

# A Study Of Antimicrobial Activity Of Acalypha Indica Against Selected Microbial Species

Rajaselvam J<sup>1</sup>, Benila smily J.M<sup>2</sup> and Meena R<sup>3</sup>

<sup>1</sup>Dep. of Zoology, Vivekananda college, Agasteeswaram, Kanayakumari Dist

<sup>2</sup>Dep. of Microbiology, J.J. college of Arts and Science, Pudhukkottai

<sup>3</sup>Dep. of Botany, Vivekananda college, Agasteeswaram, Kanayakumari Dist

[Benila.jm@gmail.com](mailto:Benila.jm@gmail.com)

## Abstract

The present study deals with the leaf extracts of *Acalypha indica* were tested against bacteria by agar well diffusion method. Antimicrobial activity of *Acalypha indica* was studied using different solvent like acetone and aqueous against bacterial strains like *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Klebsiella* sp. The acetone extract of *Acalypha indica* showed the maximum zone of inhibition against *Staphylococcus aureus* and *Bacillus subtilis*, minimum inhibition of *Escherichia coli* and *Klebsiella* sp. The aqueous extract of *Acalypha indica* showed maximum inhibition against *Escherichia coli*, *Bacillus subtilis* and *Staphylococcus aureus*. *Klebsiella* sp was resistant to aqueous extract of *Acalypha indica*. Antimicrobial activity of *Acalypha indica* plant was due to the presence of phyto chemical compounds like Alkaloids, Tannins, Saponins, Steroids and Proteins.

Keywords: *Acalypha indica*, agar well diffusion, antimicrobial, phyto chemical

## Introduction

Medicinal plants constitute an effective source of both traditional and modern medicines. About 80% of rural population depends upon the herbal medicine for their primary health care. The world health organization compiled more than 20,000 species of medicinal plants. Indian medicinal plants and their products are used to control the various types of diseases such as bronchitis, pneumonia, diarrhea and ulcer (WHO, 1978).

Medicinal plants are plants containing inherent active ingredients used to cure disease (Okigbo *et al.*, 2008). The use of traditional medicines and medicinal plants mostly used in developing countries for maintained of good health (UNESCO, 1996). Medicinal plants produce bioactive compounds used mainly for medicinal purposes. These compounds either act on different system of animals and man and act through interfering in the metabolisms of microbes infecting them. The microbe may be pathogenic or symbiotic. The bioactive compounds play an important role in regulating host microbe interaction in favor of the host. The medicinal properties of plants could be based on the antioxidant, antimicrobial, antipyretic effect of the phytochemicals in them (Adesokan *et al.*, 2008).

*Acalypha indica* known as kuppaimani in tamil is an annual weed. It belongs to the family Euphorbiaceae. It is a common weed in many parts of Asia. It grows in the common farmlands, gardens, roadside waste lands. Parts used are leaves, root, stalk and flowers. The major phytochemical constituents are alkaloids acalyphus and aclyphine (Kirtikar and Basu, 1975). This plant is used as diuretic, antihelmintic and for respiratory problems such as bronchitis, asthma and pneumonia (Varier, 1996).

Hence the present study deals with the screening of *Acalypha indica* for antibacterial activity. The selected organisms used for the study on the basis of their pharmaceutical, clinical as well as for their potential drug.

## Materials method

### Plant materials

*Acalypha indica* grows in the common farmlands, gardens, roadside and waste lands. *Acalypha indica* is an herbaceous annual weed. It can grow up to 15m tall. The stem are sparingly to densely hairy. The leaves have long petioles, arranged spirally, simple. The margins are serrate. They are glabrous and thin. Flowers are unisexual. Fruit capsules are small, concealed by the bracts. The seeds are ovoid, smooth, pale brown in colour.

### Preparation of the Extract

*Acalypha indica* plant leaves were collected from vijayanagari village of Kanayakumari dist. The collected leaves were washed with water and remove the dust particle. The collected leaves are dried under shade and powdered in a mortar and pestle. The extract were dissolved in solvent and screened for antimicrobial activity.

### **Preliminary phyto chemical screening**

The compounds that are responsible for therapeutic effect are usually the secondary metabolites. The preliminary phytochemical analysis (Kokate, 1993) was carried out by the following procedure

#### **Test for alkaloids**

A small amount of the extract is added with few drops of 1% hydrochloric acid and filtered. The filtrate is treated with wagner's reagent. Reddish brown precipitate indicates the presence of alkaloids.

#### **Test for Tannins**

5mg of extract was dissolved in small amount of water and filtered. The filtrate is treated with few drops of concentrated HNO<sub>3</sub> and NH<sub>3</sub> solution. Reddish orange precipitate indicates the presence of tannins.

#### **Test for saponins**

1 ml of extract was mixed 20ml of distilled water then agitated for 15 minutes. The formation of foam indicated the presence of saponins.

#### **Test for steroids**

##### **Solkowski test**

2ml of extract mixed with 2ml of chloroform and added 2ml of concentrated H<sub>2</sub>SO<sub>4</sub> and observed chloroform layer for red colour and acid layer for fluorescence .

##### **Test for protein**

5ml of extract was mixed with 10% NaOH solution and added few drop of CUSO<sub>4</sub>. The formation of reddish violet colour indicated the presence of proteins.

##### **Nihydrin test**

1ml of extract was treated with few drops of nihydrin solution. The change in the colour showed the presence of proteins.

#### **Microbial strains**

The test organisms include *E.coli*, *Bacillus subtilis*, *Staphylococcus aureus* and *Klebsiella sp* culture inoculated into the nutrient broth medium .The bacteria were grown in the nutrient broth medium at 37°C and maintained on nutrient agar slant at 4°C.

