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Topical and oral administration of essential oils—safety issues

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Abstract. Multiple aromatherapy models exist, both advocating and discouraging neat topical and oral administration of essential oils. Recently, attention to these safety issues has expanded as a growing number of health care professionals and individuals adopt aromatherapy as an adjunct therapeutic practice. The safety issues of neat topical and oral administration are discussed, including the available scientific data and corroborating evidence. Based on historical usage, available scientific data, the FDA GRAS list, The German Commission E approval, and the balancing effect of total compounds in essential oils it is our opinion that a wide variety of essential oils are safe to administer orally and apply neat topically without harm to the human organism, when a pure essential oil is used.

Introduction. Multiple aromatherapy models exist, both advocating and discouraging neat topical and oral administration of essential oils. As aromatherapy expands rapidly concerns about the safety of these two administration techniques have emerged. In writing about aromatherapy, Jane Buckle, PhD, RN, stated that “Aromatic plants were used in Neanderthal times and have played a part in healing throughout history. Most cultures have included aromatic plants in their use of herbal medicine, as shown by references from ancient Chinese, Indian, Tibetan, Australian and New Zealand, North America, South America, Egyptian, Roman, and Middle Eastern sources.”¹

Historical evidence suggests these ancient cultures inhaled, ingested, and applied topically the volatile parts of aromatic plants. Aromatherapy is the second most common complementary therapy used among nurses,² especially in mental health care.³ Nurses in the United States, Australia, Canada, Germany, United Kingdom, Switzerland, and New Zealand augment patient care through essential oils.⁴

Topical Application of Essential Oils—Safety Issues. The French model of aromatherapy involves three methods of essential oil use: inhalation, topical, and oral use. When Marguerite Maury introduced

essential oils in England in the 1960s, she recommended dilution, as little as 1 to 3 percent essential oils to cold-pressed carrier oil. This dilution ratio is generally not followed in Europe or in the United States.

Essential oils are listed in numerous pharmacopoeia. The seventh edition of the American Medical Association's book *Useful Drugs* includes eight essential oils: clove, cinnamon, eucalyptus, peppermint, wintergreen, and sandalwood, with the volatile oil of rose in water and thymol, the phenol constituent of thyme oil. Also included were the resins of *Styrax benzoin* and *Commiphora myrrha*.⁵ In addition, according to Dr. Buckle, "Of the 200 or so essential oils in common use, eight essential oils are specifically named by the Commission E list of approved herbs. Therefore, to some extent, aromatherapy is recognized, even approved, by the Commission E."⁶

There are certain "hot" oils that always must be diluted before skin application: lemongrass, cinnamon bark, and cassia, for example. But use of other oils "neat" or at 100 percent has been safely documented in many studies. An Italian study stated: "It's important to notice the route of administration . . . being the oils are highly volatile and fat-soluble substances, they are easily absorbed through the skin. . . In fact, EOs could stimulate both the immune system and the keratinocytes for improving local defences, the horny layer and lipid intercellular material."⁷ In addition, caution is advised with photosensitizing oils, like citrus oils, which may discolor the skin when exposed to the sun within 12 to 72 hours after application.

We list five studies discussing the safety of topical application of essential oils. A university study in Portugal concluded that the oil and essential oil of *Laurus novocanariensis* "were well tolerated by the skin and did not cause significant perturbation of the barrier or irritation."⁸ A patient in London suffered extreme pain from herpes zoster infection for three years. Doctors at a pain management clinic recommended she apply peppermint essential oil neat as menthol has been shown to reduce thermal C-fiber activity. After a stinging sensation, the woman experienced almost complete pain relief. After three full weeks of neat application, the skin began to redden upon application so she was directed to dilute to a 1:5 ratio with almond oil. The study reported that "The diluted oil prevented reddening and produced adequate pain relief . . . The patient said she still used undiluted oil when the pain was particularly bad."⁹

