



“FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER BY USING GUAVA LEAVES”

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Abstract: Firsthand contact is the primary means of infection and microbial transfer. One of the most important practices for the prevention, management, and decrease of infections is good hand hygiene. The COVID pandemic has raised the need for hand sanitizer, which reduces hand dryness. We made a herbal sanitizer with readily available herbal plant extract and additional substances after taking the necessity into consideration. This study focuses on the potency, visibility, and positive effects of herbal hand sanitizer made with aloe vera leaf extract and Psidium guajava. The prevention of pathogen entry into the body through the hands has been the main focus of a significant amount of study on hygiene. After discussing the benefits of lowering the microorganisms, the goal of the current investigation is established.

Key Words: Hand Sanitizer, Hygiene, Pathogens, Psidiumguajava, Aloe vera

INTRODUCTION

Herbal cosmetics have no negative effects because they are created entirely of herbs and shrubs. The natural ingredients in the herbs give the body nutrition and other beneficial minerals without having any negative effects on it.¹ The definition of hygiene is preservation of cleanliness standards, which is crucial for maintaining health. Maintaining personal hygiene and using cleaning products are necessary for a healthy lifestyle. These ideas emphasize how important it is to practice good hygiene in order to avoid illness.²

The most recent definition of hand sanitizer by the FDA is that it is an addition to or substitute for washing your hands with soap and water. Hand antiseptics and hand rubs, together with hand sanitizers, are products used on the hands to remove common An infection on the hands. Typically, hand sanitizers come in liquid, gel, or foam form. There are several preparation options available, such as gel, foam, and liquid solution.³

The skin is the area of the body that is most exposed to light, pollutants in the environment, and some degree of pathogen defense. Eczema (atopic dermatitis), warts, acne, psoriasis, rashes, allergic reactions, and other skin conditions are the most prevalent ones. In order to shield the skin avoid dangerous microorganisms and to stop skin infections from spreading through many pores. Indeed, washing your hands is a crucial safety measure.⁴

Hands are the primary conduits for the transfer of illnesses and microbes. Hand hygiene is a key concept and practice in the management, prevention, and reduction of illnesses. On hands, there are two kinds of bacteria: resident bacteria and transient bacteria. The resident flora, which includes *Staphylococcus epidermis*, *S.*, is located on the skin's surface and lives beneath the stratum corneum. *hominis*, *fungus Malassezia spp.*, *Dermobacteria*, *Propionibacteria*, *Cyanobacterial*, and *Micrococci*. Hand washing is an essential precautionary step. Rather than employing a synthetic preparation, the present endeavor is to physically inspect and produce a herbal hand sanitizer made from commonly accessible herbs. 5.

Cleaning your hands with clean water is the most common way to disinfect them. However, soap and detergents have been added in addition to the water because the water used could not always be safe. There are now hand sanitizers on the market that promise to be safe to use and to have strong bactericidal activity. There are hand sanitizers on the market with and without alcohol. The hand sanitizer with alcohol content promises to eliminate 99.99% of germs, even the strain with the highest resistance. To create and assess natural remedies. *sanitize* is a ready-to-use herbal hand sanitizer that combines extracts of guava leaves and aloe vera gel with the appropriate excipients and humectants. Different approaches are used to stop viruses from spreading from person to person. Among the most crucial method of preventing transmission is hand sanitization with hand sanitizer. Sanitizer is in high demand right now, and sales are occurring at a rapid pace. Sanitizer production cannot keep up with its sales rate. As a result, a method for making less expensive hand sanitizer using readily accessible materials has been provided. People from all social classes are able to purchase this commodity.⁷ As a member of the Myrtaceae family, the guava (*Psidium guajava* L.) tree is a particularly special and traditional plant that is grown for its many nutritional and therapeutic qualities. In tropical regions such as South America, Bangladesh, Pakistan, Indonesia, India, and others, guavas have been cultivated and are valued fruits. Guava leaves (*Psidium guajava* folium; GL) have an obtuse-type apex and are oval, elliptic, and dark green in color. An extract from guava leaves has strong antibacterial properties that can stop *S. aureus* from growing. *P. guajava* metabolic extracts from plant leaves and bark show strong antibacterial properties.⁸

Natural disinfectants can be made from guava leaf aqueous extract. Four distinct solvents with increasing polarity—hexane, methanol, ethanol, and water—were used to extract the guava leaves. Aloe extract is also utilized as a moisturizing and antibacterial ingredient in this composition. It has been claimed that *streptococcus pyogenes*, *klebsiella pneumoniae*, and *staphylococcus aureus* can all be efficiently killed, significantly reduced, or eliminated by aloe vera gel. Advantages of Applying Herbal Hand Sanitizer: - □ Availability: Herbs are widely accessible and can be utilized by everyone, including in urban and rural settings. Affordable: The price of herbal plants is lower than that of chemical compounds found in manufactured hand sanitizers.

