



Formulation And Evaluation Of Herbal Hand Sanitizer

Bhagyashri Kalyan Padul^{1*}, Rutuja Nehru Kabre^{2*}, MR. Abhijeet Rathod³, Aarti Bhausaheb Narwade⁴, Yogeshwari Bapu Pamane⁵

¹ Student of Bachelor of Pharmacy, Raosaheb Patil Danve College of Pharmacy, Badnapur, Jalna.

² Student of Bachelor of Pharmacy, Raosaheb Patil Danve College of Pharmacy, Badnapur, Jalna.

³ Asst.Prof.(Faculty of Pharmaceutics) Raosaheb Patil Danve College of Pharmacy, Badnapur, Jalna.

⁴ Student of Bachelor of Pharmacy, Raosaheb Patil Danve College of Pharmacy, Badnapur, Jalna.

⁵ Student of Bachelor of Pharmacy, Raosaheb Patil Danve College of Pharmacy, Badnapur, Jalna.

Raosaheb Patil Danve College of Pharmacy, Badnapur, Jalna 431202

1. **ABSTRACT:** In order to manage pathogenic diseases, health hygiene has been of utmost importance. As an alternative to handwashing, hand sanitisers assist stop infections by preventing the spread of bacteria, which in turn stops infectious diseases from spreading. Different formulations of hand sanitisers are available, including liquids, gel-based products, and foam-forming products. The efficacy of herbal hand sanitisers is the focus of this study report. One Herbal hand sanitisers are more efficient against microorganisms than chemical-based ones. By using herbal hand sanitisers instead of chemical-based ones, one can avoid the toxicity that comes with the former. One The first way that bacteria and illnesses are spread is through the hands. One of the most important concepts and practices in the prevention, management, and decrease of infections is hand hygiene. Natural herbal hand sanitisers are affordable, safe for the environment, biodegradable, and effective.
2. **KEYWORDS:** microorganisms, hygiene, hand sanitizer, infectious

2. **INTRODUCTION:** Hand sanitiser, also known as hand antiseptic or hand rub, is an agent that is applied to the hands to get rid of common pathogens (organisms that cause disease). Usually, hand sanitisers are available in liquid, gel, or foam form. Maintaining cleanliness practices is known as hygiene, and it is crucial for preserving one's health. Maintaining good hand and personal hygiene is crucial for preventing a variety of infectious diseases. In today's mechanised world, consumers will always choose premade alcohol hand rub formulations over hand washing (which involves using either non-antimicrobial or antimicrobial soap and creating mechanical friction by rubbing hands together for a minute, then rinsing with water and finally drying completely with a disposable towel).

In India's officially recognised medical systems—Ayurveda, Yoga, Unani, Siddha, and Homeopathy—many herbal medicines have been used for a very long time in a safe and consistent manner. Widely utilised in a variety of systems, evidence-based herbal hand sanitisers are produced by a well-organised business in accordance with pharmacopoeial norms. According to a number of research, hand sanitisers with at least 70% alcohol were recommended to eradicate 99.9% of bacteria. Guava, neem, and tulsi leaf extracts are combined with appropriate excipients and humectants to create and assess a herbal hand sanitiser that is ready to use.²

Several tactics are used to lessen the spread of viruses from person to person alone. Hand sanitisation with hand sanitiser is one of the most crucial ways to prevent transmission. 2 Currently, there is a significant demand for and sales rate of sanitiser. The sanitizer's selling rate is higher than its production rate. Thus, a method for creating less expensive sanitiser using readily available materials has been proposed here. People of all social levels can purchase this goods. 2.

Hand sanitisers come in a variety of forms:

1. Hand sanitisers that contain alcohol

1. Ethanol-based: Have ethanol as their primary component.
2. Isopropanol-based: This type of product has isopropanol as its active component.

2. Hand Sanitisers That Do Not Incorporate Alcohol

1. Triclosan-based: This type of product has triclosan as its active component.
2. Compounds based on quaternary ammonium: Have quaternary ammonium compounds as the active component.

