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Available online at: http://www.iajps.com *Review Article*

A COMPREHENSIVE REVIEW ON EXTRACTION OF *AEGLE MARMELOS* FOR ANTIMICROBIAL ACTIVITY

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Abstract:

Beal (Aegle marmelos), commonly known for its medicinal properties, has gained significant attention due to its potential antimicrobial activity. This study aims to evaluate the antimicrobial effects of Beal leaf extracts against a range of pathogenic microorganisms, including both Gram-positive and Gram-negative bacteria. The leaves were collected, dried, and extracted using solvents such as ethanol and methanol.

The antimicrobial potential was assessed using the agar well diffusion method, measuring zones of inhibition around the wells. The results indicated that Beal leaf extracts exhibited notable inhibitory effects against several bacterial strains, with the methanol extract demonstrating superior activity compared to ethanol.

These findings suggest that Beal leaves possess bioactive compounds that may be useful in the development of natural antimicrobial agents. Further studies are recommended to isolate and identify the specific compounds responsible for this antimicrobial activity, as well as to evaluate their safety and efficacy in clinical applications.

The goal of this study was to assess the antibacterial properties and phytochemical components of Aegle marmelos (Linn.) Correa fruit pulps. Reducing sugars, saponins, tannis, flavonoids, and phenols were found in the crude extract after phytochemical screening. Additionally an estimate of the total phenolic and flavonoid content was made.

Additionally, the crud extract was evaluated for antimairobial activity against two gram-positive strains of Staphylococcus aureus (ATCC 29213, ATCC 700699) at several concentration (10, 50, 100, 250, and 500 ug/ml) over a three-hour period. The ethanolic extract were found to be efficient in preventing the growth of the bacterial strain Staphylococcus aureus ATCC 29213 at concentrations between 50 to 100 ug/ml. Worked well for aqueous extracts, while 500 ug/ml worked well for petroleum ether extracts.

***Key Words**: Aegle marmelos, Medicinal plants, Phytochemical Screening, Antibacterial activity.*

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INTRODUCTION:

The use of herbs and medicinal plants as the first medicines is a universal phenomenon. Today, as much as 80% of the world's population depends on the traditional medicine as primary health care needs. Ancient literature such as Rigveda, Yajurveda, Atharvaveda, Charak Samhita and Sushrut Samhita have been extensively studied by advanced scientific techniques and are reported for various medicinal activity.

Aegle marmelos is a medicinal herb belonging to family Rutaceae. The different part of plants like leaves, fruits, bark and root shows antimicrobial activity and has the therapeautic significance in Ayurveda. Aegle marmelos commonly known as Bael Tree, is a tropical plant that has been traditionally used in various cultures for its medicinal properties. A marmelos is grown as a temple garden plant and the leaves are used to pray Lord Shiva. A marmelos is an important medicinal plant with several ethanomedicinal applications in traditional and folk medicinal system. A marmelos is used in the treatment of diarrhea and dysentry. Leaves of this plants are used to cause infertility/abortion in women.





Figure 1: Leaves of Bael Plant

Modern researches have successfully supported the pharmacological action of Bael by discovering the presence of valuable bioactive compounds. The antimicrobial activity of medicinal plants has gained significant attention in recent years due to the increasing resistance of pathogens to synthetic drugs. The leaves of Aegle marmelos are rich in bioactive compounds, including flavonoids, alkaloids, tannins and essential oils, which are believed to contribute to its antimicrobial effects.

Antioxident, antiulcer, antidiabetic, anticancer, antihyperlipidaemic, antiinflammatory and antispermatogeniceffects have also been reported on various animal model by the crude extract of this plant. A poultice made from bael leaves is used to treat ophthalmic conditions and is also applied to inflamed area, often in combination with black paper to reduce edema. The juice of Aegle marmelos leaves, when mixed with honey, is commonly used to treat fever and can also help in management of tuberculosis.

Beal (Aegle marmelos), commonly known as Beal, is a tropical fruit tree native to the Indian subcontinent. The leaves of the Beal tree have been used in traditional medicine for centuries, particularly in Ayurvedic practices, due to their numerous therapeutic properties.

The biological screening of the compounds present in these medicinal plants proved their activity in treating diseases like dysentery, diarrhoea, stomach pain, dyspepsia. In the past few years several plant species have been assessed and evaluated for their antimicrobial activity.

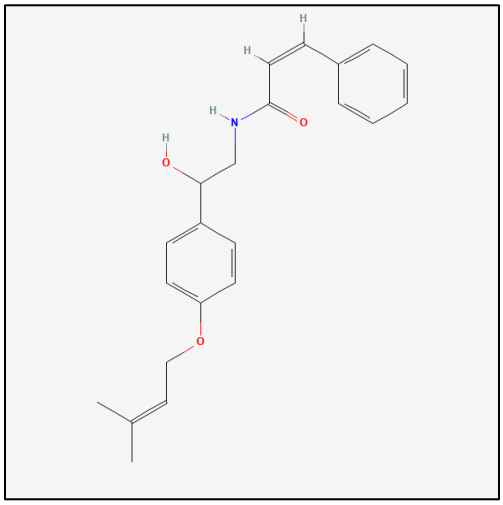


Figure 2: Chemical Formula - Marmeline (C22H25NO3)

