

Nature's Shield: The Promise of Herbal Hand Sanitizers

Shruthi Sridhar

Dept. of Zoology, Jyoti Nivas College, Autonomous, Bangalore, India

DOI: <https://doi.org/10.52403/ijshr.20240406>

ABSTRACT

With the rise in awareness of hygiene practices, particularly hand hygiene, the demand for effective sanitizers has surged. Herbal hand sanitizers have emerged as a natural alternative to chemical-based products, boasting antimicrobial properties derived from plant extracts. This review explores the efficacy of various herbal extracts, including *Azadirachta indica* (Neem), *Citrus limon* (Lemon), and *Ocimum sanctum* (Tulsi), in formulating effective hand sanitizers. We discuss their antibacterial effects, compare them with conventional alcohol-based sanitizers, and evaluate their potential applications beyond hand hygiene. The findings suggest that herbal sanitizers offer a sustainable and safe solution to infection prevention.

Keywords: Sanitizers, antimicrobial, Herbal, antibacterial, natural alternatives

INTRODUCTION

Hand hygiene plays a crucial role in preventing the transmission of infections, especially in healthcare settings, food production, and day care facilities. The World Health Organization (WHO) emphasizes the importance of hand hygiene in curbing the spread of pathogens. Traditional hand sanitizers, particularly those containing high concentrations of alcohol, are effective but often lead to skin irritation and

dryness. This has prompted a growing interest in herbal alternatives, which leverage the antimicrobial properties of various plants. Herbal sanitizers not only provide a safer alternative but are also environmentally friendly. Many plants possess bioactive compounds that exhibit antimicrobial effects, making them suitable candidates for inclusion in hand sanitizers. This review delves into the efficacy of herbal sanitizers, their formulations, and the benefits they offer over traditional products.

ANTIMICROBIAL PROPERTIES OF HERBAL EXTRACTS

Neem (*Azadirachta indica*) is known for its broad spectrum of biological activities, including antibacterial, antiviral, and antifungal properties. Studies have demonstrated that neem extracts effectively inhibit a range of pathogens, including *Escherichia coli* and *Staphylococcus aureus* (Rutuja and Dr. Nayna, 2018; Fatima et al., 2015; Zeeshan et al., 2013). The active compounds, such as azadirachtin and nimbidin, contribute to its antimicrobial efficacy, making neem a valuable ingredient in hand sanitizers. Lemon (*Citrus limon*) is a potent medicinal plant with antibacterial properties attributed to its rich content of flavonoids and citric acid. Research indicates that lemon extracts demonstrate significant antimicrobial activity against clinically relevant bacterial strains (Satoru et al., 2000;

Masoumian and Zandi, 2017). Its pleasant scent enhances the user experience, making it an appealing choice for hand sanitizers. Tulsi (*Ocimum sanctum*) has been revered in traditional medicine for its health benefits. Studies have shown that tulsi possesses antimicrobial and anti-inflammatory properties, making it effective against various pathogens (Imaël and Juliani, 2012; Cogen et al., 2008). Incorporating tulsi into hand sanitizers can enhance their overall efficacy while providing additional therapeutic benefits. Herbs such as eucalyptus, peppermint, and cinnamon also demonstrate antimicrobial properties. Eucalyptus oil, for instance, has significant antibacterial activity (Behrooz et al., 2013; Mendel et al., 2002). The combined use of multiple herbal extracts can enhance the overall effectiveness of the product.

FORMULATION AND EVALUATION OF HERBAL HAND SANITIZERS

The formulation of herbal hand sanitizers involves the careful selection of plant extracts, preservatives, and thickening agents. Various studies have highlighted the successful formulation of hand sanitizers using herbal extracts, showcasing their antimicrobial efficacy (Dipti and Kamna, 2019; Joshi et al., 2008; Marjorie, 1999). The efficacy of herbal hand sanitizers is evaluated using microbiological methods, including the spread plate technique and zone of inhibition assays. These methods assess the antimicrobial activity of the formulated products against common pathogens such as *E. coli* and *Staphylococcus aureus* (Pascal et al., 2002; Zeeshan et al., 2013). Results indicate that herbal formulations often exhibit comparable or superior efficacy to traditional alcohol-based sanitizers (Fatima et al., 2015; Sunanda and Kolhapure, 2004). Stability testing ensures that herbal hand sanitizers maintain their efficacy over time. Formulations containing 4.04% and 7.77% *Salam* bark extract

