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Lavender and Lavandin

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Enhancements Aromatherapy LLC
5435 Indian Summer Ct
Boulder, CO 80301 USA
Tel: + 815 814 1444 Skype: lora.cantele
Web: www.ijpha.com
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From the Editor

Winter seems to have finally arrived in most places where the IJPHA is read and the holidays are upon us! I invite you to sit back and enjoy a cup of tea as we revisit in this issue a constant companion to many.

While the IJPHA generally brings you information about essential oils that are not so mainstream, for this issue we will take a look at some new information about Lavender (*Lavandula angustifolia*) and how it is being used clinically. Jennifer Rhind explores the different varieties and uses of Lavender essential oil, while Anita Bor-Brown provides us a review of current Lavender research. Artisan distiller and researcher Ann Harman reminds us of the healing uses and benefits of Lavender hydrolat.

Jane Buckle has frequently spoken about the importance of research and the value of its publication to our aromatic community. We at the IJPHA agree and continue to request that our readers submit their case studies and research for publication in the IJPHA. In this issue we will showcase the work of three nurses and their research on gender preferences for essential oils, the use of Aromatherapy in the treatment of symptoms of restless legs syndrome and the use of essential oils in relieving headaches.

In our ongoing look at essential oil adulteration, we tested many samples of commercially sold *Lavandula angustifolia* to see the degree of adulteration in the aromatic community. Prabodh Satyal, PhD, reveals common adulterants found in Lavender essential oil.

During this season, our thoughts often go to those less fortunate and our desire to help those in need. For Stanley Stinson, this is more than a seasonal endeavor. His compassion shines as he shares his work as a "street Aromatherapist."

In our continuing education series, the IJPHA is sponsoring complementary care specialist and author Madeleine Kerkhof to come to Boulder, CO, to teach a four-day course in AromaCare for Palliative and End of Life Care. Sue Pace interviewed Madeleine to give IJPHA readers more insight into the upcoming class.

Happy holidays and warm wishes,

Lora Cantele

On the cover: *Lavandula angustifolia*
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In this issue

True Lavender, Spike Lavender and Lavandin–Genus Dynamics

Jennifer Rhind, PhD, CBiol

York Lavender Farm (UK)
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True Lavender is a well-known therapeutic essential oil, and for this we possibly need to thank the 'father' of Aromatherapy, René-Maurice Gattefossé, who documented its healing effects on the skin. In this article, we will explore why True Lavender has such an important place in our *Materia Aromatica,* and the therapeutic potential of its close relatives, Spike Lavender and Lavandin.

True Lavender and its attributes

True Lavender is sometimes called English Lavender. Its botanical names are *Lavandula angustifolia*, *L. officinalis* or *L. vera* (and subspecies include '*delphinensis*' and '*fragrans*') – and it is just one of around 25 species and their numerous hybrids. Belonging to the Lamiaceae (or Labiateae) family, the Lavenders are aromatic, evergreen, woody shrubs which are native to the Mediterranean regions, throughout the Middle East and south as far as India. True/English Lavender was not actually cultivated in England until around 1568, but the name has persisted due to the popularity of the scent of its essential oil (Hemphill and Hemphill, 2004). By the 18th century, it was being grown in Mitcham in England to produce essential oil for the House of Yardley's English Lavender Water (Gordon, 1980) – and indeed it is one of the few essential oil crops that can be grown successfully in the British Isles. Nowadays Lavender is cultivated throughout Europe (especially France and Spain) and other parts of the globe including Tasmania, specifically for the essential oil. The essential oil is sweet, fresh, light, and herbal (lavender), with floral, woody and fruity notes. Holmes (2016) tells us that it has a moderate yield – 1kg of oil from 100-150kg of the herb. In fine perfumery, True Lavender is used to bring freshness to fragrances (Williams, 2000).

An absolute is available too, and this smells more like the flowering herb than does the essential oil. It is bright green in colour and has an intense aroma that is sweet and herbaceous, with a green-floral character and hay-like undertones. It bears some similarity to the essential oil in terms of its constituents, but it also contains coumarin, which gives the natural, agrestic, hay-like element. Although it is usually destined for the perfume industry, there is no reason why it could not be used in a therapeutic context. However, Tisserand and Young (2014) cite research that the absolute can cause allergic-type skin reactions, so caution must be observed in clients who are prone to such reactions. Inhalation should be safe. It is not known which constituents are responsible.

True Lavender essential oil is characterised by the presence of l-linalool, anywhere between 20-45% depending on origin – French oils usually range from 30-45% – and also its ester, linalyl acetate. This occurs typically at 40-42%, although some oils contain less and some high-altitude French oils may have as much as 50-52%, giving rise to a fruity, 'pear drops,' bergamot-like note. It also contains lavandulyl acetate, β-caryophyllene, terpinen-4-ol, β-ocimene and others. True Lavender absolute contains linalyl acetate at around 45% and linalool at around 30%, with coumarin (4%), β-caryophyllene (3%), geranyl acetate (up to 3%), terpinen-4-ol (3%), 7-methoxycoumarin (2%), trans-β-farnesene (1%), camphor (1%) and *1*-octen-3-yl acetate (1%).

With so many Lavenders to choose from, we can expect natural variations in composition. Tisserand and Young (2014) offer a comprehensive review of the composition of some commercially available Lavender essential oils, such as Australian, Bulgarian,

French, Moldovan and Ukrainian, as well as the ISO standards for Lavender oil.

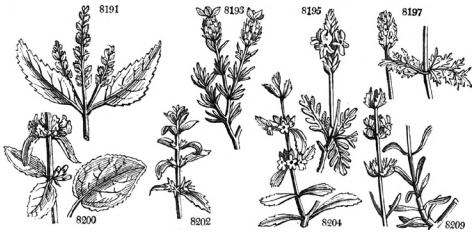


Image from *An encyclopedia of plants* c.1841

Lavender has been associated with health, cleansing and hygiene since early times – even its name comes from the Latin word *lavare* – to wash. Saint Hildegard (1098-1179 CE) was a German writer, philosopher, mystic and a Benedictine Abbess. Her holistic stance on healing was rooted in the natural world, and in her work *Causae et Curae* ('Causes and Cures'), she praised Lavender above all other herbs. In a chapter dedicated to Lavender, '*De Lavendula*,' she made specific reference to its scent, and this could be seen to mark the beginning of its popularity. Then later, according to Gordon (1980), in 1579, William Langham published *The Garden of Health*, in which he claimed that the scent of Lavender could comfort and clear the head and sight, comfort the heart, and reduce giddiness. Gordon also cites the work of early herbalists such as John Parkinson who maintained that Lavender could 'dry up the nature of a cold brain,' and John Gerard who suggested that it helped migraine, faintness and the 'panting and passion of the heart' (Gordon, 1980).

So, with such an impressive reputation, it is hardly surprising that Lavender was one of the first essential oils to be investigated in relation to its therapeutic properties – especially its effects on the psyche. By 1991, when Buchbauer *et al.* published the paper 'Aromatherapy: evidence for sedative effects of the essential oil of Lavender after inhalation,' Aromatherapy was already very popular in the UK and English-speaking countries, but hard, scientific evidence for its efficacy was scant, so this was a welcome piece of research that helped to validate the use of Lavender as a sedating, relaxing scent. Several subsequent studies on animals and humans (Diego *et al.*, 1998; Moss *et al.*, 2003; Lehrner *et al.*, 2005) have confirmed that this is indeed the case.

As holistic Aromatherapists, we will be aware that if we can modulate moods we might also expect to elicit physiological responses. This expectation was supported by an animal study, where Shen *et al.* (2005) explored the effects of inhalation of Lavender essential oil (and also isolated linalool) on lipolysis (the breakdown of fats), heat production and appetite. Their results suggested that Lavender, by virtue of its relaxing, stress-reducing actions, could also result in decreased lipolysis, increased appetite and thus weight gain. More recent studies elucidate the types of metabolic changes that occur in response to aerial diffusion or inhalation of essential oils (Wu *et al.*, 2012; Zhang *et al.*, 2013).

However, Lavender has also acquired a formidable reputation for pain relief, anti-inflammatory and anti-allergic actions, and of course, for skin-healing – and like many essential oils, it has moderate antioxidant and antimicrobial activities. For a summary of the therapeutic and biological actions of True Lavender please see Table 1.

Therapeutic actions	Some evidence for Lavender essential oil, its main components, and in combination with other essential oils
Analgesic	Lavender, administered via oxygen face masks, can reduce the application of analgesic opioids immediately post-surgery (Kim *et al.*, 2007). In a randomized, double-blind trial, a blend of Lavender, Clary Sage and Marjoram (2:1:1 ratio, 3% in a cream base for abdominal massage) provided pain relief and reduced the duration of pain in outpatients with primary dysmenorrhoea (Ou *et al.,* 2012). This blend may have offered relief from cramping – see **Antispasmodic.** In a randomized controlled study, Lavender essential oil, combined with Marjoram, Black Pepper and Peppermint (a 3% cream formulation, applied daily), was significantly more effective in reducing neck pain in comparison with the control group; effectiveness was assessed by a visual analogue scale, pressure pain threshold and motion analysis (Ou *et al.*, 2014). Linalool is implicated in the GABA-ergic system[1], which could explain its anti-convulsive and sedative effects, as well as its analgesic activity (Guimarães *et al.*, 2013).
Anti-allergic	True Lavender essential oil has been shown to have anti-allergic action. Tisserand and Young (2014) cite a 1999 study conducted by Kim and Cho where topically applied Lavender inhibited immediate-type reactions in rats and mice. The inhibition was concentration dependent, and thought to be via the inhibition of histamine and TNF-α release by mast cells.

[1] GABA-ergic system – gamma-aminobutyric acid (GABA) is the main inhibitory neurotransmitter in the central nervous system; some substances including essential oils and their components can modulate GABA-ergic transmission.

Anti-inflammatory	Guimarães *et al*. (2013) noted the good anti-inflammatory activity of *l*-linalool, which has a significant presence in Lavender essential oil.
Antinociceptive	Lavender displayed antinociceptive actions in an animal study (Adjoran and Buchbauer, 2010).
Antispasmodic	Linalyl acetate, a significant component in True Lavender essential oils, can induce relaxation of smooth muscle, probably (and at least partially) via endothelial-dependent pathways[2] (Kang *et al.*, 2013). This has implications for the gut (antispasmodic) and respiratory systems (bronchodilatory and antispasmodic), the uterus (antispasmodic) as well as vascular tissues (vasodilatory, possibly hypotensive).
Anxiolytic	Itai *et al*. (2000) conducted a clinical trial with chronic haemodialysis patients and the results indicated that aroma of Lavender oil could alleviate anxiety. Linalool is implicated in the GABA-ergic system, which could explain its anti-convulsive and sedative effects, as well as its analgesic activity (Guimarães *et al.,* 2013). It has been suggested that linalool may inhibit glutamate binding, thus acting as a sedative. *l*-Linalool is certainly considered to contribute to the anxiolytic effects of Lavender essential oils, but linalyl acetate, often present in significant amounts, does not appear to have anxiolytic effects when presented independently. However, Lavender essential oils that contain both compounds have a greater effect than linalool alone – certainly suggestive of synergism – and indeed both must be present for Lavender oil to exhibit anxiolytic action. Takahashi *et al.* (2011) suggested that the synergistic effects of linalyl acetate might be because in the limbic system, it is hydrolysed by an esterase enzyme to linalool. It has also been demonstrated that inhaled Lavender essential oils can have anxiolytic-like effects without affecting locomotor functions[3] (Takahashi *et al*., 2011) – highlighting the advantages of Aromatherapy over some conventional medications. Lavender aroma within an 'Optimal Soothing Environment' prior to gastroscopy minimised patient anxiety (Hoya *et al*., 2008). Inhaled *l*-linalool has an anxiolytic and relaxing effect in mice, with memory affected only by higher doses (Linck *et al*., 2010). 'Silexan' (an oral Lavender oil capsule) is as effective as Lorazepam (a benzodiazepine) in reducing both somatic anxiety and psychic anxiety, but does not have sedative effects and is well tolerated (Woelk and Schläfke, 2010). *Note:* Perry *et al*. (2012) conducted a systematic review of the RCTs investigating the anxiolytic effects of Lavender. The authors were highly critical of the majority of the studies – from the design and methodology to the analyses, discussion and conclusions – leading to the conclusion that oral administration of Lavender 'was promising' but inconclusive, and that Lavender administered by Aromatherapy, inhalation, and massage was 'not supported by good evidence of efficacy.'
Anti-atherosclerosis	Essential oils could have a role to play in the prevention of atherosclerosis due to their antioxidant activity against LDL.[4] Inhalation of Lavender and Monarda (species not identified) essential oils (0.1-0.2mg/m^3 of air) can reduce the cholesterol content in the aorta and atherosclerotic plaques, but without affecting blood cholesterol (Nikolaevskii *et al*., 1990 cited by Shaaban *et al.*, 2012).
Anti-stress	It is likely that oxidative stress is involved in the pathogenesis of psychiatric disorders, including anxiety and depression (Zhang *et al*., 2013). Atsumi and Tonosaki (2007) explored the effects of smelling Lavender and Rosemary (*Rosmarinus officinalis*) on free radical scavenging activity[5] (FRSA) – a measure of the biological antioxidant system. The healthy volunteers sniffed each aroma for five minutes and the saliva was collected immediately and analysed for cortisol,[6] secretory immunoglobulin A (sIgA[7]) and α-amylase activity. It was found that the odours of Lavender and Rosemary significantly increased the FRSA level and decreased cortisol. The total effect of Lavender was observed at low concentrations (1000 times dilution) but not at high concentrations (10 times dilution, which was perceived as less pleasant). Rosemary was observed at high concentrations but not at low. However, both low and high concentrations decreased cortisol. Lavender stimulates the parasympathetic nervous system, and Rosemary the sympathetic, and the authors suggested that both stimulate FRSA, although the former has a weaker effect. Significant effects were not detected for either sIgA or α-amylase activity; it is possible that the short (five minutes) exposure was insufficient to elicit any physiological effects. It was concluded that stimulation with a pleasant smell potentiates FRSA and simultaneously

[2] In endothelial cells, an increase in Ca2+ is involved in the synthesis and release of NO and prostaglandins; this alters Ca2+ sensitisation (a signalling mechanism in the contraction/relaxation mechanism) in smooth muscle cells.

[3] Some essential oils, when administered via inhalation, can inhibit locomotor activities (Muchtaridi *et al.*, 2010).

[4] Other than Lavender and Monarda, essential oils that are characterised by identified LDL antioxidants include Tea Tree (*Melaleuca alternifolia* with terpinolene, γ-terpinene), Pinus mugo (terpinolene), Thymus species (with thymol), Clove (*Syzygium aromatica* with eugenol), and Narcissus absolute (*Narcissus poeticus*), Mandarin Petitgrain (*Citrus reticulata* leaf), and the citrus peel oils Yuzu (*Citrus* x *junos*), Mandarin (*C. reticulata*), Bergamot (*Citrus aurantium* subsp. *bergamia*), Lemon (*C. limon*) and Lime (*C. aurantifolia*), all of which contain γ-terpinene.

[5] FRSA decreases in response to exercise fatigue and increases in response to pleasant mental stimulation, including inhalation of a pleasant aroma (Atsumi and Tonosaki, 2007).

[6] Cortisol is a stress hormone; salivary cortisol is used as a stress marker.

[7] Secretory IgA is an antibody important in mucosal immunity; it is the main immunoglobulin found in tears, saliva and sweat. It can survive harsh physiological environments. It is used as a stress marker – it is secreted immediately after a stressful event, and there is also delayed secretion.

	decreases cortisol, not always acting via parasympathetic and sympathetic nerves, and thus could protect against oxidative stress. Lavender, inhaled along with Ylang Ylang (*Cananga odorata* var. *genuina*) and Bergamot (*Citrus aurantium* subsp. *bergamia*), reduced psychological stress responses and serum cortisol levels, and reduced the blood pressure of patients with essential hypertension (Hwang, 2006). Hand massage with essential oils of Lavender, Bergamot and Frankincense (*Boswellia carterii*) had a helpful effect on pain and depression in hospice patients (Chang, 2008). Exposure to Lavender essential oil in the air has an anti-stress effect, with chromogranin A (CgA, a salivary endocrinological stress marker) levels being significantly lowered in the aroma group, but no effects on salivary cortisol were noted (Toda and Morimoto, 2008).
Tissue-healing	In a randomised double-blind, placebo-controlled study, exploring the effects of topical Lavender oil on recurrent aphthous ulceration,[8] it was shown that Lavender oil produced a significant reduction in inflammation, ulcer size, healing time (2-4 days) and pain relief (mainly from first dose) compared to the baseline and placebo (Altaei, 2012). Note: Lavender essential oil is not recommended in anti-aging preparations as it displays cytotoxicity in endothelial cells and fibroblasts (Baumann, 2007).
Biological actions	
Antimicrobial	De Rapper *et al.* (2013) explored the interactive *in vitro* antimicrobial properties of 45 essential oils when combined in various ratios with Lavender (*Lavandula angustifolia*). They reported a 26.7% incidence of synergism, and 48.9% incidence of additive effects. There was only one instance of antagonism – a combination of Lemongrass (*Cymbopogon citratus*) and Lavender (*L. angustifolia*).
Antioxidant	Wei and Shibamoto (2010) reported that Lavender oil has moderate antioxidant actions as a DPPH radical scavenger. Yang *et al.* (2010) reported that an Australian-grown Lavender was significantly more effective against lipid peroxidation than the five other oils studied. In an assay determining free radical-scavenging ability (DPPH), Lavender exhibited the strongest performance, similar to that of *d*-limonene (however Lemon oil did not perform as well as *d*-limonene alone).

Table 1. Therapeutic and Biological Actions of Lavender Essential Oil (compiled from Rhind, 2016).

[8]Aphthous ulceration is the term used to describe benign, usually recurrent mouth ulcers.

Diversity

There are significant differences between the many species and varieties of Lavender. They hybridise easily – that is, they can interbreed readily within the genus – and this has given rise to many subspecies or varieties, such as *delphinensis*. These will all have their own olfactory signatures and of course, just as with geographical origins, they will show variability in composition. In this article we will also explore the hybrid Lavandin, whose essential oil is a common adulterant of True Lavender (Tisserand and Young, 2014), and which is often sold as Lavender to the unsuspecting public (Cantele, 2016). Lavandin oil is used to fragrance low-cost products and detergents, and to impart a lavender note in soaps (Jouhar, 1991; Williams, 2000), and thus is often viewed as the 'poor relative'!

Lavandin, or *Lavandula* x *intermedia* (sometimes *L. hybrida* Reverchon or *L. hortensis* Hy) is a hybrid of True Lavender and Spike Lavender, and to fully appreciate it, we also need to take a look at Lavandin's 'parents.'

Spike Lavender

Spike Lavender, or *L. latifolia*, is also known as *L. spica*, and it has a subspecies named *fragrans*. Its essential oil is clearly lavender-like, but more camphoraceous, with a penetrating quality, and it lacks the soft, fruity, bergamot-like notes found in True Lavender. It is used in the fragrance industry to impart freshness in products. Spike Lavender has a higher yield than True – 100-110kg will yield 1kg of essential oil (Williams, 2000). It contains *l*-linalool at between 27-43%, but does not contain any linalyl acetate. Spike Lavender oil is also characterised by the presence of substantial quantities of 1,8-cineole at 28-35%, and camphor at 10-23% approximately. We also find borneol, α- and β-pinene, trans-α-bisabolene, β-caryophyllene, α-terpineol and germacrene D (Tisserand and Young, 2014). So, as its aroma and chemistry might suggest, it is a much more 'stimulating' oil, and useful for clearing the head (1,8-cineole), respiratory congestion (1,8-cineole and camphor) and muscular aches and pains (linalool, 1,8-cineole, β-caryophyllene). It will probably not display the anxiolytic effects of True Lavender – it has been suggested that these are due to synergy between *l*-linalool and linalyl acetate – and is more likely to have cephalic qualities because of the presence of 1,8-cineole. Spike Lavender oil may

be mildy neurotoxic because of the camphor content – although any effects might be mitigated by the presence of linalool (Tisserand and Young, 2014).

