

BARUS CAMPHOR HAND SANITIZER FORMULATION AND DEVELOPMENT- A BOON IN COVID-19 ERA

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Abstract:

Microbes and diseases are transmitted mostly through the hands. However, simply coming into contact with the germ is insufficient to produce sickness. The essential stage in the presentation of sickness is for the germ to reach the interior body. Contact transmission of illness symptoms from the skin to the inner body can happen when an infected portion (usually the hands) comes into contact with the mucous membrane of an open cavity such as the mouth, nose, eyes, or an open injury. As a result, using high-quality sanitizers to avoid illnesses like COVID-19 is one of the most important precautions to take. Hand sanitation is an important principle and practice in disease protection, management, and minimization. The requirement for hand sanitizer has grown as a result of the COVID outbreak, resulting in less hand dryness. We developed a hand sanitizer containing Barus camphor and additional substances like isopropyl alcohol, Rosewater, tulsi water, and aloe vera, based on the necessity. The antibacterial properties of the components were taken into consideration when choosing them. The antibacterial properties of the components and sanitizer were tested and shown to be effective against the gram-positive bacterium *S. aureus*, *Pseudomonas Aeruginosa* and *Staphylococcus aureus*. The improved antibacterial activity and effectiveness of Barus camphor can be used to make commercially viable herbal hand sanitizers. When the components are combined, a hand sanitizer is formed.

Keywords: *Barus camphor, Hand sanitizer, Aloe vera, COVID-19, Isopropyl alcohol.*¹

1. Introduction

Washing hands before meals is one of the most essential scientific and spiritual concepts. This is to prevent harmful germs from ente

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ring the body and causing infectious disorders. In December (2019 year), a few instances of unexplained viral pneumonia were recorded in Wuhan, China. The viral pneumonia is generated by the Novel Corona Virus, according to laboratory tests of respiratory specimens. [1] The preponderance of hospital-acquired illnesses is caused by the poor hygiene of both the patient's and hospital staff's hands. The medical council and the World Health Organization have made it clear that hand sanitizers authorized by the hospitals should be used to sanitize hands. Various measures have been implemented to prevent viral transmission from person to person. Hand hygiene using hand sanitizer is one of the most essential strategies for reducing transmission. The requirement for sanitizer is now quite strong, as is the rate of sales. The rate at which sanitizer is produced never copes with the rate at which it is sold. As a result, a method for making a less expensive Sanitizer using readily accessible components is described below. In less than 20 minutes, you can make this sanitizer. Its manufacturing rate can keep up with market demand. This product may be purchased by persons of all socioeconomic levels. [2,3]

Barus Karpooora is one of the type of camphor. (D. Camphora). Barus camphor is a natural substance that has a wide range of uses in both old and innovative medicine. In complement to its function as a skin permeation booster, barus camphor has insecticidal, antibacterial, antiviral, anticoccidial, antinociceptive, anticancer, and antitussive qualities. Barus camphor concentrations in exterior applications should not exceed 12 percent in any product. Barus camphor is quickly absorbed by the skin, causing a cooling or warming feeling.[4,5] Researcher investigated aloe vera and exhibited a paper claiming that aloe vera is particularly effective against herpes simplex virus types 1 and 2, influenza virus, and pseudorabies virus, among other viruses. E.V. Christaki et al. studied the biological components and uses of aloe vera and concluded that it may be used as an antimicrobial agent. A group of investigators has also stated that the antibacterial efficiency of isopropanol-based sanitizing rubs is best achieved when glycerol is not employed in the formulation, hence aloe vera could be used as an alternative to glycerol. [6,7] An analysis compared the effectiveness of alcohol-based and non-alcohol-based sanitizers and found that alcohol-based sanitizers are more efficacious than non-alcoholic sanitizers. Isopropyl alcohol is favored 70%–91.3 percent of the time. [8] Rosewater showed anti-microbial property could be used for killing certain microbes and the same properties were shown by tulsi water. [9,10]

2. Material and methods

Barus camphor, aloe vera, isopropyl alcohol, rose water and tulsi water were the materials utilized for formulating hand sanitizer.

Instrument- Labman instrument Ultra-sonicator, Equip-tronics pH-meter was utilized for formulating sanitizer.

