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A REVIEW ON HERBAL HAND SANITIZER

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ABSTRACT

Hand sanitizer is an alternative to the hand washing with soap water. Hand sanitizer is the most important measure to avoid the transmission harmful microbes and prevent the infection, to keep the skin safe from harmful microorganism and to prevent spreading of many infectious diseases.

The crucial I deal and practice in the prevention, management and decrease of diseases is hand cleanliness. We created aloe vera hand sanitizer utilizing other components such Eucalyptus oil, hydrogen peroxide, glycerine, vit E, Ethanol, distilled water, camphor. Different formulation are prepared and characterised using eucalyptus oil is an active pharmaceutical ingredient.

The PH of herbal sanitizer found to be 6-6.5 with no irritation to skin. Natural aloe vera hand sanitizer are affordable, effective and environmentally friendly.

KEYWORDS : *Formulation, Evaluation, Hand Sanitizer.*

INTRODUCTION

1. Hands are primary mode of transmission of disease causing bacteria, viruses and other micro- organism. So, Hand hygiene is the most important measure to avoid the transmission of harmful micro- organism and thereby we can prevent the infections. To maintain hand hygiene the most simplest, and least expensive means is to sanitize hands using sanitizer.
2. Hand sanitizer, also called hand antiseptic, or hand rub, agent applied to the hands for the purpose of removing common pathogens (disease causing organisms). Hand sanitizers typically come in foam, gel, or liquid form. Hygiene is defined as maintenance of cleanliness practices which carries utmost importance in maintenance of health. Contaminated hand can give out vectors for the transmission of microorganisms.
3. Hand contact with ready-to-eat foods symbolizes a very important means by which pathogens may enter the food supply. To guard the skin from harmful microorganisms and to prevent spreading of many communicable diseases, hand washing is absolutely an important safeguard. Before the invention of contemporary medicine, plants were the chief remedy for treating various diseases. With the arrival of different antibiotics, microbes also
4. slowly develop resistance to these substances. These bring researchers importance towards the plants having antimicrobial, antibacterial properties.
5. In the current scenario of mechanized life style; a consumer will always prefer ready- made formulation of alcohol hand rub rather than hand washing.
6. Indian traditional herbal medicine is very famous since India is leading in the medicinal systems of Ayurveda and Siddha.
7. These medicinal plants are also important source of other type of beneficial compounds including the ingredients for functional foods. The functional foods promoted the better health to prevent the chronic illness. Plant based hand sanitizers are very common in India.
8. There are many advantages of herbal hand sanitizers as compared to chemical-based hand sanitizers which are toxic and there are many health issues have been discussed.
9. The alcohol based hand sanitizer claim to kill 99.99% microbes and it is most effective.
10. Herbal content in the formulation i.e. eucalyptus oil and alcohol which act as disinfectant is responsible for the anti-bacterial action and causing hands germs free.
11. Eucalyptus oil also known as nilgiri oil obtained from leaves of Eucalyptus globulus belonging to Myrtaceae family. Eucalyptus oil has wide application. It is traditionally used as an anti-viral, antiseptic, insect repellent, flavouring. According to different studies, Eucalyptus oil also shown to be effective against viruses.
12. Hydrogen peroxide(H_2O_2) is added in the formulation as an antiseptic and helps to eliminate bacterial spores.
13. The present studies deals with effective way of using eucalyptus oil by formulating alcohol based hand sanitizer to maintain hand hygiene.

AIM:- Formulation and evaluation of aloe Vera hand sanitizer.

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OBJECTIVES

1. It is used in killing foreign microorganism on hand.
2. To study anti- bacterial antiseptic effect of sanitizer.
3. To formulate it within a short period of time.
4. The need of hand sanitizer has increased which causes less dryness to hand.
5. To prepare environment friendly bio-degradable hand sanitizer.