Enhanced effectiveness: The promotion of hand hygiene is more effectively achieved by herbal hand sanitizers. Fewer negative effects: Compared to conventional hand sanitizers, herbal hand sanitizers have fewer side effects.¹ Guava leaves and aloe vera are the primary natural ingredients in the herbal hand sanitizer.

Hand Sanitizer Types: Three Hand Sanitizers Can Generally Be Classified Into Two Types:

- A) Hand sanitizer sans alcohol
- B) Hand sanitizer with alcohol content

MECHANISM OF ALCOHOL ACTION ON BACTERIA:

The most often utilized alcohol component in biocides is n-propanol. Its precise mechanism underlying alcohol's antimicrobial activity is not well understood; potential explanations include membrane damage, suppression or uncoupling of mRNA and protein synthesis via effects on ribosomes and RNA polymerase, or protein denaturation. Its ideal bactericidal efficiency for antibacterial action is attained at doses ranging from 60% to 90%. Absolute alcohol, that is, alcohol that is no longer less bactericidal than 1% water, while alcohol falls between the two ranges. Water plays a crucial role in the process of denaturing proteins. Alcohol affects all processes, if not several of them, including vital metabolic pathways, membrane damage, and In the end, cellular integrity is lost. But it's crucial to remember that alcohols have bactericidal action only on vegetative bacteria, or those going through binary fission and metabolism, not spores.

THE ALCOHOL'S MODE OF ACTION ON VIRUSES:

The viral envelope is the main target of alcohol-based hand sanitizers, if present, which comes from the lipid envelopes of the host, the genetic material itself, and the protein capsid that encloses and shields the genetic material. Since each of these elements is essential to the viral life cycle (e.g., attachment, penetration, biosynthesis, maturation, lysis), and since their functions are crucial to the virus's capacity to spread to new hosts, it can be assumed that changing the composition or functionality of any of these elements will usually make the virus inoperable. Although the precise mechanism of action of alcohol-based treatments against viruses is not as well understood as it is for bacteria, it is known that ethanols have a more potent and widespread virucidal effect than propanols. High ethanol concentrations have actually been demonstrated to be mostly effective against viruses that are encapsulated, which makes it effective against most viruses that are clinically significant. Interestingly, ethanol solutions can be made more effective against viruses that are more resistant to ethanol alone by adding acids to them. Even though ethanol and acidity may work in concert, the majority of hand sanitizers are still known to be ineffective against nonenveloped viruses.