2.1. Preparation of rose water

1000 g of rose petals were sifted and cleaned to make the rose extract. Petals were boiled in 500ml distilled water until they were reduced to 1/3 of their original volume. The extract was chilled, filtered, and sealed to keep it fresh. Use around ten ml of water.[11]

2.2. Preparation of tulsi water

1000 g of Tulsi leaves were sifted and cleaned to make the tulsi water. Leaves were boiled in 500ml distilled water until they were reduced to 1/3 of their original volume. The extract was chilled, filtered, and sealed to keep it fresh. Use around 10 ml of water. [11a]

2.3. Method of formulation of hand sanitizer

The weights of the extracts and other substances were meticulously measured. Barus camphor was properly weighed and dissolved in 75ml of 70% isopropyl alcohol. After obtaining a clear solution. A sufficient amount of aloe vera was dissolved in the above preparation and kept in the sonicator for about 10 minutes. When aloe vera is completely dissolved in the above preparation 10ml of rose water and 10ml of tulsi water should be added in the above formulation. 100ml of the formulation was formulated. The quantities of the ingredients are mentioned in Table 1.

Table 1- Formulation of hand sanitizer

Sr. no.	Ingredients	Quantity taken	Uses
1)	Barus camphor	6 gm	Anti-microbial, Anti-viral, cooling agent.
2)	Aloe vera	3 gm	Humectant, Anti-bacterial.
3)	70% Isopropyl alcohol	75ml	Anti-bacterial
4)	Rose water	10ml	Anti-bacterial
5)	Tulsi water	10ml	Anti-bacterial

Table 2- (2x2x2) full factorial design of the formulations

Levels	Factor X1: Amount of Rose water	Factor X2: Amount of Aloe vera	Factor X3: Amount of Tulsi water
-1	5	1.5	5
1	10	3	10

Batches	X1	X2	X3
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F1	-1	-1	-1
F2	1	-1	-1
F3	-1	1	-1
F4	-1	-1	1
F5	1	1	-1
F6	1	-1	1
F7	-1	1	1
F8	1	1	1

Optimization was carried out by (2x2x2) full factorial design. The F8 batch was found to be suitable or best batch in terms of consistency and pH of the formulation.

2.4. Evaluation parameters

- pH test**-A pH-meter was used to determine the pH of 0.5 ml of formula, and the findings were noted. The purpose of this test was to see if the formulation could be utilized at the pH of human skin (4.5-7.0), as it was subsequently utilized on hands.
- Organoleptic Test**- The form, colour, and odour of the concoctions were used to conduct organoleptic testing. Liquid hand sanitizers should be transparent, non-lumpy, pourable, and have an unique essential oil scent.
- Particle tests**- Particle tests were performed by looking at the liquid hand sanitizers to see whether they had any precipitate or fragments in them. The test involved examining the presence or absence of a black and white backdrop.
- Agar well diffusion method**- Sterilized Nutrient agar was placed into sterile petri dishes and permitted to harden under sterile condition. On the surface of agar plates, 0.1ml of culture was equally disseminated. A hole with a diameter of 5 to 7mm was punched utilizing a tip. Each well received 0.1ml of sanitizer. The plates were labelled and incubated for 24 h at 37°C. The antimicrobial agent diffuses through the agar medium and resist the formation of the microbial strain tested, resulting in the formation of a clear zone or inhibition zone.
- Tissue paper test**- Paper Chromatography is used in this test. On tissue paper, we drew a circle with a ballpoint pen and put some sanitizer droplets on it. If the Sanitizer has enough alcohol, the ink will disintegrate in the Sanitizer and begin to disperse. The sanitizer gradually dispersed and migrated out of the circle.
- Stability of the preparation**- The liquid sanitizer was kept at 37°C for 2 months. During this time, the consistency of liquid sanitizer was examined. After resting, the sample that was steady liquid was labelled as stable, whereas the sample that induced deposition was labelled as unstable.[3a]

3. Result and discussion

- a) **pH test-** The pH of the formulation was found to be 6.48 which is very close to neutral pH and will cause no harm to the skin pH .



Figure 1. pH of the hand sanitizer.

- b) **Organoleptic tests**

Table 2- Organoleptic properties of the formulation

Sr.no.	Tests	Results
1)	Form	Liquid
2)	Colour	Red
3)	Odour	Camphor like
4)	Lumpy/Non-lumpy	Non-lumpy
5)	Transparent/Non-transparent	Non-Transparent

- c) **Particle Tests-** Results concluded that no fragments or precipitation were observed in the formulation.