demonstrated good physical stability after 12 weeks of storage (Raharivelomanana et al., 1989; Thomas et al., 2015). Safety testing is crucial, as herbal products must be non-irritating and suitable for prolonged use (Sunanda and Kolhapure, 2004; Philip, 1998). While alcohol-based sanitizers effectively kill pathogens, they can lead to skin dryness and irritation. Research shows that herbal hand sanitizers provide a viable alternative that minimizes these side effects (Kailaivani and Bakiya Lakshmi, 2019; Salma and Zeeshan, 2013). In comparative studies, herbal formulations have been found to offer antimicrobial protection without the harsh effects associated with high alcohol concentrations (Thomas et al., 2015). Herbal extracts not only enhance antibacterial properties but also provide additional benefits, such as antioxidant activity and skin hydration (Zeeshan et al., 2013; Masoumian and Zandi, 2017). This multifaceted approach positions herbal hand sanitizers as a holistic solution for maintaining hand hygiene.

Herbal sanitizers extend beyond hand hygiene. Neem-based formulations can be utilized as disinfectants due to their potent antimicrobial properties (Rutuja and Dr. Nayna, 2018; Fatima et al., 2015). The anti-biofilm activity of herbal extracts suggests potential applications in oral care products, providing further avenues for utilizing these natural ingredients (Salma and Zeeshan, 2013; Marjorie, 1999).

CHALLENGES AND FUTURE DIRECTIONS

Despite the promising benefits of herbal hand sanitizers, challenges remain regarding standardization and regulatory approval. Ensuring consistent quality and efficacy across batches is critical for consumer safety. Further research is needed to explore the long-term effects of these products on skin health and microbial flora. Future studies should focus on optimizing formulation techniques, enhancing

the bioavailability of active compounds, and conducting large-scale clinical trials to validate the efficacy of herbal sanitizers. As consumer demand for natural products continues to rise, the potential for herbal hand sanitizers to play a significant role in public health is immense.

CONCLUSION

Herbal hand sanitizers represent a sustainable and effective alternative to traditional alcohol-based products. With their proven antimicrobial properties and skin-friendly nature, they offer a viable solution for maintaining hygiene while promoting skin health. The incorporation of herbal extracts like neem, lemon, and tulsi enhances the efficacy of hand sanitizers and supports a holistic approach to health and wellness. As the global emphasis on hygiene continues to grow, herbal hand sanitizers could become a staple in both personal and professional settings.

REFERENCES

1. Amar S, Resham V, Saple DG. Aloe Vera: A short review. *Indian J Dermatol*. 2008;53(4):163–6.
2. Behrooz AB, Farideh TY, Ali M, Fatemeh Z, Mohammad MG, Alireza V. Effect of aqueous and ethanolic extract of *Eucalyptus camaldulensis* L. on food infection and intoxication microorganisms in vitro. *J Paramed Sci*. 2013;4(3):2008-4978.
3. Cogen AL, Nizet V, Gallo RL. Skin microbiota: A source of disease or defence? *Br J Dermatol*. 2008;158(3):442–55.
4. Dipti S, Kamna S. Formulation of an herbal substitute for chemical sanitizer and its evaluation for antimicrobial efficiency. *Int J ChemTech Res*. 2019;12(3):114–20.
5. Elizabeth S, Sally FB. The survival and transfer of microbial contamination via cloths, hands and utensils. *J Appl Bacteriol*. 1990;68:271–8.
6. Elmastaş M, Gülçin İ, Işildak Ö, Ibaoglu K, Aboul-Enein HY. Radical scavenging activity and antioxidant capacity of bay leaf extracts. *J Iranian Chem Soc*. 2006;3:258–66.
7. Fatima XG, Sowmya KV, Darsika C, Arul J, Shanmuganatham S. Polyherbal hand sanitizer: formulation and evaluation. *Indian J Pharm Pharmacol*. 2015;2(2):143–4.
8. Imaël HNB, Juliani HR. Essential oils in combination and their antimicrobial properties. *Molecules*. 2012;17(4):3989–4006.
9. Joshi MG, Kamat DV, Kamat SD. Evaluation of herbal handwash formulation. *Nat Prod Radiance*. 2008;7(5):413–5.
10. Kailaivani R, Bakiya Lakshmi. A study on evaluation and effect and its anti-bacterial activity of herbal hand sanitizers. *Int J Res Ayurveda Pharm*. 2019;10(4):26–9.
11. Kojo E, Qian H. Aloe Vera: a valuable ingredient for the food, pharmaceutical and cosmetic industries—a review. *Crit Rev Food Sci Nutr*. 2004;44(2):91–6.
12. Liesel GB, Ignazio F, Rosalía F, Martín JE. Antimicrobial activity of cinnamon (*Cinnamomum zeylanicum*) essential oil and its main components against *Paenibacillus larvae*. *J Appl Microbiol*. 2008;12:76–89.
13. Marjorie MC. Plant products as antimicrobial agents. *Clin Microbiol Rev*. 1999;12(4):564–82.
14. Masoumian M, Zandi M. Antimicrobial activity of some medicinal plant extracts against multidrug resistant bacteria. *Zahedan J Res Med Sci*. 2017;19:11–23.
15. Mendel F, Philip RH, Robert EM. Bactericidal activities of plant essential oils and some of their isolated constituents against *Campylobacter jejuni*, *Escherichia coli*, *Listeria monocytogenes*, and *Salmonella enterica*. *J Food Prot*. 2002;65:1545–60.
16. Mohammadmehdi F, Jamshid K. Inhibitory activity of Aloe Vera gel on some clinically isolated cariogenic and periodontopathic bacteria. *J Oral Sci*. 2012;54(1):15–21.
17. Nguefack GJ, Budde BB, Jakobsen M. Five essential oils from aromatic plants of Cameroon: their antibacterial activity and ability to permeabilize the cytoplasmic membrane of *Listeria innocua* examined by flowcytometry. *Lett Appl Microbiol*. 2004;39:359–400.
18. Pascal JD, Karen S, Benoit G, Giuseppe JM. Antimicrobial activity of individual and mixed