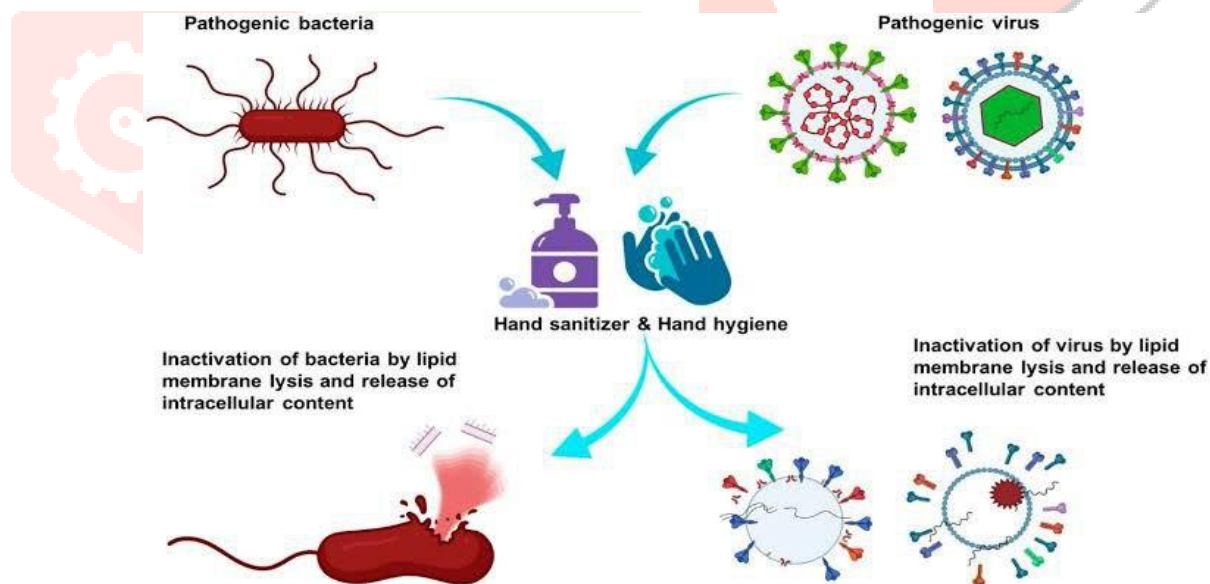


Figure No 1 – Mechanism Of Sanitizer

Benefits of Using Herbal Hand Sanitizer:

1. Doing laundry by machine takes less time than doing it by hand.
2. Act quickly to eradicate bacteria from your hands.
3. Simpler to operate than sinks.
4. Cut down on the microbes that are on your hands.

5. It is not appropriate to promote antibiotic resistance.

6. Water and soap cause less skin irritation.

7. Some even contribute to better skin health.

One drawback of using herbal hand sanitizer is:

1. It has been demonstrated that hand sanitizer is effective at eradicating bacteria.

2. It Can Kill Bacteria, But Using It Has Some Drawbacks. Overuse of hand sanitizer can result in dry, cracked skin.

3. It can also be dangerous if swallowed or gets into the eyes, along with flaking, redness, or discoloration. Taking precautions when applying hand sanitizer:

4. When your child is using hand sanitizer, watch out for them.

5. Keep hand sanitizer out of reach of toddlers and young children since its scent and color can entice them to drink it.

6. Wait until your hands are completely dry before touching your mouth or eyes after using hand sanitizer.

7. Store the hand sanitizer in a dry, cool environment.

8. Avoid putting hand sanitizer in closed spaces like cars since the alcohol content flammabilises the product and increases the risk of fire if left in the car for several hours or days.

9. Hand sanitizer Is Very Inflammatory Because It Contains Alcohol. After using hand sanitizer, let your hands air dry completely before beginning any task that could expose you to heat, an open flame, or electricity.

Negative effects of hand sanitizer include:

1. Overuse of hand sanitizer might cause our skin to lose moisture. Additionally, it may cause dry, flaky, and cracked skin. Dry skin is more vulnerable to bacterial attacks, according to numerous studies.

2. Red or discolored, itchy patches on our skin may result from overusing hand sanitizer. Another Name for This Patch Is Eczema.

3. Eye irritation and redness may occur from direct contact with hand sanitizer. When We Use Hand Sanitizer More, Pathogens And Germs Start Building Up Resistance To The Drugs, Putting Us At Risk For Multiple Infections. If It Is Not Washed Immediately, It Can Damage The Outer Layer Of Our Eye.

4. Approved Hand Sanitizer: Contains a High Amount of Alcohol (60–95%) Along With Other Ingredients. Therefore, if ingested in a large quantity, they can exhibit symptoms resembling alcohol poisoning.

INGREDIENT IN HERBAL SNITIZER :

1. Aloe vera
2. Guava Leaves Extract
3. Surgical Spirit
4. Glycerin
5. Camphor

1.Aloe vera :

Synonyms :-Aloe, musabbar, kumari, korphad

Biological sources:

The biological source of aloe is dried latex of aloe barbedensis miller

Family:- Liliaceae

Chemical constituent:-

A. The two main class actives constituents of the aloe vera plant extract are chromone and anthraquinone and its glycosides derivatives

b. other such as phenylpyrone derivatives flavonoids ,phenylpropanoids coumarins phytostreol, naphthalene analogs lipids and vitamin

Features of its Morphology:

- a. It is a succulent plant.
- b. The plant is a perennial evergreen.
- c. The plant has short stems or no stems at all.
- d. It can reach a height of 60–100 cm.
- e. It has meaty, thick leaves.
- f. Their color ranges from green to grey-green.
- g. Leaves have a rosette-like form.

