concentrations. The antibacterial effect was tested by Disc Diffusion Method [8], using following strains *Klebsiella pneumoniae*, *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, for the preparation of Antibiotic discs, the filter paper discs of 4.5mm were prepared with different concentration, i.e. 20mg/ml, 40mg/ml, 60mg/ml, 80mg/ml and 100mg/ml of petroleum ether, acetone and ethanol extracts. The sterile discs were introduced on to the surface of nutrient agar medium (pH 6.8-7.2). The discs of chloramphenicol (10µg/disc) were used as a comparative drug and DMSO was used as a control.

Statistical Analysis:

All the results were expressed as mean \pm SEM. The significance of difference was evaluated by AVNOVA. The significance of probability was considered $p < 0.001$ by using software Origin 8.

RESULT AND DISCUSSION

The *Ricinus communis* showed good activity against dermatophytic and pathogenic bacterial strains *Streptococcus progenies*, *Staphylococcus aureus* as well as *Klebsiella pneumoniae*, *Escherichia coli*. The antibacterial assay revealed that the petroleum ether and actone extracts of *Ricinus communis* possess good zone of inhibition where as ethanolic extract having anti bacterial activity only on higher concentration. (Table 1-5).

Significant susceptibility was recorded by most of the organisms tested to the petroleum ether, ethanol and acetone of leaves of *Ricinus communis*, which showed a comparatively reduced susceptibility pattern. The susceptibility pattern exhibited by the tested organisms to these leaf extracts could be exploited for probably medicinal purposes in chemotherapy among humans.

The findings from this study partly agree with the earlier report conducted on unfermented and fermented seed extract of same plant [9].

With the current spread of antibiotic resistance almost at geometric scale [10] and obvious challenges confronted with by medical practitioners in the treatment of infectious diseases [11], proper

attention should be given to such plants to reap the potential antimicrobial benefits inherent in them , However actual antimicrobial ingredients need to be extracted and identified , also its tolerable levels in the human body as well as any toxic effects on human and animal tissues be investigated accordingly . In conclusion, petroleum ether and actone extracts of leaves of *Ricinus communis* were found to be substantially active against both dermatophytic as well as pathogenic bacteria. However, before coming to conclusive statement further research is needed to investigate the antibacterial ingredients.

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FIGURES & TABLES**Table 1:** Antibacterial effect of various Leaf Extract of *Ricinus communis* at concentration 20mg/ml.

Test organism	Diameter of Zone of inhibition (mm)				Standard Reference
	Extract concentration (20mg/ml)				
	PE	AE	EE	DMSO	chloramphenicol
	Dermatophytic Bacteria				
<i>S. aureus</i>	8.3±0.1*	12.7±0.7***	10.50±0.5**	----	15.7±1.2***
<i>S. pyrognes</i>	8.8±0.6*	13.7±1.3***	8.6±0.6*	----	16.3±1.2 ***
	Pathogenic Bacteria				
<i>K. pneumoniae</i>	12.3±1.2***	10.4± 0.5**	8.30±2.4	----	14.6±1.3***
<i>E. coli</i>	8.3±0.3*	15.5±1.32***	11.3±0.6**	-----	16.2±2.3***

PE: Petroleum ether, AE: Acetone Extract, EE: Ethanol Extract, ---- = No zone of inhibition, Chlorramphenicol (10µg/disc). Values are Mean ± SEM.*P<0.05,**P<0.01 and ***P<0.001

Table 2: Antibacterial effect of various Leaf Extract of *Ricinus communis* at concentration 40mg/ml.