Growth and Cultivation of Aloe vera

Aloe vera, known for its easy care, is a versatile plant suitable for indoor and outdoor cultivation. It thrives in bright, natural light; it prefers up to six hours of full sun outdoors but appreciates a bit of shade during the hottest part of the day. Meanwhile, it is adaptable to dry air and doesn't demand extra humidity. It excels in poor soil conditions and is well-suited to the nutritional scarcity of desert soil. Aloe vera, with a shallow and wide root system, benefits from wider pots during repotting. It's letting topsoil an inch or two dry out entirely between waterings. Likewise, it flourishes in bright direct to indirect light as it originates from hot and arid regions.

Effectiveness

The efficacy of the hand sanitizer is dependent upon the proper technique, the quantity of the sanitizer used, the ingredient, and its consistency of use. In various circumstances, such as using it on soiled or greasy hands and heavy loading of microbes, a reduction in the effectiveness of the sanitizer is reported.

The increment in the purchase of hand gels is not just dependent upon the fear of pandemics, but the sale in the market has been driven in pretty, child-friendly colours and with wellness-friendly fragrance such as lemon and orange Flavors, that are far acceptable than the pungent-smelling waterless sanitizers found in hospitals. bacterial spores, enveloped viruses (e.g., norovirus), and encysted parasites (e.g., Giardia). Hand sanitizers are not effective when hands are noticeably soiled, lubricated, and greasy prior to application.

Botanical Description of Aloe vera

- **Kingdom** : Plantae
- **Scientific Name** : loe Barbadensis Mill.
- **Family** : Liliaceae
- **Common Names** : Aloe , Ghritkumari (India)
- **Plant Type** : Perennial succulent
- **Habitat** : Widely cultivated in tropical and subtropical regions.

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Morphological Features

- **Roots** : fibrous root system.
- **Stem** : Very Short, sometimes stemless
- **Leaves** : Thick, fleshy, lance-shaped
- **Inflorescence** : Spike and raceme
- **Flowers** : yellow, orange or red

Natural Benefits of Aloe Vera

1. **Aloe Vera Protects Against Infection**

Many people are aware that Aloe Vera is a natural moisturizer and its gel-like consistency makes it perfect for use in hand sanitizers. However, what many people don't know is that Aloe Vera guards against viral and bacterial infections naturally, thanks to the presence of polyphenols that inhibit the growth of bacteria. Together with Ethyl Alcohol 70%, the organic Aloe Barbadensis (Aloe Vera) Leaf Juice that we use in our proprietary formula works to fight bacteria without disrupting your hormonal balance.

2. **Aloe Vera Moisturizes**

While the benefits of hand sanitizer are undeniable, many available products dry out your hands. Fortunately, hand sanitizer with Aloe Vera helps overcome that problem. Aloe Vera moisturizes and nurtures with essential vitamins and nutrients, keeping your skin soft and supple as well as clean.

3. **Aloe Vera is a Safe Alternative to Harsh Chemicals**

Many hand sanitizers use harsh chemicals and synthetic ingredients to eradicate germs. However, these may dry or even damage your skin. Aloe Vera is a wholesome ingredient with antioxidant and moisturizing properties. Hand sanitizer with Aloe Vera soothes skin while it cleanses. opt for products that avoid harmful hormone disruptors and seek more nurturing ingredients.

4. **Aloe Vera Contains Powerful Antioxidants**

If you've read about skincare products for a youthful appearance, you'll be familiar with the role of antioxidants in supporting healthy skin structure. Found in many plant-derived ingredients, these powerful substances encourage collagen production for greater skin elasticity and protect against free radical damage from excessive sun exposure.In our hand sanitizer with Aloe Vera, you can enjoy the benefits of bioactive compounds including antioxidants, vitamins, minerals, and amino acids that gently nourish your skin while you cleanse from the germs and grime of the day.

Chemical Constituents of Aloe Vera

1. **Polysaccharides (Major Active Components) :**

- **Acemannan:** Immunostimulant and wound-healing agent.
  - Other mucopolysaccharides contributing to gel viscosity.

