REVIEW OF RESEARCH
ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)
VOLUME - 15 | ISSUE - 6 | MARCH - 2026

ANTIBACTERIAL ACTIVITY OF ETHANOL EXTRACT OF Aegle Marmelos(LEAVES) AGAINST HUMAN PATHOGENS

Dr. P.Pazhaniraja
Assistant Professor and Head, Department of Microbiology,
Aries Arts and Science college(W),Karunkuzhi,Vadalur.

R. Akshaya
B.Sc.,Microbiology Aries Arts and Science college(W),Karunkuzhi,Vadalur.

ABSTRACT

Aegle marmelos are a subtropical species.The origin of this plant from Eastern Ghats and central India. It is native to India and found mainly in sub-Himalaya tract to west Bengal. It also found in foothills of Himalaya, Bihar, Chhattisgarh, and Uttaranchal. A.marmelosisa widely distributed plant and found in India. The plants samples were collected from Natarajar Temple Chidambaram.From this study it was found that the effectiveness of ethanolic extract against both bacterial strains of Staphylococcus aureus was more or less equal to the treatment of control antibiotic ampicilin. As the treatment of control drug ampicilin was found similar to the ethanolic extract of the fruit pulp of Aegle marmelosin inhibiting the growth of pathogenic bacterial strains of Staphylococcus aureus, this can be attribute to its pharmaceutical important to human beings and in future can be used as an important tool while formulating drugs and ointments for curing different ailments.

KEYWORDS: *subtropical species , control antibiotic ampicillin , human beings, pharmaceutical important.*

1. INTRODUCTION

In the traditional system of medicines, medicinal plants from the back- bone in India. The phytochemical ingredients from these medicinal plants serve as compounds in drug discovery and design. *Aegle marmelos*are a subtropical species. The origin of this plant from Eastern Ghats and central India. It is native to India and found mainly in sub-Himalaya tract to west Bengal. It also found in foothills of Himalaya, Bihar, Chhattisgarh, and Uttaranchal. *A.marmelosis*a widely distributed plant and found in India, Ceylon, china, Nepal, Bangladesh, Srilanka, Thiland, Tibet, Java, Malaysia, Fiji. It is slow growing plant with medium size having 12 to 15 m height and short trunk with blanking bark, sometimes also unusual spiny branches. Alternate leaf, oval to lanceolate toothed leaf with one terminal with long petiole, reticulate pinnate venation. Fruits are yellowish green in color with numerous seed. Flowers are greenish white color. Coumarins, alkaloids, steroids, and essential oils. Xantotoxol, imperatorin and alloimperatorin, different types of carotenoids, ascorbic acid, sitosterol, crude fibers, carotenoids, tannins, skimminine, aegelin, lupeol, cineol, citral, citronellal, marmesinin, marmelosine, marmin and tannins. In jaundice, astrigent, carminative, conjuctivitis, swelling of joints, anti-ulcer, anti-pyretic, carioprotective, analgesic, radio protective action, wound healing. It inhibits the HMG-COA reductase enzyme which is necessary in cholesterol biosynthesis and Aegeline-2 an alkaloid may be responsible for this action. This will limit cholesterol biosynthesis and show hypolipidemic action. (Patel Urvi*et al*., 2016).

2. OBJECTIVES

- Collection and drying of *Aegle marmelos*leaves.

- ❖ Extraction of leaves using Ethanol.
- ❖ Antibacterial assay against four pathogenic bacteria.

3. COLLECTION OF SAMPLES

The plants samples were collected from Natarajar Temple Chidambaram

4. Collection and identification of *Aegle marmelos*plants leaves

The medicinal plants, colleded from Natarajar Temple Chidambaram Tamilnaduindia, The taxonomic position of the plants were identified and authenticated. Leaves from the plants were collected in a large quantity and washed with clear distilled water and dried in an oven at 60 for 5 mins for extraction purposes.

5. Processing of plant samples

Leaves of Aegle marmelos were used to extract bioactive compounds. 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.

6. Extraction of plant materials (Cancer *et al*., 1995).

Extraction of plant materials 250 gm of each plant leaves were taken for extraction procedure and blender in a mortar and pestle separately under aseptic condition. The solvents extraction was done by modified method of dissolving 20 g of dried plant powder in soxhlet apparatus with ethanol (200ml) separately for 24 hrs at 65. The extracts were concentrated to dryness in rotary pressure evaporator and stored at 40 for further antimicrobial study.

7. Results

The results of the experiments carried out on the antibacterioal effect on the plant *AeglesMarmelas*with solvent ethanolic against microorganisms.

