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Research



Formulation and Antimicrobial Evaluation of Herbal Hand Sanitizer and Disinfectant Using Ethanolic Bark Extract of *Acacia nilotica* Linn

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	Abstract
Published on: 18 July 2025	<p>This study investigates the formulation and in-vitro antimicrobial evaluation of herbal hand sanitizer and disinfectant utilizing the ethanolic bark extract of <i>Acacia nilotica</i> Linn. The bark extract was subjected to phytochemical screening to confirm the presence of bioactive compounds. Two distinct formulations, a hand sanitizer and a disinfectant spray, were developed and evaluated for their antimicrobial efficacy against common pathogens including <i>Escherichia coli</i>, <i>Staphylococcus aureus</i>, <i>Bacillus subtilis</i>, <i>Bacillus cereus</i>, and <i>Pseudomonas aeruginosa</i>. The formulations underwent physicochemical analysis, stability testing under varied conditions, and skin compatibility assessment. Both formulations exhibited significant antibacterial activity, with zones of inhibition comparable to standard antibiotics, suggesting the potential of <i>A. nilotica</i> as an eco-friendly and effective antimicrobial agent for hygiene applications.</p>
Published by: Futuristic Publications	<p>Keywords: <i>Acacia nilotica</i> , Herbal hand sanitizer , Natural Disinfectant potential , Ethanolic extract, Antimicrobial activity, skin compatible formulation, antibacterial effectiveness, promoting natural hygiene.</p>
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INTRODUCTION

The global escalation in antimicrobial resistance and rising consumer awareness regarding the harmful effects of synthetic chemicals have created a demand for safer, plant-based alternatives in healthcare and hygiene. Herbal sanitizers are emerging as viable options due to their broadspectrum antimicrobial properties and favorable safety profiles.

Acacia nilotica Linn, commonly known as Indian gum arabic tree or Babul, is a member of the Leguminosae family. The bark of *A. nilotica* is rich in polyphenols, flavonoids, tannins, and other phytochemicals known for antimicrobial, antioxidant, and wound-healing properties.

Traditionally, it has been used in Ayurveda and Unani systems to treat infections, inflammation, and skin disorders. This study aimed to harness these bioactivities to formulate a herbal hand sanitizer and surface disinfectant, providing a natural alternative to alcohol-based and synthetic products.

MATERIALS AND METHODS

Collection and Authentication of Plant Material: The bark of *Acacia nilotica* was collected from the Krishnagiri region in Tamil Nadu and authenticated by a taxonomist at the Department of Pharmacognosy, RKP College of Pharmacy.

Extraction Procedure: 100 g of powdered bark was macerated with 70% ethanol for 72 hours and concentrated.

Phytochemical Screening: Standard phytochemical tests were performed.

Phytochemical Screening Results

Phytochemical	Presence
Alkaloids	+
Flavonoids	+
Tannins	+
Saponins	+
Phenols	+
Glycosides	+

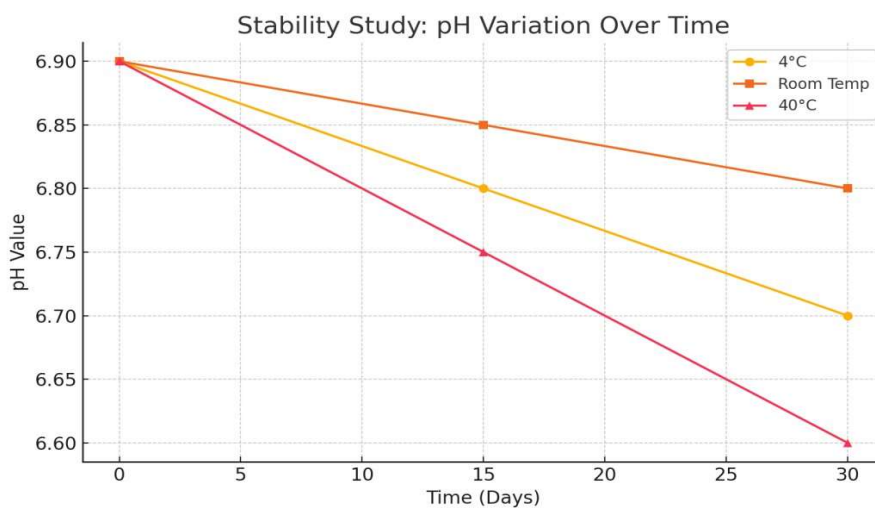
Formulation of Herbal Products

Details of ingredients and process are described.