Lavandin species
© Holistic Photo

Lavandin

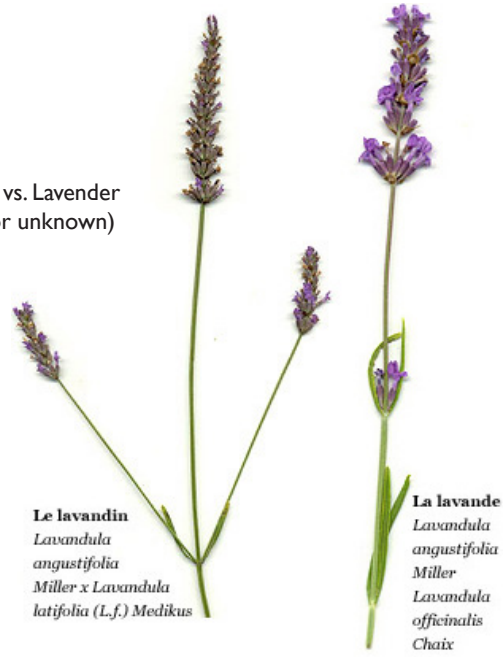
Lavandin essential oil has a scent that is less 'fruity/pear drops/ bergamot-like' than that of high-altitude True Lavender, but it is not as penetrating and camphoraceous as Spike Lavender. There are three varieties that are available commercially – 'Abrialis,' 'Grosso' and 'Super.' It is very hardy, and has a high volatile oil content (3%) and a much higher yield than True Lavender; as a result, it is widely produced (Holmes, 2016). Just 80kg of the herb will yield 1kg of oil (Williams, 2000). Depending on the variety, the essential oil contains moderate amounts of the dominant constituents of its 'parents' – including *l*-linalool, linalyl acetate, camphor and 1,8-cineole, with others such as borneol, β-caryophyllene, and lavandulyl acetate. Again, Tisserand and Young (2014) give a very comprehensive review of the typical levels of these components. Typical figures include linalyl acetate (25-44%), *l*-linalool (23-33%), camphor (5-30%, 'Super' has only 5%), 1,8-cineole (3-11%, 'Abrialis' 11%), and borneol (2-4%). It is interesting to note that in 'Grosso' and 'Super,' linalyl acetate is the dominant component, and in 'Abrialis,' linalool dominates slightly. They comment that 'Abrialis' has the highest 1,8-cineole content, and that 'Super' has the sweetest aroma and most resembles True Lavender in this respect. Of the three Lavenders being examined here, Lavandin is the only one to carry a hazard warning – it may inhibit blood clotting and interfere with anticoagulant medications – leading Tisserand and Young (2014) to suggest caution with oral administration in cases of anticoagulant medication, major surgery, peptic ulcer, haemophilia, and bleeding disorders. This could therefore be a cause for concern if Lavandin oil was being sold to the general public as 'Lavender oil.'

However, despite being considered to be less bioactive than True Lavender (Holmes, 2016), Lavandin oil has its merits too. From its constituent profile we might reasonably expect pain-relieving (linalol, 1,8-cineole) and anxiolytic actions (linalool with linalyl acetate), and possibly mucolytic/expectorant actions (1,8-cineole, camphor).

Lavandin has not been researched as extensively as True Lavender, but there are two papers that have elucidated its therapeutic potential.

Barocelli *et al*. (2004) explored the effects of both inhaled and orally administered Lavandin 'Grosso' oil, finding that it had both antinociceptive and gastroprotective effects – possibly by activating the vagus nerve and enhancing food intake. In 2009, Braden *et al*. published the results of their study which aimed to establish whether Lavandin essential oil could reduce preoperative anxiety in surgical patients, in comparison with standard care. In this case, the sample size was large (150) but the outcomes were measured simply by using a visual analogue scale. It was demonstrated that the Lavandin group experienced significantly lower anxiety than either the control (standard care) or the sham (standard care and Jojoba) groups, and Lavandin was described as a 'simple, low-risk, cost effective intervention.'

Lavandin vs. Lavender
(author unknown)



True Lavender, Spike Lavender and Lavandin in Aromatherapy

To highlight the differences and merits of the three Lavenders discussed, specifically in relation to Aromatherapy applications, it is helpful to compare and contrast them (Table 2.) It is clear that we have a better evidence base for True Lavender, and we need to speculate about Spike Lavender and Lavandin.

Indications	True Lavender	Lavandin	Spike Lavender
Anxiety	Yes Inhalation and topical application	Yes As for True Lavender	Not noted
Atherosclerosis	Yes Inhalation	Not noted	Not noted
Dysmenorrhea	Yes	As Spike Lavender	Possibly (consider blending with linalool-rich oils and/or ether-rich oils)
Infection	Yes, moderate antifungal and antibacterial actions (Holmes, 2016); has been shown to interact synergistically with other oils (Cassella *et al*., 2002; De Rapper *et al*., 2013)	Potential	Yes, antiviral potential and moderate antibacterial actions (Holmes, 2016)
Insomnia	Yes	Potential	Not noted
Musculoskeletal pain	Yes	Potential	Yes, it is stimulating and warming (Holmes, 2016)
Respiratory congestion	Yes, due to observed bronchodilatory and antitussive actions	Potential	Yes, a stimulating expectorant and mucostatic (Holmes, 2016)
Skin inflammation or allergy	Yes	Not noted	Not noted
Stress	Yes	Yes	Not noted
Tissue healing	Yes	Potential, see Spike Lavender (borneol)	Yes, it is a capillary stimulant and vulnerary (Holmes, 2016); and it contains borneol, which is antimicrobial, and has wound-healing and anti-inflammatory potential (Barreto *et al*., 2014).

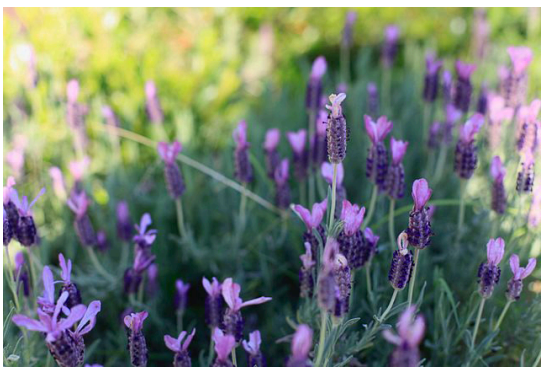
Table 2. True Lavender, Spike Lavender and Lavandin.

An essential oil is more than the sum of its components

Much of the discussion presented above has considered these oils from the perspective of their chemistry. It is so important that we look beyond this however – chemistry does give us insight and allows us to speculate, and it is exciting when we read about instances of synergistic interactions within oils and blends, but it does not necessarily provide us with all of the information we need when considering essential oils from the aromatherapeutic stance, or when we are fine-tuning our selection of oils for a blend. So how do we go about gaining a deeper understanding? There are several ways that authors and therapists have proposed, from Mailhebiau's 'Characterology' and Farrer-Hall's intuitive approach, to Vitalism, Chinese Traditional Medicine, Ayurvedic medicine, and Traditional Greek Medicine (Rhind, 2016).

It may be the case that their true identity can be found in their aroma. It is quite possible that by using our sense of smell, with meditation and mindfulness, we can gain deeper insights into the energetic actions of essential oils.

- True Lavender with its gentle, sweet, soft, herbal scent is relaxing and regulating (useful for 'stuck' energy), cooling and restorative (Holmes, 2016); it is one of the very best anxiolytics in Aromatherapy, calming and smoothing out moods and our emotional and physical rhythms.
- Spike Lavender has a penetrating, incisive, sharper herbal aroma and is stimulating and warming (Holmes, 2016). It can alleviate mental and physical fatigue and is useful in 'cold' conditions, weakness and lethargy, and congestion.
- Lavandin has an aroma that falls between True and Spike – it is typically lavender-like, but not as soft and fruity (bergamot-like) as True, and not as piercing and camphoraceous as Spike. It has a very clean and refreshing aspect. This would suggest that it is calming on the senses but at the same time cephalic, cutting through the fog of confusion and anxiety that accompanies stressful circumstances. In the emotional and physical realms, it is softer than Spike but more stimulating than True. Holmes (2016) suggests that, perhaps for these reasons, it is well-suited to diffusion, whole body massage and on acupoints.



Spike Lavender © Kate Branch/WikiMedia Commons

Reflection

True Lavender has, quite rightly, become one of the best-known essential oils in Aromatherapy – and this has probably contributed to its current popularity – witnessed in its widespread presence in supermarkets and drugstores! Spike Lavender, although widely produced and with its own therapeutic merits, is perhaps too 'medicinal' to have such a wide appeal, and of course its camphor content may be viewed as prohibitive in this respect.

But what of Lavandin, which seems to be a complete fusion of both oils, occupying the space between them? Perhaps, instead of being seen as a more stimulating version of True Lavender, yet milder than Spike, it has been largely disregarded rather than explored. Have its potential anticoagulant drug interactions played a role in this? Its presence in some commercial outlets – labelled as 'Lavender' – is clearly wrong, and probably due to its excellent yield thus low cost, and delightful aroma.

So, perhaps it is time that Lavandin emerged from the shadows and was recognised as a therapeutic oil in its own right, rather than a pale imitation of True Lavender!

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Jennifer Peace Rhind is a Chartered Biologist with a PhD in Mycology. She has worked in quality assurance, research, and development. A long-standing interest in Complementary and Alternative Medicine led to qualifications in massage, Aromatherapy and reflexology. She worked as a therapist and partner in a multidisciplinary complementary healthcare clinic, and as an Aromatherapy tutor before becomming a lecturer at Edinburgh Napier University for fourteen years, and remains involved in essential oil and scent education. Jennifer is the author of several books including *Essential Oils: A Handbook for Aromatherapy Practice* and *Aromatherapeutic Blending*.

Understanding the Chemistry of *Lavandula* Distillate Water

Ann Harman, Artisan Distiller

Spent lavender from distillation
© Sharon Falsetto

Whether we call them hydrosols, hydrolats or distillate waters I think we can all agree that these waters are the gentle giants of Aromatherapy. Their uses go far beyond the occasional facial spritz or room spray. Lavender (*Lavandula angustifolia*) has a long history of medicinal use. Lavender was among several herbs found in the clay vessels of the "World's Oldest Perfume Factory." This archeological site dates to around 1850 BCE; it is located on the island of Cyprus. It is surprising to note that with such an ancient history we know so little about the distillate waters compared to their essential oil counterparts. As the interest in hydrosols grows so is the body of research and we now have some idea of the chemistry of hydrosols.

	***L. angustifolia* Sample 1**	***L. angustifolia* Sample 2**	***L. angustifolia* Sample 3**	***L.* x *intermedia* Sample 4**
Origin	France	Italy	USA	USA
Saturation	313 ppm	418 ppm	639 ppm	490 ppm
linalool	154 ppm	160 ppm	280 ppm	72 ppm
α-terpineol	37 ppm	38 ppm	93 ppm	50 ppm
terpinene-4-ol	27 ppm	65 ppm	78 ppm	56 ppm
1,8-cineole	2 ppm	5 ppm	4 ppm	20 ppm
linalool oxide	20 ppm	33 ppm	34 ppm	12 ppm
borneol	10 ppm	19 ppm	8 ppm	169 ppm
lavandulol	9 ppm	10 ppm	5 ppm	ND
geraniol	ND	9 ppm	32 ppm	13 ppm
camphor	2 ppm	3 ppm	<2 ppm	20 ppm
coumarin	7 ppm	5 ppm	4 ppm	5 ppm
nerol	2 ppm	3 ppm	9 ppm	3 ppm
cryptone	4 ppm	<1 ppm	8 ppm	7 ppm

Table 1. Constiutents of various Lavender and Lavandin hydrosols. Data courtesy of Circle H Institute.

In Table 1, the saturation (total volatiles per liter) range from 313-639 ppm. Considering that a 10% dilution of Lavender essential oil is approximately 8841 ppm[1] (Tabanca, 2013) you can understand that the hydrosols are extremely diluted.

The constituents of *Lavandula angustifolia* (Table 1) correspond with the findings of Price and Price (2004) in their book, *Understanding Hydrolats*. They found the main components to be linalool, terpineol-4-ol, α-terpineol, and eucalyptol (1,8-cineole). It is interesting to note that two of their samples showed acetone (2.23-10.11%). No acetone was detected in the samples above. It may be possible the acetone was a residual from cleaning commercial stills.

Reading a GC/MS analysis of a hydrosol

At the current time the most cost-effective means of analyzing a hydrosol is to measure the volatiles with a GC/MS (gas chromatography/mass spectrometry) test. Many of us are familiar with reading the GC/MS analysis of an essential oil, which is 100% volatile. The analysis of an essential oil is relatively simple compared to analyzing the hydrosol. There are actually more steps involved when analyzing a hydrosol thus making the analysis nearly double the cost of that of an essential oil. As the *Phytochemia* blog post "GC Analysis - Part VII. Hydrosol Analysis" explains, "For a given volume of hydrosol, the amount of organic volatile constituents is very small compared to a pure essential oil. Hydrosol analysis thus often implies a pre-concentration step" (St-Gelais, 2015). The author goes on to say, "It should also be known that hydrosol analysis is younger than essential oils studies, and

[1] Formula: 0.885 (density of Lavender essential oil) X 99.9 (10% dilution in liter) x 1000 (1000 ml) = 8841.

that there are higher odds of encountering unknown constituents that have not been included in scientific databases or publications. Any strongly water-soluble constituent which is found only in minute quantities in essential oils but much more abundant in the aqueous media could produce such a result."

The percentages listed on many GC/MS analyses of hydrosols are only in relation to each other not the whole hydrosol. In other words, it is not correct to state that a Lavender hydrosol is 49% linalool; it actually means the linalool content is 49% of the volatiles. A hydrosol contains a small fraction (from 0.02-0.15%) of volatiles (essential oil) in suspension; therefore a GC/MS of a hydrosol is in fact "a percentage of a percentage." Because of this, the percentage listed means very little unless it is converted to a measurable amount such as parts per million (ppm). In order to convert, you need a minimal amount of information, e.g. the total number of volatiles in a sample and the percentage of each component. The rest is simply math. A milligram (mg) is 1/1,000,000 of a liter and for our purposes is equivalent to one part per million (ppm). The formula for the conversion of percentage of component to ppm is:

ppm = mg/l of total volatiles x percentage of component

For example: 313 x 49.07% = 154 ppm

	L. angustifolia Sample 1	***L. angustifolia*** Sample 1	***L. angustifolia*** Sample 3	***L. angustifolia*** Sample 3
Saturation	313 mg/l	313 mg/l	639 mg/l	639 mg/l
	Percentage	ppm	Percentage	ppm
linalool	49.07%	154 ppm	43.85%	280 ppm
α-terpineol	11.75%	37 ppm	14.59%	93 ppm
terpinene-4-ol	8.47%	27 ppm	12.20%	78 ppm

Table 2. Saturation levels of constituents found in Lavender distillate.

At first glance, sample 1 (Table 2) seems to have more linalool than sample 3; however, this is not the case. You can see from the above table that sample 1 has a higher percentage of linalool in comparison to the other volatiles, but actually contains less ppm than sample 3. This is due to the fact that the total volatiles (313 mg/l) in sample 1 is less than half the total volatiles (639 mg/l) in sample 3. Sample 1 has only 154 ppm of linalool compared to 280 ppm in sample 3.

Bottled hydrosols
© Kristina Bauer

A multitude of uses

We are just beginning to understand what is contained in these lovely waters we call hydrosols. Now what do we do with them? I for one think their uses are nearly endless. I use hydrosols both therapeutically and for pure enjoyment. Lavender is no exception. In the book *Sauer's Herbal Cures* (Weaver, 2001), several pages are devoted to the water of Lavender being a cure for many ailments.

Medicine cabinet

Distilled water made from lavender has been used as a gargle and for hoarseness and loss of voice. –Grieve (1971)

Ice cubes

I keep a bag of Lavender hydrosol ice cubes in the freezer for a quick fast burn treatment or to sooth a wasp sting. Simply fill an ice cube tray with Lavender hydrosol and freeze, then place the individual ice cubes in an airtight bag for future use. I replace mine with fresh cubes every few months. You can place the old ice cubes on your plants for a fragrant watering.

Hydrotherapy

Foot baths, hand baths and soaking baths all benefit from the addition of hydrosols. Lavender blends well with Peppermint (*Mentha* x *piperita*) and Chamomile (*Matricaria chamomilla*).

Foot or hand bath

To soothe arthritic hands, take a small basin or tub (large enough for your hands) and fill with a quart (liter) of warm water. Add one cup (237 ml) of Lavender hydrosol and one cup (237 ml) Chamomile hydrosol. Soak for 5-10 minutes then pat dry.

For a cooling and refreshing foot soak add one cup (237 ml) of Lavender hydrosol and ½ cup (115 ml) Peppermint hydrosol to a quart (liter) of cold water in your basin and soak your hot and tired feet.

Hospice

It profiteth them much that have the palsy if they be washed with the distilled water from the Lavender flowers. –Gerard, 2015

Lavender hydrosol may be used neat (undiluted) with the elderly and infirm. In his book *Principles of Holistic Therapy with Herbal Essences* Dietrich Gumbel, PhD, (1993) states, "It relaxes the blood vessels and calms skin irritations and blushes (allergic reactions)."

Use a soft compress (either a handkerchief or very soft washcloth) soaked in a blend of Lavender hydrosol and Rose Geranium (*Pelargonium* spp.) hydrosol. Soak the compress in the hydrosol blend (I use a cold compress in summer and a warm compress in the winter) and lightly apply to exposed areas to soothe the skin and aches of being bedridden. A cool compress can be soaked in Lavender water and placed on the forehead to reduce fever in a patient.

A quick spritz of Lavender hydrosol in the sick room can clear the stale air and put a smile on the face of the ailing.

Animals

Lavender hydrosol is effective ingredient in my homemade fly spray for horses.

Fly spray

2 parts Catnip (*Nepeta cataria*) hydrosol
1 part Lavender (*Lavandula angustifolia*) hydrosol
1 part Lemongrass (*Cymbopogon* spp.) hydrosol
1 part Rose Geranium (*Pelargonium* spp.) hydrosol

Image © www.horseandhound.co.uk

Mix all together in a gallon jug and use to refill spray bottles as needed.

Where I live in "tick country," I have found that this spray works well to repel mosquitoes, black flies and ticks. It also works on humans.

Kitchen

Take a nut shell full of Lavender water and add it to the water that you mix with flour when baking bread. If you bake the bread with it, the bread will not become moldy for as long as you want to keep it. –*Sauer's Herbal Cures*, 1818 (from Weaver, 2001)

Lavender lemonade
© Didriks/Flickr

Lavender water has many culinary uses. It is much easier to cook with Lavender water for flavoring than the essential oil simply be cause it is already diluted. I use only *Lavandula angustifolia* varieties as I find the Lavandin (*Lavandula* x *intermedia*) hydrosols to be too harsh for cooking. Try adding one tablespoon (15 ml) to your lemonade. You can also add one teaspoon (5 ml) to your favorite sugar cookie recipe for a delicate delight.

These gentle giants of the plant world can be used daily. They are gentle enough for children and the elderly thus giving the Aromatherapist another tool in their tool box. I believe their uses are only limited by our imagination.

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Ann Harman is an organic farmer, botanist, herbalist and distiller. She is the author of *Harvest to Hydrosol*, a book about distilling hydrosols. Currently she is involved in research of the hydrosol: chemistry, microbiology and therapeutic uses. She has been making herbal products for decades and distilling hydrosols for nearly 20 years. She loves sharing her knowledge of the world of distillation and hydrosols. She is an international speaker who lectures on her continual research on hydrosols and the Art of Distillation. She regularly contributes articles on distillation and hydrosols to industry journals. Ann has started a membership-based website where she shares her research and education materials. www.circlehinstitute.com ann@circlehinstitute.com

Authentication of Lavender Essential Oil: Commercial Essential Oil Samples and Validity of Standard Specifications

Lavender samples
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Prabodh Satyal, PhD and Aaron C. Sorensen, MS

Introduction

Lavandula angustifolia Mill., also known as Lavender, is comprised of more than 39 known species. It is one of the most popular essential oils in Aromatherapy and is part of the Lamiaceae family. The flowering plant of Lavender (*Lavandula angustifolia* or *Lavaendula officinalis*) is used to produce Lavender essential oils. It is a sweet, camphoraceous, aromatic and pale yellow to colorless essential oil. It is widely used in Aromatherapy and in the fragrance industry because of its biological activities and aromatic potentials. It is also considered one of the most widely-used essential oils in Aromatherapy and the perfume industry. Lavender is grown worldwide with most of the industrial production coming from France, Bulgaria, China, India, New Zealand, Australia, Russia, and USA. Global production of Lavender is approximately 500 metric tons. Commercial essential oils are obtained by steam distillation of freshly cut flowering tops and stalks, with an essential oil yield in the range of 0.6 to 1 percent (Fenarali, 1971).