An Irish study reported on the successful treatment of hand warts in a young girl using neat application of 100 percent tea tree oil. The researchers stated, "Employment of TTO [tea tree oil] itself may carry the risk of allergy and skin irritation in certain individuals; therefore, patients need to be made aware of such potential problems. In this case, employment of TTO proved efficacious with no side effects to the patient."¹⁰ Additionally, a small study in Louisiana reported on a 100% geranium oil treatment for neuralgic pain relief. Among the 24 subjects that completed the study, there were "10 minor adverse reactions among 7 patients for the five treatments, none of which were serious and all resolved in 1 hour."¹¹ The researchers stated that "Geranium oil relieves pain in minutes and is well tolerated."¹²

Another report from a group of nine doctors in Germany and Australia employed an essential oil blend to enhance quality of life among terminal patients with tumor necrosis and the resulting malodor that magnifies the patients' suffering. A solution of antibacterial essential oils: tea tree, grapefruit, and eucalyptus oil was sprayed on the cancerous ulcers. The doctors found that "The foul smell associated

with the necrotic ulcers normally recedes entirely after 2-3 days of treatment.”¹³ The patients also reported pain relief due to the anesthetic properties of the eucalyptus oil. The doctors noted, “We have not observed any allergic reactions to the essential oils as has been reported in earlier studies.”¹⁴

Oral Administration of Essential Oils—Safety Issues. Several studies and supplementary evidence suggest oral consumption of a diversity of essential oils is safe when observing appropriate dosage guidelines. Essential oils are utilized extensively in the food industry as safe flavoring agents and natural preservatives.^{15,16,17,18,19,20} The U.S. Food and Drug Administration (FDA) records 160 essential oils, oleoresins and distillates considered safe for direct addition to food for human consumption on the Generally Recognized as Safe list (GRAS), adding further evidence that various essential oils are harmless when taken orally.²¹

The safety of orally administering essential oils has been reported in animal studies. The acute oral toxicity of *Croton cajucara* Benth (Euphorbiaceae) was assessed in male Swiss albino mice in 2000. The study authors concluded that the essential oil exhibited low toxicity in mice and offered gastroprotective benefits.²² No teratogenic, genotoxic, mutagenicity, or adverse effects to the cardiovascular, central nervous or respiratory functions were observed in an animal study using a lavender oil preparation.²³ A 2009 report investigating the safety of black cumin essential oil in normal Sprague dawley rats through hematological indices, serum biochemistry, cardiac enzyme levels, and serum electrolytes. The results revealed that the essential oil was safe as a food additive based on “serological indices like liver and kidney functioning tests, serum protein profile, level of cardiac enzymes, electrolytes balance . . . remained in the normal ranges even after 56 days of study. Similarly, indices of red and white blood cells remained within the defined limits.”²⁴

The absorption rate in the buccal cavity mucosa is considered more than 3 to 9 times greater than that of the gastrointestinal system,²⁵ and up to 4,000 times more permeable than the skin making it a very efficient delivery method for essential oils.²⁶ This suggests that a significant amount of essential oils rapidly enters the bloodstream when introduced into the oral cavity. Essential oil containing mouthwashes have been safely used for decades. Studies using essential oil mouthrinses for up to 6 months concluded that they were safe to use orally with no serious adverse events.^{27,28,29,30}

Two of the most well-researched and documented essential oils administered orally in clinical investigations are *Mentha piperita* (peppermint) and *Lavandula angustifolia* (lavender). Research suggests that peppermint is a safe and effective remedy for a variety of gastrointestinal disorders, including irritable bowel syndrome (IBS). Studies examining the oral administration of peppermint essential oil indicate that it is well tolerated even among children. A systematic review and meta-analysis, which included 3 studies reporting adverse events found only 5 of 174 participants in the active treatment groups experienced an adverse event reaction (AER).³¹ That equates to a 3% AER, which is much lower than a report suggesting up to 26 percent of placebo control groups experienced AERs³². Another prospective double blind placebo-controlled randomized trial administering 2 enteric-coated peppermint oil capsules daily for 4 weeks concluded that “when peppermint oil is administered for a short 4-week period, it is safe and effective for patients with IBS.”³³ Only 1 participant left the active treatment group as a result of the trial medication, reporting prolonged heartburn and a minty taste in

the mouth. This reaction may have been due to the patient chewing the capsule or premature dissolution, leading to esophageal reflux of gastric juice and menthol. The harmlessness of oral ingestion of peppermint was confirmed in a small randomized, double-blind controlled trial of 42 children with IBS. Children received an oral solution containing 187 mg of peppermint oil three times daily. No AERS or side effects were reported in the active treatment group during the two-week trial.³⁴ Two additional studies that combined peppermint with an additional essential oil, either caraway or spearmint, reported similar findings of good tolerance and very few side effects related to the study medication, with the most common being eruction, and a burning sensation behind the sternum.^{35,36} Furthermore, fennel essential oil is considered safe to administer orally to infants to alleviate colic.^{37,38}