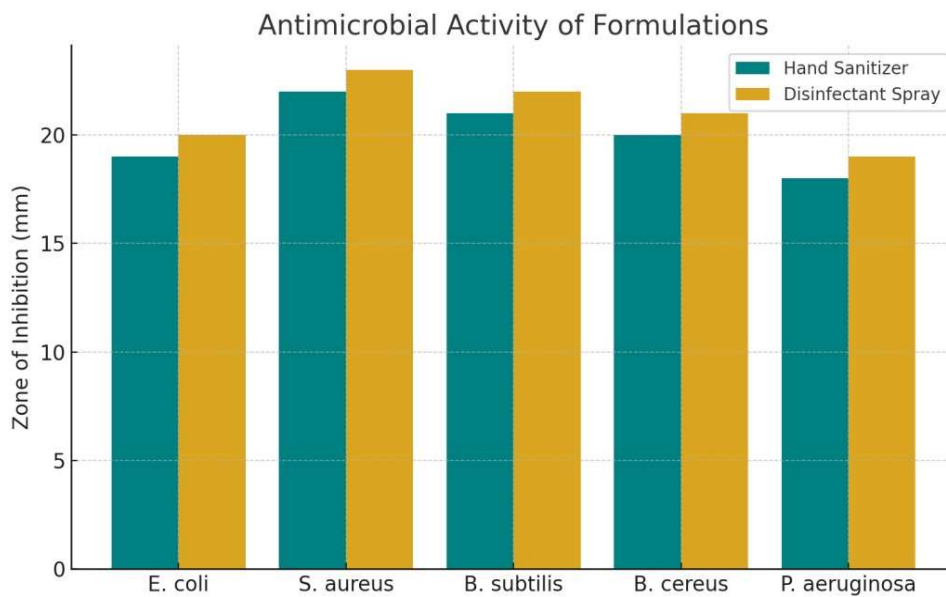
Physicochemical Evaluation

Parameter	Hand Sanitizer	Disinfectant Spray
pH	6.9 ± 0.1	6.7 ± 0.2
Appearance	Clear brown gel	Pale yellow transparent
Viscosity (cP)	4200 ± 50	—
Spreadability	Good	Excellent
Foam Test	—	Moderate

Stability Study



Antimicrobial Evaluation



Zones of Inhibition (in mm)

Microorganism	Hand Sanitizer	Disinfectant Spray
E. coli	19 ± 1.2	20 ± 1.5
S. aureus	22 ± 1.4	23 ± 1.2
B. subtilis	21 ± 1.3	22 ± 1.1
B. cereus	20 ± 1.0	21 ± 1.3
P. aeruginosa	18 ± 0.9	19 ± 1.0



Herbal hand sanitizer and disinfectant formulation from ethanolic bark extract of acacia nilotica



Phytochemical screening on ethanolic bark extract of acacia nilotica



Microscopic evaluation on ethanolic bark extract of acacia nilotica

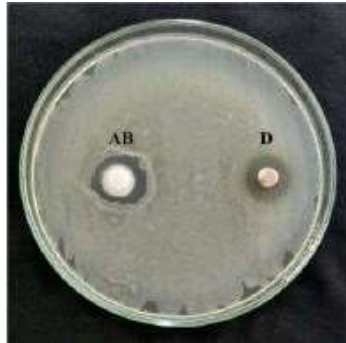
Antibacterial activity assay by disc diffusion method (Kirby&Bauer, 1966)

RESULTS

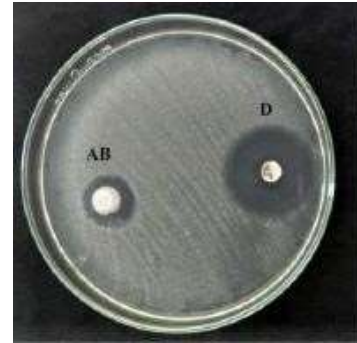
Disinfectant



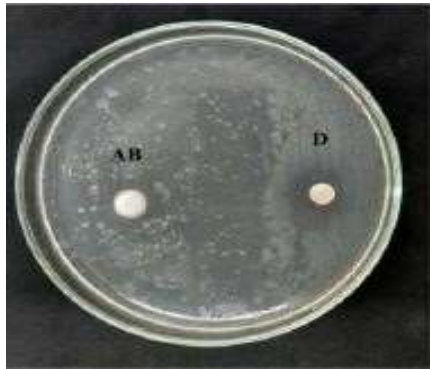
Bacteria: E.coli



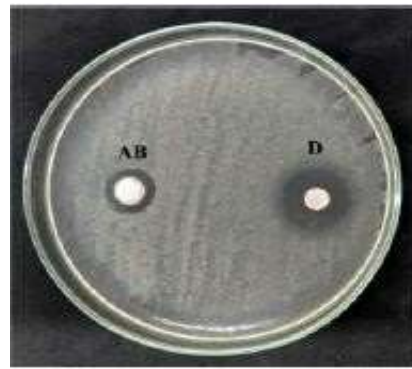
Bacteria: Staphylococcus aureus



Bacteria: Bacillus subtilis



Bacteria: Bacillus cereus

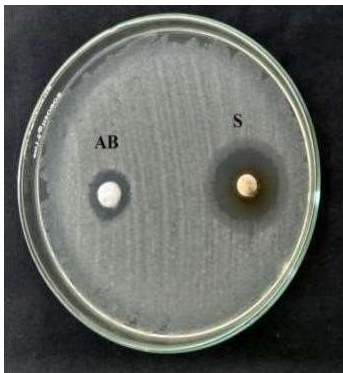


Bacteria: Pseudomonas aeruginosa

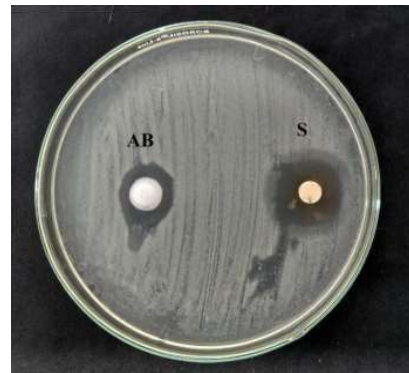
Sanitizer



Bacteria: E.coli



Bacteria: Staphylococcus aureus



Bacteria: Bacillus subtilis



Bacteria: Bacillus cereus

Bacteria: Pseudomonas aeruginosa

CONCLUSION

The formulated herbal hand sanitizer and disinfectant using *Acacia nilotica* showed excellent antimicrobial activity and acceptable stability, indicating potential for use as eco-friendly hygiene products.

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