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Antibacterial Multi-herbal Hand Sanitizer Description and Review

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Abstract

Many hand sanitizers on the market contain alcohol formulations that can lead to various issues. In response, we have focused on developing alternative hand washing solutions using detergents to address problems such as dermatitis, itching, dryness, and irritation. Our current efforts involve creating a range of hand sanitizers enriched with ingredients like aloe vera gel, Rita, Azadirachta indica, holy basil, reetha fruit, eucalyptus (Nilgiri), rose, and citrus fruits. Additionally, we have incorporated Mimosa Leaf Extract (Don't Touch Me) and Argemon, a Mexican extract known for its ability to alleviate itching, dryness, irritation, and inflammation, including dermatitis. This plant boasts numerous medicinal properties. Skin testing is conducted to assess the effectiveness of the hand sanitizer using non-chemical parameters such as pH, viscosity, foam height, foam retention, disinfection efficacy, as well as colour, smell, and taste. While some side effects have been observed, the findings are limited. We have also evaluated the physical properties, pH, and viscosity of the detergent. Our formula demonstrates a reduction in hand bacteria compared to commercial hand sanitizers and can be used as a standalone hand sanitizer without any additives. The evaluation of our hand disinfectant aligns with standard values and our business plan. In conclusion, consumers are increasingly seeking natural cosmetics to mitigate allergic reactions and adverse effects. We advocate for further research to develop hand sanitizers that offer additional skin benefits.

Keywords: Hand disinfectant, antibacterial movement, fixings hand cleanliness, skin pathogens, *Azadirachta indica*

INTRODUCTION

Medicinal plant use is also known as phytotherapy. The use of seeds, roots, leaves, bark, flowers or plant parts for therapeutic purposes is called herbal medicine. Since the skin is the foremost obvious portion of the body, skin infections have to be avoided. Herbs have been used to treat the many diseases. [1] Hand washing is a vital way to assist battle the spread of infection. Hand washing evacuates obvious earth from hands and decreases the number of hurtful microorganisms. Harmful microbes and infections, such as *E. coli* and *Salmonella*, can be spread to food by individuals, other microbes, or medical equipment [2]. Sullied hands can work as vectors for the spread of germs. Outbreaks are transmitted from one person to another when a food handler contaminates their hands and then transfers these microorganisms to customers through hand contact with food or drinks [3]. Utilizing characteristic source has the advantage of being easily accessible, affordable, and safe compared to chemical products. Questioning has been greatly expanded to include the production of regular products with upgraded features. Despite being cheaper, chemical products are not hazardous and have no adverse effects.

The emergence of bacterial resistance to the currently available antimicrobial drugs necessitates early investigation in the revelation of modern, safe,

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and effective antimicrobial professionals. By using plant extracts with antibacterial properties, we can create a powerful antimicrobial expert in our home-grown hand wash.

Information on Homemade Soap and Cleaning Techniques

Hands are the primary exposed area of the body, and skin plays a crucial role in protecting against bacterial pathogens. The most crucial, least challenging, and tainted way to predict health care-related germs is through proper hand washing. Homegrown hand wash showcased is primarily composed of a blend infused with plants such as *Ocimum sanctum*, Aloe vera, *Azadirachta indica*, *Eucalyptus* spp. (nilgiri), and citrus fruits, chosen for their diverse chemical and therapeutic properties. In many infections and complications, *Ocimum sanctum* is traditionally used for antimicrobial action [4, 5].

Indian Medicinal Plants' Antimicrobial Properties

They provide a detailed account of the events through anecdotal evidence. There have been reports of inhibitory activity. Resisting certain microscopic and pathogenic organisms and parasites, using what you have. The utilization of plants as a remedy for ailments has been discovered to be an important factor in the healthcare system in India. Most practitioners in these Indian pharmaceutical systems create and distribute their own formulas. This requires appropriate documentation and inquiry [6]. The abundance of anti-infective chemicals in plants is noteworthy. The utilization of plant-based antimicrobials represents a significant potential in medicine that remains largely undiscovered. While avoiding some of the unfavourable outcomes with synthetic antimicrobial specialists, they are effective in treating bacterial diseases. Various microscopic organisms can be targeted by flavonoids and polypeptides found in advanced therapeutic herbs [7, 8].

PLANT MATERIAL

Aloe vera

- Kingdom: Plantae
- Order: Asparagales
- Division: Spermatophyta
- Subdivision: Angiospermae
- Class: Monocotyledoneae
- Family: Liliaceae
- Genus: *Aloe*
- *Species: barbadesis* Mill

Medicinal Use of Aloe vera

Aloe vera gel's anti-inflammatory properties offer help wounds repair faster due to its antibacterial properties. Aloe gel limits *Streptococcus pyogenes* and *Streptococcus faecalis*, two sorts of tiny living beings. It kills *Pseudomonas aeruginosa* by killing infinitesimal life forms. Aloe vera's liquid and leaf squash combat pathogenic fungi in plants. Moreover, the arranging of aloe gel prevents *Candida albicans.* By interfering with the mix of proteins, the lectin-rich fraction of aloe gel particularly curbs the advancement of *cytomegalovirus*. Aloe leaf anthraquinone subordinates have been showed up to kill included contaminations. The majority of diseases, checking *Varicella zoster*, flu, the pseudorabies disease, and herpes simplex contaminations, are inactivated by aloe emodin [9].

