

## Comparative Analysis of Anti-Bacterial activity of Medicinal Plants

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**Abstract:** Antibacterial activity of aqueous, methanolic and petroleum ether extracts of Indian medicinal plants Neem, Tulasi were investigated against, *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Micrococcus leuteus* and *Pseudomonas aeruginosa*. The antibacterial activity was performed by Agar well diffusion methods against 5 bacterial species (3gram positive and 2 gram negative) . Methonolic extract of neem has produced better activity than other extracts. Aqueous extract of tulasi has produced better activity than other extracts.

**Key Words:** Neem (*Azadirachta indica*), Tulasi (*ocium sanctum*) Antibacterial Activity, Agar well Diffusion Assay.

### Introduction:

In nature, there are a huge variety of herbs, having medicinal properties and they are used to prepare the herbal medicines. Many higher plants produce economically important organic compounds. The emergence and spread of antimicrobial resistance is a growing problem in both developing and developed countries and threatens to become a global crisis. A strategy for the containment of resistance needs to be developed, applied and evaluated. Such a strategy should focus on improving rational use of antimicrobials and reducing opportunities for spread of resistant organisms. One of the important approaches to solve this problem has lead to the screening of several medicinal plants for their potential antimicrobial activity. Antibacterial properties of various plants parts like leaves, seeds and fruits have been well documented for some of the medicinal plants for the past two decades. Tulasi is also known as "the elixir of life" since it promotes longevity. Different parts of plant are used in Ayurveda and Siddha Systems of Medicine for prevention and cure of many illnesses and everyday ailments like common cold, headache, cough, flu ,earache, fever, colic pain, sore throat, bronchitis, asthma, hepatic diseases, malaria fever, as an antidote for snakebite and scorpion sting, flatulence, migraine headaches, fatigue, skin diseases, wound, insomnia, arthritis, digestive disorders, night blindness, diarrhea and influenza. Neem and its leaves used for the treatment of various diseases including eczema, ringworm, acne,

anti-inflammatory activities, anti-hyperglycemic and also treat chronic wounds, diabetic foot and gangrene. It also removes toxins from the body. To clean wounds, soothes, swellings and erases skin problems, boiled Neem is used. Neem leaves have been demonstrated to have vast properties like as immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic observed the anti bacterial effects of crude extract of Neem seed against pathogens involved in eyes and ear infections.

### **Materials and Methods:**

- ❖ The present research work was designed to evaluate antibacterial activity of medicinal plants including neem and tulasi leaf.
- ❖ The plant was collected from Botanical garden of Vagdevi College of pharmacy Gurazala, Guntur (dist).
- ❖ This study was performed at Vagdevi College of pharmacy, Gurazala.
- ❖ In order to see the antibacterial activity of Neem and tulasi, the following main steps were involved.

### **Collection of Medicinal Plants and Bacterial Strains**

The plants were collected from Botanical garden of Vagdevi College of pharmacy, Gurazala, Guntur (dist).

The test organisms were obtained from the Department of Microbiology, vagdevi College of Pharmacy, Gurazala. Cultures of these test organisms were maintained on Nutrient agar slants at 4°C.

### **Crude Extracts Preparation**

The freshly collected leaves of the plant were shade dried and coarse powdered and passed through #20. The coarse powdered materials were extracted using various solvents like ethanol, petroleum ether and methanol for about 72 hrs by Soxhlet extraction.

### **Procedure:**

The powdered drug to be extracted is packed in a thimble form made of a filter paper and it is placed in the body of Soxhlet extractor. The Methanol solvent was taken in the flask.

When solvent is boiled on heating the flask it gets converted into vapours. These vapours enter into the condenser through the side tube and get condensed into hot liquid which falls on the column of the drug. When the extractor gets filled with the solvent, the level of siphon tube also raises up to its top the solvent containing active constituents of the drug in the siphon tube siphon over and run into the flask thus emptying the body of extractor. The alternation of filling and emptying the body of extractor goes on continuously. The soluble active constituents of the drug remain in the flask while the solvent is repeatedly volatilized. The process of filling and emptying of extractor is repeated until the drug is extracted. Plant material is completely dried and kept for Aqueous Extraction using same process, After complete extraction again plant material dried and kept for Petroleum ether extraction.

The crude extracts were concentrated under vacuum. The concentrated crude aqueous, petroleum ether and methanol extracts were stored in desiccators until use.

### **Procedure for antibacterial assay:**

Agar well diffusion method method four wells were prepared in the plates with the help of a cork-borer (0.6 cm). 200 µl of each test extract was introduced into well. Antibiotics were added to the wells. The plates were incubated overnight at 37° C. Microbial growth was determined by measuring the diameter of zone of inhibition. For each bacterial strain, controls were maintained where pure solvents were used instead of the extract. The result was obtained by measuring the zone diameter.

## Results and Discussion:

We conducted a prospective observational study of antibacterial activity of Neem and Tulasi against bacterial strains *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Micrococcus leuteus* and *Pseudomonas aeruginosa*. by using agar well diffusion method. Graphical presentation of zones of inhibition of aqueous, petroleum ether and Methanol extracts of Neem and tulasi are shown in Figures: 1 and 2 The antibiotic Ampicillin drug was loaded as a control to check the comparison of antibacterial activity with different crude extracts of medicinal plants. The maximum antibacterial activity observed by ampicillin against *E.coli* was 22 mm. The results are shown in Table: 1 and 2.