#### **Agar well diffusion method**

The antimicrobial activity was evaluated by employing 24 hours cultures of *E.coli*, *Bacillus subtilis*, *Staphylococcus aureus* and *Klebsiella sp* were spread on Muller Hinton Agar plate by using sterile cotton swab. In each plate one well of 6mm diameter were made using a sterile borer. Accurately 100µl of aqueous extract and solvent extract were transferred to wells. The plates were incubated for 37°C at 24 hours. After incubation the result observed based on zone of inhibition around the colonies.

### **Result**

The present study aimed at testing the antibacterial activity of *Acalypha indica* against *Staphylococcus aureus*, *E.coli* and *Klebsiella sp*. Antimicrobial activity of *Acalypha indica* was studied using different solvent like acetone and water against bacterial strains like *Staphylococcus aureus*, *Bacillus subtilis*, *E.coli* and *Klebsiella sp*. The acetone extract of *Acalypha indica* showed the maximum zone of inhibition against *Staphylococcus aureus* and *Bacillus subtilis* and minimum inhibition of *E.coli* and *Klebsiella sp*. The aqueous extract of *Acalypha indica* showed maximum inhibition against *E.coli*, *Bacillus subtilis* and *Staphylococcus aureus*. *Klebsiella sp* was resistant to aqueous extract of *Acalypha indica*(Table 1). Antimicrobial activity of *Acalypha indica* plant was due to the presence of phyto chemical compounds like Alkaloids, Tannins, Saponins, Steroids and Proteins (Table 2).

Table 1: Zone of inhibition of different extract of acalypha indica against different pathogens

Sl.No	Test Organisms	Zone of inhibition (Diameter in mm)	
		Acetone	Aqueous
1	<i>Escherichia coli</i>	22	12
2	<i>Klebsiella sp</i>	16	-
3	<i>Staphylococcus aureus</i>	15	13
4	<i>Bacillus subtilis</i>	18	15

Table 2 : Phytochemical analysis of *Acalypha indica*

Sl.No	Phytochemical compounds	Result
1	Alkaloids	+
2	Saponins	+
3	Steroids	-
4	sugars	+
5	Tannins	-

### Discussion

*Acalypha indica* commonly referred to as Kuppaimeni. The plant has wide uses in the traditional medicines of various countries. *A. indica* leaves contain acalyphine which is used in the treatment of sore gums and have a post-coital ant fertility effect, anti-inflammatory effect, diuretic effects etc. (Sumathi and Pushpa, 2007) was reported the aqueous extract of *Acalypha indica* shows 9mm inhibition zone to *Escherichia coli* and no zone were showed against *Staphylococcus aureus*, *salmonella typhi* and *Shigella flexneri*. Alcoholic extract of *Acalypha indica* shows 10mm inhibition zone towards *Staphylococcus aureus* and *Salmonella typhi*.

In our study we obtained two extracts via, acetone and aqueous extract assayed for its antibacterial activity against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Klebsiella sp*. We got zone of inhibition to acetone against *Staphylococcus aureus* (22mm), *Bacillus subtilis* (18mm), *Klebsiella sp* (16mm) and *Escherichia coli* (15mm). In aqueous, we got *Staphylococcus aureus* (13mm), *Bacillus subtilis* (15mm), *Escherichia coli* (16mm). No zone was observed against *Klebsiella sp*. In the present study, acetone extract was more active than the aqueous extract. The widest zone of inhibition was observed acetone extract of *A. indica* against *Staphylococcus aureus*. The acetone extract of *Acalypha indica* was found to be more effective against the majority of the bacterial strains (Shoba, 2008). (Khaleel Basha and Sudarshanam, 2011) was reported the antimicrobial activity of *A. indica* plant leaves due to the presence of phytochemical compounds like Tannins, Alkaloids, saponins, Phenolics and Flavonoids. In our present study we identified *A. indica* leaves contain Alkaloids, Tannins, Saponins and Proteins.

### Conclusion

The study of antibacterial activity of herbal plant extract of *Acalypha indica* shown that acetone extract shows antibacterial activity against *Staphylococcus aureus* and *Bacillus sp* minimum inhibition of *Escherichia coli* and *Kebsiella*. The aqueous extract of *Acalypha indica* showed maximum inhibition against *Escherichia coli*, *Bacillus* and *Staphylococcus aureus*. *Klebsiella sp* was resistant to aqueous extract of *Acalypha indica*. Phyto chemical analysis showed that antibacterial activity of *Acalypha indica* was due to the presence of phyto chemical compounds such like Alkaloids, Saponins, Steroids and proteins. The result indicated that scientific studies carried out on medicinal plant having traditional claims of effectiveness might warrant fruitful results. These plants could serve as useful sources for new antimicrobial agent.

## References

- [1] S. Khaleel Basha and G.Sundarshanam.2011. Multiple herbal therapy- Antimicrobial activity of wound healing paste (pasuru) used by sugali tribes of yerramalai of Kurnool Dist Andra Pradesh, India. International journal of Pharm Tech Research 3(3): 1238-1241.
- [2] K.R. Kirtikar and B.D. Basu.1975. Indian medicinal Plants 2:30-45.
- [3] C.K. Kokate.1993. Practical pharmaognosy .Vallabh Prakashan, Delhi, India. 107-111.
- [4] G. Sumathi and B. Pushpa.2007. Evaluation of antibacterial activity of some india medicinal plants. Asian journal of microbiology, Biotechnology and Envirnomental science 9: 201-205.
- [5] V.P.S. Varier . Indian medicinal plant: a compendium of 500 species orient Longman.1996:134.
- [6] World health organization. The promotion and development of traditional medicine. Geneva : World Health Organization.1978.(Technical report series no.622.