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Formulation And Evaluation Of Herbal Hand Sanitizer

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Abstract :

Formulations that not only clean hands but also utilize the inherent antibacterial qualities of botanical extracts are of interest due to the growing demand for efficient hand sanitizers among consumers worldwide. Tulsi (Ocimum tenuiflorum) and neem (Azadirachta indica), which are highly valued in traditional medicine for their extensive antibacterial properties, make excellent additions to these mixtures. The goal of this introduction is to develop a herbal hand sanitizer that combines natural efficacy with the formulation advantages of Carbopol by integrating extracts from tulsi and neem into a gel based on Carbopol.This project aims to formulate an herbal hand sanitizer incorporating neem and tulsi extracts with Carbopol as a gelling agent. The goal is to develop a natural and effective sanitizer with antimicrobial properties and a user-friendly gel consistency

Keywords: Hand sanitizer, Antibacterial, Carbapol, Herbal**.**

Introduction:

The global demand for effective hand sanitizers has spurred interest in formulations that not only sanitize but also harness the natural antimicrobial properties of botanical extracts. Neem (Azadirachta indica) and Tulsi (Ocimum tenuiflorum), revered in traditional medicine for their broad-spectrum antimicrobial activity, offer compelling ingredients for such formulations. This introduction explores the integration of Neem and Tulsi extracts into a Carbopol-based gel, aiming to create a herbal hand sanitizer that combines natural effectiveness with the formulation benefits of Carbopol.Carbopol, a versatile polymer known for its ability to thicken and gel aqueous solutions, provides a stable base for incorporating these botanical extracts. The inclusion of Neem and Tulsi not only enhances the sanitizer's antimicrobial efficacy against bacteria and viruses but also aligns with consumer preferences for natural and sustainable products. This formulation seeks to deliver a product that not only sanitizes hands effectively with isopropyl alcohol but also nourishes and protects the skin with moisturizing agents like glycerin.By exploring this formulation, we aim to understand how the synergy

between Carbopol and botanical extracts can yield a herbal hand sanitizer that meets both regulatory standards and consumer expectations for efficacy, safety, and natural ingredients.

Advantages of Hand Sanitizer:

1.Convenience: Simple to use without water while on the go.
2. Effectiveness: Hands become less contaminated with bacteria quickly.
3. Portability: Small and lightweight.
4. Moisturizing: To avoid dryness, moisturizers are a common ingredient in formulations.
5. Versatility: Beneficial in a range of contexts, including private and public spaces.:
6. Quick Drying: dries completely without leaving any trace.
7. Prevents Spread of Infections: Assists in lessening the spread of germs in crowded or open areas.
8. Accessibility: It is simple to locate and utilize because it comes in a variety of shapes and sizes.
9. Support for Hand Hygiene: Promotes frequent hand washing in situations without access to soap and wate r.

Methods and Materials:

Maerials :

1.NEEM

Neem (Azadirachta indica) is a tree native to India and the Indian subcontinent. It is known for its medicinal properties and is widely used in traditional Ayurvedic medicine. Neem has potent antibacterial, antifungal, and anti-inflammatory properties, making it effective for skin care, wound healing, and treating infections. The active compounds in neem, such as azadirachtin, contribute to its wide range of therapeutic uses. It is also used in agriculture as a natural pesticide**.**

USES:

1. Antibacterial
2. Antifungal
3. Anti-inflammatory
4. Used in soaps, shampoos, and creams for its skin-healing properties

2. TULSI

Tulsi (Holy Basil) is used for its antimicrobial, antiviral, and anti-inflammatory properties. It helps boost immunity, relieve stress, and promote respiratory health. In skincare, tulsi is used for its antioxidant benefits and ability to soothe and protect the skin. It is also commonly found in herbal teas and supplements.

USES:

1. Antimicrobial Properties.
2. Respiratory Health
3. Stress Relief
4. Antioxidant Benefits
5. Skin Care

3. CARBAPOL

Carbopol is a synthetic polymer used as a thickening, gelling, and stabilizing agent in various personal care products, including gels, creams, and lotions. It provides a smooth texture and helps maintain the consistency of formulations. In hand sanitizers, Carbopol creates a gel-like consistency that is easy to apply and spread.

4.TRIEHANOLAMINE

Triethanolamine (TEA) is a chemical used to adjust pH and help mix ingredients in products like lotions, creams, and shampoos. It's also found in cleaning products and industrial applications. Generally safe in small amounts, but it can cause irritation if overused.

5.GLYCERIN

Glycerin in hand sanitizer serves as a humectant, helping to retain moisture and prevent the skin from drying out due to the alcohol content. It enhances the skin's hydration and improves the overall feel of the sanitizer, making it more comfortable to use.

METHODOLOGY

1.Hand Sanitizer Extract Preparation:

Extracting the active ingredients from dried neem and tulsi leaves involves mechanically powdering them and immersing them in ethanol for a whole night. After the extraction process is finished, the mixture is usually filtered to eliminate any solid particles or contaminants, leaving behind a clean liquid extract, using a funnel and filter paper. Then, this extract can be added to hand sanitizer recipes to provide the product inherent antiviral and antibacterial qualities.

