



REGULAR ARTICLE

# ANTIMICROBIAL ACTIVITY OF AEGLE MARMELLOS AGAINST CLINICAL PATHOGENS

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## SUMMARY

*Aegle marmelos* is a medicinal herb belongs to the family Rutaceae. The different parts of plants like leaves and flowers are extracted by using the solvent methanol. The methanol extracts were screened for the antimicrobial activity. They showed greater inhibitory effect against both gram positive and gram negative organisms. The organisms used were such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Salmonella typhi*, *Staphylococcus aureus*. Based on the present investigation results it is concluded that the methanolic extracts of *Aegle marmelos* has great potential as antimicrobial agent against different microorganisms and they can be used in the treatment of infectious diseases caused by the resistant microorganisms.

**Keywords:** Antimicrobial activity, *Aegle marmelos*, Clinical pathogens, Disc diffusion technique, Methanol extracts.

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## 1. Introduction

Medicinal plants continue to be an important therapeutic aid for alleviating the ailments of humankind. The search for eternal health and longevity for remedies to relive pain and discomfort drove early man to explore his immediate natural surroundings to the use of many plants, animal products and minerals etc for the development of a variety of therapeutic agents. Today, there is a renewed interest in traditional medicine and an increasing demand for more drugs from plants sources. This revival of interest in plant derived drugs is mainly due to the current widespread belief that “green medicine” is safe and more dependable than the

costly synthetic drugs, many of which have adverse side effects.

A major part of the total population in developing countries still used traditional folk medicine obtained from plant resources (1), There are many approaches to the search for new biologically active principles in medicinal plants (2), India is the largest producer of medicinal herbs and is appropriately called the botanical garden of world (3).

Nature has bestowed upon as a very rich botanical wealth and a large number of diverse types of plants grow wild in different parts of our country. In India, herbal medicines have been the basis of treatment and cure for various

diseases physiological conditions in traditional methods practiced such as Ayurveda, Unani and Siddha. Indian folk medicine comprises numerous herbal prescriptions for therapeutic purposes which may be as varied as healing wounds, treating inflammations due to infection, skin lesions, leprosy, diarrhoea, scabies, venereal diseases, snake bite and ulcers etc., The realization that many infectious pathogenic microorganisms are fast developing resistance against prevailing drugs has necessitated a search for new sources of antimicrobial compounds. In the course of their life cycle, plants encounter infection by a variety of viruses, bacteria, fungi, parasites specific to them. They are expected to synthesize a variety of secondary metabolites capable of providing them protection against the infectious agents.

*Aegle marmelos* is a medicinal half belong to the family Rutaceae. It is cultivated and planted as a temple tree. It is also called as wood apple (or) 'Beal'. The fruit of the tree used for the treatment of diarrhea, intestinal parasites, and dryness of the eyes. Leaf juice mixed with honey is a folk remedy for fever.

The antibacterial substances from medicinal plants can be evaluation organic solvents by the methanol. in used In the present investigation an attempt has been made to screen the antibacterial activities of *Aegle marmelos*.

## 2. Materials and methods

The medicinal in Plant samples were collected in and around Chidambaram areas cuddalore district of Tamil Nadu. The medicinal plant samples *Aegle marmelos* with leaves and flowers. Leaves and flowers of *Aegle marmelos* were used to extract bioactive compounds (Fig 1, Fig 2). The samples were washed with distilled water to clean the adhering dust particles. Then they were dried in a shaded place. Sufficient leaf

samples were cut into small pieces and placed in 250 ml conical flask. Methanol was used as a solvent to extract the bioactive compounds.

The above strains were obtained from the Department of Microbiology, Annamalai University. 40 grams of each medicinal plant sample was cut into small pieces and further ground, placed in the Soxhlet extractor for the extraction of bioactive compounds (4), Methanol as used to extract the bioactive components of the medicinal plants. Before extraction, the samples were flushed with organic solvent, methanol for two times. Thus collected extracts were concentrated by exposing them in a laminar air flow and stored at 4°C until further use (5).

### Bacterial strains

Five bacterial strains were employed for the test which include.

