



## Formulation and Evaluation of Herbal Hand Sanitizer Using *Psidium guajava* Leaves Extract

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### ABSTRACT

This research paper is centered on the effectiveness, bringing to light an optimistic effect of herbal hand sanitizer using *Psidium guajava* leaves extract. A large portion of the research has focused on hygiene by controlling the entry of pathogens into the body through hands. Having run over the positive advantages on reducing the microbes, the aim for the current study is set up. Natural herbal hand sanitizers are effective, environment friendly, and biodegradable, inexpensive.

**Keywords:** Hand Sanitizer, Hygiene, Pathogens, *Psidium guajava*.

### INTRODUCTION

Hands are primary mode of spread of microbes and infections. Hand hygiene is thus the most vital measure to evade the transmission of harmful germs and avoid the infections. Hand hygiene is the single most important, simplest, and least pricey means of preventing nosocomial infections.<sup>1</sup> Contaminated hand can give out vectors for the transmission of microorganisms. Pathogenic microorganisms responsible for epidemics are spread from the hands of the food handler to others, when the food handler contaminates his/her hands and then passes these microorganisms to consumers by means of hand contact with food or drinks. The consumer is bared following the intake of these microorganisms, which may cause gastrointestinal illness. Hand contact with ready-to-eat foods symbolizes a very important means by which pathogens may enter the food supply.<sup>2</sup> To guard the skin from harmful micro organisms and to prevent spreading of many communicable diseases, hand washing is absolutely an important safeguard.<sup>3</sup>

Before the invention of contemporary medicine, plants were the chief remedy for treating various diseases. With the arrival of different antibiotics, microbes also slowly develop resistance to these substances. These bring researchers importance towards the plants having antimicrobial properties. They endeavour to develop the inimitable ability of different secondary metabolites to show constant and long-lasting activity against broad spectrum of microbes.<sup>4</sup>

Thus, in this research study, we used *Psidium guajava* leaves extract to develop a hand sanitizer due to its beneficial effect against pathogenic microbes.

### MATERIALS AND METHODS

#### Extraction procedure for Guava leaves:

1. 50gm of fresh leaves of guava (*Psidium guajava*) were collected.
2. Leaves were cut into small pieces.
3. 50 gm of the leaves were soaked in 95% ethanol for 3 to 4 days.
4. The extract was filtered with Whatman filter paper & the filtrate was collected.<sup>5</sup>

**Table 1:** Formulation Table

Sr. No.	Ingredients	Quantity
1.	Carbopol	0.18 gm
2.	Alcohol	18.6 ml
3.	Glycerin	0.69 ml
4.	Methyl paraben	0.5 gm
5.	Guava leaves extract	0.5 gm
6.	Triethanolamine	0.07 ml
7.	Deionised water	9.3 ml
8.	Perfume	0.15 ml

#### Procedure for formulation of Hand Sanitizer:

1. Carbopol was added to deionised water with constant stirring.
2. After uniform mixing, Triethanolamine was added with slow stirring to avoid formation of possible air bubble in the product.
3. Kept aside for 24 hrs.

4. The extract of guava leaves and Carbopol were added to denaturing alcohol with glycerin, Poly sorbate 20, were mixed with aqueous phase.
5. Finally, methyl paraben was added as a preservative and perfume was added.
6. Mixed with slow stirring to obtain uniform product.<sup>6</sup>

#### Evaluation Parameters:

1. **Organoleptic Properties:**-Tests like Colour, Odour and clarity were carried out.

2. **Physical properties:-**

a) **pH:** The pH was determined by using pH paper.

b) **Irritancy test:** 5 healthy volunteers were selected. The herbal hand sanitizer was applied on palm and time was noted. Irritancy, redness, dryness and itching were checked.

c) **Evaporation rate:** 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.

d) **Antibacterial Test:** The antibacterial activity of herbal hand sanitizer using different solvents against strains of aerobic and anaerobic micro-organism was evaluated by standard cup plate method. For this standard cup plate method, the nutrient agar medium was used as a culture media.

**Table 2:** Composition of Agar medium

Sr. No.	Ingredients	Quantity (gm)
1.	Peptic digest of animal tissue	5
2.	Sodium chloride	5
3.	Beef extract	1.50
4.	Yeast extract	1.50
5.	Agar	8.5

To perform antibacterial test, the pre-sterilized petri plate was used. To pre-sterilize, the petri plate was incubated for 24 hrs at 37°C. Then next to this, the agar culture media was poured on the petri plate uniformly in aseptic condition. After spreading, the agar medium was covered with another petri plate and kept aside for 24 hrs in refrigerator to solidify the agar medium. After this, the plate was removed and on these plates the cup was formed. On two particular plates, the standard solution which contains microorganism strains i.e. *E. coli* and *Bacillus subtilis* were uniformly spread in aseptic condition. Now, in which the cup was formed on two petri plates, the standard which is pure antibiotic Gentamycin; 1ml was added by the pipette and in the next cup, the formulated herbal hand sanitizer was added in aseptic condition. Then these

two plates were kept for incubation for 24 hrs at 37°C. After the incubation period, the zone of inhibition was found on the petri plate.<sup>7</sup>

The zone of inhibition of herbal hand sanitizer and pure form of antibiotic Gentamycin was appeared. In image A, the zone of inhibition of *E. coli* was appeared and in image B the zone of inhibition of *Bacillus subtilis* was seen. Result of antibacterial test of herbal hand sanitizer against standard of pure antibiotic Gentamycin was measured in mm by scale.

