

Formulation and Evaluation of Herbal Hand Sanitizer

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Abstract: *The main intention of this research is to prepare tulsi and Neem based herbal gel sanitizer by minimizing the alcoholic usage and to evaluate the anti-bacterial activity of this herbal sanitizer. Methods: tulsi and Neem gel sanitizer was prepared from the ethanolic extract of Ocimum Tenuiflorum and Azadirachta indica (along with addition of gel base prepared from HPMC-E15. Results: The tulsi and Neem gel sanitizer was formulated and evaluated for its phytochemical constituents present in tulsi and neem, organoleptic properties, irritancy test and the efficiency of anti-bacterial activity of tulsi was also evaluated and it is safe and effective against pathogens. Conclusion: As a natural herb, tulsi and neem which was a household ingredient could also be effectively formulated as a sanitizer that reduces the side effects of alcoholic sanitizer products and is a best source that acts effectively against a numerous pathogens..*

Keywords: tulsi, HPMC-E15 (hydroxypropyl methylcellulose), Pathogens

I. INTRODUCTION

Hands are primary mode of transmission of microbes and infections, Hand hygiene is, Therefore the most important measure to avoid the transmission of harmful germs and prevent The infections. Hand hygiene is the single most important, simplest, and least expensive means Of preventing nosocomial infections. Contaminated hands can serve as vectors for the Transmission of microorganisms. Pathogenic microorganisms accountable for outbreaks are Sprad from the hands of the food handler to others when the food handler contaminates his/her Hands and then passes these microorganisms to consumers via hand contact with food or drinks. The consumer is exposed following the ingestion of these microorganisms, which may cause Gastrointestinal illness. Hand contact with ready-to-eat foods represents a very important Mechanism by which pathogens may enter the food supply. Food handlers whose work Involves touching unwrapped foods to be consumed raw or without further cooking or other Forms of treatment have been identified as a particular risk group. To protect the skin from harmful micro organisms and to prevent spreading of many contagious diseases, hand washing is absolutely an important precaution. Food production workers and foodservice personnel must be taught to use correct hand and fingertip washing by management in preparation. Any health-care worker, caregiver or person involved in direct or indirect patient care needs to be concerned about hand hygiene and should be able to perform it correctly and at the right time reported a study that demonstrated a decline in diarrheal illnesses (due to Shigella, Giardia and rotavirus) in day care centers when employees were taught to use good hand washing procedures. Hand washing removes visible dirt from hands and reduce the number of harmful microorganisms such as, E. coli and Salmonella can be carried by people, animals or equipment and transmitted to food. By far the most common mode of pathogen transmission to food by the infected food handler is via faecally contaminated hands. Poor hand hygiene is the contributing factor. WHO has recommended all people should wash hands before during and after preparing food, before eating food, before and after caring for someone who is sick, before and after treating a cut or wound, after using the toilet and changing diapers or cleaning up a child who has used the toilet. After blowing your nose, coughing, or sneezing, after touching an animal or animal waste, after handling pet food or pet treats and after touching garbage. For generations, hand washing with soap and Water has been considered a measure of personal hygiene. The concept of cleansing hands with An antiseptic agent probably emerged in the early 19th century. As early as 1822, a French Pharmacist demonstrated that solutions containing chlorides of lime or soda could eradicate the Foul odors associated with human corpses and that such solutions could be used as disinfectants And antiseptics. In a paper published in 1825, this pharmacist stated that physicians and other Persons a tending patients with contagious diseases would benefit from moistening their hands With a liquid chloride solution. Several studies suggested that sanitizers with at least

70%Alcohol were suggested to kill 99.9% of the bacteria on hands. Alcohol-based hand sanitizersExist in liquid, foam, and easyflowing gel formulations. Sometimes combined with quats(quaternary ammonium cations) such as benzalconium chloride quarts are added at level up to200parts per million to increase antimicrobial effectiveness. Before the discovery of modern Medicine, plants were the main remedy for treating various diseases. With the advent of Different antibiotics microbes also gradually develop resistance to these substances. These Bring researchers interest towards the plants having antimicrobial properties. They try to exploitThe unique ability of different secondary metabolites to show persistent and prolonged activity Against broad spectrum of microbes. In this study we used Azadirachta indica, Ocimum Sanctum and Citrus limon due to their individual benefits. All parts of Azadirachta indica areUsed in many medicinal treatments like skin diseases, healthy hair, improve liver function; Detoxify the blood, anti-inflammatory, antidiabetic, antiviral, ant carcinogenic, immune Modulatory etc. Aqueous extract of stem bark has been shown to enhance the immune responseOf Balb-c mice to sheep red blood cells in-vivo. Traditionally, microbes incorporating hands are divided into resistant and transient flora resistant flora E.g. Staphylococcus azures and staphylococcus epidermis which always canonizing deeper skin layers which always resistant to mechanical removing and had over pathogenic potential Transient flora E.g. Staphylococcus aureus are the basically colonizes the superficial skin layers for short periods. Alcohol kills germs by destroying the cell membranes and denaturing proteins of bacterial cells.

