

**FORMULATION AND EVALUATION OF HERBAL HAND SANITIZER**

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ABSTRACT:

Ayurveda is a rich source of vast information on therapeutic potentials of numerous herbs. Many simple to complex formulations can be prepared by using the therapeutic attributes of these herbs. Therefore, in the work, an attempt has been made to initiate the manufacturing of Ayurveda hand sanitizers based of various Ayurvedic medicated drugs mentioned in Samhitas, as developing countries such as India are facing a shortage of hand sanitizers which is must prevent the spread Covid-19.

The purpose of present study was to prepare herbal hand sanitizer incorporating the leaves extracts of *Ocimumcanctum* Linn.(Tulsi)and *Eucalyptus globulus* (Nilgiri), the well-known herbal combination with multidimensional activities; and to evaluate their respective antimicrobial efficacy and safety of hands.

Keywords: Sanitizer, Herbal, Formulation, Evaluation, antimicrobial,

INRODUCTION:

Hand hygiene is now regarded as one of the most important elements of infection control activities. In the wake of the growing burden of health care associated infections, the increasing severity of illness and complexity of treatment, superimposed by multi-drug resistant pathogen infections, health care practitioners are reversing back to the basics of infection preventions by simple measures like hand hygiene. This is because enough

scientific evidence supports the observation that if properly implemented, hand hygiene alone can significantly reduce the risk of cross-transmission of infection in healthcare facilities. Washing hands with soap and water is the best way to reduce the number of microorganisms (germs) on hands. Hand hygiene is of utmost importance as it may be contaminated easily from direct contact with airborne microorganism droplets from coughs and sneezes. Particularly in situations like pandemic outbreak, it is crucial to interrupt the transmission chain of the virus by the practice of proper hand sanitization. It can be achieved with contact isolation and strict infection control tool like maintaining good hand hygiene in hospital settings and in public.

The success of the hand sanitization solely depends on the use of effective hand disinfecting agents formulated in various types and forms such as antimicrobial soaps, water-based or alcohol-based hand sanitizer, with the latter being widely used in hospital settings. To date, most of the effective hand sanitizer products are alcohol-based formulations containing 62%–95% of alcohol as it can denature the proteins of microbes and the ability to inactivate viruses.

This systematic review correlated with the data available in Pubmed, and it will investigate the range of available hand sanitizers and their effectiveness as well as the formulation aspects, adverse effects, and recommendations to enhance the formulation efficiency and safety. Further, this article highlights the efficacy of alcohol-based hand sanitizer against the coronavirus. Hand hygiene is a vital principle and exercise in the prevention, control, and reduction of healthcare-acquired infections. Right hand washing and drying methods stop the chain of transmission of deadly pathogens (from the contaminated surface/site) from hands to other parts of the body. Hand sanitization is the preeminent aid in preventing nosocomial infections caused by different opportunistic microorganisms and to get this, the use of hand sanitizer becomes must in recent circumstances.

When soap and water are not readily available, alcohol-based hand sanitizers or rubs are acceptable. Hand sanitizers are effective against bacterial and fungal infections, as well as enveloped viruses, such as the common cold and flu viruses and in preventing nosocomial infections caused by different opportunistic microorganisms. Alcohol rub sanitizers containing at least 70% alcohol kill 99.9% of the bacteria on hand 30 seconds after application and 99.999% in 1 minute (10). Cleansing products powered by natural essences like witch hazel, bitter orange peel extract, thyme, lavender (a popular one), and even organic alcohol are on the rise.

Medicinal plants produce a diverse range of bioactive molecules, making them rich source of different types of medicines. Pharmacological studies have accepted the value of medicinal plants as potential source of bioactive compounds (WHO survey, 1996). Phytochemicals are secondary metabolites, which are produced by medicinal plant.

So, different studies and sanitizer formulation were carried out. Sanitizer with complex chemicals as well herbal sanitizer was formulated and their efficacy were checked against various groups of organisms. Like, in this research three herbal sanitizers were formulated from neem and lemon. As, Neem *Azadirachta indica* extract is an important source of compounds having anti-microbial, anti-oxidant, anti-tumor, anti-malarial, anti-fungal, anti-inflammatory and anti-viral properties and Lemon Citrus limon is an important medicinal plant, antibacterial potential in crude extracts of different parts (viz., leaves, stem, root, fruit and flower) of lemon against clinically significant bacterial strains has been reported (6). Hence in this studies neem leaves and lemon juice is been use their antimicrobial properties were studied and accordingly sanitizers were formulated.

