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A study on antimicrobial activity of ethanolic extract from stem barks of *Aegle marmelos*

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Abstract
Now days some synthetic formulations developing a tolerance in children and adults and the causative organisms becomes more resistant to usage of synthetic formulations. We can overcome this resistance by use of medicinal plants. We taken extract of *Aegle marmelos* with 90% Ethanol, 72 hrs of cold extraction. It gives antimicrobial activity. We have tested this activity against *Escherichia coli, Aspergillus niger, Bacillus cereus, Klebsiella pneumoniae.* The Experiment was performed by two methods *viz.* Disc-diffusion method and Cup-plate method. The Antimicrobial activity *Aegle marmelos* may be due to presence of marmin and fagarine. This results gives assurance that bael bark has significant antimicrobial activity.

Keywords: Antimicrobial activity, ethanolic extract, *Aegle marmelos*

1. Introduction
Nature has provided source of medicinal compounds from ancient times. These plants are used in traditional Ayurveda, Siddha, Unani medicines. Ancient literature in Ayurveda such as Rigveda, Yajurveda, Atharvaveda, Charak Samhita and Sushruta Samhita also describes the use of plants for the treatment of various health problems. We are using numerous plants and plant derived products to diagnose, prevention and treatment of various physical and mental diseases.

A. marmelos is a native plant of India. *A. marmelos* belongs to Rutaceae family and commonly known as wood apple (Table 1). In India, *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 ethnomedicinal applications in traditional systems. Leaves of this plant used to cause infertility, antifungal activity, analgesic activity, anxiolytic, antidepressant activity, antiproliferative activity, Radioprotective activity, anti-oxidative activity. Fruit of bael shows immunomodulatory activity, Astringent activity, antiviral activity. Seeds are used in febrifuge. Flowers are used as expectorant and treatment of epilepsy. Bark and root are used as fish poison. Seed oil is used as laxative. And Bark is used as antimicrobial activity. Recently, the plant is screened for its medicinal properties by scientific techniques and reported for various medicinal properties.

Taxonomy of *Aegle marmelos*	
Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Sapindales
Family	Rutaceae
Genus	Aegle
Species	marmelos

Common Names of Bael are

Sr. No.	Name	Language
I.	*Aegle marmelos*	: Latin
II.	Wood/Stone apple, Bengal Quince, Indian Quince	: English
III.	Oranger du Malabar	: French
IV.	Shreephal, Bilva, Bilwa	: Sanskrit

2. Materials and Methods

2.1 Collection of plant materials

The stem bark of *Aegle marmelos* was collected from Osmanabad, Maharashtra.

2.2 Preparation of Extract

The Stem Bark of *Aegle marmelos* (L.) was collected and dried under sunlight for 5 days. These dried materials were mechanically powdered Stem bark [125gm]. These powdered materials are extracted with 90% ethanol [200ml, 72 hours, cold maceration using magnetic stirrer]. and filtered using suction pump. The extract is stored in refrigerator at 4° C. The extract has a light chocolate brown color and used for further Microbiological, Phytochemical analysis.

These crude extract is tested against *Escherichia coli, Aspergillus niger, Bacillus cereus,* Klebsiella pneumoniae. The antimicrobial activity was based on Cup Plate method.

Phytochemical tests ware carried out with the Ethanolic extract of bael bark using standard procedures to identify the constituents.

2.3 Phytochemical Test

Table 1: Phytochemical Evaluation of Ethanolic Extract of *Aegle marmelos*

Test		Observation	Inference
I.	Test for Alkaloids		
✓	Mayers Test	Cream colored ppt	Alkaloids Present
✓	Wagners Test	Reddish Brown ppt	Alkaloids Present
II.	Test for Carbohydrates		
✓	Molisch Reagent	Violet colored ring	Carbohydrates present
✓	Fillings Reagent	Brick Red ppt	Reducing Sugars Present
III.	Test For Tannins and phenols	White color	Tannins and phenols present
IV.	Test For Flavanoids	Yellow Color	Flavanoids Present
V.	Test for gums and mucilage	Red Color	Gums and Mucilage Present
VI.	Test For fixed oils and fats	Filter Paper gets permanently stained with oil	Fats and oils are present.
VII.	Test For Proteins		
✓	Biuret Test	Violet Color	Proteins Present
✓	Ninhydrin Test	Purple Color	Amino acid present
✓	Test For Cysteine	Black PPt of lead sulphate	Cysteine Present
VIII.	Test for Anthraquinone Glycoside		
✓	Borntragers Test	Ammonical layer turn Pink	Anthraquinone Glycoside Present.

3. Results and Discussion

3.1 Anti-Microbial Activity

Bark extract of *Aegle marmelos* plant studied for their antimicrobial activity. The crude plant extracts were used for study of antimicrobial activity as well as antifungal activity. Anti- microbial activity of Ethanolic extracts of stem bark of *Aegle marmelos* at concentration (100µg) against *Escherichia coli, Aspergillus niger, Bacillus cereus, Klebsiella pneumoniae*. were used as test organism. Each test organism responds in varied manner to ethanolic crude stem bark extract under study.

The response of each test organism was observed after proper incubation period. The response of each organism was different with ethanolic extract of pulp of *Aegle marmelos*.

E coli [cup plate method]

Bacillus cereus [cup plate method]

Aspergillus niger [cup plate method]

Klebsiella pneumoniae [cup-plate method]

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