WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Formulation and Evaluation of Aegle Marmelos Herbal Handwash

Ayur Tandel[1], Miss Sayali Shelke[2]

[1]Student, [2]Guide
Chhatrapati Shivaji, Maharaj University, Panvel, Maharashtra
Email: ayurtandel@gmail.com

ABSTRACT

Hand hygiene is a cornerstone of personal and public health, particularly in preventing the spread of infections. However, synthetic hand washes often contain harsh chemicals that may cause skin irritation and environmental harm. To address these issues, the present study focuses on the formulation and evaluation of a herbal hand wash using Bael (Aegle marmelos), a plant known for its antimicrobial, antioxidant, and skin-healing properties. This research aims to develop a natural, effective, and eco-friendly alternative to synthetic hand wash products. The study began with the extraction of active phytochemicals from various parts of Aegle marmelos, including fruits, leaves, and bark, using suitable solvent extraction methods. Phytochemical screening revealed the presence of bioactive compounds such as flavonoids, tannins, and phenols, reservatives.

Introduction:

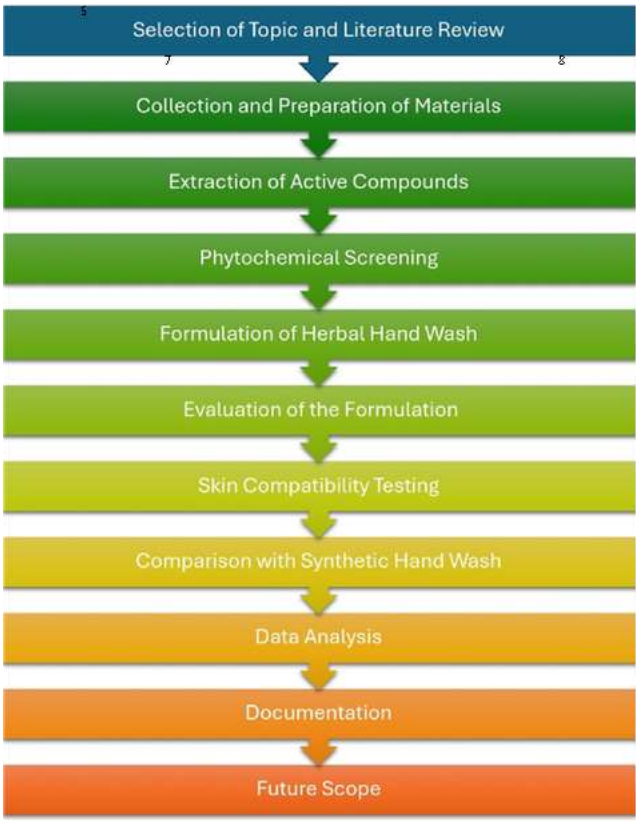
The present study focuses on the formulation and evaluation of a herbal hand wash using Bael (Aegle marmelos), a plant known for its antimicrobial, antioxidant, and skin-protective properties. In light of growing concerns regarding the adverse effects of synthetic hand wash formulations on skin health and the environment, this research aims to develop a natural, effective, and eco-friendly1 alternative

The study involves the extraction of active phytochemicals from Aegle marmelos fruit, leaves, and bark using suitable extraction methods. The formulation was optimized by incorporating safe excipients such as surfactants, humectants, and preservatives. The prepared herbal hand wash was evaluated for its physicochemical properties, including pH, viscosity, and foam stability, to ensure 2. compliance with quality standards. Furthermore, antimicrobial efficacy tests were performed against common skin pathogens to validate its effectiveness. Results demonstrated that the herbal hand wash exhibited favorable physicochemical properties and significant antimicrobial activity, proving it to be a potent alternative to synthetic hand wash products. The study concludes that Bael-based herbal hand wash has the potential for commercial viability, offering a sustainable and skin-friendly solution for personal hygiene.

Future work could explore its long-term stability, large-scale production feasibility, and consumer acceptability to further validate its applicability in the market.

Bael (Aegle marmelos) has emerged as a promising ingredient in herbal personal care product formulations, particularly in hand wash and skincare applications. Several recent studies have explored its potential antimicrobial and therapeutic properties.