Hygiene is defined as maintenance of cleanliness practices which carries utmost importance in maintenance of health. Keeping bodily hygiene and usage of cleansers are requisites of healthy living. These concepts highlight the need of maintaining hygiene in prevention of diseases. Although good & simple hygiene technique is single most important, easy and least expensive means of preventing health care-associated (nosocomial) infections and the spread of antimicrobial multidrug resistance; but, unfortunately poor hand-hygiene practices are still observed due to lack of scientific knowledge, unawareness of risks and unavailability of hand-hygiene facilities². Nosocomial infections are those which acquired or originated in a hospital or health care setting and are result of high prevalence of pathogens, high prevalence of compromised hosts, efficient mechanisms of transmission from patient to patient.

Thus, occurrence of nosocomial infections is alarmingly increasing and has emerged as a serious concern in hospital care outcome; resulting in prolonged hospitalization, ample disease and mortality, and excessive costs. *Escherichia coli*, *Pseudomonas* spp., and *Staphylococcus aureus* are commonly involved opportunistic microorganisms that primarily cause nosocomial infections. Generally infectious sites are urinary tract, surgical wounds, respiratory tract, skin, blood, gastrointestinal tract, and central nervous system. These pathogens also tend to become incorporated into the normal flora of health care workers. *Pseudomonas aeruginosa* is the most commonly detected microorganism in hospitalized patients and immunosuppressed people. Opportunistic fungal infections have become very

important especially in HIV patients and the highest frequencies of opportunistic fungal infections documented are candidiasis, aspergillosis and cryptococcosis⁴. Usually, microbes residing on the hands are divided into resident and transient flora. Resident flora (e.g., *Corynebacterium diphtheriae*, *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Streptococcus viridans*) colonizing deeper skin layers are more resistant to mechanical removal has lower pathogenic potential. Transient flora (e.g., *Staphylococcus aureus*, Gram-negative bacilli, *Candida* species) colonizes the superficial skin layers for short periods, is usually acquired by contact with a patient or contaminated environment and these microorganisms are easily removed by mechanical means such as hand washing and are responsible for most health care-associated infections and the spread of antimicrobial resistance. In the current scenario of mechanized life style; a consumer will always prefer ready-made formulation of alcohol hand rub rather than hand washing (application of a non-antimicrobial or antimicrobial soap; and mechanical friction is generated by rubbing the hands together for 1 minute, followed by rinsing with water, and then drying thoroughly with a disposable towel)⁵. Traditional healers have long used plants to prevent or cure infectious conditions. Plants are rich in a wide variety of secondary metabolites, such as tannins, terpenoids, alkaloids, and flavonoids, which have been found in vitro to have antimicrobial properties.

Considering this ultimatum; an attempt has been made to screen classical literature for the herbs with antimicrobial properties and found that, *Ocimum sanctum* (Tulsi leaves), *Eucalyptus globulus* (Nilgiri leaves) and *Azadirachta indica* (Neem leaves) has those antimicrobial activities. To formulate and evaluate herbal sanitizer comprise of combination of alcoholic extracts of *Ocimum sanctum* (Tulsi), *Azadirachta indica* (Neem) and *Eucalyptus globulus* (Nilgiri) using suitable excipients; which can be used as a ready-made herbal hand sanitizer.

Applications of Neem

Neem is an omnipotent tree and a sacred gift of nature. Neem tree is mainly cultivated in the Indian subcontinent. Neem has been used in India for over thousands of years for its medicinal properties. They are proved to have antifungal, antibacterial, antiviral and deep cleansing properties. All parts of neem are used for preparing many different ayurvedic formulations external as well internal, especially for skin.

Neem has many antibacterial properties and can be used in natural, herbal sanitizers around the world. Hand sanitizers are found everywhere, from hospitals to schools to

shopping centres. However, many of the typical sanitizers contain ingredients that kill all bacteria on the application area, good and bad.