Uses:

- a. Aloe vera is a herb with therapeutic properties that has long been used to enhance skin integrity.
- b. Aloe vera is well-known for its ability to reduce inflammation, protect the skin, fight germs and viruses, disinfect, and heal wounds.
- c. Aloe vera hand sanitizers work well as moisturizing agents in addition to helping people practice good hand hygiene and stop the spread of infections.
- d. It has been demonstrated that they possess antibacterial properties and are capable of thoroughly cleaning hands without compromising skin integrity.
- e. Aloe vera has been shown to have extremely strong antibacterial properties. After three minutes of immersion and spray disinfection, the microbial load has decreased by more than 99%, and after seven minutes, the reduction is 100%.



Figure No 2 – Aloe vera

2. Guava Leaves :

Synonym:-

jaam, peru, amrood, amrutam

Biological source (of leaves):

It is obtained dried extract of psidium guajava leaves.

Family: Myrtaceae

Chemical constituents:-

Quercetin, avicularin, hyperin, gallic acid, catechin, epicatechin, epigallocatechin gallate, caffeic acid

Geographical source:

India, Indonesia, Pakistan, Bangladesh, Mexico, Central America, Northern America

Uses :

- A. It is useful for preserving because it has antimicrobial qualities. Keeping hands clean and avoiding the spread of illness through contact with bacteria found on the hands.
- B. It is useful for maintaining hand hygiene and reducing the spread of disease through contact with microorganisms on the hands since it has antibacterial qualities. Additionally, studies have demonstrated the antibacterial qualities of guava leaf extract, which qualifies it for wound cleaning.
- C. Guava leaf extracts have been shown to be an equally efficient natural disinfectant as 0.2% chlorhexidine when used to clean contaminated toothbrushes.



Figure No 3 – Guava Leaves

3.Surgical Spirit :

In addition to being a cleaning agent, the Surgical Spirit Disinfectant Solution also possesses antiseptic qualities. It is given topically to the skin. Applied to the skin's surface, the Surgical Spirit Disinfectant Solution serves as both a cleansing and an antiseptic agent. Surgical Spirit works to create a tighter, more durable, and hygienic epidermis. In general, sick rooms make use of it as well. Your skin won't dry out or split thanks to castor oil. Excessive topical administration of methyl salicylate may result in absorption through unbroken skin. A multifunctional cleaning and sterilising solution, surgical spirit can be used to sanitise skin as well as surfaces. bottle with a child lock safety lid, capacity 500ml. Keep out of the heat and Cold.



Figure No 4 – Surgical Spirit

4.Glycerin :

Our sanitizers contain pure glycerine, which hydrates the skin's outer layer and guards against skin irritants. As a naturally occurring humectant, glycerine draws moisture from the surrounding air to keep your skin from drying out. Because of this, it is an essential component in soaps and sanitizers. You are depriving your skin of its natural oils when you wash your hands with soap or alcohol. Irritation and dryness may result from this. a multipurpose, colorless, transparent, and hygroscopic liquid that serves as a lubricant and preservative. a versatile vehicle and diluent utilized in a range of veterinary medicinal formulations. keeps the skin hydrated and helps to avoid dryness. Safe, scent-free, and non-staining. applied topically to horses to induce sweating. Recommended for use as a poultice to draw fluid out of swollen, irritated areas.



Figure No 5 – Glycerin

4.Camphor :

Synonyms:-

Gum Camphor, Kampfer, Karpooora, Karpuram

Biological source :-

It is obtained from wood and bark of tree cinnamomum camphora.

Family :- Lauraceae .

Chemical constituents:-

camphor, linalool, cineole , and 3,7,11-trimethyl-3-hydroxy-6,10-dodecadien-1-yl acetate

Uses:

Because of its antibacterial qualities, camphor is frequently used in sanitizers. It increases the sanitizer's efficacy by aiding in the destruction of bacteria and germs. Furthermore, camphor can add a pleasing aroma to the sanitizer composition, covering up any unpleasant chemical smells.



Figure No 6 – Camphor

METHODOLOGY:**1.A collection of plant leaves.**

Plant leaves were collected from the hospital complex for sanitization purposes. The plant was chosen for its strong antibacterial properties, as mentioned in the research article. The plants utilized in the experiment were Psidium guajava (guava leaves). Plant leaves were gathered, weighed, washed, cleaned, and shade dried in the laboratory. Drying the plant extract resulted in a hand sanitizer made from ethanol.