3. Hand Sanitisers Made of Herbs

1. Natural components: include aloe vera, tulsi, and neem, among other natural substances.
2. Essential oils: Essential oils may be included for their advantages and fragrance.

4. Sanitisers for Gel Hands

1. Hands are easy to rub with the thick gel texture.

5. Hand Sanitiser Sprays

1. Spray format: Easy to use and quick to apply.

6. Hand Sanitisers with Foam

1. Foam texture: easy to apply and kind to hands.

Every kind of hand sanitiser has advantages and disadvantages of its own. Think about your needs, preferences, and skin type before selecting a hand sanitiser.

The advantages of using herbal hand sanitiser include:

- i. Availability: Anyone can utilise herbs because they are widely accessible in both urban and rural locations.
- ii. Inexpensive: Compared to the chemical components found in synthetic hand sanitisers, herbal therapies are less costly.
- iii. Enhanced effectiveness: Hand hygiene can be improved with herbal hand sanitisers.
- iv. Fewer adverse effects: Compared to other hand sanitisers, herbal ones have fewer adverse effects. 3.
- v. Known for its antibacterial qualities, tulsi and neem have long been utilised in traditional medicine. In India, neem is widely utilised as a natural treatment for a variety of illnesses due to its demonstrated antibacterial, antiviral, and antifungal qualities. Holy basil, or tulsi, has been utilised for thousands of years in Ayurvedic medicine and has been demonstrated to possess antifungal and antibacterial qualities. To eradicate germs and other microbes, hand sanitisers can contain both tulsi and neem. 5.
- vi. Compared to hand cleaning with soap and water, which necessitates having access to a sink and running water, hand sanitiser is typically faster and more convenient. People who are on the go or do not have access to hand washing facilities will find hand sanitiser to be a practical solution because it can be applied anywhere and at any time. 5.

3. Goal and purpose:

Goal:

Using extracts of *Azadirachta indica* (neem powder), *Ocimum tenuiflorum* (tulsi powder), *Psidium guajava* (guava leaves), rose water, and vehicle water, the current study attempts to create and assess a herbal hand sanitiser.

Goals:

- to choose the plant materials.
- to obtain a particle-free extract by extracting plant powders.
- to make herbal hand sanitiser using the right ingredients.
- to assess hand sanitiser made of herbs.

5. WORK PLAN.

- A) Gathering ingredients: Making an extract from guava, tulsi, neem, etc. Additionally, there are chemical components like camphor and flavouring ingredients like distilled water and rose water.
- B) Base preparation: Make an extract by decoction by soaking all the herbal extract in water.
- C) Ingredient mixing: All of the ingredients were combined in accordance with the protocol.
- D) Allow the blend to cool to room temperature.
- E) Once the material is at room temperature, pour the formulation into the jar.
- F) Labelling and packaging: Create the label based on the product specifications and place it inside the container. Make sure to pack them appropriately.
- G) Testing: Conduct assessment tests to guarantee product compatibility.
- H) Final modification: If required, modify the formulation in light of the testing findings.

6. SUPPLIES AND TECHNIQUES:

Materials: Herbal hand sanitiser ingredients include: -

1. Neem

The tree *Azadirachta indica*, also known as neem, nim tree, or Indian lilac, is a member of the Meliaceae family. It comes from India and numerous African nations and is one of the two varieties in the genus *Azadirachta*. Warm tropical and semitropical regions are typically home to neem trees. They are also found on southern Iranian islands. Neem oil is made from the fruits and seeds of neem trees.⁶

Neem tree fruit can be spherical or oval and resembles a smooth olive. It is around 14 to 28 mm long and 10 to 15 mm broad when ripe. The fruit has a thin skin and a fibrous, yellowish-white pulp within that is both sweet and bitter. The thickness of this pulp ranges from 3 to 5 mm. The fruit is a hard shell that contains one or occasionally two or three long, brown-coated seeds.⁶



Fig no. 1 – Neem leaves

Phytochemicals:

Numerous phytochemicals found in neem fruit, seeds, leaves, stems, and bark were initially identified in extracts from *Azadirachta* seeds. One such compound, azadirachtin, was developed in the 1960s as an insecticide, growth disruptor, and insect antifeedant. Crushing 2 kg of seeds yields roughly 5 g of azadirachtin.