The wholesale price of Lavender essential oil starts from $50 US to $500 US per kg, depending upon factors such as origin and availability. Traditionally, certified organic Lavender essential oils are the highest priced variety. Typical retail pricing of Lavender essential oil can range from $5 US to $50 US per 15ml bottle. Because of its economic importance and popularity worldwide, Lavender essential oil is also one of the most commonly adulterated essential oils. In this article, the authors' intent is to present current trends in Lavender adulteration and techniques to detect those adulterations. We have randomly analyzed 15 different market samples so as to observe ongoing adulteration in the market. The samples were collected from a variety of sellers worldwide. Most were obtained from online essential oil suppliers in the US, a few were directly from the distiller, a few were from retail stores, and one was prepackaged with a diffuser item. In addition, some of the oils were labeled as ECOCERT, organic, wild-crafted, and "certified natural therapeutic grade."

Trends in Lavender adulteration and detection

Common ways Lavender essential oil is adulterated:

1. Addition of nonvolatile component(s).
2. Addition of volatile components naturally found in Lavender essential oil. There are several components of Lavender that can be commercially obtained as pure volatile components.
3. Addition of fractions obtained from other essential oils to Lavender essential oil.
4. Intermixing of two similar oils to mimic a Lavender essential oil profile.

These adulteration trends are further outlined and explained in Table 1.

Lavender adulteration can also be determined by measurement of physical constants such as relative density (0.878 to 0.892), refractive index (1.455 to 1.466), optical rotation (-12.5 degrees to -6.0 degrees), acid value (max 1), and ester value (102.5–165). If a Lavender sample falls out of those ranges, it is considered adulterated in some form. In addition to GC/MS and physical constant measurement, Lavender adulteration can also be determined by enantioselective GC/MS. Stoyanova and Grozeva (2008) have performed chiral GC/MS on Lavender essential oil and have found authentic Lavender should have the following enantiomeric distribution: (+)-linalyl acetate (0%), (3R)-(-)-linalool (95.0–96.6%), (3S)- (+)-linalool (3.4–5.0%), (3R)-(+)-camphor (27.4–52.2%), and (3S)- (-)-camphor (47.8–78.6%).

Adulteration type	Means of adulteration	Means of adulteration detection	Adulteration level of sophistication
Unrelated, economically motivated addition of 1 or more non-volatile components	Simple addition of dipropylene glycol (DPG), tripropylene glycol (TPG), DPG diacetate, kerosene, herculene, diethyl phthalate, benzyl alcohol, benzyl benzoate, diethylene glycol monoethyl ether (DGME), diacetone alcohol, Isopar (odorless kerosene fraction), isopropyl myristate, triacetin, nonvolatile antioxidant butylated hydroxytoluene (BHT), butylated hydroxy anisole (BHA), Vitamin E, carrier oils such as coconut, cooking oils etc. Those components are odorless and can easily pass an organoleptic test. A more experienced nose can potentially detect an odor variance, but this is also not certain.	The paper absorption method can be performed by putting a drop of Lavender on a piece of blotting paper. If everything from the drop evaporates out in 1–2 hours, it is considered adulteration free from carrier oil. If a halo of grease remains, it's considered adulterated with carrier or some other non-volatile oil (Lis-Balchin, 2002). Thin layer chromatography (TLC), organoleptic evaluation, or running a high temperature gas chromatography/mass spectrometry (GC/MS) test (which can elute high-boiling compounds) are also means of detecting this variety of adulteration.	This is considered a simple and unsophisticated form of adulteration.
Addition of Lavender-related synthetic volatile component	Several components that naturally occur in Lavender can be chemically synthesized such as terpinen-4-ol, linalool, linalyl acetate, *cis*-ocimene, *trans*-ocimene, 3-octanone, 3-octanol, camphor, and borneol to name a few. These synthetic components can be added to Lavender to gain an economic advantage and/or create a more favorable aroma or chemical profile.	Synthetic markers (trace components produced during synthesis of aroma chemicals which do not exist in nature) and biomarkers of Lavender components (those components that are not economically feasible or are not possible to synthesise are called biomarkers). Biomarkers include cryptone (>0.1%), lavandulyl acetate (>3%), santalene (>0.01%) (Burfield, 2003) for French Lavender. Detecting synthetic markers in components such as terpinen-4-ol (trihydroxy terpineol), linalool (α-linalool, dihydrolinalool, tetrahydro-linalool, dehydrolinalool, plinol *cis*- or *trans*-), linalyl acetate (dihydrolinalyl acetate, dehydrolinalyl acetate, α-linalyl acetate, plinyl acetate *cis*- or *trans*-), 3-octanone and 3-octanol (shows homologous pair such as 3-nonanone, 3-heptanone or 2-heptaone or 3-heptanol or 3-nonanol marker) indicates synthetic component adulteration. Thermally rearranged markers can also be observed in thermally produced chemicals such as myrcene, ocimene, camphor etc. But most of the time they are undetectable in ordinary GC/MS (Satyal and Pappas, 2016).	This is considered a more sophisticated type of adulteration. In some cases, GC/MS and gas chromatography isotope ratio mass spectrometry (GC-IR-MS) fail to recognize this type of addition.
Addition of fractions obtained from other essential oils	Chemicals such as β-caryophyllene, linalool from Ho wood or Ho leaf (*Cinnamomum camphora*), acetylated Ho wood or Ho leaf, α pinene, α-thujene, limonene, citral, caryophyllene fraction obtained from Copaiba Balsam (*Copaifera officinalis*) and Gurjun Balsam (*Dipterocarpus turbinatus*) or Clove (*Syzygium aromaticum*) oil can be added as a natural (non-synthesized) adulteration.	Using GC/MS and looking over biomarkers and unexpected acetylated components found in Lavender essential oils such as linalool oxide acetate cis and trans. Balsam can be identified by higher α-copaene, aromadendrene, allo aromadendrene biomarkers.	Can be a very advanced means of adulteration. Often C14 and chiral GC/MS tests fail to detect such types of adulteration.

Table 1. Types of adulteration and how they are detected.

Addition of a similar essential oil	A similar, less expensive essential oil added to Lavender is common. The most common adulterants are Lavandin (*Lavandula* x *intermedia*) oil, Spike Lavender (*Lavandula latifolia*), Eucalyptus (*Eucalyptus globulus*) oil, Clary Sage (*Salvia sclarea*) oil (expensive, so not used often), Petitgrain (*Citrus aurantium* var. *amara* fol.) oil (expensive), Rosewood (*Aniba rosaeodora*) oil or fractions of these oils.	Lavandin oil has 1,8-cineole, camphor, borneol in concentrations of more than 1%; by looking over biomarker molecules, adulteration can be predicted. Presence of rosewood oxide confirms the presence of Rosewood EO in Lavender EO.	Chiral analysis of EO can also be useful in detecting this type of adulteration. Typically, this type of adulteration is challenging to detect.

Table 1. Types of adulteration and how they are detected.

Beyond chiral GC/MS and standard GC/MS, isotopic ratio GC/MS is also used to detect adulteration (Jung *et al*., 2004). GC-IR-MS is only applicable if fossil fuel–derived synthetic compounds have been added to the essential oils. This equipment is considerably more expensive than standard GC/MS setups (Satyal and Pappas, 2016).

Not only is adulteration carried out by the above-described methods, sometimes it is also carried out using expired or oxidized Lavender essential oils. The major components of Lavender are linalool, linalyl acetate, and caryophyllene (Sköld *et al*., 2007). Out of these components, trans-caryophyllene is most susceptible to oxidation to produce oxidized chemicals (caryophyllene oxide) which is the least sensitizing molecule (Sköld *et al*., 2006). Highly oxidized Lavender produces hydroxide, epoxides and hydroperoxides of linalool, linalyl acetate, and caryophyllene (Nilsson *et al*., 2008). Autoxidation happens in the allylic positions of double bonds in linalool and linalyl acetate (C6-C7) (Sköld *et al*., 2007). Oxidizied components of Lavender are found to possess sensitizing effects on skin (Nilsson *et al*., 2008); however, few contact allergies have been reported (Letizia *et al*., 2003). Proper handling and storage of volatile compounds is always good practice. Poorly handled or expired products can be added to pure fresh Lavender for economically motivated adulteration. An increase in oxidized products like linalool oxide and caryophyllene oxide indicates autoxidation of linalool and caryophyllene (Misharina *et al*., 2003). Linalool readily undergoes autoxidation to form cyclized molecules: furanoids and pyranoids (Sköld *et al*., 2002), hence the concentration of furanoids and pyarnoids in expired Lavender essential oil is relatively high as compared to freshly distilled Lavender (Lawrence, 2012). Comparatively, due to the large bulky acetate group, linalyl acetate is unable to form cyclized furanoid and pyranoid molecules. Sesquiterpene oxide is formed from the oxidation of sesquiterpenes (Hădărugă *et al*., 2014). Ascaridole glycol *cis*- and *trans*- along with epoxide are observed as oxidized products of terpinen-4-ol (Tranchida *et al*., 2010).

Market survey of commercially available essential oil in conjunction with standard ranges

The International Organization for Standardization (ISO) and the British Pharmacopoeia are helpful in adulteration detection; however, they have some limitations. For example, their ranges do not necessarily identify adulterated essential oils because of genetic variation and other factors, such as age, vegetative cycle stage, climatic condition, and soil composition, responsible for the considerable variation in essential oil compositions (Lawrence, 2007). This means sometimes a pure Lavender essential oil may not fit the established standard ranges. ISO and the British Pharmacopoeia only mention one biomarker (lavandulyl acetate) for consideration in adulteration identification. Ideally it is better to have more than one biomarker in the specification table to track multiple types of adulteration such as in the cases of cryptone and santalene. The British Pharmacopoeia is also missing one of the most active odorant molecules, ocimene (*cis*- and *trans*-), in its specification ranges. In this study of Lavender adulteration, other biomarkers are also observed so as to provide their abundance in authentic and adulterated Lavender essential oils.

Fifteen different and random commercial samples were tested specifically for indications of adulteration. It was found that most of the commercial samples were adulterated by some means. Those results and comments on those results are outlined below and in Table 2.

A. Unadulterated samples which follow standard specification ranges:
Samples J, L, R, S, V, X follow standard specification ranges, indicating that they are unadulterated standard samples. Even though there is not an indication of adulteration in these samples, there is some variation that could be a result of various origins. They do also have healthy levels of lavandulyl acetate, lavandulol, and cryptone.

B. Unadulterated samples which do not follow standard specification ranges:
Sample Q contained 4.41% lavandulyl acetate and 0.37% cryptone, indicating it was an authentic sample. In spite of this, it had high 1,8-cineole (1.68%), which is not within the standard specification range. This unusual chemical composition might be caused by various factors such as soil condition, harvesting time, and genetic features. While not certain, it may be possible that a very small amount of Lavandin was grown along with Lavender. This would not affect quantities of biomarkers (lavandulyl acetate and cryptone) in the Lavender, but could account for the small increase (0.68%) of 1,8-cineole.

Sample I is a lab-distilled Chinese Lavender containing a low level of linalyl acetate (12.73%) and high linalool content (53.91%) compared to standard specification. Linalyl acetate will decompose and become linalool in a slightly acidic environment, such as during hydrodistillation where the pH of the water is lower than 7. This is an example where a pure oil does not follow the standard, expected component ranges.

C. Adulterated samples which follow standard specification ranges:
Sample P meets the standard specifications, but contains synthetic markers such as cis- and trans-plinyl acetate, which are indicators of synthetic linalyl acetate. Similarly, synthetic linalool has been detected in this sample which can be confirmed by the presence of plinol as the synthetic marker.

Sample W met the standard specifications, but contained trace quantities of synthetic markers such as a-linalool and dihydrolinalyl acetate, as well as the presence of synthetic linalool and synthetic linalyl acetate. It appears that the concentration of linalool

Compounds	BP	F/S	F/M	Bu	Ru	Au	Ot	I	J	K	L	M	N	O
3-octanone	0.1-5.0	tr-2	1-2.5	0.2-1.6	0-0.6	2-5	0-3	0.14	0.1	ND	0.37	0.29	ND	0.81
limonene	<1	0-0.5	0-0.3	0-0.6	0-1	0-0.5	0-1	0.2	0.39	4.92	0.36	0.92	2.42	0.95
β-phellandrene		tr-0.5	0-0.2	0-0.6	0-1	0-0.5	0-1	0.02	0.17	0.07	tr	ND	0.31	0.61
1,8- cineole	<2.5	0-1	0-0.5	0-2	0-2.5	0-1	0-3	0.32	0.54	3.58	1.39	6.70	2.38	8.38
cis-β-ocimene		4-10	0-2.5	3-9	3-8	3-9	1-10	2.48	3.67	ND	2.07	6.70	ND	2.73
trans-β-ocimene		1.5-6	0-2	2-5	2-5	0.5-1	0.5-6	1.55	1.91	ND	1.23	0.83	ND	1.96
linalool	20-45	25-38	30-45	22-34	20-35	25-38	20-43	53.91	33.56	9.45	32.62	36.4	22.36	43.11
camphor	<1.2	tr-0.5	0-1.2	0-0.6	0-0.6	0-0.5	0-1.5	0.12	0.21	3.04	0.60	6.92	0.41	5.74
lavandulol		>0.3	0-0.5	>0.3	>0.1	>0.3	0-3	4.70	1.95	ND	0.43	ND	ND	0.04
terpenin-4-ol	0.1-8.0	2-6	0-1.5	1.5-2	1-2.5	1.5-6	1-8	1.57	0.82	1.58	4.54	1.84	1.25	0.27
cryptone								0.08	0.23	ND	0.08	ND	ND	0.23
α-terpineol	<2.0	0-1	0.5-1.5	0.8-2	0.5-2	0-1	0-2	2.39	1.41	3.55	0.76	1.14	3.16	0.91
linalyl acetate	25-47	25-45	33-46	30-42	29-44	25-45	25-47	18.57	31.59	12.73	40.36	30.45	22.40	19.03
lavandulyl acetate	>0.2	>2	0-1.3	2-5	1-3.5	>1	0-8	4.92	9.92	ND	1.53	1.29	ND	0.24
α-santalene								0.01	0.39	ND	0.31	ND	ND	ND

Table 2. Comparison of market-surveyed Lavender essential oils with standard specification ranges (ISO and British Pharmacopoeia).

Note that "ND" refers to not detected component, "tr" refers to component less than 0.01%, items outside of specification are indicated in red. All the numbers presented in the table are in percentages. Components in bold letters are biomarkers of Lavender essential oils. These are not economically feasible to adulterate. The samples analyzed are categorized in the following categories 1. Lab distilled (sample I); 2. Online supplier (samples S, K, M, T); 3. Mid-size online supplier (samples U, V, W); 4. Large US distributor (not MLM) (sample P); 5. Direct from distiller; origin is known (samples Q, C, J, L, R, X); 6. Large US shopping center (samples N, O).

and linalyl acetate was increased to 28% and 50% (respectively), but in doing so has lowered its key components of cryptone and lavandulyl acetate to 0.09% and 0.68%. So from this example it can be concluded that minor biomarkers are also important in addition to synthetic markers in detecting adulteration in Lavender essential oil (EO).

D. Adulterated samples which do not follow standard specification ranges:
Sample K contains levels of 1,8-cineole and camphor that are much too high to be true Lavender. The 1,8-cineole content should not be over 1% in true *Lavandula angustifolia* or *L. officinalis*. The level of α-pinene (10.98%) is too high. Furthermore, lavandulol or lavandulyl acetate are components that are always present in Lavender EO and this product did not contain either of these components. In addition, the percentages of dihydrolinalool (0.09%) and dihydrolinalyl acetate (0.11%) indicate that all the linalool and linalyl acetate are from synthetic sources, as these markers are by-products of the synthetic manufacturing process. β-ionone (0.19%) was also observed and nopyl acetate, which does not occur in nature, was found in the product at almost 12%.

P	Q	R	S	T	U	V	W	X
2.08	0.6	1.87	1.62	0.18	0.14	0.66	0.81	1.79
0.26	0.42	0.84	0.55	0.44	0.20	0.28	0.14	0.40
0.24	0.12	0.45	0.27	0.03	tr	0.17	tr	0.32
0.61	1.68	1.14	0.94	4.76	6.55	0.82	2.05	0.51
1.03	1.83	0.55	0.51	0.19	ND	3.29	0.09	3.98
0.96	1.36	0.66	1.30	0.15	0.15	3.17	0.17	2.75
37.25	27.46	26.79	31.97	35.19	23.59	26.93	28.02	25.81
0.13	0.42	0.35	0.45	3.74	11.98	0.26	0.87	0.24
0.48	0.55	0.27	0.98	ND	1.21	1.05	0.30	0.81
1.38	6.94	0.70	0.57	1.91	0.54	4.56	1.38	5.57
0.14	0.37	0.49	0.47	0.02	ND	0.19	0.09	0.23
0.52	1.14	1.39	2.18	0.61	0.62	0.50	1.91	1.38
45.14	37.78	49.99	40.52	42.25	24.9	37.76	50.00	37.45
1.74	4.41	1.78	4.45	0.43	2.53	5.28	0.68	4.70
ND	ND	ND	ND	ND	ND	ND	ND	ND

BP=British Pharmacopoea, F/S=France ISO (Spontaneous), F/M=France ISO Maillette, Bu=Bulgarian ISO, Ru=Russian ISO, Au=Australian ISO, Ot=Other ISO

Sample M was a mixture of synthetic linalool, linalyl acetate and Lavandin. Presence of Lavandin can be confirmed by the high 1,8-cineole (6.70%) content like in the case of sample K. Synthetic linalool is present in this sample which can be confirmed by the presence of plinol and plinyl acetate. This sample is considered a misrepresentation of Lavender and does not pass standard specification.

Sample N was a completely reconstructed Lavender due to the presence of DPG (10%) with other unrelated synthetic aroma chemicals such as nopyl acetate (0.98%), ricenalidic acid lactone (0.19%), and cyclohexanol <4-tert-butyl acetate>. Related aroma chemicals such as synthetic linalool and linalyl acetate have been detected from its minor synthetic markers: dihydrolinalool and dihydrolinalyl acetate.

Sample T is similar to sample K in terms of chemical profile. Lavandulyl acetate (0.43%) and cryptone (0.02%) are the lowest of all 15 samples, confirming the misrepresentation of the botanical. It also has synthetic markers for linalool and linalyl acetate as dihydrolinalool (0.31%) and dihydrolinalyl acetate (0.57%).

Sample U is also a misrepresentation of botanical Lavender, similar to samples K and T.

Conclusion

There are various testing methods such as GC/MS, enantiomeric ratio comparison, biomarkers, trace synthetic markers and physical constant testing that can be used to detect Lavender oil adulteration. Economically motivated adulteration of Lavender essential oil is a common practice in the industry. Nearly half of the samples reviewed for this paper had some form of detectable adulteration. The means of adulteration are varied and meet the generally accepted specifications, as per ISO and the British Pharmacopoeia. There is no guarantee that a Lavender essential oil has not been adulterated.

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Prabodh Satyal received his B.Sc. and M.Sc. degrees in organic chemistry from Tribhuvan University, MS and PhD in Essential Oil Chemistry from University of Alabama in Huntsville. He has studied the chemical composition of over 4000 essential oils from the various parts of world with 18 different bio assays, and has published more than four dozen research articles in peer-reviewed journals, and is an editorial member of several journals. He has special interest in essential oil adulteration detection technique by marker-based analysis and enantiomeric distribution–based analysis. prabodhsatyal@gmail.com

Aaron Sorensen received his undergraduate degree in Chemistry and Material Engineering from the University of Utah and went on to complete a Masters of Science from Colorado Tech. He has spent over a decade managing teams focused on Quality Assurance and R&D in the dental, cosmetic, food, dietary supplement, and essential oil industries. Recently Aaron has concentrated his studies and specializes in essential oil sourcing and purity testing, building relationships with more than 50 producers world wide through on-the-ground development in over 25 countries.

The Effect of *Lavandula angustifolia* added to *Mentha* x *piperita* on Headaches

Woman with a headache
© iStock/Wave Break Media

Deborah Summarell, RN, CCBE, CCAP

Introduction

This small pilot study evaluated the effect of nasal inhalation of the essential oils Lavender (*Lavandula angustifolia*) and Peppermint (*Mentha* x *piperita*) on headaches in the general population. Results in the intervention group showed a decreased perception of headaches in seven of the 10 participants. A control group was utilized to evaluate the effect of nasal inhalation of the Lavender essential oil only. In the control group, six of the 10 participants had a decreased perception of headaches.

Headache is defined as "an ache or pain in any region of the head" by the Merriam Webster Medical Dictionary (1995) and the Mayo Clinic (2003). Millions of people suffer from headaches worldwide. There are many types and many causes. For the purpose of this study, the type of headache was not a factor for acceptance into the study, just the frequency of headaches. Because numerous individuals state their headaches are a result of feeling stress, the control group was given nasal inhalers with only the essential oil Lavender. The effects of Lavender to reduce anxiety and stress are well documented based upon previous research studies (Lim, 1997; Keegan, 2003; Dunn *et al.*, 1995).