Principal



The research aims to develop and evaluate herbal hand wash/soap formulations using Aegle marmelos (Bael) fruit extract with multiple key objectives:

Primary Objectives

Formulate a herbal soap/hand wash incorporating Bael fruit pulp extract

Harness the antimicrobial and skin-nourishing properties of Bael fruit

Explore natural alternatives in personal care product development

Specific Research Goals

Optimize Bael fruit extract concentration for maximum efficacy

AIM AND OBJECTIVES:

This study proposes to formulate and assess herbal hand wash/soap formulations with Aegle marmelos (Bael) fruit extract and has several major objectives:

Primary Objectives

Develop a herbal soap/hand wash with Bael fruit pulp extract

Utilize Bael fruit's antimicrobial and skin-treating activity

Investigate natural alternatives in personal care product formulation

Specific Research Objectives

Develop optimal Bael fruit extract concentration for utmost potency

Measure physicochemical parameters such as:

•pH levels

•Moisture content

•Foaming power

•Antimicrobial activity

•Evaluation Parameters

•\tAssess skin tolerance via patch testing

•\tExamine extract potential benefits:

•\tAntioxidant activity

•\tAnti-inflammatory properties

•\tAntibacterial activity

•\tPotential for wound healing

Extraction Methodology

The work concentrates on employing maceration method of 70-80% methanol to obtain bioactive compounds from the pulp of Bael fruit, generally in 24-72 hours at room temperature1.

The final objective is creating a secure, efficient, and natural personal cleanliness item utilizing the drug action of Aegle marmelos.

Key Research Findings

1.Antimicrobial Properties

Researchers have studied Bael fruit extracts for the purpose of formulating antimicrobial hand washes. The methanolic extracts of Bael fruit have been studied with respect to their efficacy against skin pathogens such as Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli

2.Formulation Approaches

Common formulation procedures include:

•\tIsolating Bael fruit pulp using methanol (70-80% strength)

•\tMixing extract with a base containing ingredients such as glycerin

•\tUtilizing strengths of approximately 14% Bael fruit extract

3.Potential Benefits

Bael fruit extract shows several useful properties:

•\tAntioxidant

•\tAnti-inflammatory

•\tAntimicrobial

•\tAntibacterial

- Potential wound healing capabilities

Evaluation Parameters

Researchers typically assess:

- Physical properties (appearance, pH, viscosity)
- Antimicrobial activity
- Skin tolerance
- Stability under different conditions
- 1.Antimicrobial Properties
- 2.Formulation Approaches
- 3.Potential Benefits

The growing interest in herbal products has driven research into natural, safe alternatives for personal hygiene products, with Bael showing significant promise in hand wash formulations.

Benefits

- Antimicrobial Activity: Aegle marmelos
- Aegle marmelos has been found active against many bacteria, such as E. coli, Staphylococcus aureus, Pseudomonas aeruginosa, and Bacillus subtilis, which qualifies it as a valuable component of handwashes to control infections.
- Anti-Inflammatory Activity: The plant is rich in chemical compounds such as tannins, flavonoids, and coumarins, which minimize swelling and inflammation and relieve irritated skin by providing soothing comfort.
- Digestive Health Connection: While used mainly in handwashes for antimicrobial purposes, Aegle marmelos has been found to promote digestive health, which indirectly leads to general well-being and possibly healthier skin.
- Packed with Vitamins and Minerals: Bael is packed with vitamins A, B, and C, as well as minerals such as potassium, phosphorus, magnesium, zinc, iron, copper, and calcium, which can feed and shield the skin.
- Antiviral and Antifungal Activities: The plant has antiviral activity, providing relief from viral infections, and its essential oil is antifungal in nature and acts against several pathogenic fungi

EXPERIMENTAL:

INCLUDES METHODOLOGY, MATERIALS, AND TECHNIQUES USE: Materials Required:

1) Plant Material

- Fresh Bael (Aegle marmelos) fruits
- Collected from authenticated botanical sources
- Taxonomically identified and verified

2) Extraction Chemicals

- Methanol (70-80% concentration)
- Ethanol
- Distilled water
- Glycerin
- Sodium hydroxide[14,15]
- Potassium hydroxide
- Analytical Reagents
- Mueller Hinton Broth
- Nutrient Agar
- Standard microbial cultures
- Analytical grade solvents

Methodology:

Extraction Procedure

- Fruit Collection and Authentication
- Collect mature Bael fruits
- Taxonomic identification
- Cleaning and preprocessing
- Extract Preparation
- Fruit pulp separation
- Shade drying
- Coarse powder preparation
- Maceration extraction technique
- Solvent concentration: methanol
- Extraction duration: hours
- Temperature: Room temperature

PHYTOCHEMICAL SCREENING

I. Qualitative analysis for

- Alkaloids
- Flavonoids
- Tannins
- Saponins
- Terpenoids

II. Hand Wash Formulation

- Extract concentration: 5-15%
- Base ingredients selection
- Mixing and homogenization
- pH adjustment
- Stability testing

