

Formulation of Hand Sanitizers from Herbs: A Review

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Abstract: Hand sanitizer is an alternative to the hand washing with soap and water. Hand sanitizer is the most important measure to avoid the transmission of harmful microbes and prevent the infections, to keep the skin safe from harmful microorganisms and to prevent spreading of many infectious diseases. Hand sanitizers are available in the form of liquid, foam or easy flowing gel formulation. Both alcohol and alcohol-free hand sanitizers are available in the market. But the regular use of alcoholic sanitizer destroys your hand skin; therefore, there is a need to prepare alcohol-free sanitizer and herbal hand sanitizer which is mild to skin and effective at killing germs. Plants are rich source of vast variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids etc. and which have been found to possess antimicrobial properties. The current review work attempts to summarize the work of researchers in India and worldwide who are engaged in the studies of herbs as potential antimicrobials for the development of herbal hand sanitizers. **Method:** Extensive electronic search was used to collect and analyze relevant data on herbal sanitizers using PubMed, EMBASE and Cochrane. **Result:** Various relevant studies were obtained that threw light on the herbal antimicrobial properties and their potential use as hand sanitizers. Some herbs that are used to prepare herbal hand sanitizers are *Ocimum sanctum* (tulsi leaves), *Eugenia caryophyllus* (clove), *Cymbopogon flexuosus* (lemon grass), *Aloe baarbadensis* (aloe), *Mentha arvensis* (mint), *Azadirachta indica* (neem), *Eucalyptus globulus* (eucalyptus). In the current era of Covid-19 pandemic outbreak, the applications of these sanitizers have become double fold and these are much needed. Several herbal sanitizers are being introduced in the market such as Puro herbal hand sanitizer gel, Himalaya pure hand sanitizer, and Feel Alive hand sanitizer etc.

Keywords: Alcohol, alcohol-free, alkaloids, antimicrobial properties, flavonoids, hand sanitizer, herbal hand sanitizer, microbes, tannins, terpenoids

1. Introduction

Hands are the first and the most important mode of transmission of microbes and infections. Hand hygiene is the most important measure to avoid the transmission of harmful microbes and prevent the infections. To keep the skin safe from harmful microorganisms and to prevent spreading of many infectious diseases, proper hand washing and hand sanitizing is absolutely an important precaution. People working in hospitals and laboratories need to keep their hands clean to avoid infections, so hand washing and hand sanitization play important role (Ghosh *et al.*, 2018).

Hand sanitizers decrease the level of microorganisms by killing them chemically, just like disinfectants kill the germs on environmental surfaces. The hand sanitizers are available in the form of liquid, foam or easy flowing gel formulation (Ali *et al.*, 2015).

The alcoholic gel-based sanitizers have gained successful profit in consumer markets. The products are effective and appropriate to use but regular use of these sanitizers destroys your hand skin; therefore, the need for non-flammable hand sanitizer, mild to skin and effective at killing germs were required. To fulfill the needs of the demanding market for herbal softer sanitizers, various non-alcohol hand sanitizers effective against bacteria came into being.

Herbal hand sanitizer prepared from herbs consist of combination of alcoholic extracts of *Ocimum sanctum*, *Eucalyptus globules*, *Azadirachta indica*, *Cuscuta reflexa*, *Mentha arvensis* showed potent antimicrobial activity (Wani *et al.*, 2013).

These products are generally used by the doctors, surgeons before and after the surgery, pathologists and researchers and also at restaurants, toiletries, etc. The medical and applied life science colleges in their laboratories also have hand sanitizers, which the students use after every practical class (Ali *et al.*, 2015).

Several studies have been done in the field of antimicrobial activities of herbs. One such important work done by Balakrishna *et al.*, (2018) to evaluate the antibacterial efficacy of various herbal oils such as Cinnamon oil, Eucalyptus oil, menthol oil and lavender oil and found that cinnamon oil showed better antibacterial activity. They also formulated and evaluated poly-herbal hand wash gel containing *Azadirachta indica*, *Ocimum sanctum* and *Citrus lemon* extracts. The anti-microbial activity of the formulated herbal hand wash gel was tested against *Escherichia coli*, *Staphylococcus aureus* and *Salmonella* by spread plate techniques and the results obtained were compared with commercial antibacterial standards and found to be very effective and supported the use of herbs in the formulations of hand sanitizers to give a better effect¹.

Another relevant study involves the preparation of herbal hand sanitizer using leaves extracts of *Ocimum sanctum*, *Eugeniacyrophyllus* and *Cymbopogon flexuosus* by Thombare *et al.*, (2015)⁴. The prepared herbal hand sanitizer gave better results than the commercially available synthetic hand sanitizer against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. It also showed better efficacy in reducing higher number of microorganisms from the hands as compared to commercial synthetic hand sanitizer. Thus, the study supported the use of herbal extracts in the preparation of herbal hand sanitizers on commercial scale.

In a study done by **Yousaf Ali (2015)**, the effectiveness of both Alcohol/ non-alcohol based hand sanitizers were tested against the standard *Staphylococcus aureus* and *E. coli*. The evaluation of the hand sanitizer is done by Kirby-Bauer technique. In the study, the non-alcoholic sanitizer viz. Alemlaq (Alkyl Dimethyl Benzyl Ammonium chloride) was found to be more effective than other alcoholic sanitizer against *Staphylococcus aureus*. Similarly Lux (Sodium laurate) was found to be more effective than other alcoholic sanitizer against *E. coli*.

Thus, the various studies done to prepare herbal hand sanitizer incorporating the leaves extracts of various selected plants with multidimensional activities with their respective antimicrobial efficacy and efficiency supported the use of herbs for the formulation of hand sanitizer. These were evaluated against specified microorganisms like (Bacteria- *E. coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Bacillus subtilis* and Fungi- *Sacchromyces cerevisiae* and *Candida albicans*) by culture sensitivity test. The significance was found to be more in comparison to the standard reference.

2. Conclusion

It is concluded from the various studies that herbs are very useful agents that can be used as hand sanitizers with lesser side effects and long lasting effects. These herbal formulations have shown even better results than the commercially available alcohol-based sanitizers. Some useful Indian herbs that can be used for sanitizer making are *Cuscuta reflexa*, *Eucalyptus globulus*, *Ocimum sanctum*, *Ocimum grarissum*, *Azadirachata indica*, *aloe*, *Mentha arvensis*, *Ocimum sanctum*, *Eugeniacyrophyllus* and *Cymbopogon flexuous* as some of these have been found to be effective against pathogenic bacteria like *Staph aureus*, *E. coli* and *Pseudomonas aeruginosa* with no side effects on human tissue.

References

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