Sanitizer

Defintion:

Sanitizer may be defined as a liquid or gel, typically one containing alcohol,That is used to clean the hands and kill bacteria, viruses, and other disease-causing agents onThe skin.

Advantage of Sanitizer

- Require less time than hand washing.
- Act quickly to kill microorganisms on hands.
- Are more accessible than sinks.
- Reduce bacterial counts on hands.
- Do not promote antimicrobial resistance.
- Are less irritating to skin than soap and water.
- Some can even improve condition of skin.

Properties of Sanitizer

- Apply procdut to the palm of one hand.
- It should be stable and should have a good appearance.
- It should soften on application to the skin.
- It should spread easily without dragging.Rub hands together.Rub the product overall surface of hands figers until hand are dry.

b. Role Of Sanitizer

Hand sanitiser kills pathogens present on our hands and diminishes transmission of germs also from one person to another. Sanitisers have ethyl alcohol, isopropyl alcohol, and the antibacterial substance triclosan.The use of hand sanitiser can help us fight against the Coronavirus effectively.

II. INTRODUCTION OF DRUG

1. NEEM

Scientific Name: *Azadirachta indica*

Odour:- Sapindales

Family:- Meliaceae

Kindom:- Plantae

Chemical Constituent: nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinat, gedunin, salannin, and quercetin.

Use:-

- Neem is an effective herb to treat hair loss.
- Due to its antibacterial, antifungal and anti-inflammatory properties, neem is an excellent way to curb dandruff.
- It helps the hair follicles to become stronger and also encourages hair growth.



Neem trees are attractive broad-leaved evergreens that can grow up to 30 m tall and 2.5 m in girth. Their spreading branches form rounded crowns as much as 20 m across. They remain in leaf except during extreme drought, when the leaves may fall off. The short, usually straight trunk has a moderately thick, strongly furrowed bark. The roots penetrate the soil deeply, at least where the site permits, and, particularly when injured, they produce suckers. This suckering tends to be especially prolific in dry localities. Neem can take considerable abuse. For example, it easily withstands pollarding (repeated lopping at heights above about 1.5 m) and its topped trunk resprouts vigorously. It also freely coppices (repeated lopping at near-ground level). Regrowth from both pollarding and coppicing can be exceptionally fast because it is being served by a root system large enough to feed a full-grown tree. The small, white, bisexual flowers are borne in axillary clusters. They have a honey like scent and attract many bees. Neem honey is popular, and reportedly contains no trace of azadirachtin. The fruit is a smooth, ellipsoidal drupe, up to almost 2 cm long. When ripe, it is yellow or greenish yellow and comprises a sweet pulp enclosing a seed. The seed is composed of a shell and a kernel (sometimes two or three kernels), each about half of the seed's weight. It is the kernel that is used most in pest control. (The leaves also contain pesticidal ingredients, but as a rule they are much less effective than those of the seed.) A neem tree normally begins bearing fruit after 3-5 years, becomes fully productive in 10 years, and from then on can produce up to 50 kg of fruits annually. It may live for more than two centuries.

2. Tulsi

Scientific Name: *Ocimum Tenuiflorum*

Odour:- Lamiales

Family :- Lamiaceae

Kindom:- Plantae

Chemical Constituent: Oleanolic acid, Ursolic acid, Rosmarinic acid, Eugenol, Carvacrol, Linalool, and B-caryophyllene

Use:-

- Lower blood sugar.
- Lower cholesterol.
- Ease inflammation and joint pain.
- Protect stomach.



The holy basil plant is a small annual or short-lived perennial shrub, up to 1 metre (3.3 feet) in height. The stems are hairy and bear simple toothed or entire leaves oppositely along the stem. The fragrant leaves are green or purple, depending on the variety. The small purple or white tubular flowers have green or purple sepals and are borne in terminal spikes. The fruits are nutlets and produce numerous seeds. The holy basil plant is revered in Hinduism as a manifestation of the goddess Lakshmi (Tulsi), the principal consort of the god Vishnu. The plant is especially sacred to Vaishnavites (devotees of Vishnu), and the Lord Krishna, an avatar of Vishnu, is said to wear a garland of holy basil leaves and flowers around his neck. The plant is grown in many Hindu homes, often in the courtyard in a dedicated four-sided structure, and the presence of a holy basil plant is believed to increase piety, foster meditation, purify, and protect. Devotees commonly worship in the morning and evening with mantras and offerings of flowers, incense, or water from the Ganges, and Tuesdays and Fridays are considered especially sacred. Even the ritual act of watering and caring for the plant, usually undertaken by the women of the house, is considered worshipful and meritorious. Holy basil is cultivated at many temples, and the woody stems of plants that have died are used to make beads for sacred japa mala (rosaries). The beginning of the Hindu wedding season is marked by a festival known as Tulsi Vivah, in which homes and temples ceremonially wed holy basil to Vishnu. Water infused with the leaves is often given to the dying to help elevate their souls, and funeral pyres are commonly fitted with holy basil twigs with the hopes that the deceased may obtain moksha and be liberated from the cycle of rebirth.