The antibacterial activity was studied that extraction which has ethanolic, aqueous by disc diffusion method against 4 bacterial species. Summarizes the microbial growth inhibition of both aqueous and methanol extracts of the screened plant species. The aqueous extract of the screened plant species. The acqeous extract of only plants showed antibacterial activity (*Aegle Marmelos*) the other aqueous extracts did not show any antibacterial activity. On the other hand, methanol extracts of almost all the plants exhibited antibacterial activity towards one or another bacterium.

The maximum antibacterial activity was shown by *Aegle Marmelos*respectively. The ethanolic extracts of the investigated plants showed maximum antibacterial activity against Gram-negative.

The antibacterial activity results are shown in table 1. The extracts showed varying degree of inhibitory effect. The inhibitory effect of extracts was directly proportional to increasing concentration of field grown leaf extracts.

The leaf extract inhibit the growth of pathogenic microorganisms. Maximum zone of inhibition was obtained in 100 µg concentration of leaf extract of all bacteria screened except. *Pseudomonas aeruginosa*. The minimum zone of inhibition observed in 20 µg concentraction of leaf extract except *Pseudomonas aeruginosa* and *Staphylococcus aureus*. The MIC OF 20-100 µg/ml was found against all the tested bacteria but its all concentrations did not show any inhibitory effect on *Escherichia coli.*

7.1 Antibacterial activity of ethanolic extract of *Aegle marmelos*

Antibacterial activity of ethanolic extracts of *Aegle marmelos*at different concentrations (20,40, 60,80,100 µl/ disc) against different bacteria with control was shown in Tables and plates. The sensitivity of the organisms were assessed by the formation of zone of inhibition. The present study showed that the ethanolic extracts of *Aegle marmelos*had interesting activity against both gram positive and gram negative bacteria. The leaves extract proved to be active against four different bacterial strains such as *Bacillus Species, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus.*

Table-1
Inhibition of plant *Aegle marmelos* leaves Extract against Bacillus species

S.N0	Plant leaves Extract in µl	Plate-1	Plate-2	Plate-3	control
1	20µl	No Zone	No Zone	No Zone	No growth
2	40µl	1mm	2mm	1mm	
3	60µl	1mm	3mm	2mm	
4	80µl	2mm	4mm	4mm	
5	100µl	6mm	5mm	5mm	

Table-2
Inhibition of plant *Aegle Marmelos*leaves Extract against *Escherichia coli*

S.NO	Plant leaves Extract in µl	Plate-1	Plate-2	Plate-3	Plate-4	Control
1	20µl	1mm	2mm	No Zone	No Zone	No Growth
2	40µl	3mm	5mm	1mm	2mm	
3	60µl	4mm	8mm	4mm	3mm	
4	80µl	4mm	8mm	3mm	2mm	
5	100µl	6mm	11mm	5mm	6mm	

Table-3
Inhibition of plant *Aegle Marmelos*leaves Extract against *Pseudomonas aeruginosa*

S.NO	Plant leaves Extract in µl	Plate -1	Plate -2	Plate -3	Control
1	20µl	No Zone	No Zone	No Zone	No Growth
2	40µl	2mm	3mm	3mm	
3	60µl	4mm	6mm	5mm	
4	80µl	5mm	5mm	6mm	
5	100µl	9mm	11mm	15mm	

Table-4
Inhibition of plant *Aegle marmelos*leaves Extract against *Staphylococcus aureus*

S.NO	Plant leaves Extract in µl	Plate-1	Plate-2	Plate-3	Control
1	20µl	No Zone	2mm	No Zone	No Growth
2	40µl	1mm	4mm	1mm	
3	60µ	3mm	7mm	3mm	
4	80µl	4mm	8mm	5mm	
5	100µl	5mm	11mm	4mm	

8. CONCLUSION

*Aegle marmelos*may impart health benefits when it is used in functional food products and should also be regarded as a potential nutraceutical resource in the future. In addition, it can be used as a food additive because of its typical color, flavor and texture. These results are useful for developing and improving the quality of bael fruit cultivate in order to provide more value added and usefulness of bael fruit.

This present study evaluated the presence of phytoconstituents such as reducing sugars, saponins, tannins, flavonoids (phenolic compounds) in the ethanolic extract and aquaeous extracts fruit pulp of *Aegle marmelos*which were responsible for its antimicrobial activity. These compounds exhibited a zone of inhibition against Staphylococcus aureus, when compared with the control drug penicillin. From this study it was found that the effectiveness of ethanolic extract against both bacterial strains of Staphylococcus aureus was more or less equal to the treatment of control antibiotic ampicilin. As the treatment of control drug ampicilin was found similar to the ethanolic extract of the fruit pulp of *Aegle marmelos*in inhibiting the growth of pathogenic bacterial strains of Staphylococcus aureus, this can be attribute to its pharmaceutical important to human beings and in future can be used as an important tool while formulating drugs and ointments for curing different ailments.

