



## ANTIMICROBIAL ACTIVITIES OF *RICINUS COMMUNIS* AGAINST SOME HUMAN PATHOGENS

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### ABSTRACT

The present paper deals with the antimicrobial activities of seed extracts of *Ricinus communis* against some human pathogenic bacteria namely *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*, *Escherichia coli* and two fungal strains namely *Candida albicans* and *Candida glabrata*. The aqueous and methanol extracts of seeds were screened for their antibacterial activity using agar disc diffusion method. The aqueous seed extracts were less active but methanol extracts showed high degree zone of inhibition against the tested pathogens.

**Key words:** Antimicrobial activity, pathogens, Seed extracts, *Ricinus communis*

### INTRODUCTION

Antibiotic resistance has become a global concern (Westh *et al.*, 2004). There has been an increasing incidence of multiple resistances in human pathogenic microorganisms in recent years, largely due to indiscriminate use of commercial antimicrobial drugs commonly employed in the treatment of infectious diseases. This has forced scientist to search for new antimicrobial substances from various sources like the medicinal and herbal plants. Search for new antibacterial agents should be continued by screening many plant families. Recent work revealed the potential of several herbs as sources of drugs (Iwu, 2002).

Medicinal plants were found to contain various phytochemical compounds, which are used as natural medicines to treat common bacterial infections. Indian medicinal plants are regularly used in various system of medicine because of minimal side effect and cost effectiveness. The potential for developing antimicrobials from medicinal plants appears rewarding as it may lead to the development of phytomedicine against microbes.

In the past few decades, the antimicrobial properties of various plant species of family Euphorbiaceae have been well studied by several workers such as *Acalphya indica* (Hiremath *et al.* 1993), *Croton urucurana* (Marize *et al.* 1997), *Alchornea cordifolia* (Ebi, 2001) and *Tetracarpidium conophorum* (Ajaiyeoba and Fadare, 2006). The screening of plant extracts and plant products for antimicrobial activity has shown that higher plants represent a potential source of novel antibiotic prototypes (Afolayan, 2003).

*Ricinus communis* L (Euphorbiaceae) is indigenous to the South eastern Mediterranean basin and India but it is widespread throughout tropical regions. The seeds of castor are the source of castor oil, used as cathartic and also for lubrication and illumination. The oil is useful in treatment of eye-inflammation. The oil is used in the manufacture of sebaceous acid, surface coatings, disinfectants, cosmetics and pharmaceuticals preparation (Bringi *et al.*, 1985). The seeds of *R. communis* popularly called castor oil plant are biochemically composed of various macromolecules: the fat which is about 15% to 25% consists of about 40-53% of fixed oil comprising glycosides of ricinoleic, isoricinoleic,

stearic and dihydroxy stearic acids (Lin, and Areinas, 2007). Also the seeds contain about 25% protein with 10-20% carbohydrates, 2.2% ash and 5.1-6.5% moisture (Verscht, *et al.*, 2006).

The purpose of the present study was to evaluate the antimicrobial activities in various seed extracts of *R. communis* against some common human pathogens.

### MATERIAL AND METHODS

#### Plant Material

Fresh seeds of *Ricinus communis* were collected from fields of Agra (Uttar Pradesh).

#### Extract preparation

The collected materials were washed thoroughly in water, chopped, air dried for a week at 35-40°C and pulverized in electric grinder and exhaustively extracted successively in soxhlet apparatus, using methanol. The extracts were concentrated under reduced pressure and were then made to powder. These powder extracts were used for analyzing the antimicrobial activity against reference strains.

#### Microorganisms

Four clinical bacterial strains *Escherichia coli*, *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus* and two fungal strains *Candida glabrata* and *C. albicans* were used for assessing the antimicrobial activity with standard drug tetracycline (10 mg/ml).