Applications of Tulsi

Tulsi is well known for its anti-microbial properties making it a natural disinfectant and the perfect ingredient to be used in a sanitizer providing effective protection. Infused with the added benefits of Neem and other natural ingredients like aloe vera, formulate the safest shield for your kids with no concerns about the negative effects of harsh chemicals on their sensitive skin. Nowadays, as sanitizer has become a most wanted and needed a companion in our daily life due to the prevailing pandemic era; Tulsi and Neem sanitizer will serve the purpose for you as well as your little ones due to its kid-friendly composition ensuring total hand hygiene.

Applications of Aloe Vera

Hand sanitizers contain mainly alcohol, due to which their regular use can excessively dry out your hands. That is why moisturizing agents are added to kill those germs and still keep your hands hydrated. Since the world is battling against the COVID-19 pandemic, it is crucial to sanitize your hands every few minutes so that they can stay clear of germs. However, continually sanitizing the hands can irritate the skin and cause burning, cracking, and redness, especially between the fingers. That is why it is important to add a moisturizing agent to the sanitizers, one of the best ones being aloe vera. Aloe vera contains vitamins, amino acids, and minerals that keep your skin healthy. Antibacterial properties of aloe vera help in preventing the growth of bacteria and other germs on your hands.

So, when it comes to hand sanitizers, those containing aloe vera deliver a plethora of benefits. If you choose the best, you can be sure that your hands will remain germs free, and your skin too will stay nourished without being stripped off its natural oils.

Application of Hibiscus:

- ✚ This high mucilage content of hibiscus enhances the skins' ability to retain moisture, which is a key factor in retaining a youthful complexion.
- ✚ The naturally moisture rich quantities of hibiscus help skin stay hydrated soft and supply for longer, keeping, dry, dull skin at bay.
- ✚ Hibiscus is rich in antioxidants called anthocyanin's, which fight off free- radicals that help to prevent skin ageing and decrease information.
- ✚ It also has natural surfactants (called saponins) that cleanse the skin in the process.

DRUGS AND CHEMICALS:

Neem leaves, tulsi leaves, aloe vera leaves, hibiscus flower petal.

Ethyl alcohol 50%, glycerine, rose water.

EXTRACTION OF PLANT MATERIAL:

Neem and Tulsi leaves extract, aloe vera and alum and camphor extract, hibiscus petal extract.

ACTIVE INGREDIENT:

Ethyl alcohol 50% v/v.

Glycerine

Rose Water

Tulsi Leaves

Neem Leaves

Alum

Camphor

Aloe Vera

Hibiscus Foulter petals

METHOD OF PREPRATION

- 1) Clean the working surface.
- 2) Wash your hands and put on a clean lab coat or an apron.
- 3) Gather the ingredients and place within easy reach.
- 4) Add Neem and Tulsi Leaves.
- 5) Boil the water with those leaves thoroughly for several minutes.
- 6) Then another beaker add the aloe Vera gel from freshly cut aloe Vera leaf
- 7) Boil the water for a few more minute and add alum and camphor to it.
- 8) Allow this mix to cool completely.
- 9) Filter the mix property and store.
- 10) Add hibiscus flouter's petals, boil the water for a several minute and the mix filter properly.

- 11) Use the measuring cylinder to measure ethyl alcohol 50% v/w and glycerin into the mixing container.
- 12) Add all the extract together and filter the mixture.
- 13) Then added the rose water.
- 14) Then performing the charcoal cavity test.
- 15) Store the mixture in plastic container.
- 16) Store the bottle for 72hr before use to make sure that any microbes that may have been present in the making container of the new/reused bottle are destroyed.

Evaluation of Herbal Sanitizer:

The hand sanitizer gels were evaluated for organoleptic properties, density, dispersive power, and homogeneity. The hand sanitizers were thereafter sensorial assessed in 20 volunteers by the interview questionnaires. Homogeneity test aims to look at the stability of the gel during storage. Homogeneity of hand sanitizer gel dosage was investigated by placing it on two objective glasses and the result showed the homogeneous form of a transparent gel.

A lot of sanitizers including this hand sanitizer also include humectant, for instance, glycerine, in the formulation to reduce the incidence of dry skin associated with the use of alcohol-based products as the alcohol can strip away sebum that helps to keep the skin moist.

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 antimicrobial resistance. Scientific evidence and ease of use support of alcohol-based hand sanitizers during patient care. It may be concluded that Herbal Hand Sanitizer made up from *Ocimumcanctum* Linn. (Tulsi) and *Eucalyptus globulus* (Nilgiri) has a cleaning property. Various tests were performed and we got positive result.

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