

## Antibacterial Activity of *Macaranga peltata*

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**Abstract:** *Macaranga peltata* belonging to Euphorbiaceae family. Fruits of *M. peltata* were dried and extracted using petroleum ether and acetone. The antibacterial activity of petroleum ether and acetone fruit extract of *M. peltata* checked by disc diffusion method, using Gram negative bacterial strains such as *Escherichia coli*, *proteus vulgaris* and *Klebsiella pneumoniae*. Zone of inhibition was measured using a scale. The zone of inhibition of petroleum ether extract of *M. peltata* against *E. coli*, *Proteus vulgaris* and *Klebsiella pneumoniae* were 0.5mm, 0.4mm and 0.5mm at 10% concentration. Where as zone of inhibition of acetone fruit extract of *M. peltata* against *E. coli*, *Proteus vulgaris* and *Klebsiella pneumoniae* were 0.7mm, 0.6mm and 0.5mm. The activity was higher with increasing concentration of the extract. Acetone fruit extract shows better antibacterial activity than petroleum ether extract.

**Key words:** Antibacterial; *Macaranga peltata*; acetone extract, petroleum ether extract

**Introduction:** Plants have formed the basis of Sophisticated traditional medicines practice that have been used for thousands for years by people in China, India and many other countries. The medicinal properties of plant are due to the presence of certain chemical constituents. Large no. of plants are known to be medicinal are remaining uninvestigated. India is the largest producer of medicinal herbs and is appropriately called the botanical garden of the world.

Medicinal plants have been found useful in the care of no. of diseases caused by microorganisms. Medicinal plants are a rich

source of antimicrobial agents. Due to the rapid increase in the rate of infections, antibiotic resistance in microorganisms and due to the side effects of synthetic antibiotics, medicinal plants are gaining popularity over these days. Although medicinal plants produce slow recovery, the therapeutic use of medicinal plants is becoming popular because of their lesser side effects and low resistance in microorganisms (Seyendnejad *et al.*, 2010).

The present investigation is based on the antimicrobial activity of *Macaranga peltata*, commonly known as Kenda in Sri Lanka and Chandala in India, belong to Euphorbiaceae family. The root extract and warmed bark of *M. peltata* are used in the treatment of piles. Leaves and bark boiled in water and used to care ulcers. The oil content is less than 10% (Maman *et al.*, 1986)/ leaves used as a green manure. The wood is used for making match boxes and pencils. It is also used as shade tree in coffee plantations. The present study made an attempt to evaluate the antibacterial activity of acetone and petroleum ether extract of *M. peltata* fruit.

## **Materials and Methods**

### **Preparation of Extract**

*M. peltata* fruits were air dried in room temperature for several days. The dried fruits powdered using mixer grinder. The powder collected in a clean plastic and kept for future use.

20g of powdered sample was taken in a thimble (Whatman No.1 filter paper) and loaded in the main chamber of the Soxhlet apparatus. Analytical grade acetone and petroleum ether were used for extraction. The solvent vapour travels up the distillation arm and floods into the chamber housing the thimble of dried plant materials. The condenser ensures that any solvent vapours cool and drips back down in to the

chamber housing the dried powders. Some of the compounds in plant materials slowly dissolve in the warm solvent. When the Soxhlet chamber is most full, the chamber is automatically emptied by a siphon side arm, with the solvent running back to the distillation flashes. This cycle is repeated for 15 times. After 15 cycle the desired tire is concentrated in the distilled flask. The filtrate was taken and transfers in to a preweighed petridish. The yield of the materials was calculated from the dried extract. A part of the extract is taken and 10% stock solution, were prepared and stored in air tight glass containers and kept it.

## **Media Used and their Composition**

### **Nutrient Agar**

Nutrient agar media was used for maintaining pure culture of bacteria for detecting antibacterial activity. The plates were prepared with nutrient agar containing 10g tryptone, 5g yeast extract, 10 g NaCl and 6g agar in 950ml distilled water. The pH of the medium was adjusted to 7. The medium was autoclaved, cooled to 60°C and poured on to sterile plates.

### **Nutrient Broth**

Nutrient broth was prepared with 10g tryptone, 5g NaCl and 5 g yeast extract in 1000ml distilled water, pH adjusted to 7.2, autoclaved, cooled to room temperature and used for making suspension of test bacteria.

Standard inoculums was prepared by making a suspension of 4 to 5 colonies from on agar plate containing pure culture of specific microorganisms in nutrient broth. A uniform lawn culture of bacterial suspension was made on the Petri plates containing nutrient agar medium with the help of a glass spreader.

