



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Research Paper

Development Of Herbal Hand Sanitizer Gel Using Ocimum Sanctum and Neem Extract

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ARTICLE INFO

Published: 17 July 2026

Keywords:

Polyherbal Hand
Sanitizer, Herbal
Formulation, Hand
hygiene, Antimicrobial
activity Neem, Tulsi

DOI:

10.5281/zenodo.21412605

ABSTRACT

Hand hygiene is essential for preventing the spread of infectious diseases. The present study focuses on the formulation and evaluation of a polyherbal hand sanitizer prepared using natural ingredients such as neem, tulsi, aloe vera, turmeric, and essential oil. The formulation was evaluated for its physicochemical properties and antimicrobial potential. The developed herbal hand sanitizer showed promising antimicrobial activity, good stability, and skin-friendly characteristics, suggesting its potential as a safe and effective alternative to conventional hand sanitizers.

INTRODUCTION

1.1 Herbal

Plants have been used for medicinal purposes for centuries, and many modern drugs have been derived from plants. In addition to antibiotics, plants also contain compounds that have antiviral, anti-fungal, and anti-inflammatory properties^{1,2}. For example, tea tree oil is a natural antiseptic that has been used to treat wounds and skin infections. Aloe vera has anti-inflammatory properties that make it effective in treating burns and other skin conditions. Some other plants that have been

studied for their antibacterial properties include garlic, turmeric, and honey^{3,4}. However, it is important to note that not all plant-based treatments are safe or effective, therefore it is always best to consult a healthcare professional before using any herbal remedies.¹

1.2 Hand Sanitizer

Hand hygiene plays a critical role in preventing the Spread of infections, especially in light of the COVID-19 pandemic. Traditional alcohol-based Sanitizers, although effective, often lead to

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



Dryness, irritation, and allergic reactions upon Frequent use. This has led to increased interest in Developing natural, plant-based sanitizers with Anti-microbial properties and minimal side effects.²

The most important aspect of the infection control activity is the hand hygiene. There is an ongoing problem of healthcare associated infections which also includes multi-drug resistant infections. Hand hygiene can significantly reduce the risk of cross contamination. Skin is the most exposed part of the body so it can be contagious. The main aim is to prepare and evaluate polyhedral sanitizer from commonly available plants.³

There are different types of hand sanitizer available commercially, liquid, gel or foam form, whereas they differ based on the compositions, alcohol based (contain combination of isopropyl alcohol, ethanol (ethyl alcohol) or n propanolol, with versions containing 60% to 95% alcohol) or herb based. The sanitizer may be less effective due to incorrectly wiping out hands before sanitizer dries or if concentrations of alcohol too low in sanitizer. The correct way of using of hand sanitizer is first by applying on palm of the hand and then rub the product over the surfaces of hands and fingers until hands are dry. Compounds such as glycerol may be added to prevent drying of the skin . In some sanitizers fragrances are added, but

it is discouraged due to the risk of allergic reactions.⁴

Neem and Tulsi have been traditionally recognized for their antibacterial, antiviral, and antifungal Activities. Aloe vera provides moisturizing and Healing benefits, while Turmeric offers Antimicrobial and anti-inflammatory properties. Orange essential oil not only enhances the Fragrance but also adds antimicrobial strength. Incorporating these herbal extracts in a hand Sanitizer formulation could yield a safer, eco-friendly, and effective personal hygiene product.⁵

1.3 Benefits of Herbal Hands Sanitizer:

1. It is a safe and eco-friendly.
2. It is a moisturizing product.
3. Dryness of the skin is less.
4. Herbal product provides an extra beneficial effect.
5. Less side effect compared to synthetic hand sanitizer.
6. Made from plant that are easily available.
7. Herbal hand sanitizer can decrease about 96% of bacteria.⁶

1.4 Types of Hand Sanitizer

- Hand Sanitizers Can Usually Be Divided into Two Types:
 - A) Alcohol-Free Hand Sanitizer
 - B) Alcohol-Based Hand Sanitizer⁷