*Escherichia coli*, *Staphylococcus aureus*, *Salmonella typhi*, *proteus mirabilis*, *Pseudomonas aeruginosa*.

### Preparation of sterile disc

Sterile disc of size 5 mm diameter were obtained by using Whatman filter paper No.1 used for the present investigation. The extracts of medicinal plants were incorporated into the sterile disc. Each sterile disc was incorporated individually with 50,100,200 ppm. The discs were allowed to dry in laminar air flow. Then another dose of extract was applied. Assay of the antibacterial activity of the medicinal plant extract were done by Disc diffusion technique.

### Disc Diffusion Technique

The nutrient agar plates were prepared and the test bacterial strain was smeared on the Nutrient agar surface using sterile cotton swab. The antibiotic disc loaded with plant extract was placed on the surface of the Nutrient agar plates.

Controls were maintained by loading dimethyl sulfoxide on disc. Then the plates were incubated at 37°C for 12 to 18 hours.

### 3. Results

The results of the experiments carried out on the antimicrobial effect on the plant *Aegle marmelos* of leaves and flower with solvent methanol against clinical pathogens. Antibacterial activity of methanolic extracts of leaves and flower *Aegle marmelos* at different concentrations (50,100,200 ppm disc) against different clinical pathogens with control was shown (Tables 1,2).

Table 1. Antibacterial activity of methanolic extracts of *Aegle marmelos* leaves

S.No.	Organisms	Zone of inhibition (mm) concentration in ppm		
		50	100	200
1.	<i>Escherichia coli</i>	14	16	17
2.	<i>Staphylococcus aureus</i>	12	14	15
3.	<i>Salmonella typhi</i>	13	16	17
4.	<i>Proteus mirabilis</i>	11	15	17
5.	<i>Pseudomonas aeruginosa</i>	10	11	13

Table 2. Antibacterial activity of methanolic extracts of *Aegle marmelos* flowers

S.No.	Organisms	Zone of inhibition (mm) concentration in ppm		
		50	100	200
1.	<i>Escherichia coli</i>	14	15	15
2.	<i>Staphylococcus aureus</i>	15	16	18
3.	<i>Salmonella typhi</i>	13	14	15
4.	<i>Proteus mirabilis</i>	14	16	18
5.	<i>Pseudomonas aeruginosa</i>	11	14	16

The leaves and flower extract proved to be active against five different clinical pathogens strains such as *Staphylococcus aureus*, *Pseudomonas*

*aeruginosa*, *Proteus mirabilis*, *Escherichia coli*, *Salmonella typhi*.

In this assay *Escherichia coli* was the most susceptible bacterium, on observation that may be attributed to the presence of Tannins alkaloids, inhibit the growth of microorganisms. The *Aegle marmelos* leaves extract, show highly active against the microorganisms. *E. coli* followed by *Salmonella typhi*, *Staphylococcus aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa* in all the concentration. In 200 ppm concentration of leaves methanol extract have no much difference between the organisms (Plate 1).



Fig 1. *Aegle marmelos* leaves



Fig 2. *Aegle marmelos* flower

The flowers extract also possesses sensitivity against the organisms at 100 ppm and 200 ppm. This is due to presence of alkalonoid, and flavonoids in the flower extract.

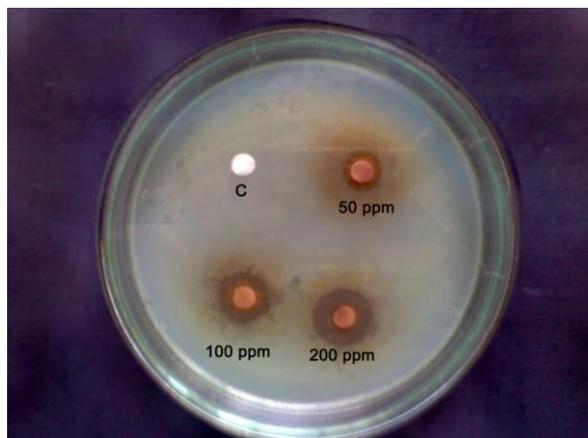


Plate 1. Antibacterial activity of Methanolic flower extract of *Aegle marmelos* against *Staphylococcus aureus*

