

## **Studies on Antimicrobial Efficiency of *Citrullus colocynthis* (L.) Schrad: A Medicinal Plant**

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### **ABSTRACT**

In the present study antimicrobial efficiency of *Citrullus colocynthis* (L.) Schrad was studied on seven bacteria *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Staphylococcus aureus*. Ethanol, chloroform and petroleum ether extracts were used for antibacterial assay. Growth inhibitions were evaluated by the disc diffusion method. Ethanol extract is more active against *Escherichia coli*, *Proteus vulgaris* and *Staphylococcus aureus*. *Pseudomonas aeruginosa* and *Bacillus subtilis* show moderate activity in chloroform extract. Petroleum ether extract is more active against *Escherichia coli*. All extracts exhibited considerably less activity against *Klebsiella pneumoniae* and *Salmonella typhi*.

**Key words:** Antimicrobial, *Citrullus colocynthis*, medicinal.

### **INTRODUCTION**

Traditional medicine is an important source of potentially useful new compounds for the development of chemotherapeutic agents. The first step towards this goal is the screening of plants used in popular medicine. Thus antimicrobial research is geared towards the discovery and development of novel antibacterial and antifungal agents. Plant drugs are frequently considered to be less toxic and freer from side effects than the synthetic ones (Momin, 1987).

Medicinal plants have been curing various disorders in humans from the time immemorial and are considered and intermittently associated and integral part of the Indian traditional medicinal system, better known as the Ayurvedic system of medicine (Basu, 2002). It is estimated that about 80,000 species of plants are utilized by the different system of Indian medicine (Prajapati *et al.*, 2006). Traditional healers and medicine man in India practice and apply few medicinal plants for curing this ailment and are cheap as compared to pharmaceutical drugs (Singh, 2006).

A number of plants from different families of angiosperms have been reported to show antimicrobial activity (Palombo & Semple, 2001; Janagakumari *et al.*, 2005). In angiosperms *Citrullus colocynthis* (L.) Schrad belongs to the family Cucurbitaceae which is an exotic and extinct member. The roots of *Citrullus colocynthis* (L.) Schrad are purgative and used for treating uteralgia, mamillitis, ascites, jaundice and urinary diseases. The powder of root mixed with ginger and jaggery is used for joints. Fruit is bitter, cooling, blood purifier and used for tumours and enlargement of spleen (John Peter Paul & Jeyachandran, 2008). Because of the lack of adequate information on microbial studies, the present investigation has been aimed to evaluate the antimicrobial effects of *Citrullus*

*colocynthis* (L.) Schrad on some of the selected pathogens.

## MATERIALS AND METHODS

### Preparation of Extracts

100gm of fresh leaves of *Citrullus colocynthis* (L.) Schrad was dried in shade and ground. 10gm of powder was used for extraction. Extracts were prepared separately and successively using Soxhlet apparatus with different solvents namely ethanol, chloroform and petroleum ether. The extracts were concentrated to dryness and the residue was dissolved in 10ml of respective solvents and used for the assay of antibacterial activity.

### Test organisms

Both gram positive and gram negative microorganisms were used for the test. The gram positive organisms include *Staphylococcus aureus* and *Bacillus subtilis*. The gram negative organisms include *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Klebsiella pneumoniae* and *Proteus vulgaris*. All the bacterial strains were maintained on freshly prepared Muller Hinton agar (Hi-media) slant and stored at 0°C. The bacterial strains were procured from Sea Horse Hospital, Trichy, Tamil Nadu.

### Screening of antibacterial Effects

Antibacterial effect was determined by disc diffusion method (Bauer *et al.*, 1966). Muller Hinton agar were inoculated with 0.2ml bacterial suspension of over night culture of each bacterium and uniformly spread out. Then the disc was placed on the upper layer of the seeded agar plates. Triplicates were maintained. The plates were incubated at 37°C for 24 hours. The inhibition zones were measured and recorded. Positive control was used by standard antibiotic Gentamycin (0.2ml/ml) and negative controls were maintained by the respective solvents.

## RESULTS AND DISCUSSION

In the present investigation antibacterial effects of *Citrullus colocynthis* (L.) Schrad against seven microbial species was recorded. Effect of plant extracts on different organisms was shown in Table – 1. Positive control (Gentamycin) produced inhibitory zone against all the chosen bacteria and negative control was also maintained using respective solvent alone.

Ethanol extract showed maximum inhibition against *Escherichia coli* (7mm) and followed by moderate effect against *Proteus vulgaris* (5mm) and *Staphylococcus aureus* (4mm). There was a least effect on *Bacillus subtilis* (2mm), *Pseudomonas aeruginosa* (2mm) and *Salmonella typhi* (1mm). There was no effect on *Klebsiella pneumoniae*.

Chloroform extract highly affected the activity of *Pseudomonas aeruginosa* (6mm), and followed by moderate activity on *Bacillus subtilis* (5mm). *Escherichia coli* (2mm), *Proteus vulgaris* (2mm) and *Staphylococcus aureus* (2mm) showed moderate activity. There was no effect on *Klebsiella pneumoniae* and *Salmonella typhi*.

Petroleum ether extract showed maximum inhibition against *Escherichia coli* (4mm). The moderate inhibition zone was observed on *Bacillus subtilis* (2mm), *Proteus vulgaris* (2mm), *Pseudomonas aeruginosa* (2mm) and *Staphylococcus aureus* (1mm). There is no antimicrobial effect against *Klebsiella pneumoniae* and *Salmonella typhi*.

Rose Mary *et al.*, (2008) and Ayana Ravi *et al.*, (2008) screened antimicrobial activity of some medicinal plants against *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Proteus vulgaris* and *Klebsiella pneumoniae*. Among these bacteria, *Escherichia coli*, *Proteus vulgaris* and *Staphylococcus aureus* were shown high inhibition zone. More or less similar results were found in the present study.

**Table – 1.** Antimicrobial activities of the Ethanol, Chloroform and Petroleum ether extracts of the aerial parts of *Citrullus colocynthis* (L.) Schrad by Disc Diffusion Method.



## CONCLUSION

The present study confirms that the plant extracts of *Citrullus colocynthis* (L.) Schrad have great potential as antimicrobial compounds against microorganisms and they can be used in the treatment of infectious disease caused by the same. *Citrullus colocynthis* (L.) Schrad arrests the activity of *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus subtilis* and *Proteus vulgaris* highly followed by *Staphylococcus aureus*, *Klebsella pneumoniae* and *Salmonella typhi* moderately.

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