** RESEARCH ARTICLE**

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**ARTICLE HISTROY** **ABSTRACT**

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The study investigates the antibacterial activity of crude solvent and aqueous extracts from leaves of three medicinal plants: Aeglemarmelos (*A. marmelos*), Phyllanthusamarus (*P. amarus*), and Memecylonmaderaspatna (*M. maderaspatna*) against ten bacterial species. Various solvents including hexane, ethyl acetate, methanol, and water were used for extraction. The results revealed that methanol extracts from *A. marmelos* and *P. amarus* exhibited significant antibacterial activity against both Gram-positive and Gram-negative bacteria. Notably, the methanol extract of *A. marmelos* demonstrated inhibitory effects against *Bacillus subtilis, Klebsiellapneumoniae,* and *Proteus mirabilis* with zone of inhibition measurements of 8.0 ± 0.6 mm, 15.0 ± 0.3 mm, and 19.0 ± 0.5 mm, respectively. The discussion highlights the significance of medicinal plants in traditional medicine and the potential of their bioactive compounds as antimicrobial agents. Mechanisms underlying the antibacterial activity of *A. marmelos* extracts, attributed to compounds like cuminaldehyde and eugenol, are discussed, advocating for further research to isolate and purify these constituents. Overall, the findings suggest the therapeutic potential of *A. marmelos* as an alternative antimicrobial agent, warranting further investigation and exploration in primary healthcare practices.

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**Keywords**

*Antibacterial activity*

*Medicinal plants*

*Aeglem armelos*

*Phyllanthus amarus*

*Memecylon maderaspatna*

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**Introduction**

Throughout human history, infectious diseases have posed a persistent threat to health and resulted in a high rate of mortality. Globally, new resistance mechanisms are spreading quickly and compromising our capacity to treat prevalent illnesses. Long-term diseases, impairments, and fatalities have been the result of this. Commercial antimicrobial drugs are no longer effective against an increasing variety of pathogenic pathogens (Hancock et al., 2012).

The objective of this study was to assess these plants' antibacterial qualities against bacteria that are clinically significant from a scientific standpoint. It replicated conventional extraction techniques using both solvent and aqueous extracts.

**Materials and Method**

***Collection of plant materials***

The *A. marmelos* botanical park in West Mambalm, Chennai, India, provided the leaves for this plant. The University of Madras botanical garden provided the *P. amarus* leaves, and the Kodaikanal highlands in South India's Western Ghats provided the *Mukia maderaspatana* leaves (Fig. 1). Following their collection, the leaves were given a thorough washing in distilled water and allowed to air dry for five days at room temperature in the shade. They were ground into a fine powder after drying, and then kept in storage at 10°C until needed again.

**Results**

An Analysis of antibacterial activity of crude solvent and aqueous extracts of medicinal plants

***Preparation of crude extracts***

 To test for antibacterial activity against human infections, crude extracts from the leaves of three medicinal plants *A. marmelos, P. amarus,* and *M. Maderaspatna* were produced using a variety of solvents, such as hexane, ethyl acetate, methanol, and water. Table 1 provides a summary of these crude extracts' yields.

**Table 1.** The quantity of crude extract obtained from the leaves of chosen medicinal plants extracted with various solvents and water

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Medicinal Plants** | **Hexane\***(g) | **Ethyl acetate\***(g) | **Methanol\***((g) | **Water@**(g) |
| *A. marmelos* | 0.340 | 1.114 | 2.100 | 0.809 |
| *M. madraspatna* | 0.160 | 1.400 | 1.980 | 0.916 |
| *P. amarus* | 0.371 | 0.958 | 1.851 | 1.040 |

\* - Solvent extracts were vacuum evaporated to complete dryness

@ - Water extract was lyophilized

**Table 2.** Antibacterial activity of crude extracts (1000 µg concentration) of medicinal plants against human pathogens

| **Medicinal plants** | **Solvents** | **Gram-positive pathogens** |
| --- | --- | --- |
| ***B. subtilis*** | ***A. baumini*** | ***B. cereus*** | ***S. aureus*** | ***M. luteus*** |
| *A. marmelos* | methanol | 8.0 ± 0.6 | - | - | - | - |
| Streptomycin | control | 21.0 ± 0 |  |  |  |  |
| **Gram-negative pathogens** |
|  |  | ***P. aeruginosa*** | ***E. coli*** | ***K. pneumoniae*** | ***V. cholerae*** | ***P. mirabilis*** |
| *A. marmelos* | hexane | 8.0 ± 0.6 | - | 8.0 ± 0.6 | - | - |
| methanol | - | - | 15.0 ± 0.3S | - | 19.0 ± 0.5\* |
| *P. amarus* | hexane | - | - | - | - | 8.0 ± 0.6 |
| methanol | 12.0 ± 0.4NS | - | - | - | 12.0 ± 0.5\* |
| Streptomycin | control | 5.0 ± 0 | 5.0 ± 0 | - | 21.0 ± 0.1 | 21.0 ± 0.1 |

Mean zones of inhibition (mm) ± SD \*- Significant at 95% level, S- significant, “-“No activity, ZI –Zone of Inhibition

**Discussion**

For many centuries, medicinal plants have been the main source of medication in many impoverished countries (Robinson, 2011). 75–80% of people in India use traditional medicine extensively, and a large percentage of contemporary treatment is based on plant extracts and their active ingredients (Rathish et al., 2005).

**Conclusion**

This work demonstrates the broad-spectrum antibacterial efficaciousness of *A. marmelos* by highlighting the variety of active phytochemical substances present in the plant.

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**Conflicts of interests**

The authors declare that there are no conflicts of interests.

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**Data and material availability**

All data associated with this study are present in the paper.

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