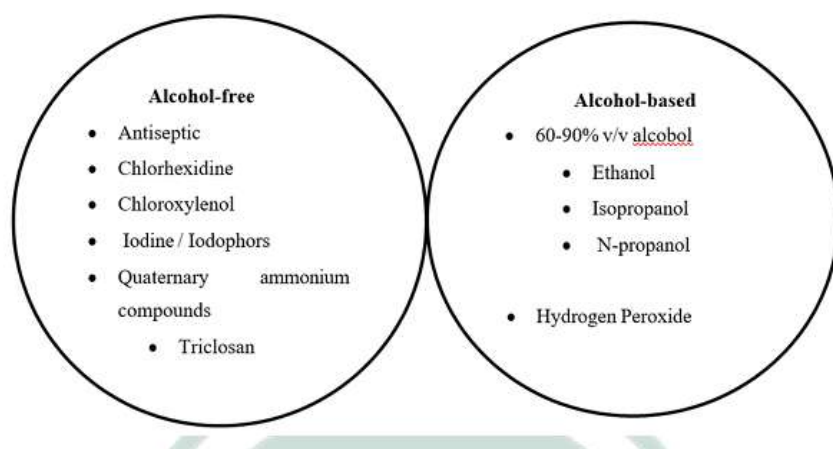


FIG NO. 1.1 Type of Hand Sanitizer

1.5 MECHANISM OF ACTION

The compound, n-propanol, is the most commonly used alcohol compound in biocides. It is not known with much confidence the exact mechanism of alcohol's antimicrobial activity; however, it may be related membrane damage, and inhibition or uncoupling of mRNA and protein synthesis through effects on ribosomes and RNA polymerase or associated with protein

denaturation. For activity against bacteria, its optimal bactericidal efficacy is achieved at concentrations between 60% and 90%¹². In fact, absolute alcohol, or alcohol that is no more than 1% water, is less bactericidal than alcohol. Water is thus critical in the protein denaturation process, if not multiple, are affected by alcohol, essential metabolic pathways, membrane damage and loss of cellular integrity ultimately occur.⁸

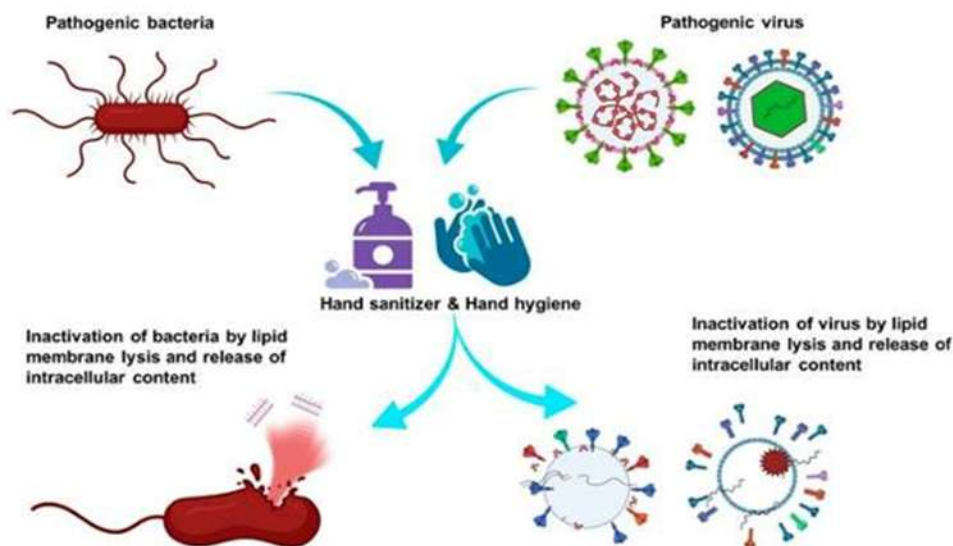


Fig No. 1.2 Mechanism of Action

1.6 Advantage of herbal hand sanitizers:

- These are antiseptic products used to avoid the transmission of skin infections/pathogens.
- Drying of the skin is less and leaves more moisture.
- Herbal ingredients provides extra beneficial effects as well.
- Herbal handwashing can reduce the number of young children who get sick and help prevent school absenteeism.⁹

1.7 DISADVANTAGES

- Short shelf life
- Less effective against some germs
- May cause allergy and irritation
- Higher preparation cost
- Limited scientific proof
- Can get contaminated easily

2 DRUG AND EXCIPIENT PROFILE



Fig No :2. 1 Neem (Azaardirchata Indica)

1. **Common Name-** Nimba, Margosa Tree, Indian Lilac.

2. **Scientific Name** -Azardica Indica

3.**Family**-Meliaceae

4. **Biological source** -It consists of the fresh and dried leaves, bark, seeds, and oil of Azadirachta indica.

5. **Geographical Source**-Widely found in India, Pakistan, Bangladesh, and tropical regions Common in rural and urban areas of India

6. **Uses**

Antibacterial – used in skin infections, acne

Antifungal – treats dandruff and fungal infections

It consists of the fresh and dried leaves and flowering tops of Ocimum sanctum.