Neem

- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Division: Magnoliophyta
- Class: Eudicot
- Subclass: Rosidae
- Order: Sapindales
- Family: Meliaceae

- Genus: Azadirachta
- Species: *A. indica*

Medicinal Uses of Neem

Azadirachta indica may be a portion of the Meliaceae family of plants. Neem is its common title. It may be a source of various remedial pros in traditional medicine. It is known that neem leaves have antimicrobial and antifungal properties against an assortment of pathogenic tiny life forms, checking *E. coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa.* Neem may be an adaptable tree that has different prosperity benefits. It was outlined that diverse parts of the tree had antimicrobial properties against a wide run of microorganisms. Furthermore, Neem leaves can be utilized for the treatment of different sicknesses tallying dermatitis, ringworm, skin break out, exacerbation, reliable hurt contamination, hyperglycaemia, diabetic foot and gas gangrene [10].

Tulsi Leaves

- Kingdom: Plantea
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Lamiales
- Family: Lamiaceae
- Genus: Ocimum
- Species: *O. Tenuiflorum*
- Binomial name: *Osmium tenuiflorum*

Medicinal Uses of Tulsi

To treat ringworm and other skin diseases like leukoderma, a paste made from Tulsi leaves is applied to the affected area. Saffron and Tulsi leaves are combined in the treatment of chickenpox to alleviate the condition. In cases of elevated blood sugar levels, the ethanolic extract of Tulsi leaves leads to a significant drop in blood sugar [11].

Eucalyptus (Nilgiri)

- Kingdom: Plantae
- Division: Flowering plants
- Class: Dicotyledons
- Order: Myrtales
- Family: Myrtaceae
- Genus: Eucalyptus
- Species: Eucalyptus globulus
- Binomial name: Eucalyptus globulus Labill

Medicinal uses of Eucalyptus

(Nilgiri) *Eucalyptus camaldulensis* and *Eucalyptus urophylla* are well known to contain bioactive things that showed up antibacterial [12] analgesic and anti-inflammatory impacts [13], antioxidative and antiradical properties [14].

Mimosa pudica L. (Mimosaceae) in addition insinuated to as touch me not, live and pass on, disfavour plant and humble plant, is a prostrate or semi-erect subshrub of tropical America and Australia, in addition found in India. It is equipped with recurved thorns and having tricky fragile dim green leaflets that wrinkle and hang at night or when touched and cooled. It majorly has antibacterial, antivenom, antifertility, anticonvulsant, upper, aphrodisiac, and distinctive other pharmacological activities. The herb has been utilized generally for ages, inside the treatment of urogenital disarranges, piles, free bowels, sinus, and also applied on wounds [15].

Rose Oil

- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Rosales
- Family: Rosaceae
- Genus: Rosa
- Species: Centifoli

Medicinal Uses of Rose

In recent research, *Argemone Mexicana* has been chosen as the major component in a gel-based product. Rose oil may be utilized reasonably to diminish uneasiness, wretchedness and torment. It has repairing property, and moisturizes the skin. It advances skin tone and brightness. It makes a contrast to decrease imperfections, skin break out scars and gloomy spot [16].

MATERIALS AND METHODS

Method (*Extraction)*

Preparation of herbal leaf extracts:

Extraction of Neem

1. Modern neem leaves are collected and shade dried for 20 days.
2. The dried leaves are then powdered using a mortar and pestle.
3. The fuelled neem leaves are weighed 25 gm and macerated in a holder utilizing 100 ml of methanol.
4. The organized mix is kept secured with aluminium foil and kept for 3 days for maceration while stirring in between, and after that the mix was filtered utilizing a filter paper.
5. The overabundance dissolvable is vanished utilizing a rotary evaporator and after that the remaining mix was dried on a hot water bath.
6. The dried extract was collected and kept in desiccator for cooling.
7. The prepared extract is weighed [17].

Extraction Method of Tulsi

1. The samples of Tulsi leaves were isolated, washed with water, and then air-dried. The dried leaves were subsequently separated.
2. A methanolic extract was prepared from the Tulsi powder. Approximately 10 gm of finely powder of Tulsi was debilitated with 80 ml of methanol for 4 to 6 days. The alcoholic decoction was subjected to filtration to induce a clear filtrate [18].