The seed oil contains beta-sitosterol, nimbolide, triterpenes, glycerides, and other polyphenols in addition to azadirachtin and related limonoids. The oil is yellow, unpleasant, and smells like garlic. It contains 2% limonoid chemicals. Vitamin C, carotenes, catechins, and quercetin are all present in the leaves.⁶

Applications:

1. Antimicrobial
2. Antifungal
3. Anti-inflammatory
4. Because of its skin-healing qualities, it is used in soaps, shampoos, and creams.⁴

2. Tulsi

Tulsi, often known as holy basil, has antibacterial, antiviral, and anti-inflammatory qualities. It supports respiratory health, reduces stress, and strengthens immunity. Because of its antioxidant properties and



capacity to calm and shield the skin, tulsi is used in skincare products. Additionally, herbal drinks and supplements frequently include it.⁴

1. Antimicrobial properties are used.
2. Health of the Respiratory System
3. Reduction of Stress
4. Advantages of Antioxidants
5. Skincare⁴

Fig no.2-Tulsi leaves

Morphology:

Tulsi leaves often have a pointed tip and an oval or elliptical form. The medium-sized leaves typically have a length of 2 to 4 inches. Though certain types may have purple or crimson tones, the leaves are always bright green. The leaves have a smooth, rather shiny surface. Tiny hairs may also give them a slightly abrasive sensation.⁶

Tulsi leaves feature tiny, sharp notches along the sides, which is known as serration or toothing. Two leaves arise from the same spot on either side of the stem as they grow opposite one another on the stem. One of the reasons tulsi leaves are prized in traditional medicine and cooking is their potent, pleasant scent.⁷

Chemical components:

These days, elevated blood fat levels, including triglycerides and cholesterol, are becoming a serious health concern. In rats with excessive blood fats, studies have shown that an aqueous extract of *Ocimum basilicum* (tulsi) can help lower these fat levels, including total cholesterol, triglycerides, and LDL cholesterol.

In a another study, rabbits' total fat levels were reduced after consuming 1-2% fresh Tulsi leaves for 28 days.

3. Guava leaves:

Psidium guajava, another name for guava leaves, is a tropical fruit that grows in South America, Bangladesh, Pakistan, Indonesia, and India. The numerous health advantages of guava leaves are well documented. This is because they contain a variety of natural compounds that have been shown to boost health in diverse ways, including quercetin, kaempferol, and catechins. According to research, guava leaf extracts may aid with a number of illnesses, such as diabetes, cancer, infections, high cholesterol, liver protection, and digestive difficulties.⁶

fig no.03-guava leaves



Morphology:

Guava leaves have only one blade. Usually elliptical to ovate (egg-shaped), the leaves have an acute apex, or pointy tip. Although the size of guava leaves can vary, they typically measure 7 to 15 cm in length and 3 to 7 cm in width. Guava leaves are usually dark green when they are fresh, but as they age, they may become lighter or yellow.⁶

Guava leaves have a smooth, whole border devoid of lobes or serrations. The lower surface of the leaves is lighter in colour and may have a little hairy texture, but the upper surface is typically glossy and dark green. Their leathery texture and relative thickness aid in preventing water loss.

The leaves have a pinnate venation pattern, with secondary veins branching out from the bottom of the leaf and the main vein running down the midrib. On the underside of the leaf, the veins are frequently noticeable.⁷

Chemical makeup:

Guava leaves are a rich source of nutrients and health-promoting substances. They consist of 18.53% protein, 12.74% carbohydrate, 0.62% fat, 3.64% minerals (ash), and 82.47% water. In addition, guava leaves contain 1717 mg of total phenolic compounds, including gallic acid, a potent antioxidant, and 103 mg of vitamin C per gramme.⁹

Uses of medications:

Antioxidants found in guava leaves aid in the body's fight against oxidative stress.