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2. **Anthraquinones (Laxative Compounds)**
- Aloin
- Emodin
- Chrysophanic acid

3. **Vitamins**
- Vitamin A (beta-carotene) – antioxidant
- Vitamin C – antioxidant, promotes healing
- Vitamin E – antioxidant, skin protection
- Vitamin B12, folic acid, choline – metabolic support

4. **Minerals**
- Calcium
- Magnesium
- Zinc
- Chromium
- selenium – essential for cellular functions

5. **Enzymes**
- Amylase
- Lipase

6. **Bradykinase :** aid digestion and reduce inflammation
7. **Amino Acids**
- Contains 20 of the 22 required amino acids, including 7 essential one
8. **Other Phytochemicals**
- Sterols: **Lupeol, campesterol, β-sitosterol** – anti-inflammatory
- Salicylic acid – anti-inflammatory, antimicrobial

Hand Hygiene and Infection Control

Hand hygiene is one of the most fundamental and effective measures for preventing the transmission of infectious diseases in both healthcare and community settings. Hands act as a primary vehicle for the transfer of microorganisms, including bacteria, viruses, fungi, and parasites, from contaminated surfaces to susceptible hosts. Poor hand hygiene practices significantly contribute to the spread of healthcare-associated infections (HAIs) and community-acquired infections.

Hand hygiene encompasses various practices, including handwashing with soap and water, antiseptic hand washing, and the use of hand sanitizers. Handwashing with soap and water is considered the gold standard, particularly when hands are visibly soiled or contaminated with organic matter. Soap mechanically removes dirt, debris, and a broad range of microorganisms. However, in situations where access to clean water and soap is limited, hand sanitizers provide a practical and effective alternative.

Alcohol-based hand sanitizers (ABHS) are widely recommended because of their rapid antimicrobial action and broad-spectrum efficacy against gram-positive and gram-negative bacteria, fungi, and enveloped viruses. Their ease of use, quick drying time, and portability improve compliance with hand hygiene practices, especially in busy healthcare settings. Regular use of hand sanitizers has been shown to significantly reduce microbial load on hands and interrupt the chain of infection.

General Information of Hand Sanitizer

- **How to Use Hand Sanitizers**

By now, you've seen guidelines for wishing your hands with soap and water. Scrub for 20 seconds. Pay attention to your thumbs and fingernails. Don't touch the faucet once your hands are clean, and use a clean towel. The emphasis on using regular soap and water is no accident. It's the best way to get rid of germ of all kinds, and when done correctly, it's effective against the novel coronavirus that cause COVID-19.

You should wash your hands regularly, especially after spending time in public, before preparing food or eating, and after you sneeze, cough, or blow your nose. But you may not always have access to hand soap and a sink. In a pinch, hand sanitizer can be a

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convenient alternative. To use hand sanitizer effectively against the any type of virus, you need the right type, amount, and application method

- **Choose the Right Hand Sanitizer**

Because the COVID-19 pandemic has made some name-brand sanitizers harder to find, you may see new hands on store shelves. Before putting a bottle in your cart, read the product label. You should choose an alcohol-based hand sanitizer that contains at least 60 percent alcohol.

The Food and Drug Administration has also advised against band sanitizers that contain methanol, a substance that can be toxic when rubbed into skin. Some hand sanitizers are labelled as containing ethanol or ethyl alcohol but actually contain methanol. You can use the FDA's searchable database to make sure your hand sanitizer brand isn't one of the offenders. In addition, the FDA has not approved any hand sanitizers, so steer clear of brands labelled "FDA approved".

- **Storing Hand Sanitizer**

Chances are, you're using more hand sanitizer these days than ever before. But sanitizer does have a shelf life. Its alcohol content gradually drops as the expiration date approaches. If you have expired hand sanitizer, dispose of it and get a new bottle. Store your hand sanitizer in a cool,location. Avoid direct sunlight and repeated exposure to heat. When you return home, bring your hand sanitizer inside instead of tossing it into the glove box or a cup holder. While there's little risk of combustion, extreme heat can speed up alcohol evaporation especially if air gets inside the bottle.

- **Use the Right Amount of Hand Sanitizer**

One mistake many people make is using too little hand sanitizer, especially if your dispenser doesn't provide rough in one squeeze. The World Health Organization recommends applying a "coin-sized amount" of gel. In other words, you need enough hand sanitizer to cover both sides of your hands and between your fingers- just as you do with hand soap.