Test organism	Diameter of Zone of inhibition (mm)				Standard Reference
	Extract concentration (40mg/ml)				
	PE	AE	EE	DMSO	chloramphenicol
	Dermatophytic Bacteria				
<i>S. aureus</i>	12.5±2.5**	16.3±0.9***	9.8±2.3*	---	17.3±1.8***

<i>S. pyrognes</i>	9.2±1.7**	15.5±1.2***	8.8±0.9*	---	17.9±1.4***
Pathogenic Bacteria					
<i>K. pneumoniae</i>	9.3±1.2*	18.3±2***	14.8±2.3**	---	13.8±2**
<i>E. coli</i>	9.1±2.3*	18.7±1.2***	11.3±0.6**	--	16.2±2.3***

PE: Petroleum ether, AE: Acetone Extract, EE: Ethanol Extract, ---- = No zone of inhibition, Chloramphenicol (10µg/disc). Values are Mean ± SEM.*P<0.05,**P<0.01 and ***P<0.001

Table 3 : Antibacterial effect of various Leaf Extract of *Ricinus communis* at concentration 60mg/ml.

Test organism	Diameter of Zone of inhibition (mm)				Standard Reference
	Extract concentration (60mg/ml)				
	PE	AE	EE	DMSO	chloramphenicol
Dermatophytic Bacteria					
<i>S. aureus</i>	10.8±1.3**	11.8±3.8**	8.90±1.8**	---	17.3±1.8***
<i>S. pyrognes</i>	9.6±0.8*	15.2±1.4***	10.50±1.8**	---	18.2±2.3***
Pathogenic Bacteria					
<i>K. pneumoniae</i>	12.3±1.2*	10.4±6.5**	8.38±2.4**	---	14.6±1.3***
<i>E. coli</i>	8.6±1.9*	12.1±0.7***	10.56±0.5**	---	15.7±1.2***

PE: Petroleum ether, AE: Acetone Extract, EE: Ethanol Extract, ---- = No zone of inhibition, Chlorramphenicol (10µg/disc). Values are Mean ± SEM.*P<0.05,**P<0.01 and ***P<0.001

Table 4 : Antibacterial effect of various Leaf Extract of *Ricinus communis* at concentration 80mg/ml.

Test organism		Standard
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	Diameter of Zone of inhibition (mm)				Reference
	Extract concentration (80mg/ml)				
	PE	AE	EE	DMSO	chloramphenicol
	Dermatophytic Bacteria				
<i>S. aureus</i>	5.8±1.0*	12.8±1.5**	11.20±0.7**	---	10.8±0.9**
<i>S. pyrognes</i>	5.5±0.6*	12.3±2.7**	10.20±20.1*	---	15.6±1.7***
	Pathogenic Bacteria				
<i>K. pneumoniae</i>	8.8±0.6	13.7±10.3**	8.60±0.6*	---	16.3±1.2***
<i>E. coli</i>	9.6±0.8*	13.6±3.8**	8.90±1.2*	---	18.2±2.3***

PE: Petroleum ether, AE: Acetone Extract, EE: Ethanol Extract, --- = No zone of inhibition, Chlorramphenicol (10µg/disc). Values are Mean ± SEM.*P<0.05,**P<0.01 and ***P<0.001

Table 5 : Antibacterial effect of various Leaf Extract of *Ricinus communis* at concentration 100mg/ml.

Test organism	Diameter of Zone of inhibition (mm)				Standard Reference
	Extract concentration (100mg/ml)				
	PE	AE	EE	DMSO	chloramphenicol
	Dermatophytic Bacteria				
<i>S. aureus</i>	10.1±1.3*	15.2±1.4***	10.50±1.8**	---	17.1±1.0***
<i>S. pyrognes</i>	13.4±2.6**	16.9±2.0****	10.2±1.2**	---	18.1±2.8***
	Pathogenic Bacteria				

<i>K. pneumoniae</i>	8.7±0.8*	16.2±1.2****	11.6±0.9**	---	18.6±1.9***
<i>E. coli</i>	9.7±1.3*	15.3±0.5**	8.1±0.3*	---	13.8±1.2**

PE: Petroleum ether, AE: Acetone Extract, EE: Ethanol Extract, ---- = No zone of inhibition, Chlorramphenicol (10µg/disc). Values are Mean ± SEM.*P<0.05,**P<0.01 and ***P<0.001

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