2. Carbopol Gel Preparation:

- Disperse 5-10 g of Carbopol in 100-200 ml of distilled water.
- Allow it to hydrate completely.

3. Neutralization:

- Gradually add 0.5-1 ml of TEA to the hydrated Carbopol while stirring to form a clear gel.

4. Blending:

- In a separate container, mix 600-700 ml of ethanol or isopropyl alcohol with 100 ml of aloe vera gel and 20 ml of glycerin.
- Add 20-30 ml each of neem and tulsi extracts to the mixture.
- Slowly incorporate the prepared Carbopol gel into the alcohol mixture, stirring continuously to ensure a uniform consistency.

5. Final Adjustments:

- Check and adjust the pH to ensure skin compatibility.
- Mix thoroughly until a smooth, homogenous gel is achieved.

EVALUATION

1.Organoleptic Test: The gels were described as having a light, continuous flow, being homogenous, clear, and simple to use. Positively, they showed no signs of syneresis, or the separation of liquid from a gel-like substance. However, after being stored for a whole night, the gels started to look like bubbles. This occurs frequently in gels and is usually not regarded as a serious problem. After a brief shaking, the bubbles vanished, showing that the gels had maintained their flowability and homogeneity.According to reports, the gel had a

yellowish-white appearance. This could have been caused by particular active substances or formulation additions. The description of the smell as "characteristic" could mean that certain scents or natural extracts that are utilized to accentuate the essence of the product are present.In general, the organoleptic test findings suggest that the created hand sanitizer gels have the appropriate physical characteristics and would probably be favorably accepted by customers. But it's crucial to remember that the sanitizer's potency in eradicating Organoleptic testing alone is insufficient to determine whether a substance is blocking the growth of pathogenic bacteria or not; additional testing and validation are necessary.

2. **pH Evaluation:** Using a digital pH meter, the pH values of the gel formulations for hand sanitizer were determined. The study's objective was to assess the neutralization of different manufactured formulations, which is probably code for bringing the formulation's pH down to a suitable level.To avoid irritating and inflaming the skin, a topical dosage form, such a gel hand sanitizer, should have a pH between 4.0 to 7.0, which is the normal range of the skin. The average pH readings from this study were found to be approximately 4.3, which is on the lower end of the skin's natural pH range and fairly acidic. The presence of a significant amount of aloe vera in the formulation, which naturally has an acidic pH of 4.0 to 4.5, could potentially be the cause of the lower pH measurements. However, it is important to note that other ingredients in the formulation could also contribute to the pH level.

3. Viscosity: The viscosity of hand sanitizer gel formulations is an important aspect that affects their consistency and flowability when applied to the skin. A higher viscosity can result in a thicker and more gel like consistency, which may be preferred by some users. the viscosity of the generated gel formulations was measured in this study, and the effects of gel components were examined. The results indicated that the produced formulations had higher viscosities compared to pure ethanol and water. This suggests that the gel components, such as thickeners or gelling agents, were effective in increasing the viscosity of the formulations.It is important to note that the viscosity of the gel formulations can also be influenced by factors such as temperature, shear rate, and formulation composition. Therefore, it is essential to carefully select and control the gel components to achieve the desired viscosity and consistency for the hand sanitizer gel formulation.

4. Spreadability Study: Spreadability is an important factor to consider when developing hand sanitizer formulations, as it can affect both customer compliance and the effectiveness of the product. A hand sanitizer gel with poor spreadability may not be applied evenly, which can result in areas of the skin being missed and potentially leaving areas of the skin unprotected.To test the spreadability of the hand sanitizer gel formulations, a gel spreadability test was conducted in this study. The test measures the time it takes for the gel to spread over a surface and the force required for spreading. The optimum gel formulation should have a quicker spreading time and require less force to spread (i.e., high spreadability).

5. Stability: The stability trials involved 4 weeks of storage at various temperatures, including 40°C, 25°C, and 37°C. The prepared hand sanitizer showed no phase separation or colour change throughout the stability testing.

CONCLUSION

Based on the findings of the study, it can be concluded that herbal hand sanitizers can have a substantial bacterial impact on targeted microorganisms. This suggests that there is potential for expanding the use of antibacterial herbal products as a way to combat multidrug-resistant bacteria and prevent their spread from person to person.Additionally, the use of natural herbal hand sanitizers can be considered an alternative to chemically-made hand sanitizers containing active silver nitrates. This is because herbal hand sanitizers are generally more economical, efficient, and ecologically responsible, and may be preferred by those who prefer natural products.However, it should be noted that further research is needed to fully understand the effectiveness and safety of herbal hand sanitizers. Additionally, it is important to ensure that any herbal products used for hand sanitization are properly formulated and manufactured to ensure their efficacy and safety.

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