



Non-alcohol pure poly herbal hand sanitizer- formulation and evaluation

Varsha walunj^{1,*}, Sumit walke², Sonal waykar.³, Rutuja wagmare⁴, Shruti sonawane⁵

¹Department of pharmaceuticals, HSBPVT, GOI, College of Pharmacy, Kashti, Shrigonda, 413702, Maharashtra, India

²Department of pharmaceuticals, HSBPVT, GOI, College of Pharmacy, Kashti, Shrigonda, 413702, Maharashtra, India

³Department of pharmaceuticals, HSBPVT, GOI, College of Pharmacy, Kashti, Shrigonda, 413702, Maharashtra, India

⁴Department of pharmaceuticals, HSBPVT, GOI, College of Pharmacy, Kashti, Shrigonda, 413702, Maharashtra, India

⁵Department of pharmaceuticals, HSBPVT, GOI, College of Pharmacy, Kashti, Shrigonda, 413702, Maharashtra, India

ABSTRACT:

Hand hygiene is important to prevent or minimize the spread of infection.

Especially in epidemics where ethanol and isopropyl alcohol are in high demand, it is important to prepare non-alcoholic hand disinfectants (AFHS) in small household appliances.

Regular and reliable hand washing is one of many ways to prevent the spread of disease.

This study shows that hand antiseptics prepared with 5% (v/v) clove oil can be an alternative to alcohol-based hand antiseptics (ABHS).

KEYWORDS: Hand hygiene, non-alcoholic hand sanitizer, poly herbal, Infection, skin

1. INTRODUCTION : New diseases or infectious diseases often pose threats to global health.

One such dangerous disease is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which the Food and Agriculture Organization of the United Nations World Health Organization (WHO) is known as the cause of coronavirus disease 2019 (COVID-19).

It started the 2020 global pandemic. There have been more than 150 million confirmed cases worldwide since the virus was discovered in Wuhan in December 2019 through April 2021.

Preventive solutions for COVID-19 are the best way to provide support to reduce the spread of this disease. Regular and reliable hand washing is one of many ways to prevent the spread of disease. In addition, hand antiseptics in gel form have many advantages over other hand antiseptics such as liquid (spray) or foam.

The main feature of the gel formula is that it creates a protective layer at the application point and can protect the skin for a longer time than other types of detergents. The staying period of hand antiseptics is longer than liquid and foam hand antiseptics, and they have better moisturizing and adhesion to the skin. Therefore, in this study, hand disinfectant is considered to be a suitable hand disinfectant for the preparation of AFHS.

Sometimes alcohol free hand sanitizers are chosen for health, safety or home security reasons. In other cases, skin irritation may occur from previous use of alcohol-containing hand sanitizers

- Ingestion of alcohol –based hand sanitizers can pose a serious threat and even alcohol poisoning, particularly in young children.
- Alcohol-based hand sanitizers are flammable, which can compromise a buildings safety if they fail into the wrong hands.
- If frequent hand sanitizing is required, repeated use of an alcohol-based hand sanitizer can irritate skin and strip away natural, protective oils needed for healthy skin care.

What is an Alcohol-Free Hand Sanitizer?

Alcohol-free hand sanitizers use different ingredients to kill bacteria instead of alcohol, which can irritate skin and be flammable.

Benefits of alcohol-free hand sanitizer:

- Safe, non-flammable formula
- Prevents alcohol consumption/poisoning
- Will not dry skin like alcohol-based sanitizers
- Kills 99.99% of common germs in 15 seconds.
- No water needed; rub in and let dry

2 .Materials and Methods :

2.1 : Materials

Herbal Plants:(, Neem, Lemon ,)

Excipients:(Glycerine, Clove oil, Lavender oil, Tea tree oil , perfumes, preservative, Carbopol940, Triethanolamine, deionised water etc)