Background

Aromatherapy uses essential oils as a complementary method for healing and therapeutic benefits (Buckle, 2003). Essential oils, and the chemicals that comprise them, have proven to have healing properties through scientific research (Buckle, 2003). Topical and inhalation methods of Aromatherapy are used to treat a wide range of ailments.

Many articles suggest the use of Aromatherapy for general stress reduction. Selye (1956) calls stress "the non specific response of the body to any demand made upon it" (Pemberton and Turpin, 2008). Researchers have documented that Lavender is safe to inhale and calms stress and anxiety (Lim, 1997; Keegan, 2003). The odor of Lavender may have a sedative effect on brain wave patterns and so is likely to be particularly useful in stressful circumstances such as in intensive care settings (Dunn *et al.*, 1995; Pemberton and Turpin, 2008). Lavender contains esters that have endocrine balancing and nervous system restoring properties and applications.

The effects of Peppermint and ethanol preparations were investigated in 32 healthy subjects in a double-blind, placebo-controlled, randomized cross-over design. A significant analgesic effect with a reduction in sensitivity to headache was produced by applying the essential oil to a large area of the forehead and temples using a small sponge. "The essential plant oil preparations often used in empiric medicine can thus be shown by laboratory tests to exert significant effects on mechanisms associated with the pathophysiology of headache" (Göbel *et al.*, 1994).

Methods

Design

This pilot study used an onset design, with 20 participants: 10 receiving the combination intervention inhaler and 10 in the control group receiving the inhaler of Lavender only. The participants in the intervention group were both male and female with an age range of 30 years to 62 years (mean age 44.33). The control group participants were all females, ranging in age from 30 years to 60 years (mean age 40). They were invited to participate by the primary

investigator (PI) if they met the inclusion criteria. Participants' informed consent was obtained and they were invited to sign up and participate in the study. There was minimal deception in that the participants did not know whether the inhaler they received had the combination of oils formulated to reduce perception of headache. Although there was no requirement for participants to provide anecdotal comments, several participants elected to explain their responses to the PI.

The intervention combination inhaler was prepared with four drops of Grapeseed (*Vitis vinifera*) oil, one at top, one at bottom, and one on each side of the wick. This was done to keep the essential oils from evaporating too quickly. Eight drops of Lavender and four drops of Peppermint were then applied to the wick. The wick was inserted into the inhaler, base pushed firmly in place, and cap screwed over the inhaler for storage.

The control group nasal inhalers were prepared with four drops of Grapeseed oil, one at top, one at bottom, and one on each side of the wick. Eight drops of Lavender were then applied to the wick. The wick was inserted into the inhaler, base pushed firmly in place, and cap screwed over the inhaler for storage.

Sample

The study used a convenience sample; participants were known to the PI either personally or through referral. Inclusion criteria were that the individuals had previously complained of headaches or were currently complaining of headaches. These individuals were willing to give informed consent, capable of following directions to use the inhalers and willing to report results within 30 minutes of the beginning of symptoms and utilization of the inhalers. The first 10 individuals were assigned to the combination inhaler group. The second 10 individuals were assigned to the control inhaler group.

Exclusion criteria: Peppermint can be a stimulant (Warm and Dember, 1990). Participants were asked if stimulation like that in caffeine would pose a health issue for them. The participants were informed that occasionally inhalation of Peppermint may be a stimulate in the same way. No participants were excluded because of the stimulant effect.

Instructions also included that coffee grounds could be used to neutralize the smell, if the aroma in the inhaler was irritating to the participant. All participants were informed that they could withdraw from the study at any time, without penalty. Consent forms were signed by the 20 participants (100%) that met the inclusion criteria.

Ethical considerations

Each consent form described what the study involved and that there were no known risks or side effects. This study had no financial benefit to anyone involved, nor was any participant responsible for any cost.

Data collection

This study took place at various locations from January 14, 2014, through March 31, 2014. Each participant was given one nasal inhaler to use at the onset of the headache. Each participant was asked to rate pain on the scale of 0-10. Instructions were given to deeply inhale five sets of four inhalations (each nostril) at onset of headache. Participants were encouraged to utilize the inhaler as needed for 30 minutes. Participants were asked to then rate pain on the scale of 0-10. Participants were asked to note if pain returned and if medications were taken. This same procedure was utilized for both the intervention combination inhaler and the control group inhaler.

The PI purchased twenty nasal inhalers, essential oils and carrier oil through online Aromatherapy distributors. Each participant was given an inhaler, verbal instructions, and a pain level log sheet (see Figure 1). Each participant was given specific instructions on how to use the pain level log sheet, which included markings for a range of 0 to 10, to document his or her level of pain. The instructions specified that only whole numbers were to be identified. For example, if the participant felt that his or her pain was between 4 and 5, a decision needed to be made to mark either 4 or 5, not 4.5. The value of 0 was no pain, 5 was medium pain, and 10 was the worst pain the participant experienced. Instructions were to assess pain level on a 0 to 10 rating scale at onset of headache and document this rating on the log sheet. The pain level log was then to be returned to the PI. This same procedure was utilized for both the intervention combination inhaler and the control group inhaler.

Pain Rating #1 / #2
Pre-inhalation Post-inhalation

#1 _____ #2 _____

Pain Rating scale
0—1—2—3—4—5—6—7—8—9—10
(Worst pain)

Fig. 1. Pain level log sheet.

Data analysis—results

The pain level scores from the logs of all participants were entered into spreadsheets in Excel for analysis. Each participant's scores were grouped pre-inhalation and post-inhalation. This enabled the PI to look for trends of decreased pain after utilizing the inhalers for 30 minutes. Charts were developed to illustrate the individual scores for each participant, both pre-inhalation and post-inhalation. Numbers 1 through 10 were assigned to represent each participant in the control and intervention groups. These charts are presented as Figures 2 and 3. As an example to interpret the charts, participant 1 in Figure 2 (intervention group) scored 5 for the pre-inhalation and 8 for post-inhalation. Charts were developed to illustrate the percentages of each group's increased, decreased or same level pain. These charts are presented as Figures 4 and 5.

Personal inhalers
© Stillpoint Aromatics

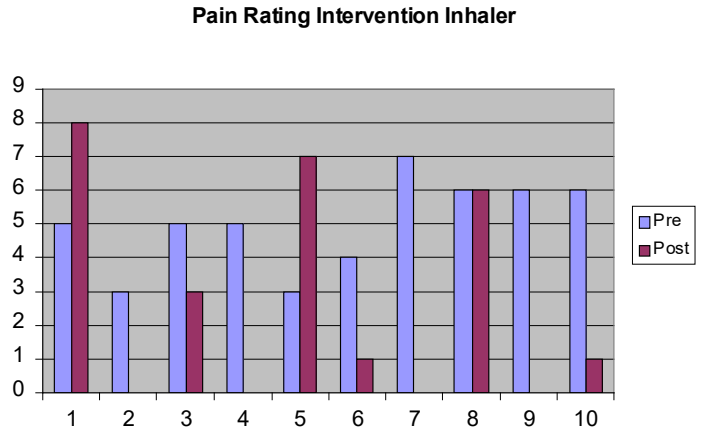

Figure. 2. Pain Rating Intervention Inhaler Chart.

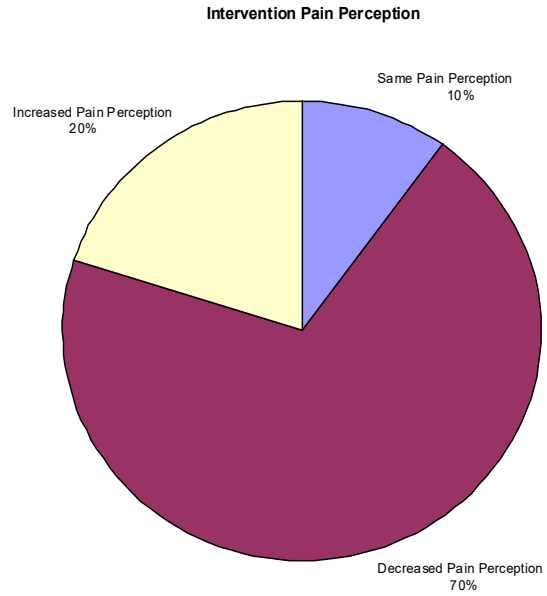

Figure 3. Intervention Percentage Pain Perception.

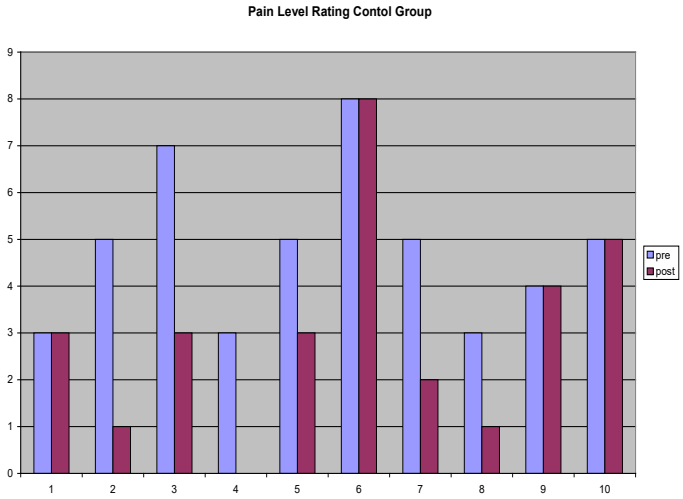

Figure 4. Pain Rating Control Group.

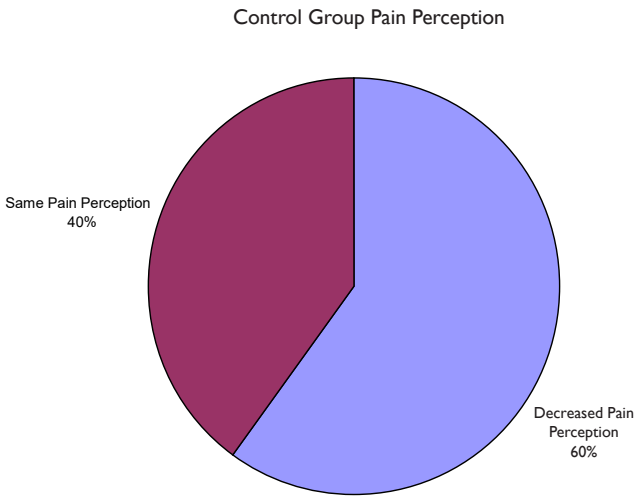

Figure 5. Control Percentage Pain Perception.

Discussion

The purpose of this study was to evaluate the effect of inhalation of these essential oils on perceived headache pain levels of the general population. The oils had a positive effect; they reduced pain in seven of the participants sampled who utilized the combination intervention inhaler. One participant had pain remain the same, neither increasing nor decreasing. Two participants had pain that increased. Of these 10 participants, two took medication prior to the thirty-minute inhalation ending. Neither of these two participants utilized the inhaler during the 30 minutes after the initial sets of five inhalations. One of the two participants stated prior to beginning the inhalation treatment, "I really don't believe this will help at all."

In the control group, again, the oil had a positive effect in decreasing perception of pain for six participants. Four participants had pain remain the same (neither increasing nor decreasing). None of the participants stated their pain increased. Of these 10 participants, one took medication after the initial 30-minute inhalation time ended. All 10 of these participants utilized the inhaler throughout the 30-minute testing time.

This demonstrates potential for a simple, noninvasive process to reduce perceived headache pain, which could be accomplished in a short timeframe. It is acknowledged that there are many other factors that could influence results in perceived pain reduction. For example, individuals may perceive pain differently, which would affect responses on the rating scale. Also, during the headache treatment interval, a participant may have a stressful encounter, which could cause a higher rating of perception of pain. Then, if the stressful encounter stabilized, perception of pain may decrease. Did the oil have an effect, or did the reduction of the stressful encounter reduce the perception of pain?

The reverse could also be true: a pre-inhalation perception of pain rating could be low; then, at the post-inhalation rating, a stressful situation occurs causing perception of pain to increase. There is limited ability to control all factors that could increase or decrease perception of pain in the general population in uncontrolled settings. In the general medical field, patients rating perceived headache pain as a 5 or above may prompt an intervention of two Tylenol (acetaminophen) tablets instead of one to decrease pain. Greater reduction in perceived headache pain may have occurred if a higher (seven drops) concentration of Peppermint had been used instead of the four drops.

Suggestions for further research

A study involving a larger group of participants specifying the types of headaches suffered would provide a broader spectrum for analysis. Using a different method of application (such as topical) may show a difference over the inhalation application used in this test. Also, many other essential oils have headache pain–reducing properties. Comparisons and experimentation with those oils would be useful for further knowledge about the use of essential oils and perceived headache pain in the general population. Testing with only male participants may have different results from testing with only female participants. Testing by age groups may also have produced different results.

Conclusions

In conclusion, the perceived headache pain in the intervention group decreased in 70% of the sample. This indicates that the use of nasal inhalation intervention, a combination of eight drops of Lavender and four drops of Peppermint in Grapeseed oil, had a beneficial effect, reducing perceived headache pain in the general population. This treatment could be added to other stress reduction methods, such as meditation, chair massage, and full body massage.

Together these treatments could reduce perceived headache pain in the general population and reduce the amount of pain medications used.

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Deborah Summarell is a Certified Clinical Aromatherapist Practioner. She was certified through R. J. Buckle Associates, LLC (www.rjbuckle.com) upon completion of the course of instruction: Clinical Aromatherapy for Healthcare Professionals. This nursing education activity was approved by the American Holistic Nurses Association. She currently works at Baylor Scott and White Hospital in Fort Worth, TX. Ms. Summerell offers personal Aromatherapy and wellness consultations throughout the Dallas / Fort Worth, Texas area, as well as classes in the use of essential oils in crafting personal care aromatics. Contact: 817-682-1564 for consultations or class listings.

The Gender Preference for Essential Oils

Jessica Roth, RN, BSN, CMSRN

Man and woman smelling a rosemary plant
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Abstract
The purpose of this small pilot study was to identify whether a gender preference between two essential oils existed. Males and females were each given two inhalers; one inhaler marked "A" and the other inhaler marked "B." Inhaler A had twenty drops of Clary Sage (*Salvia sclaria*), and inhaler B had twenty drops of Sandalwood (*Santalum album*). Subjects were asked to smell the inhaler and to then rate their preference for each oil on a scale of 0 to 10 (0 being the worst and 10 being the best). Study results indicate that preference for oils is not based on gender.

Introduction
I believe men and women have different preferences for most things in life. This makes us unique and different in the choices we make. The purpose of this small pilot study was to determine if there was a gender preference for essential oils. Little is known about scent preferences in men versus women. O'Callaghan and Jordan (2003) conducted a study regarding postmodern values, attitudes, and the use of complementary medicine. One hundred and seventy-one adults were surveyed on several areas of postmodern values about health. The study results highlighted the importance of patients' belief in natural remedies and in their active involvement in the healing process (O'Callaghan and Jordan, 2003). A person's belief in natural remedies, their mood and gender may contribute to their scent preference in essential oils.

There seems to be an association among individuals' values and attitudes regarding essential oils and this may impact their preference to certain essential oils. The use and indications of essential oils may play a role in scent preferences. If people are skeptical about essential oils and their benefits, they may not be open to their healing or therapeutic properties.

I chose the scents of Sandalwood and Clary Sage from the information given in the monographs from a Clinical Aromatherapy class. I wanted to test whether gender played a role in preference for these oils, in particular whether males liked the more masculine scent of Sandalwood and whether females liked the more feminine scent of Clary Sage. I considered Clary Sage to be a more feminine scent because it is sweet, light and airy; its fragrant and fruity aroma is similar to that of a women's perfume. It comes from a flower and is high in esters. Esters are thought to be anti-spasmodic, calming and relaxing (Buckle, 2008). Sandalwood, on the other hand, has a more musky scent, much like many men's colognes. Made from the root and the heart of the wood, Sandalwood is high in sesquiterpene alcohols. Sesquiterpenes in the alcohol group are thought to be decongestant and liver regenerative and some are cardiac stimulants (Buckle, 2008). My personal bias for the scent of Clary Sage did not have an effect on the outcome of the study. I did not let the chosen participants know of my preference or thoughts until after they had rated both scents. The Clary Sage essential oil that was chosen for this study originated from the United States. Purity and quality was assured by GC-MS analysis by Elizabeth Van Buren, Inc. The Sandalwood essential oil that was chosen for this study originated from France. Distillerie Florihana assured purity. When choosing these scents, I did not check to see if the manufacturers tested the oil to ensure the ester content.

Inhalation of essential oils is the fastest and simplest way to test if a person prefers a given scent or not.

Inhalation takes the essential oils from outside the body to deep inside the body in one easy step (Buckle, 2003). Odors naturally provoke emotions that are pleasant or unpleasant (Arsenault and Marchand, 2002), and within seconds a person can know if a scent is pleasant or unpleasant to them and what memories it evokes (Buckle, 2003). Every person is different in the scents that they prefer, but research suggests that odors significantly influence mood in both women and men (Arsenault and Marchand, 2002).

According to a study by Fitzgerald *et al.* (2007) in which the researchers looked at the connection between gender and ethnicity of children and their scent preferences, although Aromatherapy is frequently recommended for children, children's preferences for specific essential oils are not well documented. The researchers found that females were more likely to feel happy when smelling Sweet Orange (*Citrus sinensis*) (p=.043). Additionally, female Latinos were more likely than Caucasian females to find Sweet Orange calming. Male Latinos were more likely (65.2%) to describe Peppermint (*Mentha* x *piperita*) as "energetic" than male Caucasians (30%). Ginger (*Zingiber officinale*) and Lavender (*Lavandula angustifolia*) were the least preferred. These results suggest that gender and ethnicity play a role in children's scent preferences.

Participants

A convenient sample of family and friends was chosen due to time and location. I asked if they could take a few minutes to participate in my Aromatherapy class project. I made sure that none of my participants were pregnant. I asked participants if they had high or low blood pressure and excluded those that did for safety. I asked the participants if they had cancer since Buckle (2008) recommends avoiding phytoestrogens with use of Sandalwood. I recruited 10 women and 10 men. All of the participants were Caucasian and over the age of 25. The average age of the women was 36. The average age of the men was 38. The average age of all participants was 37 (Figure 1).

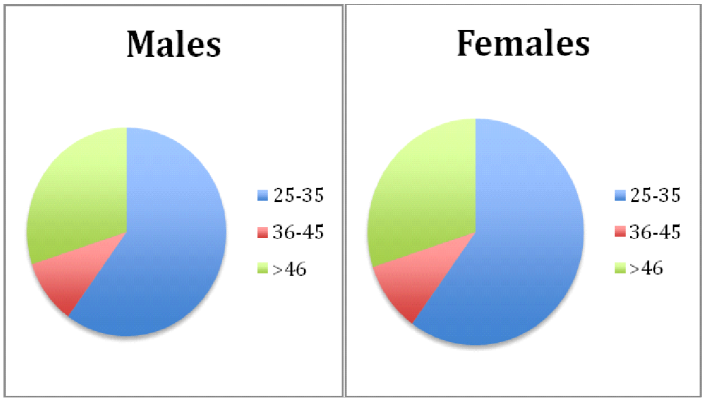

Figure 1. Demographics of the ages of the study participants.

Consent form

Date:_____

I, _____ freely agree to take part in a small pilot study for Jessica Roth's aromatherapy class project. I agree to smell two different inhalers and rate my preference of them for the study. I verify that I am not pregnant, do not have cancer and do not have high or low blood pressure.

I understand that these results may be presented but my name and other personal details will remain confidential.

Signed: _____

Print name: _____

Figure 2. Consent form.

Procedure

Written informed consent was obtained before the study began. I had previously made two nasal inhalers with two different essential oils and marked the outside with an "A" and "B." I asked each person to smell one of the inhalers, then rate the scent using the Likert scale from 0 to 10, with ten being the best and zero being the worst. Participants put their number on a Post-It Note with their name. Nothing was given in between sniffs of the inhalers to cleanse the nose palate. After about approximately two minutes I had them smell the other inhaler and rate it the same way. The participants did not smell the inhalers in a particular order. For some A was first and for others they sniffed B first. I did this for all twenty participants. This procedure may have affected the outcome since there was not a uniform way that participants sniffed the inhalers. If they sniffed coffee in-between to cleanse the nasal palate, a difference in preference may have been seen.