What Is a Sanitizer?

The Lupe Hernández hand sanitizer legend concerns an American nurse who, as a student in Bakersfield, California in 1966, invented the now-ubiquitous hand sanitizer gel. The claim is controversial as attempts to verify it by independent investigations at The Washington Post, the National Museum of American History and the Los Angeles Times have proven fruitless. Nevertheless, the story became viral during the 2020 COVID-19 pandemic and was widely reported as established fact and/or urban legend in the press.

According to the World Health Organization (WHO), "an alcohol-containing preparation (liquid, gel, or foam) designed for application to the hands to inactivate microorganisms and/or temporarily suppress their growth. Such preparations may contain one or more types of alcohol, other active ingredients with excipients, and humectants."3 In 1966, hand sanitizers came into existence in healthcare facilities and was popularized significantly in early 1990s.4

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Types of Hand Sanitizers

1. Alcohol-Based Sanitizers

Active Agents

Ethanol / Isopropyl alcohol (60–95%)

Effectiveness

- Highly effective against bacteria and enveloped viruses.
- Not effective against spores and some non-enveloped viruses.

2. Alcohol-Free Sanitizers

Active Agents

- Benzalkonium chloride
- Chlorhexidine
- Triclosan (restricted in many countries)

Effectiveness :

- Moderate antimicrobial activity
- Less effective against viruses compared to alcohol

3. Herbal / Natural Sanitizers

Active Agents

- Aloe vera

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- eucalyptus oil

Effectiveness :

- Mild to moderate
- Not standardized; efficacy varies

4. Foam Sanitizers

Form

- Dispensed as foam

Limitations :

- Slightly slower drying than sprays

5. Gel Sanitizers :

Form

- Thick, semi-solid gel

Limitations :

- Can feel sticky if formulation is poor

6. Spray Sanitizers

Form

- Liquid spray or mist

Limitations :

- Risk of inhalation
- Uneven hand coverage if misuse

Materials and Methods

Sr. No.	Ingredients	Chemical Constituents	Uses
1	Aloe vera	Lupeol, Salicylic acid, urea nitrogen, cinnamomic acid, phenol, and Sulphur	Antimicrobial, antibacterial, antioxidant
2	Eucalyptus oil	1,8-cineol & α- pinene	Deodorant properties
3	Glycerine	Glycerine	Lubricant, Emollient
4	Vitamin E	Vitamin E	Nourishing agent
5	Camphor	Camphor	Fragrance, soothes
6	Hydrogen peroxide	Hydrogen peroxide	Disinfectant
7	Ethanol	Ethanol	Anti infective
8	Distilled water	Distilled water	Vehicles

Preparation of Extract for Hand Sanitizer

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- Fresh Aloe vera were collected.
- Washed thoroughly to remove the unwanted particles and dust
- The Aloe vera leaves are cut into half and inner pulps are separated from leaves by knife.
- The pulps were grinded in grinder machine.
- Then put the gel into separate bowl.

Preparation of Hand Sanitizer

i. The prepared extract of aloe vera was added in to beaker containing ethanol.

ii. Glycerine were mix with aqueous phase.

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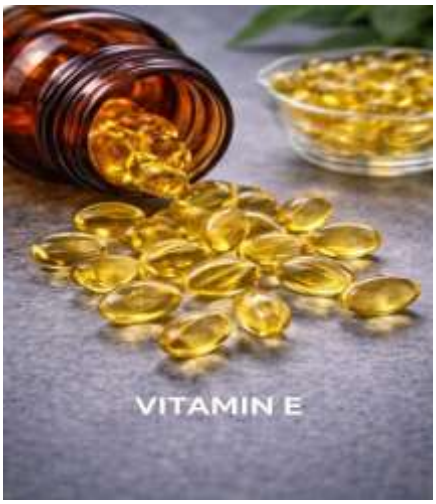
iii. **Hydrogen peroxide was also added in beaker.**

iv. **Eucalyptus oil were added drop wise with constant stirring to avoid air bubbles formation and to obtain uniform homogeneous gel followed by adding vitamin E.**



v. **To this filtrate 2 gm of camphor was added and then volume is made upto 50ml with distilled water.**

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Purpose

The primary objectives of a sanitizer are:

- To interrupt the chain of infection
- To prevent cross-contamination
- To maintain personal and public hygiene
- To reduce the spread of communicable diseases.

