

## Anti-microbial Effects

**Benencia, F. (1999). Antiviral activity of sandalwood oil against Herpes simplex viruses-1 and -2. *Phytomedicine* 6(2), 119-23.**

The study tested the antiviral activity of sandalwood oil, the essential oil of *Santalum album* L against Herpes simplex virus type 1 (HSV-1) and 2 (HSV-2). Results demonstrated dose-dependent effect of sandalwood oil in inhibiting the replication of virus, and more significantly against HSV-1. The results also indicate a possible chemopreventive action of sandalwood oil against carcinogenesis.

**Buckle, J. (2007). Literature review: should nursing take aromatherapy more seriously? *British Journal of Nursing*, 16, (2), 116-120.**

This article discusses the expansion of aromatherapy within the U.S. and follows 10 years of developing protocol and policies that led to pilot studies on radiation burns, chemo-induced nausea, slow-healing wounds, Alzheimers and end-of-life agitation. This article outlines pilot studies, carried out in the U.S. by nurses, that subsequently led to the integration of aromatherapy in hospitals.

**Burt, S. A. (2003). Antibacterial activity of selected plant essential oils against *Escherichia coli* O157:H7. *Letters in Applied Microbiology* 36, 162-7.**

The research studied the antibacterial properties of five essential oils (EO) on *Escherichia coli* O157:H7. The results show that oregano and thyme EO have significant in vitro colicidal and colistatic properties and are exhibited in a broad temperature range. The effects were greatly improved by the addition of agar as stabilizer. Bay and clove bud EO are shown less active in reducing the number of *E.coli* O157:H7.

**Dryden, M., Dailly, S., Crouch, M. (2004). A randomized, controlled trial of tea tree topical preparations versus a standard topical regimen for the clearance of MRSA colonization. *Journal of Hospital Infec*, 56, (4), 283-6.**

A randomized, controlled study of 224 patients found tea tree to more effective at clearing MRSA from the skin of 114 hospital patients than mupirocin (Bactroban). Tea tree oil may be considered in regimens for eradication of methicillin-resistant *Staphylococcus* in hospitals.

**Edris, A. (2007). Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: A review. *Phytotherapy Research* 21, 308-323.**

Essential oils are widely used to prevent and treat human disease. This article outlines their possible roles, which include antibacterial, antiviral, antioxidant and antidiabetic agents, as well as their potential modes of action, including prevention and treatment of cancer and cardiovascular diseases (including atherosclerosis and thrombosis). It also discusses essential

oils' application as natural skin penetration enhancers for transdermal drug delivery and their therapeutic properties with regard to aroma and massage therapy.

**Hammer, K. A., Riley, T. V. (1999). Antimicrobial activity of essential oils and other plant extracts. *Journal of Applied Microbiology* 86, 985-90.**

Hammer et al. investigated 52 plant oils and extracts for their antimicrobial activity(1999). They found that the essential oils extracted from lemongrass, oregano and bay inhibited all organisms at concentrations of  $\leq 2.0\%$  (v/v). The study also found the antimicrobial effect of thyme oil against *C. albicans* and *E. coli* at the lowest minimum inhibitory concentration of 0.03% (v/v).

**Hayashi, K., & Hayashi, T. (1994). Virucidal effects of the steam distillate from *Houttuynia cordata* and its components on HSV-1, influenza virus, and HIV. *Planta Medica*. 61, 237-41.**

The anti-inflammatory activities of the water extract of dried plants of *Houttuynia cordata* was investigated by Hayashi et al (1994). The authors found the essential oils (Saururaceae) to have direct inhibitory activity against herpes simplex virus type 1 (HSV-1), influenza virus, and human immunodeficiency virus type 1 (HIV-1) without showing cytotoxicity, although it was not shown to have direct impact against poliovirus and coxsackie-virus.

**Inouye, S., Yamaguchi, H. (2001). Antibacterial activity of essential oils and their major constituents against respiratory tract pathogens by gaseous contact. *Journal of Antimicrobial Chemotherapy*, 47, 565-73.**

The antibacterial activity of fourteen essential oils and their major constituents in the gaseous state were evaluated against four different bacteria by Inouge and Yamaguchi (2001). The authors found *H. Influenzae* to be most susceptible to most essential oils examined. The research also indicated that the antibacterial action of essential oils was most effective when at high vapour concentration for a short time.