Results

The graphs below (Fig. 3 and Fig. 4) include the study findings. They show how many times a number was chosen by the participants on the Likert scale, with 0 indicating they did not like the scent at all and 10 indicating they liked the scent very much. Participants were told to choose which number they wanted for their scent preference. More females liked scent A than males (Fig. 3). Neither the males nor the females had a preference for scent B (Fig. 4). The mean for scent A for all participants was 4.85. The mean for scent B for all participants was 4.4. The median number for scent A was 5 and for scent B was 4.5. The mode for scent A was 5 and for scent B was 2.

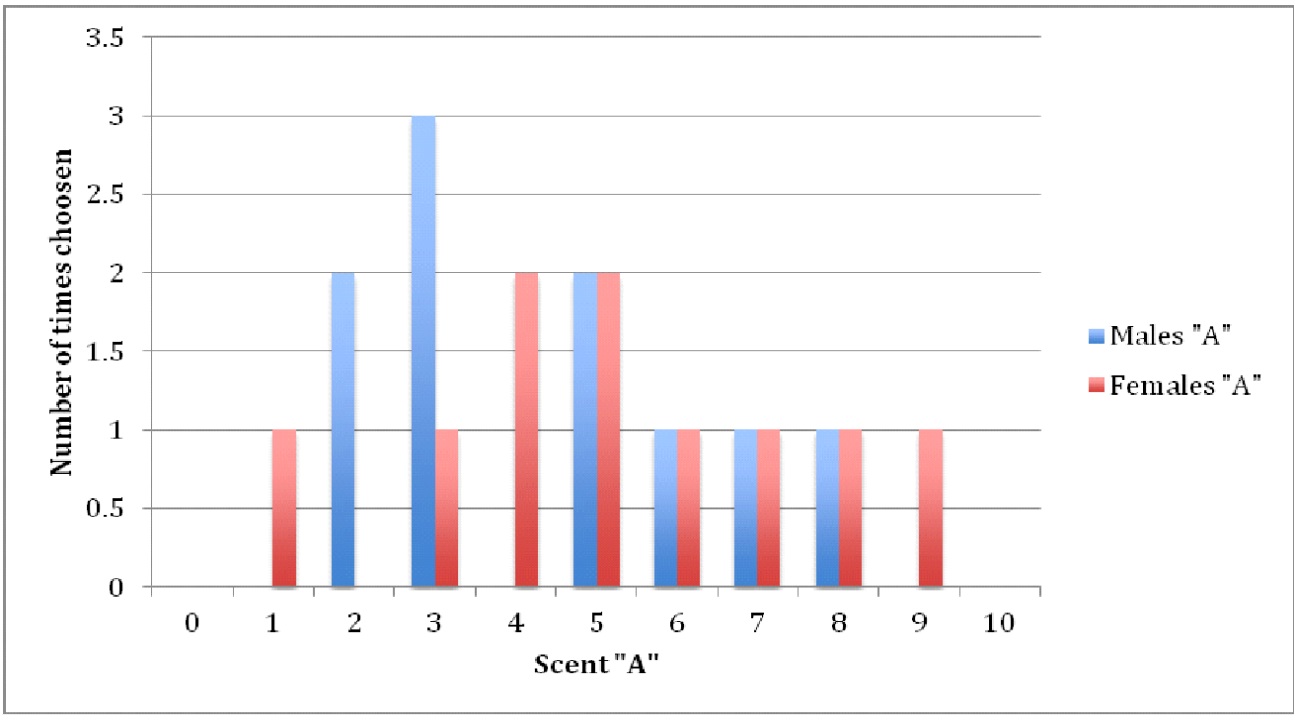

Figure 3. Results for scent A.

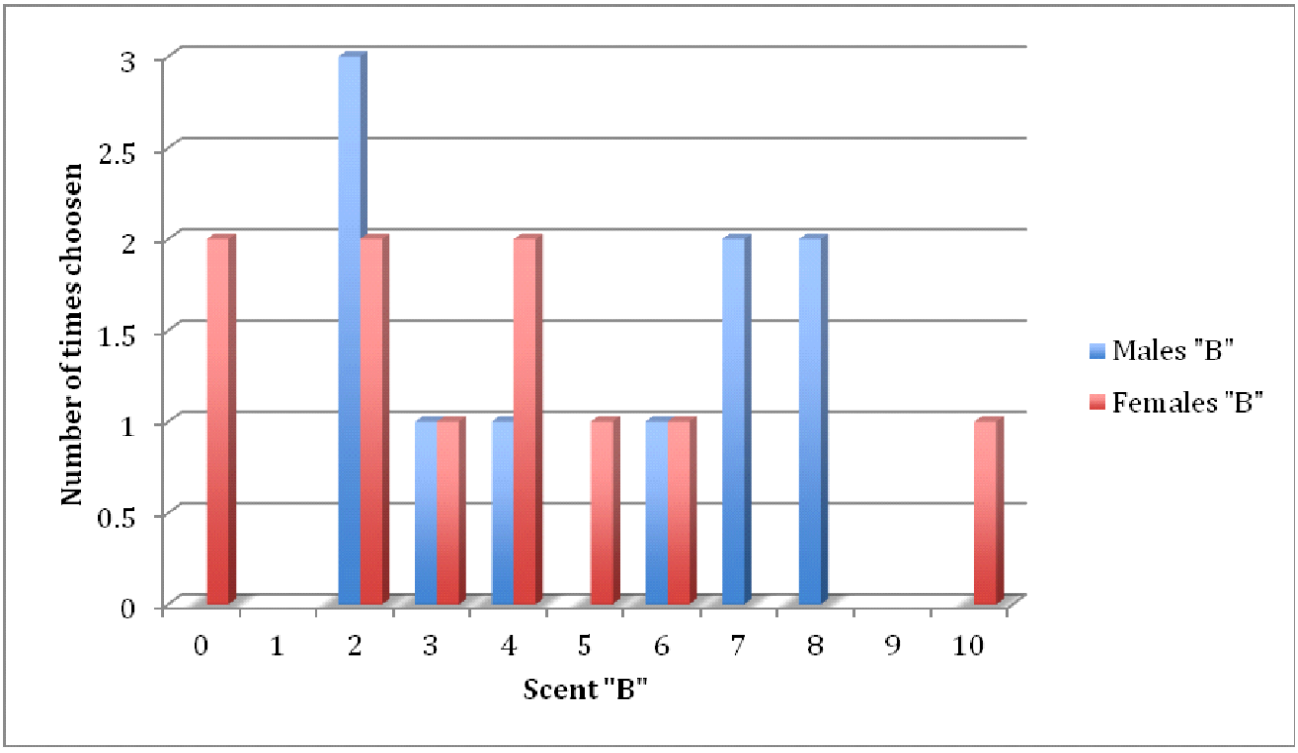

Figure 4. Results for scent B.

Discussion

Analysis of the data showed an inconclusive gender preference for the essential oils. Factors that impacted the results could have been a small sample size and the fact that the participants knew one was a masculine scent and the other was a feminine scent after talking to others that I had asked before. Essential oils are highly complex and are made up of many different chemical components, or odor molecules (Buckle, 2003). The participants had no previous knowledge of essential oils or what they do, which was a benefit to obtaining an honest response from the participants. Participants said they did not fully understand the 0 to 10 scale or that there was no right answer to their preference. Other factors that may have influenced the results include stress level, overall attention of the participant, distraction, mood or their understanding of essential oils. Many of my participants were interested in the essential oils and wondered, "Did I like the more masculine or more feminine one more?" Several thought this study was very interesting but did not understand how I would be using it. "The aroma of Sandalwood is thought to resemble androsterone" (Buckle, 2003), which some would consider a masculine scent. "Whereas *Salvia sclarea* (Clary Sage) comes from the flowering tops and leaves. Clary Sage has possible estrogen like effects on female functions" (Buckle, 2003), making it more feminine. This may be how a preference in scent can be determined. I believe that the moods of the participants may have been indirectly affected when smelling the different scents. Since both scents can cause relaxing and sedative moods this may have affected the participants but not their preferences. When choosing scents I did not take into consideration that some scents are designed to attract the opposite sex. With the chosen scents, this may have affected the participants' choices depending on their gender preference.

Conclusion

In this small pilot study, there seems to be no evidence that a gender difference occurred. Further research on a larger scale would be beneficial to determine if there is a gender preference. A study that may be considered could include the use of other essential oils including Geranium (*Pelargonium graveolens*), Cypress (*Cupressus sempervirens*) or Fennel (*Foeniculum vulgare*) for a feminine scent and Scotch Pine (*Pinus sylvestris*), Sweet Marjoram (*Origanum majorana*) and Basil (*Ocimum basilicum*) for a masculine scent. These scents are chosen based on my perceived notion of what is a feminine or masculine scent. The chemistry of the feminine scents are high in terpenes and esters, whereas the chemistry of the masculine scents are high in alcohols. This may be a factor in deciding what makes a scent masculine or feminine. Possibly using more than two essential oils to check gender preference, a larger sample size, a different method of inhalation and maybe a re-smell after a period of time to see if the preference is different after already inhaling the scent once, are other modifications that could be made in future experiments.

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Jessica Roth is a nurse, wife, mother of one son and a lover of essential oils. The therapeutic uses of essential oils for palliative care patients inspired her to get her CCAP. She loves nursing and learning new things everyday.

Exploring the Versatility of Lavender Essential Oil

Anita Bor-Brown MS, RN, FACHE

Lavender essential oil © GrafVision/iStock

Introduction

Aromatherapy is a complementary health therapy that utilizes essential oils to elicit positive responses in a vast variety of areas such as analgesia, anxiety, insomnia, antisepsis, mood enhancement, wound healing and skin care. Essential oils are volatile materials that are extracted from plant parts, such as leaves, flowers, bark, seeds and fruit. Methods of essential oil extraction from plant material include distillation, expression, and extraction with volatile solvents. Certain essential oils can be administered directly to the skin via neat application or mixed in various carriers and administered via massage, inhalation, compresses or soaks. There are well over 100 therapeutic essential oils available; however, a common one that most people may be familiar with is Lavender: "Lavender oil enjoys the status as being the most popular and versatile essential oil in aromatherapy" (Battaglia, 2003).

There are four main species of Lavender (*Lavandula*), which are as follows: True Lavender (*L. officinalis*, *L. angustifolia*, *L. vera*), Spike Lavender (*L. latifolia*, *L. spica*), Lavandin (*L. fragrans*, *L. burnatti*) and Maritime Lavender (*L. stoechas*). True Lavender (*L. angustifolia*) is produced mainly in Bulgaria, France and the United States. Lavender that is grown and distilled at higher altitudes is reported to be of the best quality because the oil contains a higher ester content. Spike Lavender (*L. spica*) is native to the Mediterranean region and differs from True Lavender in that it has a higher camphor and 1,8-cineole content. The main chemical components of all the types of Lavender are linalool, linalyl acetate, 1,8-cineole, β-ocimene, terpinen-4-ol and camphor; however, the relative level of each of these components varies in the different species (Koulivand *et al*., 2013). Lavandin (*L. fragrans*) is a hybrid of True Lavender and Spike Lavender and is popular because it has twice the oil yield of True Lavender. Maritime Lavender (*L. stoechas*) is primarily from Portugal and is used sparingly due to concerns about toxicity. Some of the therapeutic qualities attributed to Lavender include analgesic, antiseptic, antidepressant, chologogue, decongestant, antispasmodic, nervine, sedative and vulnerary (Battaglia, 2003).

For the purposes of this paper, the effectiveness of Lavender (*Lavandula angustifolia*) in addressing conditions such as pain, insomnia, stress, pruritus, and wound care will be examined through a review of current literature. A literature search was conducted utilizing EBSCO and Google Scholar with the search terms "Lavender" and "essential oils." The search was limited to articles published within the last five years and resulted in 25 articles that explored Lavender essential oil usage for a variety of medical and psychological conditions. A few of those articles will be discussed.

Skin and wound care

The healing effects of Lavender were first observed by René-Maurice Gattefossé when he applied Lavender oil to a burn sustained in a laboratory accident. According to Battaglia (2003), "Lavender oil is commonly associated with burns and healing of the skin. It has antiseptic, analgesic and cytophylactic properties which will ease the pain of a burn, prevent infection and promote rapid healing."

In a clinical trial by Vakilian *et al.* (2011), *Lavandula angustifolia* was evaluated to assess its effects on the healing of episiotomy incision. In this trial, a control group of primiparous mothers had their episiotomy incisions treated with the standard treatment of po-

vidone-iodine while the experimental group received twice daily sitz baths with a 1.5% dilution of Lavender essential oil in olive oil for 10 days. Episiotomy healing for both groups was evaluated in the areas of pain, edema, sutures, redness and dehiscence. The group treated with Lavender sitz baths had a significantly lower amount of redness and inflammation in comparison with the control group. In regards to the other factors, there were no significant differences between the control group and the test group. Due to the similarity of findings between the two groups, it is concluded that Lavender can effectively be used as an alternative therapy for postpartum episiotomy wound care.

Pruritus

Pruritus is synonymous with itching and arises from a variety of skin disorders and renal failure. Management is to determine the cause of the itch and to treat accordingly (Battaglia, 2003); in the case of pruritus resulting from end-stage renal failure, the only method of resolution is a kidney transplant. Essential oils have been looked at as a means of providing itch relief to those suffering from pruritus. Battaglia (2003) indicates that soothing, anti-inflammatory essential oils such as German Chamomile (*Matricaria recutita*) and True Lavender can effectively reduce itching.

According to Shahgholian *et al*. (2010), pruritus is a common, irritating symptom that directly impacts quality of life for end-stage renal failure patients undergoing hemodialysis. In an attempt to look at complementary medicine as a treatment option for pruritus, the researchers evaluated the effect of Aromatherapy on pruritus in hemodialysis patients. In their study, a convenience sample of patients undergoing hemodialysis with a pruritus score of 3 or greater on the pruritus scale was evaluated. Subjects were evaluated for allergies. Eligible participants received massages using a 5% dilution of Mint (not specified), Lavender and Tea Tree (*Melaleuca alternifolia*) oils in Sweet Almond oil during their dialysis sessions over a two-week period. Findings showed a significant decrease in pruritus scores, from an average score of 7.40 pre-intervention to 5.85 post-intervention, leading researchers to conclude that Aromatherapy can impact pruritus relief.

Curcani and Tan (2014) evaluated the effectiveness of Aromatherapy in relieving pruritus in hemodialysis patients. In a quasi-experimental clinical trial, a 5% solution of Lavender and Tea Tree oils were diluted in Sweet Almond and Jojoba (*Simmondsia sinensis*) oils and applied topically to the affected areas of the experimental group. The control group received routine nursing care. After six weeks of treatment, pruritus scores declined in the experimental group indicating a reduction in pruritus severity.

Fall prevention in the elderly

Sakamoto *et al*. (2012) conducted a study to evaluate the effectiveness of Lavender odor in preventing falls in elderly nursing home residents. In this trial, the experimental group participants had a Lavender-scented patch attached to their clothes near the neck while the control group participants wore unscented placebo patches daily. The study concluded that the group of residents who wore the Lavender-scented patches daily had a significantly lower incidence of falls in comparison to the control group. The authors attribute this to either the impact Lavender has on anxiety and agitation or to Lavender's stabilizing effects on balance.

Sleep

Insomnia can be divided into two categories: sleep-onset insomnia, or difficulty falling asleep, and maintenance insomnia, or frequent or early wakening (Battaglia, 2003). "The calming, soothing, balancing and anxiety reducing benefits of essential oils make aromatherapy very effective for treating insomnia. The most commonly used essential oil for relieving insomnia is Lavender" (Battaglia, 2003). Koulivand *et al*. (2013) state that Lavender has been suggested as an excellent natural remedy to treat insomnia and improve sleep quality.

Lytle *et al.* (2014) looked at the effect of Lavender Aromatherapy on vital signs and quality of sleep on intermediate care unit patients in a randomized, controlled pilot study. In this pilot, fifty intermediate care unit patients were randomized into a control or intervention group, with 25 in each group. The intervention group had a jar of 100% pure therapeutic-grade Lavender essential oil placed within one meter of their bedside while the control group received routine care. The intervention group was exposed to the Lavender scent from 10pm until

6am. Vital signs were collected for both groups and participants were asked to complete a perceived sleep questionnaire. The intervention group did experience a decrease in blood pressure and better quality of sleep scores than the control group; however, the difference between the two groups was not statistically significant. The authors cite limitations to their study that may have contributed to the lack of statistical significance such as small sample size, participants receiving oxygen via nasal cannulas and the fact that, for infection control reasons, they could not administer the Aromatherapy via a heat source or a diffuser.

Moeini *et al.* (2010) looked at the effects of Lavender oil on sleep quality in patients admitted to the coronary care unit with ischemic heart disease. In this clinical trial, 64 hospitalized ischemic heart disease patients were randomized into control and experimental groups. The experimental group was exposed to Lavender oil for three nights, nine hours each night, while the control group received no intervention. Both groups completed an inventory to assess their sleep quality pre- and post-intervention. It was noted that quality of sleep scores were significantly improved in the group that received the Lavender Aromatherapy intervention.

Chien *et al.* (2012) evaluated the effects of Lavender Aromatherapy on menopausal women with insomnia. In this single blinded, randomized pilot study, subjects were assigned either to an Aromatherapy group or control group. The Aromatherapy group inhaled Lavender oil and water via an Aromatherapy diffuser, 20 minutes a night, twice a week for 12 weeks. Results showed a short-term improvement in heart rate and an improvement in quality of sleep for study participants.

Pain management

Battaglia (2003) cites that "Lavender is very beneficial for the relief of muscular aches and pains." It also relieves premenstrual tension and pain and is popular for use during childbirth (Battaglia, 2003).

Kaviani *et al*. (2014) specify their use of *Lavandula officinalis*, or True Lavender, in their study of the effect of Lavender Aromatherapy on primiparous women's perception of pain during labor and intrapartum outcome. In this study, 160 laboring primiparous women were divided into control and test groups. The test group was given tissues containing 0.1ml of Lavender mixed in 1ml of distilled water to inhale during labor while the control group was given tissues soaked with 2ml of distilled water under similar conditions. Although no significant difference was found between the two groups in regards to duration of first and second stages of labor or first and fifth minute Apgar scores of their newborns, a significant difference was noted in perception of pain intensity 30 minutes and 60 minutes after intervention, with the test group, who inhaled Lavender oil, reporting a lower intensity of labor pain. The women in the test group also reported a significantly higher level of contentment during labor than the control group.

Huang *et al.* (2014) evaluated the effectiveness of Lavender in relieving post-arthroscopy pain. In this study, 60 post-arthroscopy patients, who met the inclusion criteria, were randomized into control and experimental groups. Seventy-two hours after surgery, when anesthesia had completely worn off, the experimental group was given a bottle filled with 0.5 ml of 2% Lavender to wear around their necks while the control group wore an empty bottle. Participants wore the bottles continuously for three days. Although initial findings showed no significant differences in pain scores between the two groups in the first 72 hours post-recovery from anesthesia, there was a significant difference in pain scores after 72 hours post-anesthesia recovery with the experimental group reporting lower pain scores than the control group. The authors concluded that Lavender can be used as an agent for pain relief in post-arthroscopy patients but that it has to be used for more than 72 hours to maximize its effectiveness.

Bagheri-Nesami *et al.* (2014) looked at the effectiveness of Lavender oil in reducing the pain following needle insertion into a fistula in dialysis patients. In the randomized, controlled study, Lavender-soaked cotton balls were sniffed by hemodialysis patients prior to their fistulas being injected in preparation for dialysis. The control group inhaled a placebo of Lavender essence that produced the smell of Lavender without the actual properties of Lavender. The researchers found a significant reduction in pain among the Lavender Aromatherapy group as compared to the control group, thus supporting the pain-relieving effects of Lavender.

Stress

According to Battaglia (2003), Lavender has a "harmonizing effect on the nervous system." Stress can trigger hyper-functioning of either the sympathetic or parasympathetic nervous system. Lavender oil can assist in stress management by inhibiting the sympathetic and parasympathetic nervous system functions.

In a study to evaluate the effect of Lavender essential oil on job stress symptoms among nurses, Chen *et al.* (2015) identified a sample of nurses who suffered from a higher number of job stress–related symptoms than average. This group was randomized into control and experimental groups with subjects in the experimental group given small bottles to wear on a necklace filled with 3% Lavender oil while the control group wore bottles that contained no oil. Stress symptoms were evaluated in both groups for four days. No significant difference in stress symptoms were noted on days one and two; however, days three and four showed a marked decrease in stress symptoms in the experimental group exposed to the Lavender oil, suggesting that prolonged exposure impacts effect.