5. **Geographical Source:**

Widely distributed in India and tropical regions of Asia

Commonly grown in houses and gardens in India

6.**Uses**

Used in herbal sanitizer, medicines, teas, and cosmetics



Fig No : 2.2 Tulsi (Ocimum Sanctum)

1. **Common Name:** Tulsi, Holy Basil, Sacred Basil

2. **Scientific Name:** Ocimum sanctum (also called Ocimum tenuiflorum)

3. **Family:** Lamiaceae

4. **Biological Source:**



Fig No : 2. 3 Carbapol 940

1. **Common Name:** Carbopol 940, Carbomer, Polyacrylic acid polymer

2. **Chemical Name:** Carbomer 940 (Cross-linked polyacrylic acid)

3.**Category:** Synthetic polymer (gelling agent)

4. **Source:** Synthetic origin (prepared by chemical polymerisation of acrylic acid)

5. **Uses:**

- Used as a gelling agent

- Provides thickness and viscosity



Fig No:2.4 Triethalamine

- Common Name:** Triethylamine (TEA)
- Chemical Name:** Triethylamine
- Chemical Formula:** $C_6H_{15}N$
- Category:** Organic base (alkaline compound)
Neutralizing agent
- Source:** Synthetic (prepared chemically in industry)
- Uses:**
 - Acts as a neutralizer

3.METHODOLOGY

INGREDIENT USE IN HERBAL HAND SANITIZER

SR NO	List of drug	Uses	Collection from
1	Tulsi	- Natural antiseptic and antimicrobial - Provide cooling and soothing effect - Enhance immunity-related protection	Tulsi leaves
2	Neem	- Strong antibacterial, antifungal, antiviral - Help kill germs and prevent infections - Gives herbal therapeutic value	Fresh neem leaves
3	Carbopol	- Provides thickness and consistency - Stabilizes formulation - Gelling agent – forms gel base	Collected from lab
4	Triethylamine	- Neutralising agent - Adjusts PH - Converts Carbopol into gel from	Collected from the lab
5	Glycerin	- Humectant - Prevents skin dryness - Make gel smooth	Collected from the lab
6	Distilled Water	- Solvent/base - Dissolves all ingredients	Collected from the lab
7	Methyl paraben	- Preservative - prevent microbial growth and increase shelf life	Collected from lab
8	Rose oil	- Fragrance - provide soothing and refreshing effect - Mild antibacterial property	Collected from lab

4 Formulation of herbal hand sanitizer gel

INGREDIENT	ROLE	F1	F2	F3	F4	F5
Neem extract	Antimicrobial	2ml	2.5ml	3ml	3.5ml	4ml
Tulsi extract	Antiseptic	2ml	2.5ml	3ml	3.5ml	4ml
Carbopol 940	Gelling agent	0.5ml	0.5ml	0.5ml	0.5ml	0.5ml
Triethanolamine	Neutralizer	q.s	q.s	q.s	q.s	q.s



Glycerine	Humectant	3ml	3ml	3ml	3ml	3ml
Methyl paraben	Preservative	0.1ml	0.1ml	0.1ml	0.1ml	0.1ml
Rose oil	Fragrance	0.2ml	0.2ml	0.2ml	0.2ml	0.2ml
Distilled water Vehicle	Vehicle	q.s to 100 ml	q.s to 100 ml	q.s to 100 ml	q.s to 100 ml	q.s to 100 ml

5. PROCEDURE

Step 1: Extraction of NEEM (Azardichata Indica)

1. Leaves of Azadirachta indica are collected and washed
2. Dried in shade and powdered
3. Powder is soaked in distilled water (24 hours)
4. Mixture is filtered
5. Filtrate obtained is neem extract
6. Stored in airtight container

Step 2 : Extraction of OCIMUM SANCTUM (tulsi)

1. Leaves of Ocimum sanctum are collected and washed
2. Dried in shade and powdered
3. Powder is soaked in distilled water (24 hours)
4. Mixture is filtered using muslin cloth/filter paper

5. Filtrate obtained is Tulsi extract

6. Stored in airtight container

Step 3 : Preparation of herbl hand sanitizer gel

1. Carbopol 940 is dispersed in distilled water with continuous stirring and allowed to swell.
2. Glycerine is added to keep the skin moisturized.
3. Extracts of Azadirachta indica and Ocimum sanctum are mixed into the gel base.
4. Triethanolamine is added dropwise to adjust pH and form gel.
5. Methyl paraben (preservative) and rose oil/essential oil (fragrance) are added.
6. Mix properly to get a uniform, smooth gel.

Fill in clean containers and store in a cool, dry place.