The leaves can help reduce inflammation and related discomfort in conditions like arthritis because they contain chemicals with anti-inflammatory qualities.

They are helpful in treating infections since they can be effective against a variety of pathogens.

Guava leaves are a natural treatment for problems related to oral health.

When taken as a tea, guava leaves are thought to help control menstrual cycles and reduce period pain.⁸

4. Camphor

The essential oil of the *Cinnamomum camphora* tree, a member of the Lauraceae family, is the source of camphor, a solid. The tree is widely distributed throughout Asia. Known for its powerful scent, camphor is used in a variety of items, such as fragrances, medications, and flavourings.⁶

Camphor comes in two varieties: synthetic and natural. Synthetic camphor is derived from turpentine oil, whereas natural camphor is harvested from the camphor tree. Because it is "optically inactive," synthetic camphor does not react to light in the same manner as natural camphor. In many applications, synthetic camphor may someday take the place of real camphor due to its lower cost and simpler production.⁷



Fig no.4-Camphor

Chemical components:

Camphor, cineole, pinene, camphene, phellandrene, limonene, and diterpenes are all found in camphor oil. Camphor is a monoterpenic ketone in its entirety. It shares a fundamental carbon skeleton with bofneol.⁹

Medical applications: To reduce pain and inflammation, topical analgesic medicines contain camphor.

Camphor can be used to treat small wounds and abrasions because of its mild antimicrobial qualities.

Coughs and respiratory congestion can be relieved by inhaling camphor vapours.

Chest rubs and nasal congestion remedies frequently contain camphor.⁸

Approach:

- Extract preparation:

The leaves were extracted from gathered plants, including *Psidium* (guava leaves), *Ocimum tenuiflorum* (tulsi), and *Azadirachta indica indica* (neem), and they were each steeped in water individually. The extract is then obtained by heating it on a water bath. The produced extract was heated, allowed to cool, collected, and filtered through Whatsmann filter paper before being used to make hand sanitiser.

Decoction is the procedure used to extract each element.

1. *Azadirachta indica* (neem) leaf extraction: Decoction is the method used to extract neem leaves.

After gathering enough neem leaves, they are cooked in water for 20 to 30 minutes.

The mixture was then strained using Whatsmann filter paper to extract the leaves from the liquor.

More powerful compounds are extracted using this approach.

2. *Ocimum tenuiflorum* (tulsi) extraction: a sufficient amount of tulsi leaves are extracted and cooked in water for 20 to 30 minutes using a water bath.

- Then, using Whatsmann filter paper, the mixture was strained to extract the leaves from the liquid.

3. Extraction of psidium (guava leaves) : - Guava leaves are taken in a sufficient number and boiled in water by utilising water bath for 20-30 minutes.

- Then, using Whatsmann filter paper, the mixture was strained to extract the leaves from the liquid.

7. RESEARCH WORK:

• Hand sanitiser preparation:

Hand sanitiser was made using the following recipe. Ten millilitres of each plant's extract filtrate were used to make the hand sanitiser in this formulation. Five grammes of camphor and four to five drops of rose water are added to this filtrate, and the volume is increased to fifty millilitres using ethanol.

1. Gather herbs: Gather the leaves of guava, tulsi, and neem.

2. Dry the herbs: Use a dehydrator or place the herbs in the shade to dry them.

3. Grind the herbs: Finely grind the dried herbs.

4. Prepare extracts from herbs: steep the herbal

Filter and concentrate the extract after dissolving the powder in water or a solvent.