Sanitizers are especially critical in:

- Healthcare
- Food processing and handling
- Public spaces
- Emergency or water-scarce conditions.

Evaluation Parameters

I. Organoleptic Test

The prepared samples were inspected visually to check the texture, Odour, and colour of the gelsin semisolid conditions.

II. PH Evaluation

The pH measurement of the formulated gels was measured using a digital pH meter . The pH measurements represent the mean standard deviation of three replicates.

III. Viscosity (Rheological Properties)

The rheological and flowability properties of the prepared gels were determined at room temperature using a TCV 300 viscometer. A piston of a range of 1–10 cP was used, as the formulations had a texture equivalent to water, and the temperature was set to room temperature (≈24 °C). One mL from each prepared hand sanitizer was filled into the measurement chamber. The chamber was capped for 60 s until it was stable, and then the data were recorded.

IV. Spreadability

According to the methods outlined in, the spreadability of the produced hand sanitizers was assessed by spreading 0.5 gm of each formulation gel over a pre-marked transparent glass with a 2 cm diameter. After that, a second clear glass was added on top, and the contents were distributed over five minutes by adding a 500 g weight. Using this technique, the spreadability was assessed based on the gels' properties of slip and drag. The borders were scraped clean of extra gel.The diameter of the spreading area of each formulation was determined and represented by the mean SD of three replicates. The following equation was used to determine the spreading percentage:

$$\text{Spreadability\%} = A2/A1 \times 100$$

Where, A1 is initial area before spreading (cm) and A2 is final area after spreading (cm)

V. Viscosity

Viscosity (Rheological Properties) The rheological and flowability properties of the prepared gels were determined at room temperature using a TCV 300 viscometer .A piston of a range of 1–10 cP was used, as the formulations had a texture equivalent to water, and the temperature was set to room temperature (≈24 °C). One mL from each prepared hand sanitizer was filled into the measurement chamber. The chamber was capped for 60 s until it was stable, and then the data were recorded. The results represent the mean SD of three replicates.

VI. Antimicrobial Test

Antimicrobial Zone of Inhibition Test To evaluate the antimicrobial activity of the prepared hand sanitizer gels, the zone of inhibition test against different gram-positive and gram-negative bacterial strains and a yeast was performed. Three commercially available hand sanitizers were also assessed as experimental controls. A final concentration of 1 × 106 CFU/mL inoculum was equally distributed on the surface of agar plates. A sterile microbiological disc was dipped into each hand sanitizer gel, allowed to dry for a few seconds, and then positioned on the Mueller– Hinton agar plate. All plates were incubated overnight at 37 °C. The diameter of the clear area of no growth around each disc was recorded in millimetres (mm).

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VII. Skin Irritation Study

Skin Irritation Study (Acceptability Test) Based on the results of the previous antimicrobial effectiveness test, the most efficient gel formulation was selected to be tested in a skin irritation study. The study was carried out on 20 volunteers and ethically approved by the research ethics committee in King Abdulaziz City for Science and Technology .After explaining the research protocol with side effects, the volunteers were asked to sign consent forms. The assessment was performed by applying 1 mL of sanitizer gel on each volunteer's palm, then allowed to stand for 5 min.

Advantages

- Rapidly reduces microbial load on hands without water.
- Convenient and portable — useful in settings lacking sinks.
- Quick-drying and easy to apply, improving compliance.
- Alcohol-based sanitizers are effective against a broad range of bacteria and enveloped viruses.
- Herbal/supplemented formulas can provide skin conditioning (e.g., aloe, glycerine) and pleasant scent.
- Useful as an adjunct infection-control measure in healthcare, travel, and public spaces.