Discussion

A review of the literature has shown a multitude of research studies that support the effectiveness of Lavender oil in relieving a myriad of health-related concerns. This particular review only looked at articles published within the last five years; however, there are many articles available that were published prior to 2010, further contributing to the base of research regarding Lavender oil usage. Researchers have studied the effects of Lavender on various conditions and on various patient populations. The articles reviewed here showed that the majority of studies found that Lavender produced some type of positive outcome. Further work should be done to either replicate study findings or to begin new studies in order to increase the current body of knowledge and to further validate the use of essential oils as an effective complementary healthcare therapy.

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Anita Bor-Brown MS, RN has been a Registered Nurse at the Jesse Brown VA Medical Center for the past 22 years and has served in a variety of clinical, managerial and consultant roles. Anita is an ardent student of complementary and alternative health practices. She received her certification in Aromatherapy in 2015 from the Institute of Integrative Aromatherapy under the guidance of program co-founder, Laraine Pounds, RN, BSN, MSN. She is also a Healing Touch Practitioner and has a part-time Healing Touch clinic at the VA. Anita is currently enrolled in studies to become a Holistic Health Practitioner.

A Day in the Life of a Street Aromatherapist

Stanley tending to a homeless man © S. Stinson

Stanley Stinson, NR-AEMT, WEMT, MHP, CCAP,
Emily Stinson, and Kathleen Duffy, LPN, MH, CCAP

It's 3:00 a.m. and an alarm is pulsing through the sleeping house, calling from downstairs to upstairs. My adrenaline kicks in and I jump out of bed, running down the stairs to shut it off before the kids wake up. Time to get ready for work.

By 5:00 a.m. my bags are all arranged and my little Pontiac Vibe is nearly at capacity. People are sleeping in tents and on streets this morning, people with wounds and fears that go deep. Let's roll.

For me, the 66 mile commute is worth it. I get to live in the quiet country on a dirt road, and work in the concrete jungle where struggle is the lifestyle. I arrive at the office early, and begin to prepare for something impossible to prepare for: giving Aromatherapy to Detroit's homeless.

How did I get here?

My family life growing up was rocky, to say the least. Before my 5th birthday, I had been to an acute behavior health unit and tried to commit suicide. At age 16, I ran away from an abusive home and ended up living on the streets…homeless. I am very grateful to say I am one of the few that never got into drugs, was not picked up by traffickers, and did not remain homeless. God had other plans for my life.

Still, I have had a lot of issues to work through, especially related to trust. The happy pictures of me with a loving wife and three beautiful daughters do not tell you the internal struggles I've gone through. Yet I see daily, through my work, the undercurrent of purpose that has flowed through my past and now comes to the surface.

I remember the days spent in New York, taking classes to become a Certified Clinical Aromatherapy Practitioner through RJ Buckle Associates. Five times I crossed the East side of the United States, leaving my wife and kids at home to care for our small family farm, and the rest of my team to watch after my patients. For over a year and a half, class time, clinical hours in the hospital, and studying every essential oil consumed nearly all of my time outside of work. I soaked in every moment of it, because I am very passionate about Aromatherapy, and I wanted to be able to offer the gift of Aromatherapy to my patients.

The day begins for our team

The rest of the team arrives: a physician's assistant, a chaplain, some days a nurse or a paramedic. Each of us has a different skill to offer as we position ourselves to stand in the gap between society's outcast and the medical care they don't, or won't, access. We pray and ask God for guidance, and we get into the van. Some days, there are people waiting for us, anxious to receive care, but most days it's an unpredictable drive through the city, searching for the unsheltered homeless and prostitutes. We see familiar faces; the warm smiles of the gentle people who have chosen to live on the fringe of society. We see the anxious, suspicious faces of those who have no one left to trust, or the wild eyes of the ones torn by mental illness or drugs. Yet the response is the same. "We're from Covenant Community Care. We want to help you."

Stanley blending oils before outreach © S. Stinson

I am a street Aromatherapist. I am licensed as an Advanced/Wilderness Emergency Medical Technician (AEMT/WEMT), Ordained Chaplain, Certified Foot Care Specialist, and an ear cleaning specialist, but my passion is Clinical Aromatherapy, without a brick and mortar setting. I know that tucked within my bags is something almost sacred. With my blends of essential oils I have seen the miraculous happen.

Danny: open leg ulcers

One man who has become a constant part of our homeless outreach is Danny. It wasn't always that way, as Danny was the kind who did not want anyone to help him. His crass words and harsh demeanor made it clear we were not welcome in his world. I remember the first time he showed me where he lived: a dilapidated old camper parked behind a drug house. The windows were smashed, the smell was intensely nauseating, and that was only the outside. Danny let me into his life when I convinced him to let me clean his ears. Besides Aromatherapy, my other passion is ear cleaning. I always carry my otoscope, lighted ear curettes and lavage tools for those thrilling impromptu ear-cleaning sessions.

Danny being treated in the van
© S. Stinson

After that initial ear cleaning, Danny told me to meet him every Tuesday at 1:00 p.m. in an abandoned lot. He told me later that he never thought I was going to make it. Those weekly meetings showed Danny that he could trust me, and that I did not have a hidden agenda behind my desire to get to know him. Since then, Aromatherapy has become a major part of our relationship.

Danny had been living with open wounds on his legs for years. He had seen a wound care specialist on and off for a couple of years; however, he was non-compliant with his care. On December 15, 2015, I began applying an ALGICELL®[1] dressing impregnated with True Lavender (*Lavandula angustifolia*), Myrrh (*Commiphora myrrha*), Frankincense (*Boswellia carterii*), Tea Tree (*Melaleuca alternifolia*), Helichrysum (*Helicrysum italicum*) and German Chamomile (*Matricaria recutitia*) diluted at 15% in carrier oils of Tamanu (*Calophyllum inophyllum*), and Calendula (*Calendula officinalis*). I committed to treating his wounds every day that I worked for a total of five days. The Street Medicine Team's resources and budget for Aromatherapy are very limited, so we couldn't continue Danny's care for long. It was difficult to maintain contact with Danny, so consistency was not always possible. The images (Figures 1-5) were taken over the two and a half months when only the Aromatherapy treatment and ALGICELL® were being used and there was no intervention by a doctor. When we can persuade him, our team transported Danny weekly to see a wound care doctor. After that time, I saw remarkable improvement (Figures 1-5). As of May 20, 2016 Danny's leg is completely healed.

Figure 1. Dan's wound 12/3/2015. © S. Stinson

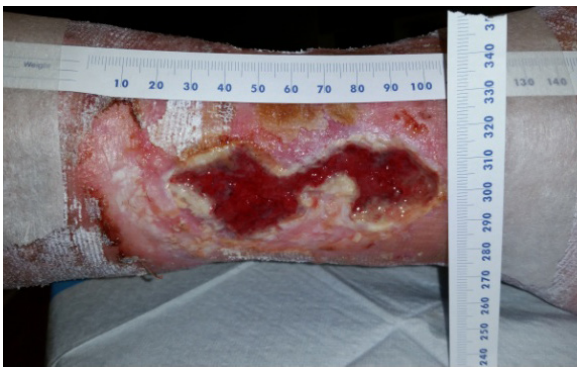


Figure 2. Dan's wound 12/9/2015. © S. Stinson

Figure 3. Dan's wound 12/12/2015. © S. Stinson

[1] ALGICELL© is white sterile dressing made with calcium alginate that absorbs moderate to large amounts of wound drainage.

Figure 4. Dan's wound 12/26/2015. © S. Stinson

Figure 5. Dan's wound 3/17/2016. © S. Stinson

Gene: orthostatic hypotension

Then there was Gene, a 16-year-old male patient who could hardly stand, as he had severe dizziness to rise from sitting to standing. A pediatrician had earlier informed him that he had orthostatic hypotension. He said his discomfort from dizziness was 9 out of 10. Using a pulse oximeter, I recorded his heart rate was 70 bpm and blood pressure was 110/70 while sitting. He nearly fainted when he stood. His heart rate had increased to 100 bpm and his blood pressure dropped to 78/56 upon standing and remained the same after one minute.

For five minutes Gene rested and I made a personal inhaler with Rosemary (*Rosmariunus officinalis* ct. cineole) essential oil. At that point his heart rate was 68 bpm and blood pressure was back up to 106/72. The young man inhaled twice from the personal inhaler and stood up. He smiled and said he felt good, and didn't have any dizziness or discomfort. The pulse oximeter displayed that his heart rate was 110 bpm and his blood pressure was 112/88 upon standing. He was referred out to a cardiologist, but because he is an undocumented minor no specialists would see him. Gene was more than happy to simply take the inhaler and has come back for refills, as it helps him daily at school through the frequent sitting and standing. Four months later his condition had completely resolved.

"The dancing man": ankle fracture

I have to mention the dancing man with the fractured ankle. Well, he wasn't dancing when we met him. A 49-year-old man had a fractured left ankle, confirmed by x-ray. I asked if he would let me help him with his pain. I told him I had no drugs to offer, but I could use essential oils with him. He said he was willing to try anything.

This man did not have any insurance or other assistance. No splint, no cast, and no medical care after the x-ray he had taken in the previous month. He believed that no one cared because he did not have insurance. He clearly favored his left foot and leg and told me he rated his pain a 9 out of 10. I asked the man to rub a 10% solution of Ylang Ylang (*Cananga odorata* var. *genuina*) essential oil in a base of Jojoba (*Simmondsia chinensis*) oil onto his foot. I didn't want to do the rubbing as the man was in too much pain. Five minutes after that initial treatment, his pain level was reduced to 6 out of 10.

After eight minutes with no additional application, it further reduced to 2 out of 10.

Within 10 minutes, he said rated his pain 0 out of 10 and he began dancing, although I advised him not to.

A matter of trust

Last winter, the team came across a group of tent dwellers. These men and women were all homeless, and very uninterested. They were opposed to having a medical outreach group come in because they didn't trust outsiders.

One day, I walked in and introduced myself. I explained that I really enjoy cleaning ears and asked if anyone was interested in having their ears cleaned. One man spoke up, who we'll call "Skip."

He asked me if I wanted his social security number and to take him back to my clinic. I told him there was no need as I could look at him there as I had my otoscope with me and could clean his ears if he needed it. It wasn't long before I had people coming out of the woodwork to have their ears checked. Eight people in all had their ears cleaned.

Skip had bilateral cerumen impaction[2] that I relieved using my lighted ear curette. Skip had been in a motorcycle accident and had to have facial reconstruction surgery. He told me that he had a lot of metal left in his mouth from that reconstruction and it was very sore. I used a T-shirt I had in our vehicle and made him a compress containing True Lavender (*Lavandula angustifolia*), Black Pepper (*Piper nigrum*), and Peppermint (*Mentha piperita*); 15 gtts (drops) total of essential oil in 150 ml of warm water. The temperature outside was below freezing, so I made the compress in our vehicle and brought Skip into the van. I applied the T-shirt compress to Skip's outer jaw and placed a grocery bag on top, while he rested for 15 minutes.

Skip's pain was incredibly alleviated. He scored his pain at a 10 out of 10 at the beginning and 0 out of 10 within 10 minutes. He was very pleased with my care, as he explained that he was formerly addicted to heroin and prescription drugs, and the essential oils felt safe to him. The gratitude shown by Skip is very moving. He still hugs me whenever he sees me to this day.

I'm happy to say that Skip now has been placed in housing and has a job. He receives medical and dental care at Covenant's Community Care Clinic, a non-profit, located in Detroit, MI.[3] After making that one connection with Skip, this tent community is now connected to the homeless outreach team, with loving hands and listening ears.

Silvio: skin lesions and severe itch

On another occasion our team met Silvio, a man with intense itchiness and lesions covering his upper body and arms. He said he had seen a doctor, but was told regarding the lesions, "We can get to that the next visit." Often with the homeless, "next visits" never happen. Silvio said his discomfort was a 10 out of 10. His arms were blistering, and had ulcerations and areas of purple and blue.

He told the team that he had intermittent fevers and that the itching would become so extreme, he used a comb to scrape his body until the itching was relieved or bleeding too much.

We had no medical supplies on hand to help Silvio. However, I had made a roll-on earlier using a blend of Peppermint, True Lavender, Frankincense, and German Chamomile diluted at 12% in Jojoba oil. The patient applied this to his itchy areas. The discomfort was reduced to 8 out of 10 within one minute. After three minutes, it was further reduced to 1 out of 10. After five minutes he found relief and had a pain score of 0 out of 10. The cause of his lesions was never identified and we have not seen him since.

The "working" girls

Prostitutes on the street corners used to hope we were potential customers as we drove up to meet them. We recognize that they are people with many wounds, visible and invisible. We made a point of searching for them as they are human beings worthy of our support. They would come to the window, and upon seeing we are not what they expected, their eyes quickly reveal suspicion, fear, or frustration. Generally we have about eight seconds before they would turn on their heels and take off. I give them Lavender essential oil in a roll-on applicator or personal inhalers that I had made for stress and anxiety relief. I remember Chloe, with eyes barely visible through the thick mascara. She stopped for a moment, breathed in the Lavender roll-on I had given her, and smiled. She gave us one more look that seemed to reflect an apology before leaving us to approach a van that had stopped at the opposite end of the street.

Tonya was one of the prostitutes we had the opportunity to help. We first met Tonya on a day when she was out on the "track" in an area known for street prostitution. One of my female co-workers rolled down the window to engage in conversation with Tonya while we approached. Seeing us, Tonya turned and walked briskly away. Moments later, she flagged us down and, when we were near enough, she jumped into the back of the vehicle. It didn't take her long to open up to us. She said she wanted a better life.

While I took her vital signs she mentioned that she had trouble hearing. I was able to examine and clean

[2] Cerumen impaction is the blockage of the outer ear canal by tightly packed cerumen (heavy accumulation of earwax).

[3] The organization serves low-income, uninsured and under-insured patients in the Detroit-metro area, many of whom have been personally affected by poverty, unemployment, inadequate housing, food insecurity, and more. Covenant is now a network of community health centers providing a full range of medical, dental, and behavioral healthcare services to the people of Detroit and the broader metropolitan region. We serve anyone regardless of their ability to pay.

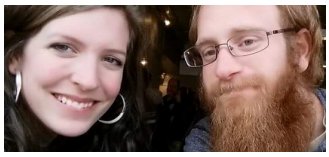
her ears within a few minutes and her hearing was immediately improved. She opened up to us about her addiction to heroin, and pleaded for help. We explained that we could help arrange for her to be seen by a medical provider, a behavioral health counselor, as well as a dental team at the clinic. I gave her my business card with my cell phone number. She thanked us and promptly got out of the vehicle, making her way towards a different one.

Nearly a month passed with no sign of Tonya. Then I got a call from her, saying she wanted to get picked up and taken to the clinic and eventually to a detoxification and rehabilitation clinic. When we got to her, she was complaining of an upset stomach and strong cravings while going through withdrawal from heroin. As she made the phone calls to get appointments arranged, her cravings intensified. Over the course of a 45-minute phone interview to set up a screening, Tonya started to leave several times. I made her a personal inhaler with 15 gtts (drops) Rose (*Rosa damascena*), Ylang Ylang, Black Pepper, and Angelica (*Angelica archangelica*), in 4 drops Jojoba oil. She breathed it in and her cravings stopped. She was able to continue the process in a calm manner for another 40 minutes before needing to use the personal inhaler again. When the arrangements were finalized, we took her to the detox center. Before entering the facility she asked if she could keep the inhaler and we were happy to oblige.

After three months, Tonya called to tell me she was doing well, and thanked me for the inhaler and for praying for her. Against all odds, she is sober, clean, and progressing well to this day. In fact, she is now employed by the detox center.

Conclusion

Many of the people we meet just seem to fade away and can no longer be found. It can be discouraging to work so hard for a person who may never show up again. It is difficult to know that they are out there with their open wounds and untreated infection setting in, and that their progress may be regressing or symptoms returning. Despite the disappointments, I see every encounter as an opportunity to give that person the same treatment I would give to royalty and to show them, if even for one moment, that they are valued. They won't know the money I invest into my oils or the time I spend at home making new blends and determining best dilutions. They don't know how much prayer and personal concern I put into them. They don't know that I am often seen as less valuable in the medical world because I use these "alternatives" and am not a doctor. They do know that I stopped for them, I tried for them, and I touched them when no one else would. I did not hesitate to give them my purest, highest quality intervention, even knowing that they may toss it in the gutter or lose it in the mess of their chaotic environment. I am just one willing and humble man who sees it as a blessing and an honor to care for these precious people. It is worth it to me to have those few moments spent making someone's life more bearable, and even more enjoyable. To see the contented look of someone who has not bathed in months, and who just smelled essential oils for the first time is a reward in itself. This is where light meets darkness and there is hope.



Stanley Stinson works for Covenant Community Care in their Homeless Outreach program as the Street Outreach Specialist. He is trained as an Advanced and Wilderness EMT, Certified Foot Care Specialist, Ordained Chaplain, as well as a Clinical Aromatherapy Practitioner. With a passion to care for the whole person: physically, emotionally, and spiritually, Stanley incorporates conventional and alternative practices with patients. A difficult childhood, which included a season of homelessness for himself, has given Stanley compassion and understanding for the individuals he encounters in his outreach. Stanley lives on a farm in Southeast Michigan with his wife Emily and three young daughters.

Emily Stinson is a stay-at-home mom with their young daughters, Emily manages Good Heritage Farm, a nonprofit organization in Southeast Michigan, while her husband Stanley works. She also helps her parents with their larger family farm and compost facility. Her passions are prayer and worship, writing, running and experiencing other cultures. She aspires to be a massage therapist, occupational therapist and use farming as therapy for victims of human trafficking and at-risk youth.

Ms. Duffy began her career in 1965 working as a critical care nurse for 13 years. In 1978, she left the hospital to open Herbarium, a retail herb and supplement shop which quickly became New England's primary complementary therapy resource. Kathy is a much sought after speaker and guest on news and talk radio programs and eventually hosted her own show in 1992. She is an adjunct professor of botanical medicine at Springfield Community College (Allied Health/Nursing Division). A contributing author for *The Complete Guide to Natural Healing*, she now performs editorial work for the textbook division of Prentice Hall Publishing. She ran a successful complementary health consulting firm for 18 years with over 1,500 clients and teaches Clinical Aromatherapy and the 'M' Technique for RJ Buckle and Associates since 2000. Ms. Duffy is in the process of publishing her research from her years working as a Clinical Aromatherapist in an acute behavior health unit.

Efficacy of an Aromatherapy Blend for Restless Legs Syndrome: A Randomized Controlled Trial

Restless legs © Natthapon/iStock

Susan Pace, RN, BA, RA, CCAP

Abstract

Restless legs syndrome (RLS) is a debilitating condition that affects millions of people worldwide. Allopathic medical treatment sometimes makes the condition worse instead of relieving symptoms. In such cases, people often turn to complementary or alternative treatments seeking relief.

This study was a double-blinded, randomized controlled trial conducted on twenty volunteers with self-reported RLS. An Aromatherapy blend designed to relieve symptoms of RLS was tested on ten individuals in the intervention group with ten subjects in the control group using a placebo.

Participants reported on the intensity of their symptoms before, during, and after the trial. The treatment group reported a reduction in symptoms of RLS as opposed to the control group, which reported little change in symptomatology.

The use of essential oils can result in an improved quality of life for sufferers of restless legs syndrome.

Introduction

Restless legs syndrome (RLS) is a common neurological disorder experienced by up to 10% of the population of the United States, meaning that as many as 32 million Americans may be affected by it (National Institute of Neurological Disorders and Stroke, 2016.)

The syndrome causes uncomfortable symptoms such as twitching, burning, itching, or jumpiness in one or both legs. These sensations can briefly be mitigated by moving the legs, but symptoms often recur. This pattern can recur for hours during each sleep period and many people experience symptoms several nights per week. Chronically interrupted rest eventually leads to sleep disturbances and subsequent daytime fatigue, confusion, and difficulty thinking clearly, thereby affecting quality of life (Kushida *et al*., 2007).

The cause of restless legs syndrome is unknown. Researchers believe it may be related to disruptions in the way an individual's brain processes dopamine, a neurotransmitter critical in producing purposeful muscle movement (Stiasny *et al*., 2000).

In most cases, RLS is initially treated with a combination of lifestyle changes, including reducing alcohol, tobacco, and caffeine intake. If these changes fail to bring about relief, then medication therapy may be initiated; medications include mineral supplements and dopaminergic agents (Allen, 2004).

A serious complication of medication therapy for restless legs syndrome is augmentation, meaning symptoms which occur as a direct result of taking RLS medication. Augmentation is often seen when an individual is taking higher doses of dopaminergic agents or when they have low iron stores (RLS Foundation, 2015; García-Borreguero and Williams, 2010.)