1. Stir the mixture: Make sure all the components are mixed together by giving the mixture a good stir.

2. Filter the combination: To get rid of any contaminants, filter the mixture.

➤ Advantages

1. Antibacterial qualities: Herbal extracts have antibacterial qualities.

2. Moisturising: Glycerin and aloe vera gel soothe and hydrate the skin.

3. Non-toxic and natural: Herbal hand sanitiser is a non-toxic and natural substitute for hand sanitisers sold at stores.

Method:

1. To obtain the extract, 10 grammes of each plant extract are steeped in water and heated on a water bath.

2. After allowing the extract to cool, Whatsmann filter paper is used to filter it.

3. Thoroughly combine all of the extract after filtering.

4. Now, combine thoroughly and add camphor for aroma. Put the sanitiser in a container that is well-filled.

Formulation table :

Sr. No.	Ingredients	Quantity
01	Neem extract	10 ml
02	Tulsi extract	10 ml
03	Guava leaves extract	10 ml
04	Camphor	5 gm
05	Rose water	5 ml
06	Distilled water	S.Q.

Table No. 01

EVALUATION PARAMETERS

Organoleptic Properties: Tests like Colour, Odour and Clarity were carried out.

- 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.
- pH : The pH was determined by using pH paper.
- Fragrance and sensory evaluation: This test is performed to assess the sensory characteristics of the hand sanitizer, including fragrance and feel. For this test, conducted a sensory evaluation with a panel of testers to rate the fragrance intensity, pleasantness, and overall user experience.
- Homogeneity: The herbal hand sanitizer formulation is homogeneous and translucent in nature.
- Labelling and compliance test: This test is performed to ensure that the product labelling meets regulatory requirements. Hence verified that all ingredients are listed accurately, along with usage instructions, warnings, and expiration dates.

8. RESULT AND DISCUSSION:

RESULT:

Sr. No.	Evaluation	Formulation (F1)
1	colour	Light brown
2	Irritancy test	Non irritant
3	Grittiness	Non gritty
4	PH	7.1

Table No. 02



HERBAL HAND SANITIZER

TALK:

According to published research, neem (*Azadirachta indica*) leaves have antimicrobial qualities. In order to create a herbal sanitiser with antimicrobial and antibacterial qualities, the current study was designed. The herbal sanitiser was found to be light brownish in colour, non-greasy, smooth in texture, and easily washable with a good PH close to normal skin range. After a few days of use, skin irritation was noticed.

We can conclude from all the research that polyherbal hand wash has demonstrated cleansing properties without causing skin irritation and is simple to use, which lowers the likelihood of adverse consequences.

9. CONCLUSION:

Cosmetics and cosmeceuticals, which are cosmetics with purported therapeutic qualities, are applied topically and contain substances that affect the skin's biological processes. According to WHO estimates, the majority of Asian countries' populations currently use herbal medication for hand hygiene, including making hand wash. The current study was conducted in order to create a herbal sanitiser that contains herbal extract and is used to both clean hands and stop bacteria from growing. It was made with consideration for the sensitivity of the skin to ensure that it wouldn't irritate it in any way. Because of their components, hand sanitiser gels are therefore far superior to regular soaps or currently available hand washes.