Objective-

- To formulate the herbal sanitizer.
- It is a good hand sanitizer,
- It is herbal product with zero Less side effects.
- It shows good antibacterial activity.
- Pharmacological studies have accepted the value of medicinal plants as a potential source of bioactive compound.

III. METHODS

1. Plant material

Fresh leaves of Rulsi and neem was collected from Chittegaon region and authenticated from Yashodeep institute of pharmacy, chha. Sambhajinagar. The leaves were dried in sunlight for 4-5 days, these leaves were ground coarsely by using mechanical blender and passes through 40 mesh sieve. Extraction Procedure Accumulated with the solvent at the siphon (or reflux arm) of the Soxhlet extractor. When the 50g of turmeric powder and orange peel powder respectively, were each weighed and put into the thimble of the Soxhlet extractor. 300ml of the solvent (ethanol) was measured with a measuring cylinder and poured into the still pot of the Soxhlet extractor, the apparatus was then coupled and the condenser unit was connected to an overhead water tank to cool rising solvent vapour. The heat source was a Bunsen burner operating at a temperature of 68°C. The solvent evaporated through the distillation path, thimble and the expansion adapter after which it condensed at the condenser unit of the Soxhlet extractor. At this point the condensed vapour returned to the thimble as liquid droplets and got in contact with the sample therein. It then broke the sample membranes to release the oil content which solvent in the thimble rose to the level of the siphon top, the entire content of the thimble and siphon was emptied back into the still pot of the Soxhlet extractor. The process was repeated severally for about nine refluxes in 3 hours after which the extraction process was completed. Temperature was regulated using a thermometer.

Procedure herbal hand sanitizer

Carbopol was added to deionized water with constant stirring. After uniform mixing. Triethanolamine (TEA) was added with slow stirring to avoid formation of possible bubbles in Vitex negundo extracts along with clove oil were added to denatured alcohol along with glycerine, polysorbate 20 was mixed with aqueous phase. Finally, 0.15gm Propyl Paraben was added as preservative and rose oil 0.15ml as perfume and mixed with slow stirring to obtain uniform product. Prepared product was stored in air tight containers.

Evaluation parameters

Various physicochemical parameters which are mentioned below were performed to establish quality of the prepared formulations.

1. Organoleptic evaluation

Clarity and color were checked by naked eyes against white background, the odor was smelled

2. Spreadability

Spreadability of the formulations was determined by measuring the spreading diameter of 5g of sample between two horizontal glass plates (10 cm x 20 cm) after one minute. The standard weight applied to the upper plate was 100g. Length of the glass slide (L): 20cm Weight of the sample (gms): 5gm Weight applied (M): 100gm Time taken (T): 16 sec. Formula for spreadability:-

$$S = \frac{M+L}{T} \times 100 \times 20 =$$

$$16$$

$$125 \text{g/cm/s}$$

3. pH

The pH of all the prepared formulations was determined by using Digital pH Meter. The formulations were dissolved in 100 ml of distilled water and stored for two hours. The measurement of pH of formulation was done in previously calibrated pH meter.

4. Determination of percentage free alkali

About 5 gm of sample was taken in a conical flask and added to it into 50 ml of neutralized alcohol. It was boiled under reflux on a water bath for 30 minutes, cooled and 1 ml of phenolphthalein solution was added. It was then titrated immediately with 0.1N HCL.

5. Irritancy test

20 volunteers were selected. the herbal hand sanitizer was applied On their palms and the time was noted irritancy, redness, dryness, and itching were checked.

6. High temperature stability

Liquid soap was allowed to stand at 50°C for one week. The stability of liquid soap was observed during this period. The sample which was homogeneous and stable liquid after standing was indicated as stable and the sample in which the crystals were roughened and the sample in which precipitation was caused; then liquid was said to be as unstable.

IV. RESULTS

The physicochemical parameters of the prepared soap and hand sanitizer were determined. Parameters such as color, odour, appearance, pH were tested. The formulations exhibited good appearance characteristics as well as the pH was found in the range of 6.5 to 7.0 which is the desired pH. Other parameters such as percentage free alkali, foam height, foam retention, and high temperature stability were determined.

V. CONCLUSION

Due to recent awareness regarding hygiene and sanitation, the usage of alcohol based sanitizers has elevated, irrespective of the side effects, therefore it is important to develop the eco friendly substitutes. This study confirmed the antimicrobial properties of aqueous extract extracted from the leaves of some plants like Eucalyptus, Sadabahar (*Catharanthus roseus*) and Neem (*Azadirachta indica*). The aqueous extract has more economical for commercial production than essential oil. Eucalyptus extract showed prominent antimicrobial properties therefore along with rose extract and glycerin was used to develop the hand sanitizer. The results showed that hand sanitizer effectively reduced bacterial load on hands to a varying degree.

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