Apparatus : (Beaker , mechanical stirrer ,measuring cylinder , Funnel ,

Filter paper, Soxhlet apparatus)

2.2 : Method :

- In maceration process, Neem extract (Coarsely powdered) is placed in Hydro-alcoholic solvent for soak.
- Extract of neem was prepared by maceration process.
- Carbopol was added to deionised water with constant stirring.
- After uniform mixing, Triethanolamine was added with slow stirring to avoid the formation of possible air bubble in the product.
- Kept aside for 24 hrs.
- The extract of plants and Carbopol were added to essential oil with glycerin were mixed with aqueous phase.
- Finally, methylparaben was added as a preservative and perfumes was added.
- Mixed with slow stirring to obtain uniform product. The non-alcoholic poly herbal sanitizer was prepared.

Formulation of Non-alcohol Polyherbal Hand Sanitizer (100ml)

Sr.No.	Ingredients	Quantity	Category
1	Aloevera gel	25 gm	Antimicrobial
2	Lemon extract	10 ml	Antibacterial , Antiviral
3	Neem	10 gm	Antibacterial
4	Glycerin	5 ml	Humectants
5	Clove oil	13.3 ml	Anti-inflammatory
6	Lavender oil	13.3 ml	Perfuming Agent
7	Tea tree oil	13.3 ml	Disinfectant
8	Carbopol 940	2 gm	Thickening agent
9	Triethanolamine	0.1 ml	Surfactant
10	De-ionized water	q.s.	For make up to 100 ml
11	Methyl Paraben	2 gm	Preservative

Physiochemical Characterization and Evaluation of Hand Sanitizer :

Organoleptic Test: The prepared samples were inspected visually to check the texture, odor, and colour of the gels in semisolid conditions

PH Evaluation:

The pH of the prepared gel was measured using a digital pH meter (Mettler Toledo pH Meter, USA). pH measurements represent the mean \pm standard deviation (SD) of three different samples.

Gel spreadability : 0.5 g of each gel sample was spread on pre-marked 2 cm diameter clear glass.

Then place another clear glass on top and add a 500g weight for 5 minutes to break up the contents.

With this method, spreading is measured based on the sliding and pulling of the gel. Scrape off excess gel from the edges. The standard deviation of each construct was determined and expressed as the mean \pm SD of three replicates. The following equation was used to determine the spreading percentage:

$$\text{Spreadability \%} = \frac{A_2 - A_1}{A_1} \times 100$$

where A_1 is initial area before spreading (cm) and A_2 is final area after spreading (cm).

Antimicrobial activity of hand sanitizer :

Microbial suspension preparation : The developed detergent was tested using the inhibition zone against Gram-negative and Gram-positive bacterial strains and *Candida albicans* yeast and was compared with our detergent (T1). Blocking zones with clear boundaries were observed at different diameters.

Viscosity (Rheological Properties):

One important variable to control is the viscosity of the gel formulation created; because this will show the consistency and fluidity of the gel formulation when applied to the skin. TCV 300 viscometer was used for viscosity measurement in this study to measure sample thickness and examine the effect of gel composition on the rheological quality of the final product. The viscosity of the prepared solution is higher than that of ethanol and water (0.9 cP). The viscosity of the preparation was determined as 0.4 cp.

Conclusion:

- In conclusion, the development of a non-alcoholic poly herbal hand sanitizer presents a significant step forward in promoting hand hygiene without the drawbacks of alcohol-based solutions.
- Through meticulous research and formulation, this innovative product harnesses the power of multiple herbal ingredients, ensuring effective germ elimination while being gentle on the skin.
- Its eco-friendly nature and pleasant aroma enhance user experience, making it a viable alternative in the fight against infections. By embracing this non-alcoholic solution, we not only prioritize health and safety but also contribute to environmental sustainability.
- This project underscores the importance of exploring nature's resources for creating efficient and sustainable hand hygiene solutions, setting a new standard in the realm of sanitization.

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