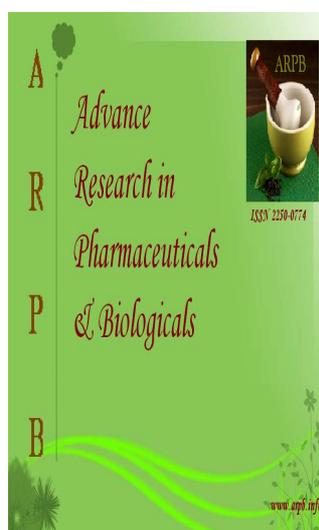




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**\*Corresponding author**

**Ms Poonam Sethi**

Guru Nanak College, Chennai,  
Tamil Nadu, India

Email:

[poonam123.73@rediffmail.com](mailto:poonam123.73@rediffmail.com)

## ANTIBACTERIAL ACTIVITY OF AQUEOUS EXTRACT OF THE LEAVES OF *TURNERA ULMIFOLIA* LINN. (TURNERACEAE)

**\*P. Sethi**

Guru Nanak College, Chennai, Tamil Nadu, India

### ABSTRACT:

*Turnera ulmifolia* Linn. belonging to family Turneraceae was investigated to evaluate *in-vitro* antibacterial activity of aqueous extract of the leaves against gram negative bacteria such as *Salmonella typhi*, *Pseudomonas fluorescens*, *Pseudomonas aeruginosa* and *Escherichia coli*. The pathogens were tested by disc diffusion assay method and minimum inhibitory concentration was determined. An attempt has been made to compare the activity of extract with standard Ciprofloxin.

**KEYWORDS:** Antibacterial, *Turnera ulmifolia*, *Salmonella typhi*, *Pseudomonas fluorescens*, *Escherichia coli*.

## INTRODUCTION

Medicinal plants are used to treat various infectious diseases. Many plants used today were known to people of ancient cultures throughout the world and they were valued for their preservative and medicinal powers<sup>1</sup>. Over the past few decades there has been much interest in natural materials as sources of new antibacterial agents. Different extracts from traditional medicinal plants have been tested. Many reports show the effectiveness of traditional herbs against microorganisms as a result, plants have become one of the bases of modern medicine<sup>2</sup>. Plants have given the Western pharmacopoeia about 7,000 different pharmaceutically important compounds and a number of top-selling drugs of modern times, such as quinine, artemisinin, shikonin and camptothecin<sup>3</sup>. The leaves have traditionally been made into a tea which was used by native people of Central and South America for its aphrodisiac effects. It has been recorded that the Indians drinking Damiana tea mixed with sugar for its ability to enhance lovemaking<sup>4</sup>.

*Turnera ulmifolia* Linn. or Damiana (Turneraceae) is a small herb of wide-ranging geographic distribution from Mexico to the North Eastern region of Brazil<sup>5</sup> and also west Bengal, Orissa and in the Peninsular India, particularly on the coast, where it is considered a weed. It is a wild weed, woody herb that grows 1-2 m high and bears aromatic, serrate leaves that are 10-25 cm long. Small yellow

flowers bloom in early to late summer which is followed by small fruits with a sweet smell and fig-like flavor. The medicinal part of the plant is its leaves, which are harvested during the flowering season. Some species of *Turnera* are widely used in folk medicine for different types of inflammatory diseases. The *British Herbal Pharmacopoeia* cites indications for the use of damiana for "anxiety neurosis with a predominant sexual factor, depression, nervous dyspepsia, atonic constipation, and coital inadequacy."

The plant contains mixture of cyanohydrins glucoside-deidaclin and tetraphyllin. Seeds contain fatty acids including vernolic, malvalic and octanoic acids<sup>6</sup>. The chief components 1, 8 cineole, alpha and beta-pinene, p-cymene, as well as thymol, alpha-copene, gamma-cadinene, calamine<sup>7</sup>.

