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Research Paper

Formulation and Evaluation of Herbal Hand Sanitizer

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ABSTRACT

The rising concerns regarding infectious diseases have increased the demand for hand sanitizers. However, the frequent use of alcohol-based sanitizers often results in skin dryness and irritation. This study aims to develop and evaluate a herbal hand sanitizer using natural ingredients such as Neem (Azadirachta indica), Tulsi (Ocimum sanctum), Aloe vera (Aloe barbadensis), Turmeric (Curcuma longa), and Orange essential oil to provide effective antimicrobial action while maintaining skin health. The prepared formulation was assessed for physicochemical properties, spreadability, viscosity, pH, ethanol content, skin sensitivity, and antimicrobial efficiency. The results demonstrated that the herbal hand sanitizer was stable, effective, skin-friendly, eco-friendly, and a promising alternative to conventional chemical-based products.

INTRODUCTION

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 dryness, irritation, and allergic reactions upon frequent use. This has led to increased interest in developing natural, plant-based sanitizers with antimicrobial properties and minimal side effects.

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.

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Figure no. 01: Image of Aloe Vera, Neem, Tulsi, Turmeric and Orange essential Oil.

Objectives:

1. To formulate a hand sanitizer using natural herbal ingredients.
2. To evaluate physicochemical properties like pH, viscosity, spreadability, and stability.
3. To assess antimicrobial effectiveness compared to standard sanitizers.
4. To ensure skin compatibility through irritation studies.
5. To promote sustainable, biodegradable alternatives for hygiene products.

MATERIALS AND METHODS:

Materials:

1. Neem leaves (Azadirachta indica)
2. Tulsi leaves (Ocimum sanctum)
3. Aloe vera gel (Aloe barbadensis)
4. Turmeric extracts (Curcuma longa)
5. Orange essential oil
6. Ethanol (70%)
7. Glycerine
8. Distilled water

Extraction of Herbal Ingredient: Neem Extract: 5g Neem powder was macerated with 20 mL ethanol at 100°C for 5–10 minutes, filtered. Tulsi Extract: 1g Tulsi powder extracted with 10 mL ethanol at 80–100°C for 5–10 minutes, filtered.

Figure no. 02: Image of Neem and Tulsi extract.

Formulation Composition:

Table no. 01: Formulation composition for Herbal Hand Sanitizer:

Sr. no.	Ingredient	Quantity (per 100 mL)	Function
1.	Neem Extract	5 mL	Antibacterial, Antifungal
2.	Tulsi Extract	5 mL	Antiviral
3.	Aloe Vera	10 mL	Moisturizer, Soothing agent
4.	Turmeric Extracts	2 mL	Antimicrobial
5.	Orange Essential Oil	2 mL	Antiseptic, Fragrance
6.	Ethanol (70%)	70 mL	Antimicrobial Agent
7.	Glycerine	5 mL	Moisturizer, Skin Protector
8.	Distilled Water	q.s. to 100 mL	Vehicle

Preparation Method:

1. Herbal extracts were prepared separately.
2. Ethanol and herbal extracts were mixed gradually.
3. Aloe vera gel and glycerine were added.
4. Orange essential oil was incorporated.
5. The final volume was adjusted with distilled water.
6. The mixture was homogenized, and pH was adjusted between 5.5–7.
7. The formulation was packed in sterile containers.

Evaluation:

Physicochemical Properties:

1. Appearance: Yellowish-white, clear gel.
2. Odor: Aromatic and characteristic.
3. Feel: Smooth and non-sticky.

pH Measurement: pH ranged between 5.5 to 7, ensuring skin compatibility.

Viscosity Test: Suitable viscosity was achieved ensuring ease of application and non-dripping consistency.

Spreadability Test: High spreadability confirmed easy and even application.

Ethanol Content: Ethanol concentration was found to be between 40–50%, slightly lower than desired standards (>60%).

Skin Sensitivity Test: Patch tests confirmed no skin irritation or allergies.

Results and Discussion: The herbal hand sanitizer exhibited good physical stability without phase separation or precipitation. The yellowish-white color, pleasant aroma, and non-sticky consistency make it user-friendly. The presence of herbal components like Neem, Tulsi, Aloe Vera, Turmeric, and Orange Oil provided antibacterial, antiviral, antifungal, moisturizing, and antioxidant effects. The slightly lower ethanol content (40–50%) suggested that while antimicrobial action is still present, optimizing ethanol concentration would further enhance efficacy against a broader spectrum of pathogens. Skin sensitivity studies confirmed the formulation to be mild and non-irritating, even upon frequent application, emphasizing its suitability for daily use.

Physicochemical Properties	
Appearance	Yellowish-white, clear gel
Odor	Aromatic and characteristic
Feel	Smooth and non-sticky
pH Measurement	pH ranged between 5.5 to 7, ensuring skin compatibility
Viscosity Test	Suitable viscosity was achieved ensuring ease of application and non-dripping consistency
Spreadability Test	High spreadability confirmed easy and even application
Ethanol Content	Ethanol concentration was found to be between 40–50%, slightly lower than desired standards (>60%)

Figure no. 03: Result of Herbal Hand Sanitizer.

CONCLUSION

The formulated herbal hand sanitizer provides an effective blend of antimicrobial activity, skin moisturizing, and soothing benefits. The use of natural ingredients ensures eco-friendliness and user safety. Though the ethanol content was slightly below standard recommendations, the herbal extracts significantly contributed to the overall antimicrobial potential. This study encourages further research and optimization for large-scale production of herbal sanitizers as viable commercial products.

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Ethical Approval:

This review article does not content of any use of animal model.

Conflict of Interest:

Authors declared that no conflict of interest for review of article.

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