Lavender essential oil has a similar safety and efficacy record. Lavender is well-known for anxiolytic properties. A multi-center, double-blind, randomized study of lavender essential oil for generalized anxiety disorder reported that orally administered lavender is effective in relieving anxiety and a well-tolerated alternative to benzodiazepines.³⁹ Physical examinations, vital signs, 12-lead ECG, and routine laboratory parameters remained normal in the active treatment group and only mild gastrointestinal events, such as nausea, eruction, and dyspepsia were reported. The study authors also concluded that lavender essential oil has no potential for drug abuse or hangover effects, which is of significance as benzodiazepines are highly associated with both addiction and hangover effects when taken chronically. A subsequent review of the same orally administered lavender oil preparation involving 280 patients concluded there is a “large safety margin of the recommended therapeutic dose,” with no AERs noted among participants receiving up to 8-fold of the therapeutic dose after single administration and 4-fold of the therapeutic dose in subjects on steady state.⁴⁰

Synergy of Essential Oil Compounds Promotes Safety. Aromatic extracts from various plant parts naturally contain myriad of chemical compounds, many of which have not been identified, but provide important therapeutic properties. It has been reported in plant medicine that using whole plants with all the naturally occurring compounds reduces the side effects experienced.^{41,42} Isolating single compounds from plants removes safety checks and balances innately developed in the plant, allowing pharmacological effects that differ significantly from whole plants. Moreover, when naturally occurring compounds are left whole a synergistic and therapeutically enhancing effect is produced as these compounds are believed to act at different receptor targets involved in health and human disease.^{43,44,45} While inactive compounds in the plant may exert little or no direct activity on the root cause of disease they assist the active compound(s) in a synergistic, additive, modifying, or antagonistic manner. According to reports they enhance bioactivity, stimulate natural and adaptive defense mechanisms, reverse resistance, modulate adverse effects, or decrease metabolism and excretion.^{41,46,47} Equally, essential oils, when distilled properly to preserve the optimal compound profile of naturally occurring constituents, verified through gas chromatography-mass spectrometry (GC/MS), offer comparable benefits, including a reduction in side effects.^{48,49,50}

Conclusion. Based on the existing body of evidence including historical usage, available scientific data, the FDA GRAS list, The German Commission E approval, and the balancing effect of total compounds in essential oils it is our opinion that a wide variety of essential oils are safe to administer orally and apply topically without harm to the human organism.



Scott Johnson

The author of two books and more than 250 articles in online publications, Scott Johnson is an expert on health, fitness, and nutraceuticals. He earned a doctor of naturopathy degree, graduating with highest honors, and is a board certified Alternative Medical Practitioner. Scott draws upon his wealth of experience and diverse educational background to share ancient knowledge and modern scientific research surrounding natural healing modalities as an international lecturer. His passion lies in bringing the secrets of natural healing to those who seek greater wellness.



Karen Boren

Karen Boren has worked in the essential oils field for 11 years, currently serving as a research writing manager. A former newspaper and grant writer, she conducted research for a neurological presentation for D. Gary Young, founder and CEO of Young Living Essential Oils, in Ecuador and traveled the Frankincense Trail with Gary and his team in 2009. She has a deep interest in religion and has published a book on biblical archaeology. Karen works on special projects and assists with the writing and editing of scientific studies published in peer-reviewed journals.

Potential Conflicts of Interest. The authors of this research paper are currently employed by Young Living Essential Oils, a cultivator, distiller, and producer of pure, therapeutic-grade essential oils and aromatherapy oils.

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