## RESULTS AND DISCUSSION

### RESULTS

#### Evaluation Parameters:

1. **Organoleptic Evaluation:**

1. Colour: - Green
2. Odour: - Characteristics
3. Clarity: - Opaque

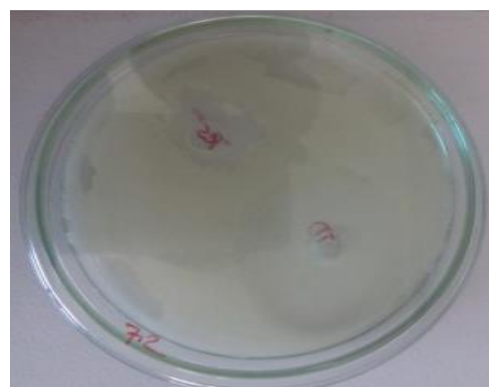
2. **Physical properties:**

- a) pH: - 4 to 6
- b) Irritancy test:- No irritancy



**Figure 1:** Irritancy test

In this particular evaluation test, the antibacterial of herbal hand sanitizer was found to be safe and on the basis of this information, we can say that the herbal hand sanitizer shows somewhat lesser activity than pure antibiotic Gentamycin. But, definitely the formulated herbal hand sanitizer has anti-microbial activity against bacterial species like *E. coli* and *Bacillus subtilis*.



**Figure 2:** Image A (*E. coli*)

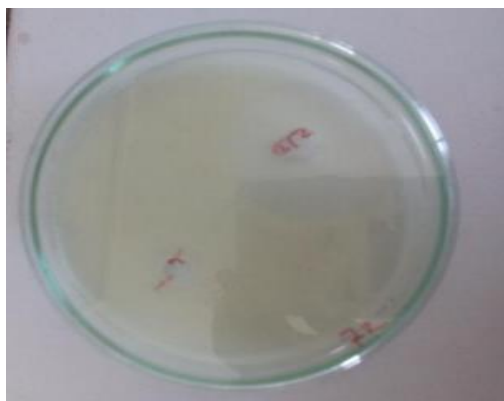


Figure 3: Image B (*B. subtilis*)

Table 3: Results

Sr. No.	Parameters	Results	
1.	Organoleptic properties	Green	
2.	a) Colour	Characteristic	
3.	b) Odour	Opaque	
4.	c) Clarity	4 to 6	
5.	pH	No irritancy	
6.	Irritancy test	Less than 1 min	
7.	Evaporation test	Std	
8.	Antibacterial test	44	44
9.	a) <i>Escherichia coli</i>	45	45
10.	b) <i>Bacillus subtilis</i>	Green	Green

## DISCUSSION

The herbal hand sanitizer was evaluated for its organoleptic properties, physical properties and antibacterial test. The prepared formulation of herbal hand sanitizer showed good effect on bacterial strains like *E. coli* and *Bacillus subtilis*. It also has antimicrobial, antibacterial, anti-inflammatory effects. It was found that the formulation was white in colour with liquid consistency and smooth texture. In the prepared formulation, the alcohol was used along with oil extract to get better result. The alcohols have excellent, rapid (within seconds) germicidal activity against vegetative bacteria, fungi, and many viruses and antibacterial activity is based on protein denaturation of microorganisms. Alcohol sanitizers are highly effective against mycobacteria (the bacteria most resistant to the disinfection process) and multidrug-resistant pathogens. Alcohol rubs are about 100 times more efficient against viruses than any form of hand washing. Sanitizer proposes several advantages over non-alcoholic hand disinfectants, rubbing sanitizers onto both hands and until it completely

evaporates usually requires only 15 to 30 seconds. Whereas vigorous friction, rinsing with water, and drying with a towel are not needed like hand disinfectants or soaps.<sup>8</sup>

## CONCLUSION

Hands are the most common mode of transmission of pathogens to patients and proper hand hygiene can prevent health care-associated infections and the spread of antibacterial resistance. Scientific proof and easiness of use support alcohol-based hand sanitizers during patient care. It may be concluded that herbal hand sanitizer has a significant bacterial effect on the specified microorganisms. Thus, there is immense potential in establishing the use of antibacterial herbal products as a measure to control the multidrug resistant microbes as well as check their spread through hands from one geographical region to another. Herbal hand sanitizer is based alternative for chemically prepared containing active silver nitrates. Natural herbal hand sanitizers are effective, environment friendly, and biodegradable, inexpensive.

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