9. REFERENCES

1. Abhijit Dutta, Neeta Lal ,MusarratNaaz , Abhijeet Ghosh and RupaVerma , 2022 Ethnological and Ethno-medicinal Importance of *Aegle marmelos*(L.) Corr (Bael) Among Indigenous People of India. American Journal of Ethnomedicine, Vol. 1, No. 5, 290-312.
2. Amit Pandey, Rashmi Mishra 2011, Antibacterial properties of *Aegle marmelos*leaves, fruits and peels against various pathogens. Journal of Pharmaceutical and Biomedical Sciences (JPBMS), Vol. 13, Issue 13 ISSN NO- 2230 – 7885.
3. Brijyog , Laliteshwar pratap singh , Anupmaiti 2017 A Review on *Aegle Marmelos*: Phyto-Pharmacological Prospective. AJPER Vol 6, Issue 1 (16-30)
4. Dinesh Kumar Sekar, Gaurav Kumar, L. Karthik and K.V. Bhaskara Rao 2011 A review on pharmacological and phytochemical properties of *Aegle marmelos*(L.) Corr. Serr. (Rutaceae) Asian Journal of Plant Science and Research, 1(2): 8-17
5. Kantha D. ArunachalamSubhashiniS. ,Sathesh Kumar A. 2012, Wound healing and Antigenotoxic activities of *Aegle marmelos*with relation to its antioxidant properties . Journal of Pharmacy Research,5(3),1492-1502.
6. MadhuraJoglekar, Mangala Mandal, ManasaParalakotiSomaiah, Shweta Murthy 2012, Comparative analysis of antioxidant and antibacterial properties of *Aegle marmelos*, Coriandrumsativum and Trigonellafoenumgraecum .ActaBiologicaIndica 1(1):105-108.
7. Patel Axay R, GarachDipak, Chakraborty Manodeep, Kamath Jagdish V. 2012. Aegle Marmelos (Linn.): A Therapeutic Boon For Human Health. IJRAP3(2),
8. Patel Urvi R, Chaudhari Priyanka R, Vijay Lambole, VipulGajera, Dhiren P. Shah. 2016. Pharmacological Activities of Aegle Marmelos: An Overview. Pharma Science Monitor7(2),98-106.
9. Uttara Singh, Anita Kochhar andRajbir Boora 2012 Proximate Composition, available Carbohydrates, Dietary Fibres and Anti-Nutritional factors in BAEL (Aegle Maemelos L.) Leaf, Pulp and Seed Powder . International Journal of Scientific and Research Publications, Volume 2, Issue 4.