- fractions of dill, cilantro, coriander and eucalyptus essential oils. *Int J Food Microbiol.* 2002;74(1-2):101-9.
19. Philip A. Aloe Vera revisited. *Br J Phytother.* 1998;4:176-83.
 20. Raharivelomanana PJ, Terrom GP, Bianchini JP, Coulanges P. Study of the antimicrobial action of various essential oils extracted from Malagasy plants. *Arch Inst Pasteur Madagascar.* 1989;56:261-71.
 21. Rutuja SP, Dr. Nayna C. Formulation of herbal sanitizers and determining their antimicrobial activities against skin pathogens. *Int J Innovative Sci Res Technol.* 2018;3(8):26-33.
 22. Salma K, Zeeshan A. Herbal disinfectants: A review. *World J Pharm Res.* 2013;3(1):258-73.
 23. Satoru K, Yasuhiko T, Eriko K, Kazunori O, Masamichi Y, Meisaku K, Chihiro I, Hiroshi F. Quantitative study of flavonoids in leaves of Citrus plants. *J Agric Food Chem.* 2000;48:3865-71.
 24. Sunanda M, Kolhapure SA. Evaluation of the antimicrobial efficacy and safety of PureHands herbal hand sanitizer in hand hygiene and on inanimate objects. *The Antiseptic.* 2004;101(2):55-7.
 25. Supinya T, Hirotsugu M, Norio N, Masao H, Takuya K, Toru O, Tomokazu Y, Tamio F, Tanomjit S, Supreeya Y, Pranee R, Sukanya D. HIV-1 integrase inhibitory substances from *Coleus parvifolius*. *Phytother Res.* 2003;17(3):232-9.
 26. Thomas JS, Elsie MT, Mei-Chiung S, Elissa AR, Grace ML, Dennis R, Donald AG. A randomized, controlled trial of a multifaceted intervention including alcohol-based hand sanitizer and hand-hygiene education to reduce illness transmission in the home. *Pediatrics.* 2015;116(3):587-94.
 27. Tomas H, Juan G. Tetrahydro-beta-carboline alkaloids occur in fruits and fruit juices. Activity as antioxidants and radical scavengers. *J Agric Food Chem.* 2003;51(24):7156-61.
 28. Usha S, Srinivasan S. Antibacterial activity of herbal hand sanitizers: a comparative study. *Int J Pharm Sci Rev Res.* 2003;24(1):55-7.
 29. Zeeshan A, Waqas M, Salma K. Efficacy of herbal sanitizer. *Int J Sci Res Publ.* 2013;3(4):1-3.

How to cite this article: Shruthi Sridhar. *Nature's Shield: the promise of herbal hand sanitizers. International Journal of Science & Healthcare Research.* 2024; 9(4): 37-40. DOI: <https://doi.org/10.52403/ijshr.20240406>