Fears of becoming more ill due to augmentation may cause individuals to seek out complementary treatments. Innes *et al.* (2012) described the positive effects of an eight-week program of yoga exercise in women with moderate to severe RLS. Mitchell (2011) describes alternative treatments for RLS including massage, acupuncture, vitamin and mineral supplementation, meditation, music, and even placebo; however, the author does not mention Aromatherapy as a complementary modality.

Hashemi *et al.* (2015) documented statistically significant improvements in symptom severity in a group of hemodialysis patients with concomitant RLS treated with Lavender (*Lavandula angustifolia*) essential oil Aromatherapy massage.

The paucity of studies in the literature regarding aromatherapeutic intervention for RLS led to the development of an Aromatherapy blend tested on volunteers in 2015.

Subjects

A sample size of twenty (20) participants was selected from a pool of forty-five (45) respondents, solicited by advertisement flyer or the author's personal contacts. Participants completed an informed consent document (Figure 1) affirming that inclusion in the study was voluntary, and they agreed to receive either a treatment blend or placebo. The document also included a demographic questionnaire.

Statement of Participation

I, _____, confirm that I voluntarily partiticipate in a research study design to test if an aromatherapy blend can help with restless leg syndrome (RLS) symptoms. I understand that I will be placed in one of two groups: a treatment group, which will receive the aromatherapy blend, and a control group, which will receive a similar product, but does not contain the aromatherapy blend.

I agree to apply the blend as instructed for seven nights, and I will note any changes in symptoms on the log form which will be provided to me. I agree to fill out a scale form designed to measure the severity of my symptoms both before and after the trial.

I understand that my name will be kept private (only age, sex and initials will be used to identify subjects), and that I have the right to withdraw from the study at any time for any reason.

I also understand that I will not be monetarily compensated for my participation.

_____(signature)

_____(date)

Sex: _____ (Male, Female, other designation)

Age: _____

Smoker: _____(Yes/No)

Occupation: _____

Figure 1. Informed consent form.

Exclusion criteria included those already taking medication to treat RLS such as pramipexole, rotigotine, or ropinirole. Also excluded were those unable to cooperate with the treatment time frame, those who were reportedly sensitive or allergic to any component(s) in the RLS blend, or any participants who self-professed an addiction to psychoactive substances. Smokers were not excluded, and each study group contained at least two smokers.

Inclusion criteria were those aged 24-67 with no known sensitivity to any component(s) of the Aromatherapy blend and those without known peripheral vascular disease or open wounds on the legs.

Apparatus

Treatment for the intervention group was a blend of essential oils in a neutral vegetable carrier oil and beeswax base. The blend was fashioned into a 4-ounce deodorant stick container for ease of application to the legs. The control (placebo) group product contained only carrier oil and beeswax. The intervention group's Aromatherapy blend consisted of Bulgarian Lavender (*Lavandula angustifolia*, cloned, steam-distilled flowering tops), Sweet Marjoram (*Origanum majorana,* steam-distilled flowers and leaves), Roman chamomile (*Chamaemelum nobile*, steam-distilled flowers), and Bergamot (*Citrus bergamia*, cold-pressed rind) essential oils. The base was comprised of liquid Jojoba wax (*Simmondsia chinensis*) and organic beeswax. The essential oils comprising the blend were chosen for their sedative, antispasmodic, and analgesic properties (Battaglia, 2003; Buckle, 2015; Rose, 1999; Kerkhof-Knapp Hayes, 2015).

The base blend was prepared by measuring 3.25 oz (92 ml) Jojoba wax/oil and 0.75 oz (22 g) beeswax, heated together until completely melted. This base, used as the blank placebo, was poured into a 4 oz (113 g) deodorant stick, immediately capped, and left to harden at room temperature for several hours.

The Aromatherapy blend was prepared in the same fashion as the placebo base. The mixture was allowed to cool to 130 degrees Fahrenheit (54 degrees Celsius), at which point the essential oils (2.5 ml total essential oils, a 2% dilution) were added to the melted base. The mixture was stirred, immediately capped, and allowed to harden at room temperature.

Procedures

The study, in a double-blind randomized controlled trial format, was conducted on 20 volunteers with self-reported RLS. Subjects were randomized into two groups, treatment group (n=10) and control group (n=10). Randomization was achieved by drawing slips of paper printed with subjects' initials. The blend sticks were marked with a colored dot on the tube bottom, representing the type of blend it contained. A person not connected with the research was chosen to deliver the corresponding stick to each study participant; this was done in order to ensure that the author remained blinded to the assignment until it was time to collect and collate data.

Prior to intervention, all study subjects completed the International Restless Legs Syndrome Study Group Rating Scale (IRLSSGRS). The scale consists of ten questions rating symptoms on a scale of zero (no symptoms) to four (very severe symptoms)(Figure 2). Higher scores indicate that participants perceived their RLS symptoms as more severe than those with lower scores.

Subjects were instructed to apply the blend to their lower legs one-half hour before bedtime for seven nights. Each participant was instructed to make four passes on each leg with the stick blend. A pass consisted of an upwards swipe with the stick from ankle to knee and a downwards motion from knee back down to the ankle. This was repeated three times in succession to cover the entire lower leg; the process was then repeated on the opposite leg. (Figure 3).

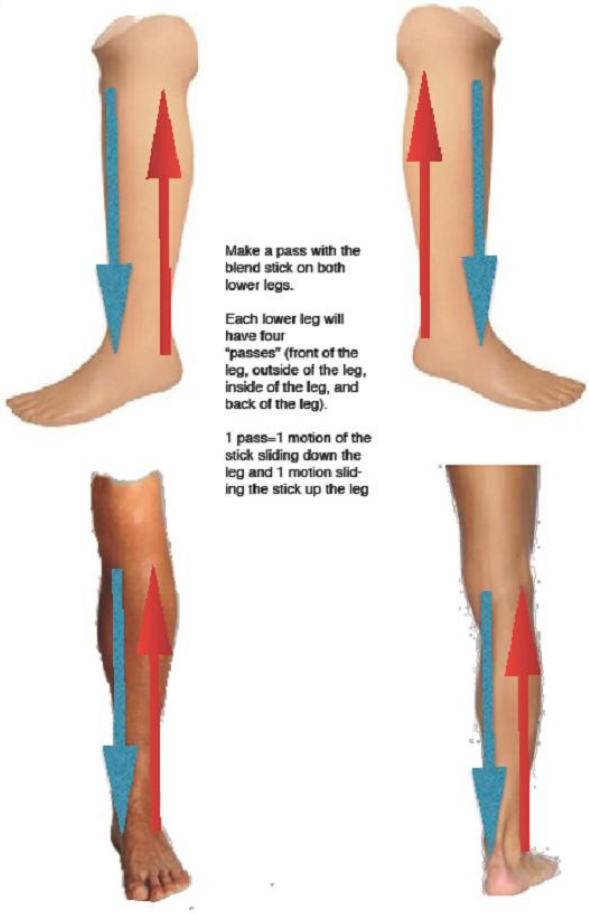


Figure 3. How to apply the stick blend to the legs. © Sue Pace

International Restless Legs Syndrome Study Group Rating Scale for Severity of Restless Legs Syndrome

Ask the patient to rate his or her symptoms for the following 10 questions. The patient, not the examiner, should make the ratings, but the examiner should be available to clarify any misunderstandings the patient may have about the questions. The examiner should mark the patient's answers on the form. Point values are in parentheses after each answer. Please rate your average symptoms during the preceding week.

1. Overall, how would you rate the restless legs syndrome (RLS) discomfort in your legs or arms?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

2. Overall, how would you rate the need to move around because of your RLS symptoms?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

3. Overall, how much relief of your RLS arm or leg discomfort did you get from moving around?
☐ No relief (4) ☐ Mild relief (3) ☐ Moderate relief (2) ☐ Complete or almost complete relief (1) ☐ No RLS symptoms; question does not apply (0)

4. Overall, how severe was your sleep disturbance because of your RLS symptoms?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

5. How severe was your tiredness or sleepiness because of your RLS symptoms?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

6. Overall, how severe was your RLS as a whole?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

7. How often did you have RLS symptoms?
☐ Very often; six to seven days (4) ☐ Often; four to five days (3) ☐ Sometimes; two to three days (2) ☐ Occasionally; one day or less (1) ☐ Never (0)

8. When you had RLS symptoms, how severe were they on an average day? ☐ Very severe; at least eight hours per 24 hours (4) ☐ Severe; three to eight hours per 24 hours (3) ☐ Moderate; one to three hours per 24 hours (2) ☐ Mild; less than one hour per 24 hours (1) ☐ None (0)

9. Overall, how severe was the impact of your RLS symptoms on your ability to carry out your daily affairs (for example carrying out a satisfactory family, home, social, school, or work life)?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

10. How severe was your mood disturbance because of your RLS symptoms (for example, angry, depressed, sad, anxious, or irritable)?
☐ Very severe (4) ☐ Severe (3) ☐ Moderate (2) ☐ Mild (1) ☐ None (0)

Figure 2. International Restless Legs Syndrome Study Group Rating Scale for Severity of Restless Legs Syndrome. NOTE: This scale is copyrighted; permission requests for clinical use may be sent by e-mail to canfray@mapi.fr. Adapted with permission from Walters AS, LeBrocq C, Dhar A, *et al.* Validation of the International Restless Legs Syndrome Study Group rating scale for restless legs syndrome. Sleep Med. 2003;4(2):129-130. http://www.sciencedirect.com/science/journal/13899457. Accessed April 1, 2008.

Upon awakening in the morning, subjects documented their perception of how well the blend had affected their RLS symptoms during the previous night's sleep period. Score choices were zero=no help, 1=little help, 2=some help, 3=moderate help, and 4=great help. T=Treatment group, C=Control group (Table 1).

Subject ID	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	TR/ CT
A	2	3	4	4	4	4	4	T
B	1	1	2	2	2	3	3	T
C	3	3	4	4	4	4	4	T
D	3	3	3	4	4	4	4	T
E	2	2	3	3	4	3	4	T
F	2	2	2	2	2	2	2	T
G	0	0	1	1	0	0	0	T
H	2	3	3	3	3	3	4	T
I	3	4	4	4	4	4	4	T
J	3	3	3	4	4	4	4	T
K	0	0	0	0	0	1	1	C
L	0	0	0	0	1	1	1	C
M	0	0	0	0	0	0	0	C
N	0	0	1	1	1	0	1	C
O	0	0	0	0	0	0	0	C
P	0	0	0	0	0	0	0	C
Q	0	1	1	0	1	1	0	C
R	0	1	2	1	1	1	1	C
S	0	0	0	0	0	0	0	C
T	0	0	0	0	0	0	0	C

Table 1. Raw 7-day data.

At the end of the seven-day trial period, participants again completed the International Restless Legs Syndrome Study Group Rating Scale (IRLSSGRS) to assess perception of the severity of RLS symptoms (Table 2).

Figure 4 illustrates changes in symptom severity for the intervention (treatment) group. Values in blue represent symptom severity scores prior to treatment; those in green represent score values after seven days of treatment with the Aromatherapy blend.

Figure 5 illustrates changes in symptom severity scores for the control (placebo) group. Values in blue represent symptom severity scores prior to placebo use; values in green represent scores after seven days of treatment with the placebo blend.

Age	Sex M/F	Smoker Y/N	Pre-study IRLSS-GRS	Post-Study IRLSS-GRS	Treatment/ Control Group (T/C)
25	F	N	30	9	T
29	M	Y	33	26	T
44	F	N	40	20	T
45	F	Y	22	9	T
55	F	N	29	15	T
60	F	N	32	26	T
53	F	N	22	21	T
29	M	N	38	28	T
41	F	N	40	24	T
43	F	N	28	15	T
24	M	Y	22	21	C
37	M	N	22	20	C
50	F	N	18	19	C
58	M	N	20	17	C
48	F	Y	24	24	C
32	F	N	28	29	C
67	M	N	31	30	C
33	F	Y	30	26	C
36	M	N	28	28	C
51	F	N	22	22	C

Table 2. Pre- and post-study IRLSSGRS scores.

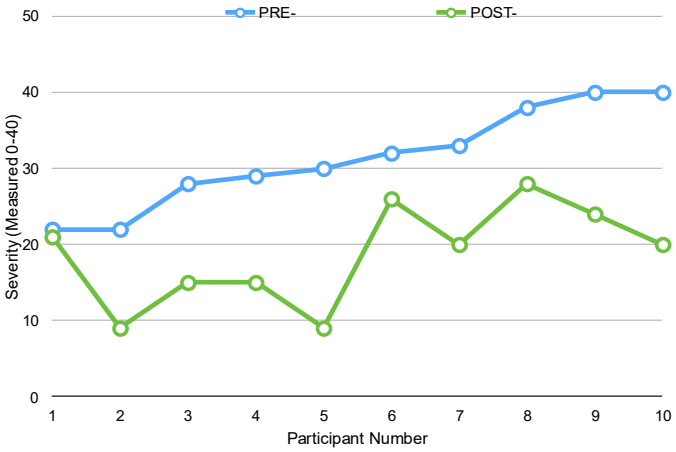


Figure 4. Aromatherapy group scores.

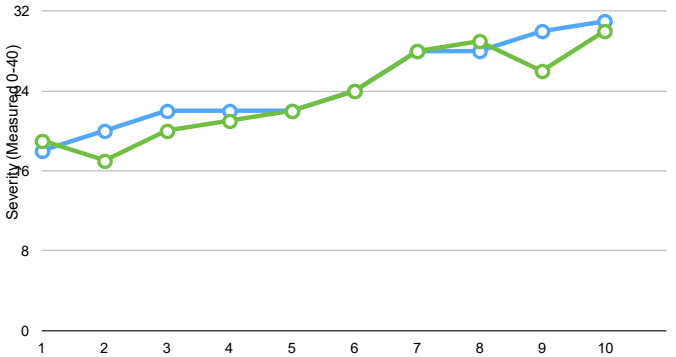


Figure 5. Placebo/control scores.

Discussion

Twenty participants met the inclusion criteria and completed the study. Twelve subjects were female, eight were male and the mean age was 43 years. International Restless Legs Syndrome Study Group Rating Scale (IRLSSGRS) scores between the control and intervention groups did not differ significantly prior to the study; however, self-reported scores using the same scale were different between the two groups after completion of the study.

Leg massage
© Zhenikeyev/iStock

The average score of the intervention group prior to treatment with the Aromatherapy blend was 31 on the IRLSSGRS; a score between 31–40 is rated as "very severe." After aromatherapeutic intervention, the group's average score was 19 (a score of 11–40 being rated as "moderate"). The control group treated with the placebo blend averaged a 25 score (21–30= "severe") prior to study initiation and averaged a 24 after seven days of treatment (21–30= "severe").

Results indicated that an application of an essential oil blend effectively reduced symptoms of RLS in the intervention group. The placebo blend did not significantly affect baseline scores.

Limits of the study include small sample size and subjective ratings of symptom severity by study participants. The placebo blend did contain the natural scent of beeswax, so aroma or lack thereof was not felt to be a limiting factor (Northern Illinois University College of Education, 2015).

Conclusion

Restless legs syndrome is a debilitating condition for which there is no proven treatment. In those for whom lifestyle changes and medication fail to relieve symptoms, complementary or alternative modalities may provide a welcome means of relief. Further study into the role of Aromatherapy in treating RLS is warranted.

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Susan Pace, RN, BA, EMT-P, CCAP, has been an Emergency Department nurse for 23 years, paramedic clinical instructor, and Certified Clinical Aromatherapy Practitioner through RJ Buckle. She has also studied with Andrea Butje, Robert Tisserand, and Mark Webb. She enjoys using Aromatherapy to help family, clients, and patients. Contact info: spacemo62@aol.com (860) 605-8036

Good to Know...

New Report on the Aromatic Profile and Bioactivities of Lavenders Grown in Spain

Compositions of True Lavender (*Lavandula angustifolia*) and Spike Lavender (*Lavandula latifolia*) essential oils, cultivated and extracted in the southeast of Spain, were determined by gas chromatography coupled with mass spectrometry detection, obtaining both relative (peak area) and absolute (using standard curves) concentrations. The characterised essential oils were tested for their antioxidant activity against free radicals ABTS, DPPH, ORAC, chelating, and reducing power. Inhibitory activity on lipoxygenase was observed indicating a possible anti-inflammatory activity, mainly due to linalool, camphor, *p*-cymene and limonene. These results can be the starting point for a future study of the potential use of *L. angustifolia* and *L. latifolia* essential oils as natural cosmetic and natural pharmaceutical ingredients for several skin diseases.

Carrasco A, Martinez-Gutierrez R, Tomas V, Tudela J. (2016). *Lavandula angustifolia* and *Lavandula latifolia* Essential Oils from Spain: Aromatic Profile and Bioactivities. *Planta Med.* 82 (1/2), p163-170.

Lavender Essential Oil Reduces Renal Colic Pain in Female Patients

About half of patients presenting with renal colic require acute hospital care. There is currently no consensus on the ideal treatment protocol, but non-steroidal anti-inflammatory drugs (NSAIDS) are the first-line treatment, followed by opioid analgesics.

In this radomized study, the participants received intramuscular diclofenac in combination with diffused Lavender essential oil (LO) or diffused placebo. While the visual analog scale (VAS) scores before and 10 minutes after treatment were not significantly different between the groups, the VAS scores at 30 minutes were significantly lower.

The authors surmise that Aromatherapy with LO can be used as an adjuvant therapy with traditional treatment in cases of renal colic.

Irmak Sapmaz H, Uysal M, Taş U, *et al.* (2015). The effect of lavender oil in patients with renal colic: a prospective controlled study using objective and subjective outcome measurements. *J Altern Complement Med.* 21(10), p617-622.

Lavender Aromatherapy Significantly Reduces the Number of Hot Flashes in Menopause

Hot flashes affect 50-80% of menopausal women. Hormone replacement therapy (HRT) is often used to treat the symptoms associated with menopause, but adverse effects limit women's desire to use HRT.

In this Iranian study, women who were in menopause kept a record of their hot flashes for one week. They were then divided into two groups. In the first phase, the Lavender "essence" or placebo "diluted milk" was administered for 20 minutes, 2 times per week, for 12 weeks. Hot flashes were recorded for 1 week. After a 4-week washout period, the groups received the other treatment for 12 weeks. Hot flashes were again recorded for 1 week.

Hot flash frequency was significantly lower with the lavender treatment (10.58 ± 7.34) than with the placebo (19.70 ± 13.40). One weakness of this study is that the authors did not describe either the lavender or placebo used in the study.

Kazemzadeh R, Nikjou R, Rostamnegad M, Norouzi H. (2016). Effect of lavender aromatherapy on menopause hot flushing: A crossover randomized clinical trial. *J Chin Med Assoc.* 79 (9), p489-492.

Oral Lavender Oil Reduces Anxiety and Depression in Patients with Mixed Anxiety and Depressive Disorder (MADD)

The World Health Organization has included Mixed Anxiety and Depressive Disorder (MADD) as a diagnosis for patients who present with both anxiety and depression, but neither condition is dominant, and neither can be classified as generalized anxiety disorder (GAD) or as a major depressive episode.

While Silexan (lavender oil capsules) is an effective anxiolytic for patients with GAD, researchers investigated its effect on patients with MADD and found that Silexan has an anxiolytic and antidepressant effect that leads to an improvement of impaired daily living skills and health-related quality of life and it was very well tolerated. Further, it had significant benefits in terms of reducing illness severity and global improvement.

Kasper S, Volz H-P, Dienel A, Schläfke S. (2016). Efficacy of Silexan in mixed anxiety-depression – A randomized, placebo-controlled trial. *Eur Neuropsychopharmacol.* 26 (2), p331-340.

Promoting the Role of Aromatherapy (AromaCare) in Palliative Care

AromaCare workshop © M. Kerkhof

Susan Pace, RN, BA, RA, CCAP

For the first time, Dutch Aromatherapist and author Madeleine Kerkhoff-Knapp Hayes crosses the Atlantic to bring her highly popular four-day AromaCare training program to the United States! This intensive course provides training designed to ease the physical and emotional concerns seen in chronically and terminally ill clients.

Her background as a nurse, Aromatherapist, herbalist, hydrotherapist and nutritionist gives Madeleine unique insights into the complex needs of palliative care clients. Since 1998, she has actively practiced complementary therapies in oncology and palliative care. Starting in 2006, Madeleine began educating health providers in specialized AromaCare through her company the Knowledge Institute of Complementary Nursing Care (Kicozo) in the Netherlands.