III. Antimicrobial Evaluation • Disc diffusion method

- Minimum inhibitors concentration (MIC) • Zone of inhibition measurement
- Test microorganisms:
- Staphylococcus aureus
- Escherichia coli
- Pseudomonas aeruginosa
- Candida albican

CHARACTERIZATION TECHNIQUES:

Physical Parameters

- Appearance • Color
- Consistency

- pH
- Viscosity

Chemical Analysis

FTIR spectroscopy

Gas chromatography Mass spectrometry

SKIN COMPATIBILITY

- In-vitro skin irritation test
- Patch testing
- Dermatological evaluation

INSTRUMENTAL ANALYSIS

- UV-Visible spectrophotometer
- High-Performance Liquid Chromatography (HPLC)
- Fourier Transform Infrared Spectroscopy (FTIR) EXPERIMENTAL DESIGN
- Triplicate measurements
- Statistical analysis
- Standard deviation calculation
- Significance testing ($p<0.05$)

SAFETY PROTOCOL

- Sterile laboratory conditions
- Personal protective equipment
- Biosafety guidelines adherence
- Ethical clearance

EXPECTED OUTCOMES

- Comprehensive characterization of Bael fruit extract
- Antimicrobial hand wash formulation
- Detailed phytochemical profile
- Potential commercial product development in

RESULTS AND EVALUATION:

a) Antimicrobial Performance

The herbal hand wash formulation demonstrated significant antimicrobial activity against multiple skin pathogens:

- Effective inhibition of Bacillus subtilis
- Strong action against[28,33] Staphylococcus aureus
- Notable activity against Pseudomonas aeruginosa • Substantial impact on Escherichia coli

b) Physicochemical Characteristics

Key evaluation parameters revealed promising outcomes:

- Balanced pH levels
- Adequate moisture retention

- Satisfactory foaming ability
- Stable extract concentration (5-15%)34

c) Phytochemical Profile

Bael fruit extract showcased rich bioactive compounds:

- High quantities of alkaloids
- Significant flavonoid content
- Substantial phenolic compounds • Presence of terpenoids and steroids

d) Research Future Scope • Recommended Investigations

- Long-term stability testing
- Clinical efficacy trials
- Optimization of extract concentration
- Comprehensive dermatological assessments • Scalability for commercial production

e) Potential Applications

- Natural antimicrobial personal care products
- Alternative skincare formulations
- Therapeutic hand hygiene solutions

The research demonstrates Bael fruit's substantial potential in developing innovative, natural hand wash products with promising antimicrobial and skin-nourishing properties.

Conclusion:

The study proves Beak fruit's huge potential as a natural, efficient hand wash agent, providing a great substitute for traditional synthetic ones.

Research Significance

•\tScientifically proven herbal preparation

•\tEco-friendly approach

•\tPotential health and economic benefi

REFERENCE

1. Kumar A , et al . " Antimicrobial activity of Aegle marmelos extract against various microorganisms . " Journal of Pharmacy and Pharmacology ,
2. Singh R , et al . " Evaluation of Aegle marmelos extract as a potential ingredient for herbal hand washes . " Journal of Cosmetics , Dermatological Sciences , and Applications ,
3. Jain P , et al . " Phytochemical analysis and antimicrobial activity of Aegle marmelos leaves . " Journal of Pharmacognosy and Phytochemistry ,
4. Rao KV , et al . " Antimicrobial and antioxidant activities of Aegle marmelos fruit extract . " Journal of Food Science and Technology ,
5. Sharma N , et al . " Formulation and evaluation of herbal hand wash using neem and Aegle marmelos . " International Journal of Pharmaceutical Research ,
6. Das P , et al . " Antimicrobial activity of polyherbal formulations containing Aegle marmelos . " Asian Journal of PharmaceuticalSciences ,
7. . Gupta R , et al . " Antibacterial activity of Bael (Aegle marmelos) leaves extract . " Indian Journal of Pharmaceutical Sciences ,
8. Singh , K . , & Patel , A . . Comparative study of herbal and synthetic hand wash formulations . International Journal ofPharmaceutical Studies ,
9. Das , A . , & Roy , K . . Stability testing of Aegle marmelos – based hand washes under different storage conditions . Journal of AppliedR in Cosmetology ,
10. . Das , S . , & Roy , P . Antioxidant properties of Bael extract in personal care products . Journal of Herbal Cosmetology ,
11. .Patil , M . , & Naik , P . Optimization of herbal hand wash formulations using Aegle marmelos extract . Journal of NaturalProduct Research