EXTRACTION OF NEEM AND TULSI

6.EVALUATION TEST

1. Organoleptic properties

characteristics of a formulation that can be evaluated by human senses such as sight, smell, and touch.

Parameters:



► Color

Herbal gels (Neem, Tulsi) may appear light green or pale green.

► Odor

The formulation should have a pleasant and mild fragrance.

► Appearance

The gel should be clear or slightly translucent. Should have a smooth and elegant look.

► Texture / Consistency

The gel should be smooth and homogeneous.

2. PH

pH is a measure of the acidity or alkalinity of a formulation. It indicates the concentration of hydrogen ions present in the solution.

Ideal pH Range

The ideal pH for herbal hand sanitizer gel is 5.5 to 7.

This range is compatible with human skin.

Helps maintain the natural skin barrier.

3. Spreadability

Spreadability depends on the viscosity and consistency of the gel.

Lower resistance → better spreadability

Proper balance is required for effective application

● Method of determination

- i. Place gel between two glass slides
- ii. Apply weight
- iii. Measure time for slides to separate

4. Antimicrobial activity

Antimicrobial activity is the ability of the gel to inhibit or kill microorganisms such as bacteria and fungi.

RESULT

The herbal hand sanitizer gel containing Ocimum sanctum (Tulsi) and Neem extract was successfully prepared and evaluated. The formulation showed good appearance, smooth

texture, pleasant odor, and suitable pH for skin application. The sanitizer spread easily on the skin and dried quickly without causing irritation.

The antimicrobial activity study indicated that the formulation was effective against common microorganisms due to the antibacterial properties of Tulsi and Neem extracts. The prepared herbal sanitizer also showed good stability during storage and was safe for regular use.

Evaluation test

1) Organoleptic property

1) Color : Light green

2) Odor : Pleasant

3) Texture : Smooth

2) PH test : 6.5

3) Spreadability test : The sanitizer spread easily and uniformly on the skin

CONCLUSION

The present study concluded that the herbal hand sanitizer gel containing Neem and Ocimum sanctum (Tulsi) extracts was successfully formulated and evaluated. The prepared formulations showed good appearance, smooth consistency, pleasant odor, suitable pH, good spreadability, and easy washability.

Among all formulations, F5 showed the best antimicrobial activity due to the higher concentration of herbal extracts. The formulation was also found to be stable and safe for skin application without causing irritation or dryness.

REFERENCES

1. Vishal Verma, Deepak Choudhary, Ashima Chandel, Sujata Thakur, Dr. Rajesh Gupta “ FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER” Volume 8, Issue 4 April 2023 Page No 25.
2. Bhoomi Sandeep Gupta, Anwesha Garnaik, Gita Mohire “ FORMULATION AND EVALUATION OF HERBAL HAND



SANITIZER CONTAINING GILOY
(TINOSPORA CORDIFOLIA)” 2025 JETIR
October, Volume 12

3. Dingar Amrut, Deshmukh Swamini, Fulpagare Nishant, Namita Jadhav, Jitendra More, Atish Salunkhe “ Formulation and Evaluation of Herbal Hand Sanitizer” 2025, Vol 3, Page no 545.
4. Jyotsana Singh Chandravanshi^{1,2}, Shazia Mansoor¹, Asha Agarwal², Rupa Guha Nandi² and N. Ganesh¹ “ Formulation of herbal hand sanitizer from Indian herbs”
5. Dingar Amrut, Deshmukh Swamini, Fulpagare Nishant, Namita Jadhav, Jitendra More, Atish Salunkhe “ Formulation and Evaluation of Herbal Hand Sanitizer” 2025, Vol 3, Page no 545.
6. Bhoomi Sandeep Gupta, Anwesha Garnaik, Gita Mohire “ FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER CONTAINING GILOY” (TINOSPORA CORDIFOLIA)” 2025 JETIR October, Volume 12.
7. Abhishekh S. Godage, Prashant S. Misal, Rupali R. Bendgude. “REVIEW ON FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER” Volume 2, Issue 2 February 2024 Page no237.
8. Tejasvee R.Shinde, Guided By Mr. Dattaprasad N. Vikhe “ Herbal hand sanitizer: A review” Volume 7, Issue 2 Mar-Apr 2022 page no 493

HOW TO CITE: Krutika Deshmukh, Irshad Ahmad, Aishwarya Shrirao, Harshali Shelaki, Shruti Shrirao, Development Of Herbal Hand Sanitizer Gel Using Ocimum Sanctum and Neem Extract, *Int. J. of Pharm. Sci.*, 2026, Vol 4, Issue 7, 3493-3500, <https://doi.org/10.5281/zenodo.21412605>

