**Effects of Essential Oils on Sleep among Cardiac Rehabilitation Patients**

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### Essential Oil Chemistry

It is the chemistry of an essential oil that determines its therapeutic properties. Essential oils, like all organic compounds, are made up of hydrocarbon molecules and can further be classified as alcohols, aldehydes, esters, ketones, phenols, and terpenes (Buckle, 2015).

Alcohols and Esters are two of the major functional groups that are key to the therapeutic effects of the selected study oils.

**Linalol** is an alcohol molecule that acts as a hypnotic by inhibiting the chemical bonding of glutamate receptors in the cerebral cortex of the brain (Wood, 2003). A study on mice showed that linalol had depressive effects when the glutamate receptors were inhibited through binding (Rezaee & Hosseinzadeh, 2013). These receptors are responsible for the glutamate-mediated postsynaptic excitation of neural cells and when linalol inhibits binding a sedative effect is produced (Goel et al., 2005).

**Esters** are formed when an organic acid and an alcohol combine. (organic acid + alcohol = ester + water)

![Example of ester formation](image)

Even though the method of action for esters is not fully understood, they are considered aromatically and therapeutically desirable. Esters are commonly accepted in the aromatherapy community as regulators of the nervous system and essential oils that contain esters are thought to be the most relaxing, balancing, and calming (Stewart, 2005).

### Background

Results of epidemiological studies support the claim that poor quality sleep influences cardiovascular morbidity, but few randomized trials of herbal sleep aids have been reported. The primary objective of this study was to determine if there was a significant difference between the sleep quality of cardiac rehabilitation patients exposed to the aroma of an essential oil mixture and those not so exposed. We hypothesized that patients who inhaled an aroma composed of essential oils high in Linalol and Esters would experience better sleep quality than patients who were not exposed.

### Essential Oil Chemistry

<table>
<thead>
<tr>
<th>Essential Oil</th>
<th>L. intermedia Super</th>
<th>C. bergamia</th>
<th>C. odorata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linalol</td>
<td>37.12%</td>
<td>10.63%</td>
<td>6.26%</td>
</tr>
<tr>
<td>Esters</td>
<td>30.37%</td>
<td>30.12%</td>
<td>5.73%</td>
</tr>
</tbody>
</table>

**Lavandula x intermedia** (Lavandin Super)

(Acetic acid + Linalol = Linalyl acetate)

**Linalyl acetate**

![Example of ester formation](image)

**Citrus bergamia**

(Acetic acid + Linalol = Linalyl acetate)

**Linalyl acetate**

![Example of ester formation](image)

**Cananga odorata** (Ylang ylang)

(Benzoic acid + Benzyl alcohol = Benzyl benzoate)

![Example of ester formation](image)

![Example of ester formation](image)

### Methods

This randomized, double-blind, cross-over pilot study examined 42 participants from an urban outpatient cardiac rehabilitation unit. Subjects placed cotton balls infused with the intervention oils or an aromatic placebo mixture at their bedside for five nights. They completed an approved adapted weekly Pittsburgh Sleep Quality Index (PSQI) at the conclusion of each treatment. After a one-week wash-out period, participants switched to the opposing group and repeated the treatment procedure.

### Results

Lower PSQI global scores indicate better sleep quality. The mean PSQI global score when receiving the intervention oil was 4.9 and the mean PSQI global score when receiving placebo was 8. Sleep quality during treatment with essential oils was significantly better than sleep quality during treatment with placebo (t = -6.868, p = 0.0001). Hours of sleep were no different between groups, but patient-reported sleep quality on a single item, “how would you rate your sleep quality overall during the past week” was significantly better among the group exposed to essential oils (X² = 4.5, p = 0.03) than the placebo group.

### Discussion

The effect of essential oil inhalation on sleep was substantial in this study (effect size: d = 1). Furthermore, results indicated that quality of sleep, rather than sleep duration was affected. Sleep disturbances have been linked to high blood pressure, atherosclerosis, heart failure, heart attack, diabetes, stroke, and obesity. Poor sleep triggers the body to produce more stress hormones which can contribute to cardiovascular disease (SCAI, 2014). This study demonstrates that gaining knowledge of low cost effective treatments to improve quality sleep could improve patients’ health. The results are promising and future research on a more diverse study group could propel essential oils to be a more widely accepted and effective complimentary medicine in hospital settings.

### References


Vosk, K. (2013). The practice of aromatherapy: Essential oils have been shown to be a more widely accepted and effective complimentary medicine in hospital settings. Focus on Complementary, 20(3), 47-48.