Tea Tree

Tea tree (Melaleuca alternifolia) is a small tree native to Australia and widely used for its pharmacological properties. Its essential oil exhibits broad antibacterial, antiviral, antifungal, and antiparasitic activities (Carson et al., 2006).

The aromatic properties of essential oils (EOs) make them popular in perfumery, agriculture, food industry, and cosmetics. Tea tree oil (TTO), obtained from the leaves of Melaleuca alternifolia, is an EO that possesses antimicrobial properties against a broad range of microorganisms, making it useful in treating dermatological disorders. Its ability to combat resistance development is minimal. Monoterpenes, sesquiterpenes, and their alcohols are among the components of tea tree oil that contribute to its various activities, such as analgesic, antiviral, antibacterial, antifungal, antiprotozoal, anti-inflammatory, antioxidant, and anticancer properties. In comparison to conventional drugs, tea tree oil has been shown to overcome bacterial species' resistance development. However, its hydrophobic nature, volatility, and sensitivity to light, air, and temperature present formulation scientists with challenges in delivering it effectively. Tea tree oil is a natural, safe, and effective agent, according to reports. (Yadav et al., 2017)

Tea tree oil is probably best known for its antibacterial activity. The study by Cox et al. (2001) suggests that tea tree oil has antimicrobial properties, affecting the viability, respiration, and membrane integrity of E. coli, Staph. aureus, and C. albicans. Despite similar MIC/MBC values, the microorganisms exhibited differences in their susceptibility to tea tree oil. E. coli was the most susceptible, followed by C. albicans and then Staph. aureus. This mode of action is similar to other broad-spectrum disinfectants and preservatives that target microbial membranes.

A study by Koh et al. (2002)provides evidence that tea tree oil may have anti-inflammatory effects in reducing experimentally induced skin inflammation in humans. TTO contains water-soluble components, including terpinen-4-ol, which has been shown to suppress the production of inflammatory mediators by activated human monocytes. This includes the suppression of cytokines like tumor necrosis factor α (TNF-α), as well as interleukins and prostaglandin E_2. The study also suggests that TTO may enable neutrophils to be fully active in acute inflammatory responses, eliminating foreign antigens while suppressing monocyte production of superoxide and inflammatory mediators. This mechanism may prevent oxidative damage and the activation of other cells seen in more chronic inflammatory conditions.

NOTES

1. Carson, C. F., Hammer, K. A., & Riley, T. V. (2006). Melaleuca alternifolia(Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties. Clinical Microbiology Reviews, 19(1), 50–62. https://doi.org/10.1128/cmr.19.1.50-62.2006

2. Yadav, E., Kumar, S., Mahant, S., Khatkar, S. & Rao, R. (2017). Tea tree oil: a promising essential oil, Journal of Essential Oil Research, 29:3, 201-213, https://doi.org/10.1080/10412905.2016.1232665

3. Cox, S. D., Mann, C. M., Markham, J. L., Bell, H. C., Gustafson, J. E., Warmington, J. R., & Wyllie, S. G. (2001). The mode of antimicrobial action of the essential oil of Melaleuca alternifolia (tea tree oil). Journal of Applied Microbiology, 88(1), 170–175. https://doi.org/10.1046/j.1365-2672.2000.00943.x

4. Koh, K., Pearce, A., Marshman, G., Finlay-Jones, J., & Hart, P. (2002). Tea tree oil reduces histamine-induced skin inflammation. British Journal of Dermatology, 147(6), 1212–1217. https://doi.org/10.1046/j.1365-2133.2002.05034.x