Figure 1. Overview of Aegle marmelos

Figure 2. Plate Inhibition zone of Bacillus Species

Figure 3. Plate Inhibition zone of Escherichia Coli

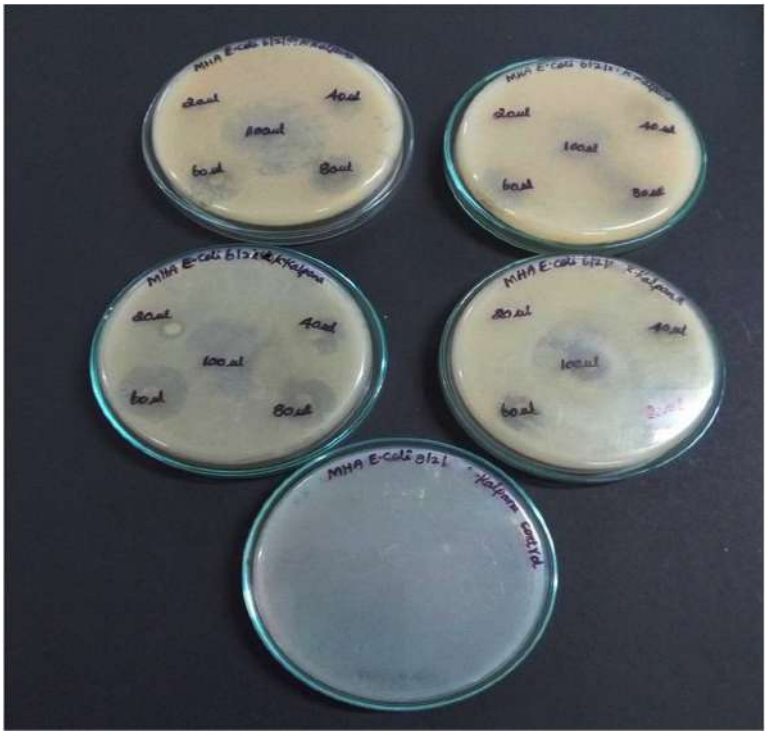

Figure 4.Plate Inhibition zone of *Pseudomonas aeruginosa*

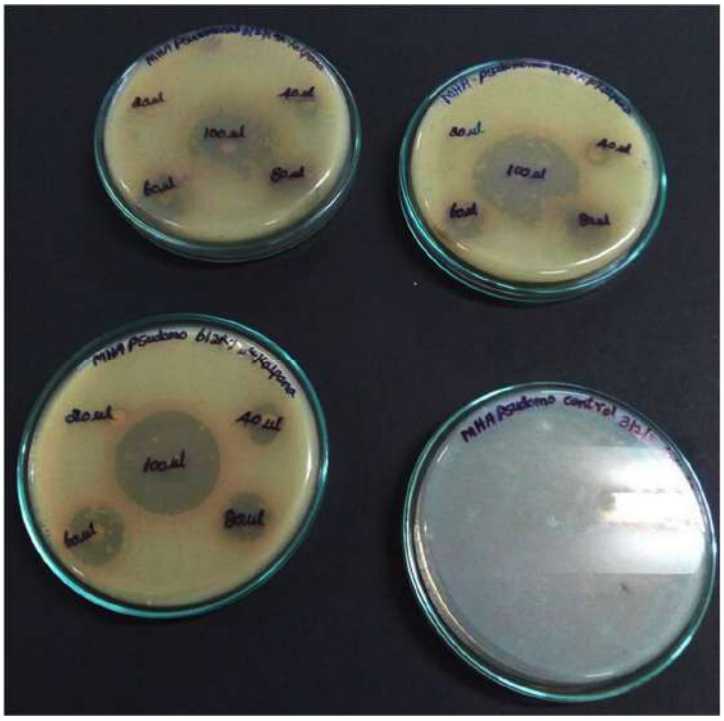

Figure 5. Plate Inhibition zone of Staphylococcus aureus

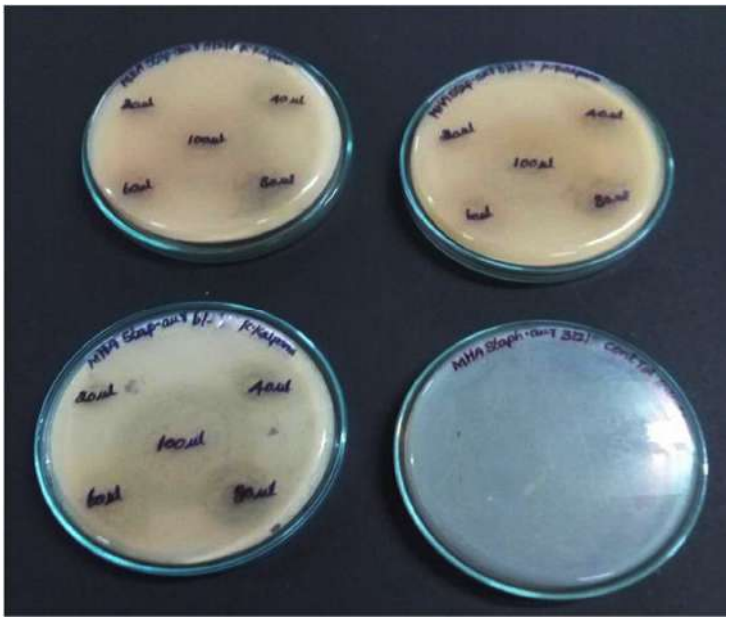

Figure 6. Soxhlet Apparatus

Figure 7. Fresh Leaf of Vilvam Leaves

Figure 8. Dry Leaf of Vilvam Leaves

Figure 9. Vilvam Leaves of Powder

Figure 10. Aqueous Solution of Water extract Conical Flask

Figure 11. Ethanol Solvant Conical Flask

Dr. P.Pazhaniraja
Assistant Professor and Head, Department of Microbiology,
Aries Arts and Science college(W),Karunkuzhi,Vadalur.

R. Akshaya
B.Sc., Microbiology Aries Arts and Science college(W),Karunkuzhi,Vadalur.