**Sherry, E., Warnke, P. H. (2001). Percutaneous treatment of chronic MRSA osteomyelitis with a novel plant-derived antiseptic. *BMC Surgery* 1(1).**

The single case clinical report described the use of a polytoxinol (PT) antimicrobial, a complex mixture whose major components are tea tree oil and eucalyptus to cure an intractable methicillin-resistant *Staphylococcus aureus* (MRSA) infection of the lower tibia in an adult male. The study introduced a cheap, simple technique as a possible alternative to long-term systemic antibiotic therapy when administered percutaneously.

**Takarada, R. et al. (2004). A comparison of the antibacterial efficacies of essential oils against oral pathogens. *Oral Microbiology and Immunology*, 19, 61-64.**

This study showed that among the essential oils tested, manuka oil and tea tree oil in particular had strong antibacterial activity against periodontopathic and cariogenic bacteria. From a viewpoint of safety, these essential oils seem to be promising antibacterial substances for oral care at concentration of 0.2% or lower, which had little effect on human cells. Essential oil

mouth washes may have an important place in reducing plaque, gingivitis and odor in the oral home care routine.

## **Anti-microbial: Tea Tree Oil**

**Bassett, I. B., Pannowitz, D. L., & Barnetson, R. S. (1990). A comparative study of tea-tree oil versus benzoylperoxide in the treatment of acne. *Med J Aust*, 153(8), 455-458.**

This single blinded randomized clinical trial evaluated the efficacy and skin tolerance of 5% tea-tree oil gel in treating mild to moderate acne comparing with 5% benzoyl peroxide lotion. The results showed that both forms of treatment had a significant effect in reducing the number of inflamed and non-inflamed lesions. It was observed that tea-tree oil had fewer side effects, although the onset of action of tea-tree oil was slower.

**Caelli, M., Porteous, J., Carlson, C. F., Heller, R., & Riley, T. V. (2001). Tea tree oil as an alternative topical decolonization agent for methicillin-resistant *Staphylococcus Aureus*. *The International Journal of Aromatherapy* 11(2). [Originally published in *The Journal of Hospital Infection* (2000), 46, 236-237.]**

In this pilot study, 30 adult patients infected or colonized with methicillin-resistant *Staphylococcus aureus* (MRSA) were randomly assigned to receive a 4% tea tree oil nasal ointment and 5% tea tree oil body wash and a standard 2% mupirocin nasal ointment and the triclosan body wash. Tea tree oil products were found to perform better than mupirocin and triclosan, although the number of patients was too small for the difference to be statistically significant.

**Gustafson, J. E., Chew, S., Markham, J., Bell, H.C., Wyllie, S. G., & Warmington, J. R. (1988). Effects of tea tree oil on *Escherichia coli*. *Letters in Applied Microbiology*, 26, 194-8.**

The study documented the effect of tea tree oil (TTO) in stimulating autolysis in exponential and stationary phase cells of *Escherichia coli*. Stationary phase cells demonstrated less TTO-stimulated autolysis and also showed greater tolerance to TTO-induced cell death, compared to exponentially grown cells.

**Hammer, K. A., & Riley, T. V. (1998). In-vitro activity of essential oils, in particular *Melaleuca alternifolia* (tea tree) oil and tea tree oil products, against *Candida* spp. *Journal of Antimicrobial Chemotherapy* 42, 591-5.**

The study examined the in-vitro activity of a range of essential oils against the yeast *Candida*. The final concentrations of tea tree oil were obtained from the diluted products in sterile distilled water after inoculation. A variety number of *Candida* isolates were tested for sensitivity to tea tree oil by the methods of agar dilution and broth microdilution. The study found the majority of tea tree oil tested possess anticandidal properties in vitro and suggested that they may be useful in the topical treatment of superficial *Candida* infections.

**Jandourek, A. & Vazquez, J. (1998). Efficacy of melaleuca oral solution for the treatment of fluconazole refractory oral candidiasis in AIDS patients. *AIDS* 12, 1033-7.**

A single center, open-label clinical trial was conducted to evaluate the efficacy of melaleuca solution derived from an Australian tea leaf. Two of the twelve AIDS patients treated for candidiasis were cured and six improved at the 4-week evaluation and a follow-up evaluation 2-4 weeks after the treatment stopped showed no clinical relapses in the two patients cured. The results of the study indicate that malaleuca oral solution may be used as an alternative regimen for AIDS patients with oropharyngeal candidiasis refractory to flueconazole.