10. REFERENCE:

1. FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER 1 Jayesh D. Bagul , 2 Nikita P. Aher , 3 Amay G. Chavan Krantiveer Vasantarao Narayanrao Naik Shikshan Prasarak Sansthas Institute Of Pharmaceutical Education And Research, Nashik, India
2. Ms. Shweta S.Dhamankar¹, Prof.Ankush R. Dudhe .Preparation of Herbal Hand Sanitizer
3. Formulation and Evaluation of Herbal Hand Sanitizers Based on Plants Producing Essential Oil Sheetal Sarraf a++
4. Mr. Rahul G. Polke* Formulation And Evaluation Of Herbal Hand Sanitizer
5. Vishal Verma*, Deepak Choudhary FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER
6. Fatima Grace, Sowmya Darsika C, Arul Jothy, S. Shanmuganathan From "Poly Herbal Hand Sanitizer Formulation And Evaluation" Indian Journal Of Pharmacy & Pharmacology Page No - 143 144
- 7.Arun Kumar¹, Vijay Kumar Sharma*¹, Gangeshwar Pratap Singh¹, Rahul Shukla¹, Rohit Kumar Bijauliya² Formulation and Evaluation of Herbal Hand Sanitizer
8. Mali Kamlesh D,etal, Formulation &evaluation of alcohol free herbal hand wash containing osmium santum IJPBS,10(2) 2020,page no.114.
9. Mounika, Vijayanand P, V. Jyoti, Formulation and Evaluation of PolyherbalHand wash
10. Megha Bahuguna and Shilpi Kashyap, Formulation and Evaluation of Hand Wash, World Journal of Pharmaceutical Research.2011, 5[7], 1559 – 157.
11. Pawar SP and Pal SC, Antimicrobial activity of Terminalia catappa root, Indian J Med Sci, 2002, 56(6), 276-278.
12. Megha Bahuguna ,etal, formulation and Evaluation of hand wash ,world journal of Pharmaceutical research (WJPR), 5(7),2016,page no. 1567.
13. Black JG, Microbiology: Principles and Applications, 3rd Edn, Prentice Hall, New Jersey, 1996, pp. 436 443.
14. Kolhapure SA & Sunanda M, Evaluation of the antimicrobial efficacy and safety of Pure Hands herbal hand herbal hand wash gel in hand hygiene and on inanimate objects, The Antiseptic, 101 (2) (2004) 55- 57.
15. World Health Organization. Guidelines on hand hygiene in health care (Advanced Draft). Global patient safety challenge, 2005- 2006, 12-23.
16. John M. Boyce & Didier Pittet, Guideline for Hand Hygiene in Health-Care Settings, MMWR,(2002) 51(RR16)1-44.

17. Shaloo, Shayna Shafi, Simran Singh, Shashi Verma, Ritesh Kumar Tiwari and Devika Tripathi, Formulation and Development of Mint containing Herbal Hand Sanitizer, European Journal of Pharmaceutical and Medical Research, 2017 [11], 454 - 457.
18. Powar P. V, Bhandari N. R, Arya Ashwini, Sharma P. H., Formulation and Evaluation of Poly Herbal Anti - Bacterial Gel Based Hand Wash, International Journal of Pharmaceutical Sciences Review and Research, 2015; 33[1],79 – 82.
19. Greenaway, RE, Ormandy, K, Fellows, C,. Impact of hand sanitizer format
20. (gel/foam/liquid) and dose on its sensory properties. J Hosp Inf 2018; 2:411–416.
21. Ravi K, Pratibha MD & Kolhapure SA, Evaluation of the antimicrobial efficacy and safety of Pure Hands as a hand sanitizer: Indian Journal of Clinical Practice, 15(10) (2005) 19-27.
22. Snyder OP & Paul ST, Safe Hand Washing, Hospitality Institute of Technology and Management, (1988)11-21.
23. Black RE, Dykes AC, Anderson KE, Wells JG, Sinclair SP et al, Hand-washing to prevent diarrhea in day-care centers, Am J Epidemiol, 113 (1981)445-51.
24. Borgatta L, Fisher M & Robbins N, Handwashing, germicides and gloves, Woman & Health. Hand protection and protection from hands, 15(4) (1989) 77-92.
25. Suvarna Bhandane, Dr. Smita Takarkhede Pooja Kakade, Sangeeta Jaiswal Shreya Karaujiya & Algama Khan From " Formulation And Evaluation Of Herbal Hand Sanitizer " , World Journal Of Pharmaceutical Research By Volume 11, Page No- 695705.
26. Jyotsana Singh Chandravanshi, Alibha Rawat, N. Ganesh From " Formulation Of Hand Sanitizer From Herbs : A Review ", International Journal Of Science And Research [IJSR] By Volume 9, Issue- 6 Page No - 1399-1400.