2 .Preparation of leaves extract:

➤ Guava leaves extract:-

Psidium guajava (guava) leaves that were still fresh were gathered. The leaves were chopped into tiny bits after being properly cleaned to get rid of any unwanted dust particles. Water was added to washed guava leaves, and the mixture was cooked until the guava leaves turned sticky. To get rid of the particles, the syrup was then strained.

➤ Aloe vera extract:-

We gathered fresh aloe vera. To get rid of the dust and undesirable particles, wash well. The aloe vera leaves are divided in half, and the interior pulps are then sliced out using a knife. The pulps were ground in a grinder, and the gel was placed in a different bowl.

3.Procedure Preparation of herbal hand sanitizer :-

First, take a 100 ml transparent bottle. There was 70 milliliters of surgical spirit in the bottle. After that, add 6 ml of glycerine and fully combine. 20 milliliters of Aloe vera gel were added to the mixture. 2 milliliters of Guava extract syrup were added to the mixture. Add 1 cc of camphor powder. 1 ml of perfume was applied at the end. The entire mixture was mixed to produce a uniform liquid sanitizer.

SR.NO	INGREDIENT	QUANTITY
1.	Guava Leaves Extract 1ml	2ml
2.	Aloe Vera Pulp	20ml
3.	Glycerine	6ml
4.	Surgical Spirit	70ml
5.	Camphor	1ml
6.	perfume	1ml

Fig no:-7 formulation table

EVALUATION PARAMETER:-**1.Organoleptic property:-**

It was said that the gels were homogenous, light, and continuous to work with. One good thing they did not show was syneresis, or the separation of liquid from a gel-like substance. It was said that the gels were homogenous, light, and continuous to work with. One good thing they did not show was syneresis, or the separation of liquid from a gel-like substance

The gel's stated green color could be attributed to specific active substances or additives included in the formulation. The smell was described as distinctive, which may mean that certain scents or natural extracts that are used to highlight the essence of the product are present.

2.Irritancy test:-

5 healthy volunteers were selected. The herbal hand sanitizer was applied on palm and time was noted. Irritancy, dryness and itching were checked.

3.pH test:-

The lower pH results may be due to the formulation containing a large amount of aloe vera, which naturally has an acidic pH of 4.0 to 4.5. It's crucial to remember that additional components in the mixture might potentially affect the pH level.

4.Spreadability test:-

While creating hand sanitizer products, spreading is a crucial component to take into account since it influences the effectiveness of the item and acceptance by consumers. Spreadability issues with hand sanitizer gels might make it difficult to apply the product evenly, missing some skin areas and possibly leaving others unprotected. The gel spreadability test used in this study was designed to evaluate the hand sanitizer gel compositions' spreadability. The test determines how long it takes the gel to spread across a surface and how much effort is needed to do it. High spreadability refers to a gel composition that requires less force to spread and has a quicker spreading duration.

5.Evaporation test:-

5 healthy volunteers were selected. The herbal hand sanitizer was applied on their palm while rubbing the sanitizer on palm, evaporation took place and that time was noted. Evaporation rate was below 1 min.

6.Stability test:

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.

RESULT:-

The herbal hand sanitizer was prepared in laboratory and its efficacy was checked. The objectives of the study were developed and evaluated a herbal hand sanitizer by using guava leaves and aloe vera by pH test, evaporation test, and stability test. All tests were passed.

Sr No	Parameters	Results
1.	1. Organoleptic properties	
	Colour	. Green
	Odour	characteristics
	Clarity	opaque
2.	Irritancy test	No irritancy
3.	pH	4 to 6.3.
4.	Spreadability test	spreadable

5.	Evaporation test	Less than 1 min
6.	Stability test	stable

CONCLUSION:-

Herbal hand sanitizers can significantly reduce the amount of germs that target microorganisms, according to study results. As a means of battling bacteria that are resistant to drugs and stopping them from spreading from person to person, this shows that the usage of antibacterial herbal remedies may be increased. In order to guarantee their effectiveness and safety, it's also critical to make sure that any herbal products used for hand sanitization are correctly prepared and produced.

A nice hand sanitizer can be made with the method described above. To test the antibacterial effect and compare with other hand sanitizers on the market.

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