## MATERIAL AND METHODS

### Collection and extraction of plant materials

The leaves of *Turnera ulmifolia* was collected from Chennai and identified with the help of botanist of RRIUM, Chennai. The dried and powdered plant material (100 g) was extracted successively with 600 ml of water with a Soxhlet extractor for 48 hr at temperature not exceeding the boiling point of the solvent<sup>8</sup>. The extracts were filtered through Whatman No. 1 filter paper and then concentrated in a vacuum at 40°C using a

rotary evaporator. Each extract was transferred to glass vials and kept at 4°C before use.

### Testing of Antibacterial activity

#### Collection of Microorganism

The microorganism *Salmonella typhi* (ATCC 00215), *Pseudomonas fluorescens* (ATCC 06341), *Pseudomonas aeruginosa* (ATCC 02150) and *Escherichia coli* (ATCC 10263) were used as test organism.

#### Disc Diffusion Method

The testing of antibacterial activity of the plant extracts was carried out *in vitro* by Kirby-Bauer disc diffusion technique<sup>9,10</sup>. Culture of bacteria was made on Muller Hinton agar plates. Sterile paper discs 5mm diameter (Himedia) were placed over the plate at an equidistant position. The discs were loaded with 10 µl of the drug at the concentration of 100 µl/ml, 150 µl/ml, 200 µl/ml, 250 µl/ml and 300 µl/ml. Distilled water was used as solvent. Separate control disc was also included using the solvent. Ciprofloxacin was used as standard

for comparison. The plates were incubated at 37°C for 24 hours. The microbial growth was determined by measuring the diameter of Zone of inhibition.

#### Minimum inhibitory concentration (MIC)

Minimum inhibitory concentration (MIC) is the lowest concentration of an antimicrobial that will inhibit the visible growth of a microorganism after overnight incubation. The MIC is determined by agar dilution method. The test were performed at four concentration 60 µg/ml, 70 µg/ml, 80 µg/ml, 90 µg/ml and 100µg/ml employing the aqueous extract of the plant.

## RESULTS AND DISCUSSION

The antibacterial activity of aqueous extract of leaves of *T. ulmifolia* Linn. against the four pathogenic bacteria *Salmonella typhi*, *Pseudomonas fluorescens*, *Pseudomonas aeruginosa* and *Escherichia coli* were assessed by zone of inhibition. The results were shown in table-1.

**Table 1. Antibacterial activity of aqueous extract of leaves of *T. ulmifolia* Linn.**

Bacteria	Zone of inhibition (in mm)					Ciprofloxacin (50µg/ml)
	100µg/ml	150µg/ml	200µg/ml	250µg/ml	300µg/ml	
<i>Salmonella typhi</i>	8±0.2	11±0.2	12±0.2	13±0.2	18±0.2	38±0.1
<i>Pseudomonas fluorescens</i>	10±0.1	17±0.2	21±0.1	28±0.1	33±0.1	46±0.1
<i>Pseudomonas aeruginosa</i>	11±0.2	15±0.2	17±0.1	22±0.2	25±0.2	34±0.2
<i>Escherichia coli</i>	7±0.2	13±0.1	18±0.2	20±0.2	22±0.2	33±0.2

All the microbes used in the present study were sensitive to the extract of the plant and showed effective activity. Maximum activity was seen

in case of *Pseudomonas fluorescens* where the zone diameter was 33 mm (300µg/ml). The minimum inhibitory concentration study revealed that the value for the bacteria

*Salmonella typhi* and *Escherichia coli* as 80 µg/ml and 60 µg/ml for *Pseudomonas fluorescens* and *Pseudomonas aeruginosa* respectively. This *in vitro* study demonstrated that folk medicine can be as effective as modern medicine to combat pathogenic microorganism. The antibacterial activity of

this plant would help for development of a new alternative medicine system which has no side effects. This study serves as a baseline in identification of new medicinal plant and further investigation on the same may yield new compounds of medicinal importance for specific microbial disease.

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