#### Antimicrobial Activity

Antimicrobial activity was determined by the agar disc diffusion method. Muller Hilton and Saboured dextrose broth were used as medium for bacterial and fungal strains respectively. Control experiments were carried out under the similar condition by using tetracycline (15ug/ml). The Petri dishes with bacterial and fungal cultures were incubated at 37±2°C for 24 hrs and 27±2°C for 48 hrs respectively. The assessment of antimicrobial activity was based on the measurement of diameter of inhibition zone formed by dissolving the plant material extract in methanol and water and standard drug also. The experiment was repeated thrice and results were taken as mean of these readings.

### RESULTS AND DISCUSSION

The results of antimicrobial activity of methanolic and aqueous seed extracts of *Ricinus communis* are summarized

in Table 1 and 2. The methanolic seed extracts exhibited significant antimicrobial activity comparable to the aqueous seed extracts and standard drug tetracycline. Methanolic seed extract shows strongest antibacterial activity on *Escherichia coli* with (15mm) zone of inhibition and least activity on *Bacillus subtilis* with (10mm) zone of inhibition. However, the aqueous seed extract shows less antibacterial activity as compared to methanol extract. However, least activity was found on *Staphylococcus aureus* with (8 mm) zone of inhibition and *Escherichia coli* with (11mm) zone of inhibition.

The aqueous and methanolic seed extracts significantly inhibited the growth of *Candida albicans* and *Candida glabrata* but methanolic seed extract shows more inhibitory growth comparable to the aqueous seed extract and standard drug as tetracycline.

The use of medicinal plant can even cure deadly diseases that have long defined synthetic drugs (Bhattacharjee, 1998). An antimicrobial is a substance that kills or inhibits the growth of microorganisms, such as bacteria, fungi or protozoan. Generally, antimicrobial drugs kill resistant microbes.

The traditional healers use primarily water as the solvent but we found in this study the seed extracts by methanol provided more consistent antimicrobial activity compared to those extracted by water. This might have resulted from the lack of

solubility of the active constituents in water while methanol extract showed some degree of antibacterial activity. Jumbo and Enebeaku (2007) studied the antibacterial activity of fermented seeds of *R.communis* against *Pseudomonas aeruginosa* and they revealed that methanol extract exhibited strong activity comparable to the aqueous seed extract. However, in the year 2008 Jumbo and Enebeaku also observed antibacterial profile of fermented seed extracts of *R.communis* against different strains of bacteria viz. *K. pneumoniae*, *E. coli*, *P.vulgaris*, *S. aureus* and *Enterococcus faecalis* and they found that the methanol extract was highly susceptible as compared to water extract.

In view of the fact that bacteria have assumed an unprecedented level of antimicrobial resistance more than ever in the history of modern medicine. The continuous research for more reliable antibiotics becomes a worthwhile and noble mission this study was therefore setup to ascertain the antimicrobial properties of seed extracts of *R. communis*. From these results we can conclude that methanol seed extract having active principle in enough quantities and can be used as antibacterial agent for infectious diseases. It needs the isolation of the active component from this methanol seed extracts that exhibit synergistic action against bacteria and fungi.

**Table 1. Antibacterial activity of seed extracts of *Ricinus communis L* by agar disc diffusion method**

S.No.	Bacteria	Zone of inhibition (mm)		
		Water extract (10 mg/ml)	Methanol extract (10mg/ml)	Standard drug (10mg/ml)
1.	<i>Bacillus subtilis</i>	10	11	12
2.	<i>E.coli</i>	11	15	13
3.	<i>S.aureus</i>	8	12	11
4.	<i>B.cereus</i>	10	14	14

Standard drug- Tetracycline

**Table 2. Antifungal activity of seed extracts of *Ricinus communis L* by agar disc diffusion method**

S.No.	Fungal strains	Zone of inhibition (mm)		
		Water extract (10 mg/ml)	Methanol extract (10mg/ml)	Standard drug (10mg/ml)
1.	<i>Candida albicans</i>	8	12	10
2.	<i>Candida glabrata</i>	10	14	14

Standard drug- Tetracycline

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