Taxonomical classification of Beal leaves:

Kingdom	Plantae
Phylum	Angiosperm
Class	Eudicots
Order	Sapindales
Family	Rutaceae
Genus	Aegle
Species	Aegle marmelos
Common name	Bael patra

MATERIAL AND METHODS:

Solvent	B.P.	M.P.	SOLUBILITY	ODOUR	DENSITY
Ethanol	78.37º C	-114.14º C	Highly Soluble In Water	Distict Slightly Sweet Odour	0.819 Gm/Cm^3
Methanol	64.7º C	-97.6º C	Highly Soluble In Water	Alcoholic Odour	792 Kg/M^3
Chloroform	61.3º C	-63.5º C	Slightly Soluble In Water	Sweet Smelling	1.48 Gm/Cm^3
ACETONE	56.05º c	-94.8º c	Highly soluble in water	Distinctive slightly sweet and fruity odour	0.784 gm/cm^3
HEXANE	69º c	-95.3º c	Insoluble in water	Gasoline like odour	0.6606 gm/ml
DIMETHYL SULFOXIDE	189º c	19º c	Missible with water	Essentially odourless	1.10 gm/cm^3

Collection and Preparation of Beal leaves:
Fresh or dried Beal leaves are collected, thoroughly cleaned to remove any dirt or contaminants, and dried if necessary. Drying helps in preserving the leaves and ensures the extraction of active compounds.

Extraction Solvent:
The leaves of Aegle marmelos were collected. The collected leaves were washed with running tap water and shade dried. After they were powedered using a grinder. The powder was dissolved with acetone, ethanol, chloroform and hexane using soxhlet apparatus separately. The extracts were dried and dissolved in DMSO (Dimethyl sulfoxide) solution and screened for antimicrobial activity.

Method for antimicrobial activity:
Step 1 - The antimicrobial activities was done by using bacterial strain like frecidomonas aeruginosa Bacillus subtills, Staphylococcus aureus, Klesiella precumonia, Escherichia coli & fungal strain like Aspergillus niger, A. flavus & Fusarium

All the strains were collected
Step 2 - The antimicrobial activity. by disc diffusion method. was determined

Step 3 - Three different concentrations of 10 mg/ml, 5 mg/ml & 1mg/ml respectively were prepared.
Step 4 - Each sterile disc was loaded with 100 ul of text extract & placed on the agar plates inoculated with respective micro organisms,
Step 5 - The plates were kept for half an hour for preincubation diffusion.
Step 6 - Then the plates were kept for Incubation cat 3ic for 24 hrs for bacteria & 48 hrs for fungi.
Step 7 - At the end of incubation zones around the discs were measured.

The study was performed in triplicate
Preliminary Phytochemical Evaluation:
1)Test for Flavonoid:
2ml of plant extracts were taken in separate test tubes and diluted Sodium hydroxide was added followed by addition of diluted Hydrochloride. Yellow solutions were observed turning colorless which indicated the presence of flavonoids**.**
2)Test for Tannin:
To 2ml of each plant extract, a few drops of 10% lead acetate were added. The appearance of white precipitate indicated the presence of tannins in the sample.
3)Ferric Chloride Test:
Extracts were treated with 3-4 drops of ferric chloride solution. Formation of bluish black color indicates the presence of phenols.
4) Test for Alkaloid:
a) Mayer's Test: Filtrates were treated with Mayer's reagent (potassium Mercuric Iodide). Formation of a yellow colored precipitate indicates the presence of alkaloids
b) Wagner's Test: Filtrates were treated with Wagner's reagent (Iodine in Potassium Iodide). Formation of brown/reddish precipitate indicates the presence of alkaloids.
c) Dragendroff's Test: Filtrates were treated with Dragendroff's reagent (solution of Potassium Bismuth Iodide). Formation of red precipitate indicates the presence of alkaloids
d) Hager's Test: Filtrates were treated with Hager's reagent (saturated picric acid solution). Presence of alkaloids confirmed by the formation of yellow coloured precipitate.
5) Test For Saponin:
The 5 ml extract was mixed with 20 ml of distilled water then agitated in graduated cylinder for 15 min formation of foam indicates Saponin.

Pharmacological Activities: The plant also possess various pharmacological activities such as Antioxidant, Antibacterial, Antifungal, Antidiarrheal, Antidiabetic, Antiproliferative, Cytoprotective, Hepatoprotective, Antifertility, Analgesic, Antiarthritis, Contractile, Antihyperlipidemic, Cardio protective,

Preparation evolution of agar culture media:
The Agar medium is poured in a thin layer into a Petri dish, covered and allowed to harden overnight. A few grams of feces are placed into the center of the agar and incubated for 2–5 days at 28°C. Solution automatically siphons back into the flask, allowing for a fresh batch of solvent to extract more compounds.

Inoculation of microorganism in culture media:
The antibacterial activity was tested by What man filter paper disc method. Stock cultures were maintained at 4°C on slopes of nutrient agar. Active cultures for experiments were prepared by transferring loopful bacterial cells from the stock cultures to Erlenmeyer flask of nutrient broth that were incubated with agitation for 24 hrs at 37°.

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