The Methanol extract of Neem Shows more activity than other extracts against bacteria and aqueous extract of tulasi Shows more activity than other extracts against bacteria.

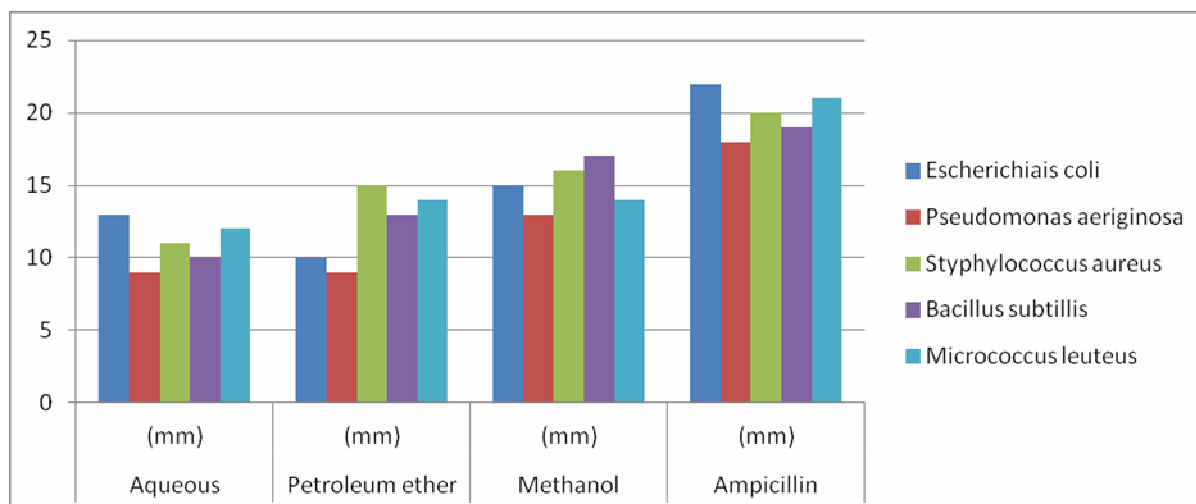
**Table 1: Anti bacterial activity of different solvent extracts of Neem**

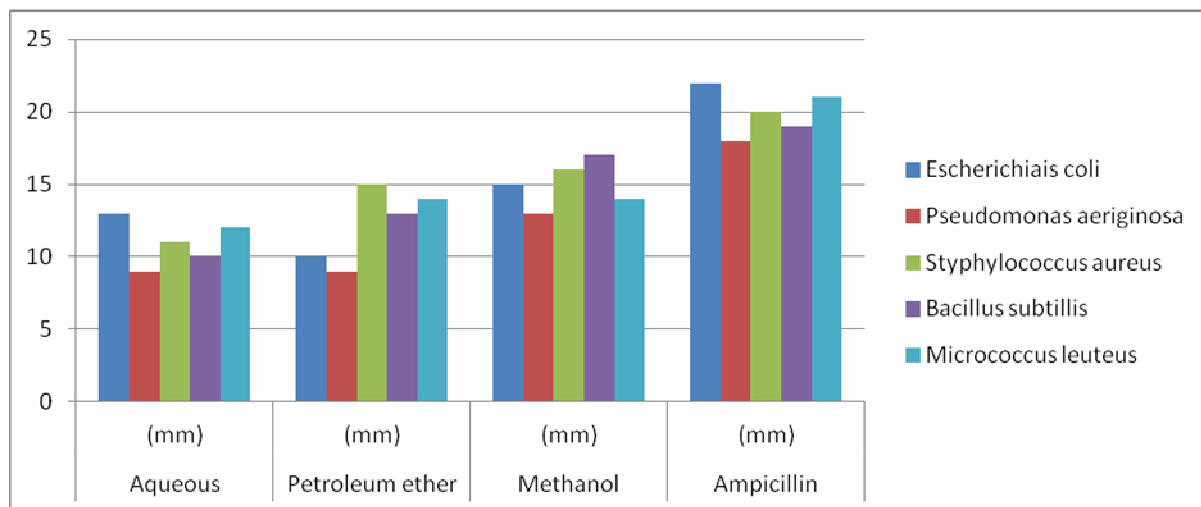
Bacterial strains	Aqueous (mm)	Petroleum ether (mm)	Methanol (mm)	Ampicillin (mm)
<i>Escherichia coli</i>	13	10	15	22
<i>Pseudomonas aeruginosa</i>	09	09	13	18
<i>Staphylococcus aureus</i>	11	15	16	20
<i>Bacillus subtilis</i>	10	13	17	19
<i>Micrococcus leuteus</i>	12	14	14	21

**Table 2: Anti bacterial activity of different solvent extracts of Tulasi**

Bacterial strains	Aqueous (mm)	Petroleum ether (mm)	Methanol (mm)	Ampicillin (mm)
<i>Escherichia coli</i>	18	12	14	22
<i>Pseudomonas aeruginosa</i>	17	13	14	18
<i>Staphylococcus aureus</i>	19	14	12	20
<i>Bacillus subtilis</i>	20	12	14	19
<i>Micrococcus leuteus</i>	22	10	12	21

**Figure 1: Anti bacterial activity of different solvent extracts of Neem**



**Figure 2: Anti bacterial activity of different solvent extracts of Tulasi****References:**

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