If you are an Aromatherapist, nurse, massage therapist or other health provider involved in caring for the needs of palliative care clients and are already equipped with basic knowledge and skills in Aromatherapy, this course is not to be missed! The IJPHA is proud to present Madeleine's premiere course in Boulder, Colorado, April 29-May 2, 2017. For more information about this program and to register, visit the IJPHA website at www.ijpha.com.

SP: Many people are unfamiliar with the term "palliative care." Can you explain what it is and why it's so important?

MK: Palliative care is care for patients for whose illness we do not have a cure. We often think of people with incurable cancer, but Chronic Obstructive Pulmonary Disease (COPD), heart disease, Amyotrophic Lateral Sclerosis (ALS) and related diseases, congenital disease in children, Huntington's disease, dementia etc. are life-threatening and life-shortening diseases for which palliative care is appropriate.

The World Health Organization (WHO) defines palliative care as follows:

Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual. Palliative care:

- provides relief from pain and other distressing symptoms;
- affirms life and regards dying as a normal process;
- intends neither to hasten nor postpone death;
- integrates the psychological and spiritual aspects of patient care;
- offers a support system to help patients live as actively as possible until death;
- offers a support system to help the family cope during the patient's illness and in their own bereavement;
- uses a team approach to address the needs of patients and their families, including bereavement counseling, if indicated;
- will enhance quality of life, and may also positively influence the course of illness;
- is applicable early in the course of illness, in conjunction with other therapies that are intended to prolong life, such as chemotherapy or radiation therapy, and includes those investigations needed to better understand and manage distressing clinical complications.

SP: What influenced your shift from providing "traditional" nursing care to a more integrative model?

MK: I left nursing mainly because I felt that patients in the hospital I worked in were mostly seen as their diagnosis rather than human beings with physical, emotional, social and spiritual needs. I wanted to care for very sick patients in a more holistic way. In the years after, I trained to be an Aromatherapist, herbalist, hydrotherapist and nutritionist. I learned how to give massage too. With these modalities in my "backpack" I started a practise. Many of my patients were cancer patients in the many diverse stadia of cancer. I did not offer "alternative medicine," but practiced Integrative Care, an approach where the emphasis lies on the integration of well-founded care of all origins, including standard, complementary and alternative modalities. I experienced that especially in palliative care and in the final weeks and days of life, complementary nursing care had a significant positive effect on well-being on all levels. In palliative and terminal care, all aspects of good care come together. It is the ultimate and last care we can give to patients and their loved ones. With complementary care we can optimize both the quality of life and the quality of dying greatly. This is why palliative care is such a passion to me: offering a great sense of well-being with small and simple care methods.

SP: Palliative care is a well-known, widely available modality in the Netherlands, but is a newer concept in the United States. How does the AromaCare model help patients and families cope with the burden of illness?

MK: When I started in nursing in the late 1970's in the Netherlands, there was also no palliative care or hospice care. This developed over the last few decennia. Nowadays, palliative care is something familiar to many people, although talking about illness and dying from it remains a difficult topic for the general public.

The AromaCare model can help patients and their loved ones in all dimensions. Physical needs include using essential oils and CO_2 extracts for pain relief, dyspnoea, skin and wound care, mouth care, etc. On a mental and emotional level AromaCare can offer consolation in grief for all involved (including carers), can help those who feel depressed and anxious, lethargic or who experience mental fatigue or trouble sleeping. Socially AromaCare can help promote communication, but most importantly help to diminish nasty smells from wounds or other sources. On a more spiritual level, we can think of supporting rituals with essential oils and CO_2 extracts, or addressing well-being on an existential level, or helping with mourning processes, fitting the personality of the person.

SP: Your upcoming course takes place over four days. Can you describe the focus of each day of training?

MK: In these four days we will discuss the most essential issues that we can help patients in palliative stages with. We will discuss a limited but well-chosen array of essential oils and CO_2 extracts and the possible treatments we can offer patients with them.

On the first day we will immerse ourselves in the dimensions of pain. We will look at the model of Loeser describing dimensions of pain, and what role evidence- and experience-based essential oils and base oils can play. Nociception can be positively influenced by Aromatherapy, as well as the way patients perceive their pain and act on it. Students will be making their own pain-relieving product, using high-quality essential oils, CO_2 extracts and base compounds. We also discuss, experience and practice other possibilities to aid pain relief, addressing well-being on all levels.

On the second day we take a closer look at different skin issues in palliative stages, such as moisture lesions, wounds and wound care, bed sores, and itching. Students learn which base oils and other basic compounds are proven effective and which essential oils and hydrolats can be used to relieve symptoms and help the healing process of scars and wounds. They learn to make skin care products with the help of prime base compounds to which essential oils and CO_2 extracts can be added.

The third day is all about emotional issues such as anxiety, depression, feelings of hopelessness, sleep disorders and fatigue. We can choose from many essential oils and CO_2 extracts. I will help students to make choices based on evidence and experience. They will make their own inhaler and massage oil. We will also discuss, experience and practice the use of comfy hot foot baths and relaxation techniques.

On the last day I will discuss issues in the dying stage. This stage of the palliative care process is marked by specific signs. When the dying phase is not recognized, this can lead to a decreased quality of dying and can affect the patient and his or her loved ones immensely. Complementary care can greatly enhance this stage of life, where the focus lies on as much well-being as possible. I will outline the possibilities and limitations of complementary care in the last days and hours of life, and show which essential oils and CO_2 extracts and interventions with them can be of great value. Special attention is paid to mouth care, dyspnoea, nausea, restlessness and anxiety. I will also provide some tools to help care for the deceased.

As you can see, these are intense days, which will address one of the most important stages of human life: its last stages. It is a stage of life which we cannot repeat, in which attention to detail of loving and knowledgeable carers is crucial to offer well-being and comfort to patients and their loved ones. The course can greatly inspire students, but can also provoke emotions, asking a lot from students as to their ability to adjust to such vulnerable patients, but is also extremely rewarding.

SP: In the Netherlands, insurance coverage for long-term care is assured for each citizen by the government. In the U.S., coverage for long-term care varies from insurer to insurer, meaning that some persons may be denied palliative alternatives. What are your thoughts on this?

MK: I have not much involvement with insurers because I do not treat patients, but teach nurses and therapists how to treat patients. What I do know is that as soon as people "enter" into the last stage of life, at approximately three months from their expected passing, they will be categorized as being in the palliative stage. That means that more funds and care are made available. I hope that in the future the three-month period will be extended for people with diseases such as dementia and Huntington's, in order to get them the so-needed extra care as soon as the diagnosis is confirmed.

My school mainly trains the nurses and other professionals within the health care system. This is often preferred by the organization because they know the situation of the patient and – after extra training in complementary interventions – are able to determine which intervention would be the most effective and which contraindications and limitations should be considered. Also privacy issues are avoided because parts of the medical files are usually shared with the nurse in question.

The financing of complementary interventions by these professionals depends on the health care facility or organization. Usually this is not funded by insurers. Many hospices have a little jar with donations from people who support the hospice. There are many hospice charities, such as "Friends of…" this or the other hospice, that fund both schooling and the purchase of products. Nursing homes usually find a way to fund schooling from their regular schooling budget, but have to incorporate aromatic products as a part of their regular purchases for patients. Many relatives of patients in nursing homes are happy to contribute to the purchase of products. After all, many normal care products for patients are not reimbursed any longer, such as lotions and creams, paracetamol or mouth care products.

I am convinced that in the near future, studies will show that complementary interventions in palliative care will lead to a decrease in cost. To give an example: good quality care using Ginger via inhalation is much cheaper than standard pharmaceutical approaches to nausea, can go side by side with standard care and offers a better standard of well-being with less side effects. With my school, I strive to convince insurers and other decision makers to reimburse the schooling for and the purchase of extra products to make complementary care more available. But my main focus is teaching complementary therapies to health care professionals.

Patients in the palliative stage deserve the best care we can offer them. My passion – and the reason I wrote my book – is to offer every fragile patient comfort and well-being, and quality of life and dying.

The IJPHA is proud to present Madeleine's premiere course in Boulder, Colorado, April 29-May 2, 2017. For more information about this program and to register, visit the IJPHA website at www.ijpha.com.

Uncommon Scents—The Movie An Interview with the Producers

Lora Cantele with Kristina Bauer and Angela Ehmke

What is *Uncommon Scents*?
Uncommon Scents is an inspired documentary exploring the world of essential oils, Aromatherapy, and natural aromatics. The feature-length documentary, which just wrapped up production in 2016, explores Aromatherapy through intimate interviews with many of the experts who hold the industry to its highest standards. The project's goal is to entertain, educate, and challenge paradigms while providing information about origins and history, chemistry and purity, safety and best practices, education and licensing, marketing and regulation, threats and sustainability. *Uncommon Scents* looks at how essential oils are used for everyday "natural living" to formal, clinical applications to elicit specific therapeutic outcomes. The film invites its audience to share a curious, open-minded, inspired, and educated journey exploring a broad spectrum of perspectives, insights, and truths. Most importantly, the film challenges newbies and enthusiasts alike to confront some of the issues facing the industry.

What was the initial catalyst that made you want to make this film?
We first imagined this film because it was one we wanted to see. In our regular conversations about Aromatherapy industry dynamics and current affairs, we often found ourselves wondering how some of the experts we trusted would answer the complicated questions about safety, marketing, certification, ethics, and sustainability that we were asking each other. The project was really born when Angie suggested we collect those questions, connect with those experts, capture the resulting dialogues, and craft them into a documentary film.

We see interest in, enthusiasm for, and engagement with essential oils growing around the world. There are now millions of people using Aromatherapy as a natural approach to health and wellness and a means to natural living. It's a many billion dollar industry world-wide. And while there are many people with considerable education and experience in Aromatherapy globally, there are also many people who are relatively new to essential oils, hydrosols, and natural aromatics. For those people, the sheer volume of information—and the pervasive misinformation—can be challenging to navigate. We believe a credible, easily accessible vehicle exploring the breadth and depth of where Aromatherapy comes from, what it offers, what it entails, who is using it, how it works, who it's helping, and why it matters—namely a documentary that is informed by reputable and experienced leaders in the field and grounded in defensible facts—could do much to tell the story of Aromatherapy.

What kept you interested in making this film?
Considering the film's scope, framing the arc of the film, crafting individual questions, and connecting with participants have all helped fuel our passion for this project. Exploring its potential and strengthening its proposition get more and more exciting every day.

As documentary filmmakers, we have a responsibility to thoughtfully approach our subject matter and faithfully represent the story that emerges from a wide variety of conversations, dialogues, and discoveries. We have to be curious, invested, honest, and very good listeners. We also have to have the courage to approach tough subjects and dialogues head-on. We're thrilled with how rich and compelling the emerging story is and particularly excited about how the evolving narrative feels.

How did you decide on the title *Uncommon Scents*?

The project's title, *Uncommon Scents*, reflects two distinct thoughts. First, it celebrates a notion Kristina first heard expressed by an herbalist talking about safety and precautions: Common sense is only common when you know it. In a field where there is so much to know, we can no longer assume basic information is so basic, especially not when we see growing numbers of questionable recipes and essential oil solutions emerging on social media. Common sense in Aromatherapy seemed more and more uncommon to us and we wanted to call that out.

Secondly, the title *Uncommon Scents* allowed us to directly reference the precious nature of the resources upon which Aromatherapy relies. Essential oils, absolutes, extracts, distillates, and other aromatic tools all rely on natural resources. Production of essential oils is a time-, resource-, cost-, and labor-intensive process, especially as models for production of essential oils include fewer communities and more and more macro-farms. Calling the film *Uncommon Scents* let us communicate at the outset that we recognize that natural aromatics are rare, precious, and worthy of respect. The title helped the film make room for the broadest possible perspective through which to explore the subject matter.

What will the film cover?

We're connecting with our participants on history, sources, distillation, chemistry, purity, interfaces, efficacy, education, safety, marketing, regulation, sustainability, therapeutics, energetics, and more. We're asking them to share their perspectives to provide original, empowering, and inspiring insights into essential oils, hydrosols, and the art and science of Aromatherapy. *Uncommon Scents* considers how we got to now, explores challenges in the industry's current state, addresses threats to the industry's future, and discusses why and how the industry may need to be protected. We hope *Uncommon Scents* will entertain, enlighten, inspire, and educate while it also challenges viewers—from newbies to consumers to professionals—to thoughtfully consider their part in Aromatherapy's future.

Interview with Shirley and Len Price © Kristina Bauer

Will *Uncommon Scents* address Aromatherapy education?

Uncommon Scents employs a global perspective; it does explore Aromatherapy education as it is offered and leveraged in a variety of countries. It also looks at educational resources, ways of grounding engagement with natural aromatics in best practices, and the challenge of qualifying and formalizing Aromatherapy education with a single, global standard.

Why are you the right people to produce an Aromatherapy documentary?

First and foremost, we have unique and passionate perspectives. Angie is a mom, Kristina has a marketing background and some exposure to multi-level marketing in the Aromatherapy industry. *Uncommon Scents* is informed by our desire to answer questions and explore challenges that we personally faced. In addition, Angie has filmmaking as her personal passion; Kristina's personal passions are storytelling and creative nonfiction. Between us, we have 15 years of experience in film, TV, and radio (Angela) and 15 years of experience in marketing, nonfiction writing, and educational training (Kristina). Before we began work on the film, we each completed Aromatherapy certification programs and teacher training and pursued extensive continuing education with some of Aromatherapy's most cherished champions and educators—and still we appreciate that our educations have only just begun. We have both engaged Aromatherapy clients and have experience teaching Aromatherapy workshops, but we are not beholden to any brand, school, distiller, or supplier. We are deeply passionate about essential oils, Aromatherapy, and the communities and resources on which they depend. Together, we have the skills, talent, experience, vision, and industry connections in both the film and Aromatherapy worlds to make *Uncommon Scents* truly exceptional.

Who is participating in the film?

Our list of interviewees includes individuals with outstanding reputations in the Aromatherapy industry and community: researchers, consultants, chemists, clinicians, educators, clinical practitioners, distillers, authors, and more. Everyone on the list is a recognizable champion of some area in the industry and is renowned for his/her contributions to the field—and the list continues to grow. We are thrilled to have so many powerful voices adding dimension and color

to the whole story of Aromatherapy as explored through *Uncommon Scents*.

You can find the current list of participants at http://bit.ly/USparticipants or on the participants' page at uncommonscentsmovie.com.

Who do you see as the film's audience?
Candidly, we believe *Uncommon Scents* will offer something for everyone:

- Individuals altogether new to Aromatherapy will discover its origins, benefits, and broad applications; they'll hear how Aromatherapy is benefitting individuals around the world.
- Individuals seeking to incorporate Aromatherapy to support holistic health will understand the importance of working with a qualified practitioner; qualified practitioners will be discernible from hobbyists.
- Dabblers will find new reasons to embrace deeper engagement with essential oils and add breadth and depth to their understanding of what essential oils are, how they impact the body, and how they can safely be employed.
- Existing enthusiasts will have new tools to help describe, inform, and enrich their practice; they'll also have new, personal insights shared by industry experts to deepen their experience.
- Educators will have a credible, responsible, and inspired resource that provides a meaningful introduction to Aromatherapy and shines a light on Aromatherapy's history, current state, and challenges for the future.

Honestly, we would be hard pressed to find an individual consumer who wasn't using or benefitting from essential oils, aromatic chemistry, or natural aromatics in one way or another.

They are leveraged in everything from food to consumer packaged goods. To wit, we think everyone will be interested to discover how essential oils, Aromatherapy, and aromatics are being used in the world, where they come from, and why they're so interesting. **Most importantly, *Uncommon Scents* will provide compelling evidence as to why everyone should care about Aromatherapy's future.**

What impact are you hoping to achieve with this documentary? How do you think it can influence the current landscape of Aromatherapy?
We truly hope that *Uncommon Scents* can elevate conversations about essential oils, hydrosols, Aromatherapy, and aromatic medicine beyond marketing speak, brand rhetoric, and hyperbolic claims. We want *Uncommon Scents* to help the industry shake off some of the misinformation in favor of evidence-based truths. We want the film to encourage thoughtful and deliberate use at the same time we invite people to consider a more enchanting relationship with individual essential oils, hydrosols, and aromatics. We certainly hope *Uncommon Scents* facilitates a deeper connection to the nature from which these materials come.

We believe *Uncommon Scents* will deepen dialogues, widen perspectives, challenge models, and empower fresh engagement with essential oils, hydrosols, and natural aromatics. Ultimately, we hope to help aromatics, Aromatherapy, and Aromatherapists get the respect, reverence, and recognition they deserve so that they all may thrive. There's a difference between being an essential oil consumer and being an Aromatherapist; we hope *Uncommon Scents* can help people mind and navigate the gap at the same time it reminds us we are all deeply invested in essential oils, Aromatherapy, and industry outcomes. Because what happens to essential oils, to aromatic medicine, and to this planet has consequences for everyone.

What support have you received thus far?
We first began sharing the idea of the film last year after we protected the intellectual property behind it. To protect the integrity of the project and keep it brand independent, we decided early on to crowdfund the film. Crowdfunding allowed us to gauge the community's enthusiasm for the project and made it possible for the film to be somewhat community-driven. Using a crowdfunding platform also meant no brand could come in as an investor and insert an agenda, shift the film's message, or otherwise muddy the emerging outline.

Uncommon Scents was slowly introduced to our immediate network and community in the summer of 2015; we formally introduced the project when we signed on in September, 2015, as Keynote Speaker

Sponsors of the Alliance of International Aromatherapists conference in Denver. We used the conference and a couple of key workshops (including Mark Webb's aromatic medicine course in Atlanta, Georgia and Gabriel Mojay's Aromatherapy and Five Element Theory course in Tampa, Florida) to help build enthusiasm for the film, connect with the first among our participants, and collect a few initial thoughts from industry leaders that could be used for our crowdfunding pitch video. Mark Webb and Gabriel Mojay helped us put a Q&A panel together in Atlanta in October; there we captured some initial footage of Mark, Gabriel, Sylla Sheppard-Hanger, Marge Clark, and others for the pitch video. Robert Tisserand was an enormous help from the beginning—he and Ixchel Leigh were generous with their time during a November visit to California where we added still more footage. We spent the holidays editing footage for the pitch, preparing perks and other campaign materials, doing public relations, and building platforms to support our crowdfunding campaign's launch on Indiegogo in January.

We were blown away by the support we received and the connections we made during the first phase of our Indiegogo campaign. From word of mouth that encouraged friends and community members to embrace and hold space for the project to multiple smaller donations from individuals to jaw-dropping donations from people/businesses to incredible, valuable perks donated by friends, colleagues, businesses, schools, and participants, the whole campaign experience was mind-blowing. We hoped the campaign would reveal enthusiasm for the project from the Aromatherapy community—we did not expect the campaign vibe to so powerfully reflect the spirit behind the film. By the time we passed our initial baseline goal, we saw how passionate, inclusive, balanced, insightful, playful, reverent, grateful, and engaged community members are. We have their generous contributions—and the individuals, groups, and businesses who encouraged that generosity—to thank for our campaign's success.

Having met our initial goal by our formal campaign deadline, the campaign for *Uncommon Scents* moved to the InDemand platform meaning we can continue to raise funds to offset crew, travel, editing, sound, animation, and other costs related to production and post-production activities. Our hope is to reach our stretch goal of $200,000 in early 2017 so that we can produce and complete a brand-independent film with a global scope and high production value.

With the funds raised to date, we filmed many of our initial interviews in 2016 at four locations in the UK and the US. We also accepted an invitation to participate in the Conscious Cinema Accelerator program at the Illuminate Film Festival in Sedona, Arizona, in June, 2016; there we connected with experienced filmmakers to improve our work and prepare for production and pitching. We have filmed in the UK and the US; we are now on filming hiatus until late winter/early spring of 2017.

When will the film be available for viewing?
If crowdfunding delivers our stretch goal ($200,000), we can produce, edit, and deliver the film in early 2018. If we only partially fund the stretch goal, our production schedule is dependent somewhat upon our ability to obtain additional funding, particularly to connect with participants based outside the US, and may slow to a later delivery.

With sufficient funding, ability to connect with key participants in a timely manner, and more limited need for travel, we can have the film completed sooner. The more money we raise, the more aggressively we can pursue our production and editing schedule. More money also means a wider scope for filming, i.e., including locations around the world such as Australia, Italy, and France.

How can our readers help?
Support the campaign. Make a contribution. Encourage your friends to contribute. Share our campaign with people on your lists. Offer valuable perks from your business to our campaign's contributors. Our second round of focused crowdfunding begins in January, 2017.

Spread the word. Let people know why you are excited about the film. Encourage a business you know and love to provide perks for our next campaign push.

Engage with *Uncommon Scents.* Connect with us on social media, at events, on location. We love meeting community members, talking about the film, and raising awareness about the project.

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