***Mimosa pudica* L.**

The collected plants *Mimosa pudica* L leaves are taken and coarsely powdered. 10 gm of coarsely powdered leaves of plants were soaked in 200 ml of methanol and kept for maceration for almost 3–4 days. After maceration, the extricate is filtered and the filtrate was collected and utilized for making hand wash. Collected leaves of plants Aloe vera, Eucalyptus, and *Sapindus mukorossi* (reetha). Eucalyptus leaves and the entire plant were dried and powdered using a mixer processor. 100 grams of the powder was then fractionated using methanol, followed by distilled water, using a Soxhlet apparatus. At long last, solvents were recouped and extracts were lyophilized and put away at 40°C. Methanolic and fluid soxhlet divisions were used to look at antibacterial action and to formulate herbal hand wash. Natural products of *Sapindus mukorossi* (reetha) were dried, powdered and extricated using distilled water. Gel of Aloe vera were depleted and collected, whereas juice of citrus natural products was utilized to plan home grown detailing.

Table 1. Formulation of Poly herbal hand wash.

S.N.	Ingredients	Quantity taken Role	Use
1	Extract of *Aloe vera*	10 ml	Soothing Properties
2	Methanolic neem extract	*10 ml*	Antibacterial and Anti-inflammatory properties
3	Powder of Tulsi	10 gm	Moisturization and gentleness on the skin
4	*Sapindus mukorossi* (reetha)	Desired quantity	Produce sufficient foaming capacity and detergents as it possesses surfactant activity.
5	Eucalyptus	Desired quantity	Cooling Agents
6	Glycerine	6 ml	Moisturizing Agents
7	Methyl paraben	0.3 ml	Preservatives
8	Rose Water	10 ml	Fragrance
9	Purified water q.s	100 ml	

Formulation of Poly Herbal Hand Wash

Procedure

1. The methanolic extract of neem leaves is mixed with holy basil in 10 ml of water.
2. At that point, incorporate aloe vera juice twice.
3. In Indian tradition, reetha is utilized as cleansers as it possesses surfactant development. Reetha and other plant extracts are mixed together at 10% final concentration. This was utilized as domestically developed liquid hand wash and used further for its antibacterial activity.
4. Use *Argemon Mexican* to reduce skin itching.
5. Incorporate rose water for fragrance.
6. At that point, incorporate needed sum of glycerine and eucalyptus oil with coordinate blending.
7. At the end, add the additive in the appropriate amount. The solution is mixed thoroughly until homogeneous at room temperature and utilized for screening the activity (Table 1).

EVALUATION PARAMETERS

Appearance

The prepared two formulations of hand wash appear as:

1. Standard appears as: Light orange; and
2. Sample appears as: greenish yellow.

pH

The pH was chosen utilizing progressed pH meter; and the pH of domestic developed wash was found to be 5.2.

Odour

1. Standard: Aromatic.
2. Sample: Aromatic.

Viscosity

Determine the viscosity of detergent using the Oswald viscometer. Put 5 ml of detergent in a 25 ml beaker, pour the detergent into the Oswald viscometer and measure. Viscosity is found as:

For Standard	For sample
F1=20 sec	F1=13 sec
F2=22 sec	F2=15 sec
F3=20 sec; Average =20.66 sec	F3=13 sec Average =13.66 sec

Foam Height

1 gm of hand wash gel was taken and scattered in 50 ml refined water. Scrambling was traded to 500 ml measuring barrel. Volume was made up to 100 ml with water. 25-strokes were given and kept it aside. The foam height over the liquid volume was measured.

Stability Test

The stability studies for the Polyherbal Hand Wash Gel formulation were conducted by storing it at different temperature conditions such as 40°C, 25°C, and 37°C for 1 week. Throughout the stability assessments, no change in color or phase separation was observed in the formulated hand wash.

Froth Upkeep

50 ml of the Domestic developed hand wash was taken into a 200 ml graduated barrel and shaken 10-times. The volume of foam at 1-min inside for 6 min was recorded.

Skin Test

Easy to use after taking the sample. It does not harm the skin when used.

RESULT

The present study was conducted to formulate a multi-herbal compound hand wash using a gel base as the carrier. The formulation was prepared using primarily approved excipients that are compatible with similar hand cleansing formulations. It was organoleptically assessed to guarantee item steadiness and performed *in-vitro* antimicrobial test to demonstrate its viability to act against irresistible microbes.

CONCLUSION

Hands are the primary source of contamination related to skin, respiratory, and gastrointestinal illnesses. The domestically developed handwash with neem extract was successfully developed with antibacterial properties and enhanced quality with aloe vera juice as diminishing agent, *Mimosa pudica* and their combinations with Holy Basil are able of giving transcendent zone of inhibition to secure against the skin pathogens. Plant extricates, utilizing reetha showed higher antibacterial development. It additionally has moistening property diminishing the skin dryness. Thus, quality overhauled domestic developed hand wash definition with unique scent and potential antibacterial development was prepared. Rose oil was used for fragrance. The characterized hand wash was surveyed for different parameters like pH, colour, foaming capability, consistency and stability. The hand wash was found to be unfaltering in terms of incredible cleansing property. Pathogenic organisms such as *Staph aureus*, *E. coli*, and *Pseudomonas aeruginosa* have been shown to be effectively targeted by the formulation, without any negative impacts on human tissue.

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