Disadvantages

- Less effective on visibly dirty or greasy hands; soil reduces efficacy.
- Does not inactivate all microorganisms (e.g., some bacterial spores such as C. difficile, and certain non-enveloped viruses).
- High alcohol content makes the product flammable and hazardous near heat/flame.
- Frequent use can cause skin dryness, irritation or contact dermatitis; botanicals may provoke allergic reactions in some users.
- Risk of accidental ingestion or misuse, particularly in children.
- Not a full substitute for handwashing with soap and water for certain situations (e.g., after handling food or after toileting).

Importance

I. Prevention of Infectious Diseases
Hand sanitizers effectively reduce the number of pathogenic microorganisms on the hands, thereby lowering the risk of transmission of communicable diseases such as influenza, gastrointestinal infections, and respiratory illnesses.

II. Interruption of the Chain of Infection
Hands are a major vehicle for cross-contamination. Regular use of hand sanitizer helps break the chain of infection by preventing the transfer of microorganisms from person to person or from contaminated surfaces to the body.

III. Rapid and Convenient Hand Hygiene
Hand sanitizers provide instant hand hygiene without the need for water, soap, or towels. This makes them highly suitable for use in public places, travel, workplaces, educational institutions, and emergency situations.

IV. Essential in Healthcare Settings
In hospitals and clinics, hand sanitizers are critical for infection control. They help reduce healthcare-associated infections (HAIs) and are widely recommended for use between patient contacts.

V. Effective Against a Broad Range of Microorganisms
Alcohol-based hand sanitizers are effective against many gram-positive and gram-negative bacteria, fungi, and enveloped viruses, making them a reliable first-line defence against microbial contamination.

VI. Time-Saving and Improves Compliance
Because sanitizers act quickly and are easy to use, they improve compliance with hand hygiene practices compared to traditional handwashing, especially in busy or high-risk environments.

VII. Supports Hygiene During Water Scarcity
In areas with limited access to clean water, hand sanitizers serve as an effective alternative for maintaining hand hygiene and preventing disease outbreaks.

VIII. Public Health Importance During Pandemics
During outbreaks and pandemics such as COVID-19, hand sanitizers become essential tools in reducing viral spread and protecting community health alongside other preventive measures.

IX. Skin-Friendly Formulations

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Modern hand sanitizers often contain humectants and herbal additives such as glycerine and aloe vera, which help maintain skin moisture and reduce irritation during frequent use.

X. Enhances Personal and Community Safety
By encouraging regular hand hygiene, hand sanitizers contribute to overall public health, reduce absenteeism in schools and workplaces, and support healthier communities.

BENEFITS OF HAND SANITIZER

1. Cleanliness

This should not come as a surprise. One of the premier benefits of hand sanitizer is just that it sanitizes. It is intended to eliminate germs and take cares of that business. When used appropriately, hand sanitizers can get rid 99.9% of the germs on your hands. The CDC prescribes washing your hands whenever you are around food (making it or eating it), animals, trash, and those are only the tip of the iceberg. At the point when you wind up in these circumstances, hand sanitizer is the ideal addition to (or occasional substitution for) washing your hands with soap and water.

2. Portability

It is impossible to take a sink with you everywhere. In some circumstances where you have to wash your hands, soap and water are not always going to be accessible. A small container of hand sanitizers can go into your glove compartment, a tote, or even your. It is also ideal for when you are getting a nibble at a game or have recently left a public space, similar to the market.

3. Ideal for Group Settings

At the workplace, in the classroom, or in any space with heaps of foot traffic, germs spread rapidly. Regardless of whether you are preparing to eat or taking out the trash, others' germs can affect you (particularly when you are in close contact with other people). This is why having hand sanitizers accessible is perfect for group settings. Educators, students, and office workers can eliminate germs occasionally for the duration of the day without leaving their study hall or work area, and even people who go to the gym can use a squirt of hand sanitizer before jumping to the next exercise machine.