## **Detection of Antimicrobial Activity**

Antibacterial activity of plant material was checked using disc diffusion method against *E. coli*, *Proteus vulgaris* and *Klebsiella pneumoniae*. Whatman No: 1 filter paper discs were made using different concentration of the leaf extract (10%, 5%, 2.5%, 1%, and 0.5%). These discs were placed on a seeded uniform lawn culture plate and plates were incubated at 37°C for overnight. All the plates were then examined for the zone of inhibition, which is a direct measure of the antibacterial effect. Antimicrobial activity was tested with leaf extracts of different dilutions *ie.*, 10%, 5%, 2.5%, 1%, 0.5% and was used to detect the inhibition. Inhibition was recorded by measuring the diameter of inhibition zone at the end of 24 hours discs with the solvent, petroleum ether, acetone, were used as control.

## **Results and Discussion**

### **Results**

#### **Antibacterial Activity**

*Macaranga peltata* fruit extract checked by disc diffusion method, using gram-negative bacterial strains such as *Escherichia coli*, *Proteus vulgaris* and *Klebsiella pneumoniae* which cause infection in humans. Zone of inhibition was measured using a scale, from the end of the disc to the end of the zone.

#### *Escherichia coli*

The acetone and petroleum ether fruit extracts of *Macaranga peltata* showed activity against *Escherichia coli* at 24 hrs of incubation in 4 tested concentrations except at 0.5%. The most antibacterial activity showed in acetone extract than petroleum ether extract

*Proteus vulgaris*

The acetone and petroleum ether fruit extract of *Macaranga peltata* showed positive effect against *Proteus vulgaris* at 24 hrs of incubation in 10%,5%,2.5%and 1% concentrations .No effect was recorded in 0.5% and control.

*Klebsiella pneumoniae*

The petroleum ether and acetone fruit extracts of *M. peltata* showed antibacterial activity against *Klebsiella pneumoniae* . The activity was higher in acetone extracts.

Concentration of fruit extract (in percentage)	Zone of inhibition (in cm) showed by bacteria		
	<i>E. coli</i>	<i>P. vulgaris</i>	<i>K. pneumoniae</i>
10	0.7	0.6	0.5
5	0.3	0.3	0.2
2.5	0.2	0.2	0.2
1	0.1	0.1	-
0.5	-	-	-

**Table 1. Zone of inhibition (in cm) shown by Acetone extracts of *M. peltata* against bacteria.**

Concentration of fruit extract (in percentage)	Zone of inhibition (in cm) against bacteria		
	<i>E. coli</i>	<i>P. vulgaris</i>	<i>K. pneumoniae</i>
10	0.5	0.4	0.5
5	0.3	0.3	0.2
2.5	0.2	0.2	0.2
1	0.1	0.1	0.1
0.5	-	-	-

**Table 2. Zone of inhibition (in cm) shown by Petroleum ether extract of *M. peltata* against bacteria.**

The development of plant based medicines begins with the observation on the traditional usage ,followed by extraction , identification of active constituents and finally formulation and clinical trials .Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards the goal is the in vitro antibacterial activity assay. The present study revealed that the petroleum ether and acetone fruit extract of *Macaranga peltata* posses antibacterial activity against *Escherichia coli* , *Klebsiella pneumoniae* and *Proteus vulgaris*. The zone of inhibition showed by extracts at different dilution indicates that the activity was maximum at 10% dilution. The antibacterial activity is found to be almost same to the tested organisms. There is no antibacterial activity in control. The acetone fruit extract of *Macaranga peltata* shows most inhibitory activity than the petroleum ether extract.

Verma *et al.* (2011) described that the stem and leaf methanolic extract of *Macaranga peltata* shows antibacterial activity against gram-negative *Escherichia coli* and gram-positive *Staphylococcus aureus* . Zone of inhibition was found to be 16mm for leaf extract and 14mm for stem against *Escherichia coli*. Zone of inhibition was obtained for *Staphylococcus aureus* was 16mm for leaf extract and 13mm for stem extract. Leaf extract showed better antibacterial activity than stem against both gram-positive and gram-negative bacteria.

The comparison of zone of inhibition of the previous and present study indicates that methanolic extract of stem and leaves has better antibacterial activity than the acetone and petroleum ether fruit extract. It may be due to the high concentration of anti microbial compound in the methanolic extract of stem

and leaf. Further studies are necessary to identify the specific antimicrobial compound present in these extracts.

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