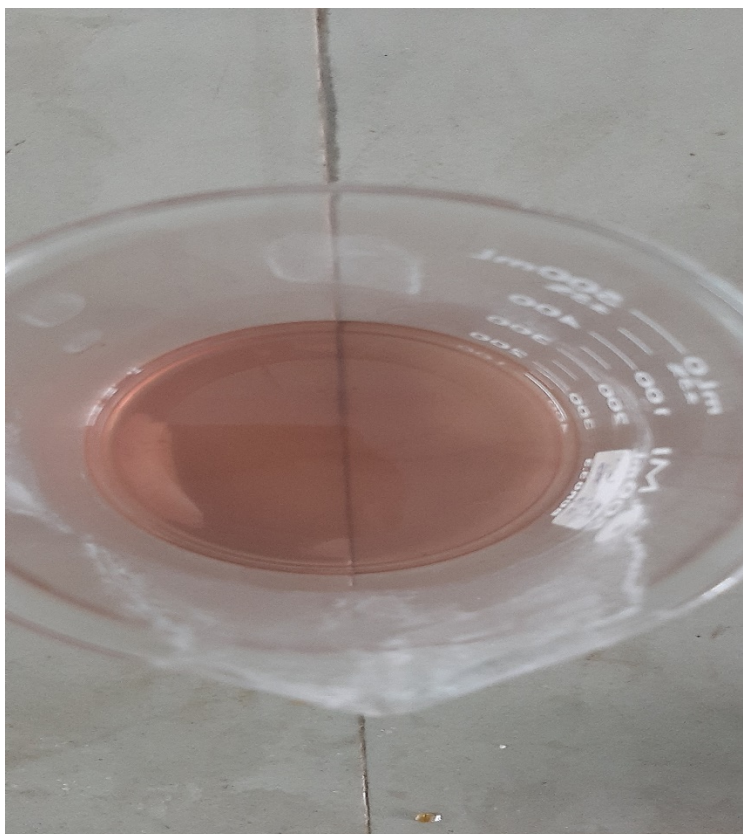


Figure 2. No deposits or fragments found in the formulation.

d) Agar well diffusion method

Table 3- Antimicrobial activity of the sanitizer

Sample	E. Coli ATCC 25922	Pseudomonas Aeruginosa ATCC27853	Staphylococcus aureus ATCC 25923
Sanitizer	22mm	24mm	24mm
Gentamicin	25mm	26mm	28mm

- e) Tissue paper test-** It was concluded that sanitizer contained sufficient amount of alcohol as sanitizer gradually dispersed and migrated out of the circle.

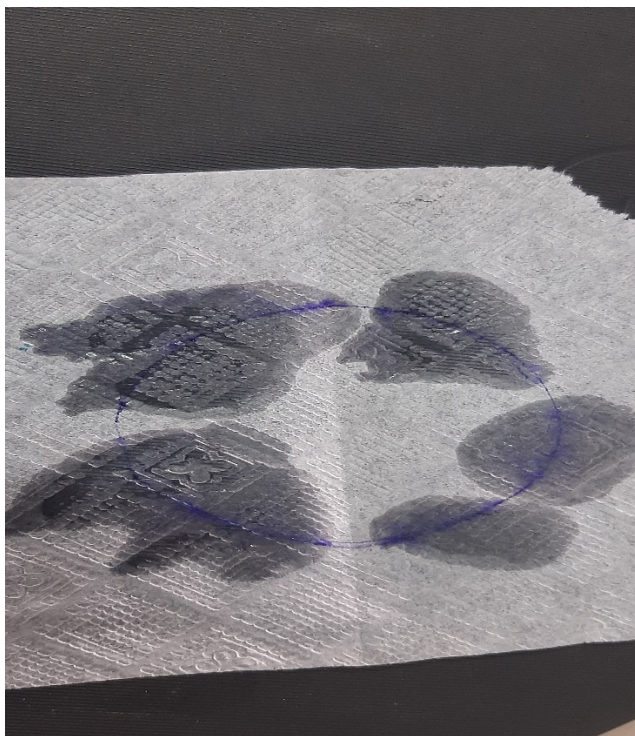


Figure 3. Tissue paper test

- f) **Stability of the preparation-** The formulation was found to be stable with no deposits or fragments in the formulation after 2 months and had same consistency as earlier.

4. Conclusion

The most prevalent mechanism of pathogen transmission to patients is through the hands, and appropriate hand cleanliness can help avoid health-care-associated illnesses and antibiotic resistance. The utilization of alcohol-based hand sanitizers during patient care is supported by scientific data and comfort of use. Sanitizer, it can be established, has a substantial antimicrobial impact on the indicated bacteria such as *Pseudomonas aeruginosa*, *E.coli*, and *Staph. aeruginosa*. As a result, promoting the application of antimicrobial herbal products as a method to control multi-drug resistant microorganisms and prevent their transfer from one geographical location to another has enormous potential.

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