4. Decreases Risk Of Illness

Particularly during flu season, limiting your exposure to others' germs is critical for your wellbeing. Each time you pause for during the day, you lessen your odds of becoming ill. Indeed, even a quick outing to a companion's home or the store can expose you to germs that could cause a cold, flu, or different diseases, so keeping your hands as clean as conceivable is important.

5. Hands That Feel Softer

This may be one of the most astounding advantages of hand sanitizer, however, it is not unrealistic. Hand sanitizers that do not contain alcohol can really improve the surface of the skin on your hands (note that hand sanitizers with alcohol will not have this impact). Some hand sanitizers contain emollients that soften your skin, giving you more pleasant looking and smoother hands.

Case Study and Pandemic Relevance of Aloe Vera Hand Sanitizer

Role of Aloe Vera Hand Sanitizer During the COVID-19 Pandemic The COVID-19 pandemic created an unprecedented global demand for effective hand hygiene products. Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) spreads primarily through respiratory droplets and contact with contaminated surfaces, making hand hygiene a critical preventive measure.

As a result, hand sanitizers became an essential public health tool alongside mask usage and social distancing. Alcohol-based hand sanitizers (ABHS), containing 60–80% ethanol or isopropyl alcohol as recommended by the World Health Organization (WHO), were widely used due to their proven virucidal activity.

However, excessive and repeated application resulted in dermatological issues such as skin dryness, irritation, cracking, and contact dermatitis, especially among healthcare workers.

To overcome these limitations, Aloe vera–based hand sanitizers gained significant attention. Aloe vera gel, known for its moisturizing, anti-inflammatory, soothing, and wound-healing properties, was incorporated into sanitizer formulations without compromising antiviral efficacy.

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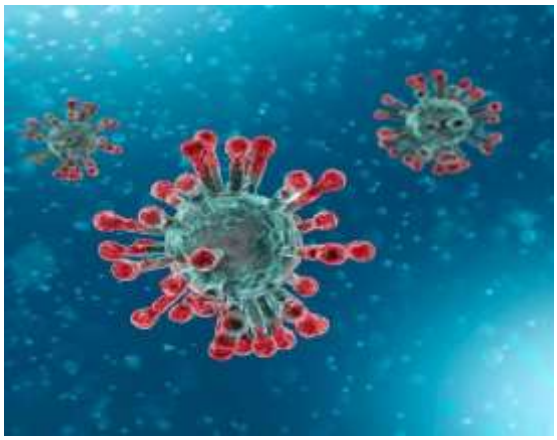

Pandemic Relevance of Aloe Vera Hand Sanitizers

- Improved user compliance during long working hours
- Reduced incidence of hand eczema and skin irritation among healthcare workers
- Suitable for continuous and repeated application
- Cost-effective and easily available during emergency situations
- Supported WHO-recommended alcohol concentration while enhancing skin safety Public Health Impact The use of Aloe vera–based hand sanitizers contributed significantly to improved hand hygiene practices during the COVID-19 pandemic. By reducing skin-related side effects, these formulations encouraged regular and correct sanitizer use, playing a crucial role in breaking the chain of infection and reducing community transmission of the virus.
- Future Scope Development of advanced herbal sanitizers with enhanced antiviral activity
- Combination of Aloe vera with other medicinal plant extracts
- Improved stability and shelf-life of formulations
- Large-scale production for public health emergencies.

CONCLUSION

Most of the people do not even know the importance of using Herbal Hand sanitizer. Since, Hands are the primary mode of spreading various infections. Proper methods of washing and drying hands can prevent infection. Hence, it was proved that the Herbal Hand sanitizer is very effective against various bacteria, viruses and microbes and must in recent circumstances. As compared to chemically prepared Hand sanitizer, Herbal Hand sanitizer is very effective, environment friendly, biodegradable and inexpensive. Mostly Herbal Hand Sanitizer protect us from many daily encounter bacteria. The result suggest that the

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constituents of the various extracts of aloe Barbandis and their combination are capable of giving superficial anti-microbial, antibiotic as well as antibacterial activity and they are able to inhibit the many pathogens than commercially available antiseptic soap.

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