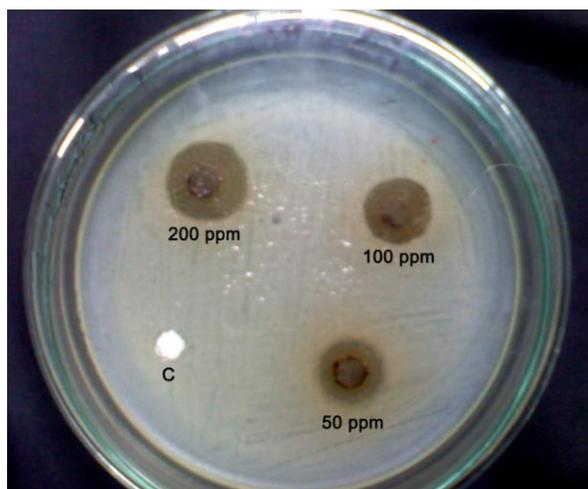


Plate 2. Antibacterial activity of Methanolic leaves extract of *Aegle marmelos* against *Escherichia coli*

In methanolic extracts of *Aegle marmelos* flowers shows high antimicrobial activity against *Staphylococcus aureus* in all the concentration (15, 16 and 18mm) followed by *Proteus mirabilis*, *E. coli*, *Salmonella typhi* and *Pseudomonas aeruginosa* (Plate 2).

#### 4. Discussion

Historically, medicinal plants have provided a source of inspiration for novel drug compounds, as plant derived medicines have made large contributions to human health and well being.

The traditional healers (or) practitioners make use of water primarily as a solvent, but our studies showed that methanol extracts of these plants were certainly much better and powerful. This may be due to the better solubility of the active components in organic solvents (6, 7).

Both the leaf and flower methanol extracts was found to be more effective against all microorganisms. The flower extracts was found to induce maximum inhibitory effect against all these microorganisms. In the leaf methanol extracts of *Aegle marmelos* antibacterial activity was maximum in *Salmonella typhi* followed by others. In the flower methanol extract *Aegle marmelos* antibacterial activity was maximum in *Staphylococcus aureus* followed by others. This due to astringent antipyretic and also contain tannins. The results support earlier result as antibacterial activity of *Amry card power* (formulation) consists of *Aegle marmelos* against *E. coli*, *Staphylococcus* and *Streptococcus*.

On the basis of the result obtained in this present investigation and conclude that the methanol extracts of *Aegle marmelos* leaves and flowers had significant in vitro antimicrobial activity. and the most active extracts can be further subjected to isolation and identify therapeutic antimicrobials and undergo further pharmacological evaluation.

#### References

1. Panthi .M.P. and Chaudhary, (2006). There are many approaches to the search for new biologically active principles in medicinal plants
2. J. Parekh and Sumitra, (2006). India is the largest producer of medicinal herbs and is appropriately called the botanical garden of world.
3. N. Shariff, et al., (2006). Antimicrobial activity of *Rauwolfia tetraphylla* and

- Physalis minima* leaf and callus extracts.  
African Journal Biotechnology, 2006; 5  
(10) : 946-950.
4. Boer, H.J., et al., (2005) Levenfors, J.J. antibacterial activity of some herbal remedies from Tanzania. J. Ethnopharmacol. 2005. 96: 461-469.
  5. Nadkarni KM, Nadkarni AK. (1999). Indian Materia Medica, Vol. I, 3rd edn. M/s Popular Prakashan Pvt, Ltd., Bombay, 46: Pp. 258, 331,
  6. Yoganarasimhan SN (2000). Medicinal Plant of Indian Tamilnadu vol. II, Pp. 64-65, 230.
  7. Ashok Kumar. B.S., K. Lakshman S.M. Tripathi, K.N. Jayaveera, V.B. Narayanasamy, K. Sabemulla R. Nandeesh, (2009). Free radical scavenging and antibacterial activities of amry card power (An Ayurvedic formulation). European Bulletin of Drug Research: 17: 5-9.