

Review

Essential Oils: Inhalation Aromatherapy – A Comprehensive Review

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Received: 05 January 2021; Accepted: 16 February 2021

Abstract: In recent years, there has been an increasing interest in the aromatherapy, a branch of phytotherapy, utilizing essential oils for the health maintenance. Essential oils are mainly applied through inhalation (through the respiratory system or olfactory nerves), through topical absorption (through skin) or through ingestion (digestive system). The essential oils are mixtures of many organic compounds, and their biological activity and fragrance are conditioned by their chemical composition. According to the aroma they can be classified into several groups: citrus, herbaceous, camphorous, floral, woody, earthy, minty and spicy. This paper reports a literature relating to the use of essential oils in inhalation aromatherapy. However, this type of aromatherapy does not cure major illnesses but it is effective at relaxation and stress relief, mood enhancement, balance and well-being, relief of minor discomforts and boosting the immune, respiratory and circulatory systems.

Keywords: scents; fragrance; relaxation; stress relief; mood enhancement; balance.

1. Introduction

In recent years, there has been an increasing interest in alternative medicine, including phytotherapy. Phytotherapy is the use of herbs, herbal preparations (in the form of *infusions*, *decoctions*, concentrates, tinctures and other herbal extracts) and phytochemicals for medicinal purpose by health professionals and practitioners of folk medicine [1; 2]. Numerous clinical and experimental studies approved the efficacy of herbal drugs, therefore phytotherapy has increased in scientific significance [3].

On the other hand, the aromatherapy is a branch of phytotherapy, utilizing essential oils, *secondary metabolites* produced by plants for protection against stress conditions caused by diseases, herbivores and insects, as well as high temperatures and draught conditions. However, humans apply them because of their beneficial biological properties for the health maintenance for a range of purposes including medicinal, cosmetic, food and beverage industry. In aromatherapy essential oils are mainly used for altering the mind, mood, cognitive function or health [4; 5; 6; 7; 8]. Aromatherapy derived its name from the word *aroma*, which means fragrance or smell and *therapy* which means treatment [9].

The essential oils are mixtures of many organic compounds, and their biological activity and fragrance are conditioned by chemical composition [8]. They can be blended together to create complex aromas, which act synergically [6; 7]. Essential oils are mainly applied through inhalation (through the respiratory system or olfactory nerves), through topical absorption (through skin) or through ingestion (digestive system) [10; 11].

Olfactory aromatherapy is able to optimize the mood or otherwise benefit the state of mind adversely affected by life factors and the subsequent effects of the illnesses like anxiety, depression

and stress, as well as physical disorders associated with immune system dysfunction such as gastrointestinal disorders (irritable bowel syndrome), herpes, allergies, asthma, arthritis, skin disorders and cancer [12].

The use of essential oils on the skin can be through a massage or cosmetic products [6]. However, when essential oils are applied topically, with massage it is difficult to isolate its effect [13], while cosmetic aromatherapy utilizes essential oils for skin, body, face and hair [14]. Apart from essential oils, the hydrolates, the by-products during essential oil production, also can be used in aromatherapy [7]. Because hydrolates are water solutions, they can be easily applied topically without dilution, as facial and body sprays mainly to feel cool and refreshed and for wound healing [15].

2. Inhalation Aromatherapy

The inhalation route is the most popular and typically associated with aromatherapy [8]. Inhalation of essential oils is a fast, convenient and safe method [16]. Essential oils can be applied in the form of a vapor balm [9], lipstick-sized nasal inhaler [6], lamp diffusion method [17], room sprays (air fresheners) [18], or direct inhalation (a tissue or cotton ball with few drops of essential oil).

However, aromatherapy does not cure major illnesses but it is effective at relaxation and stress relief, mood enhancement, balance and well-being, relief of minor discomforts and boosting the immune, respiratory and circulatory systems [7]. This paper reports a literature relating to the use of essential oils in inhalation aromatherapy.

2.1. Relaxation and Stress Relief

A systematic review of anxiolytic effects of aromatherapy was given by Lee et al. [19]. Later, it has been verified that the use of lavender essential oil, through inhalation with a dose of 2 drops within 30 minutes, effectively decrease the anxiety [20], as well as that it acts positively on sleep latency, sleep duration, sleep quality, disturbed sleep and anxiety in adult patients [21]. Furthermore, a mixture of lavender and bergamot oil was more effective than lavender oil alone for sedation and relaxation, as well as for reducing anxiety and stress [16].

Inhalation of Compound Anshen essential oil (which is a mixture of lavender, sweet orange, sandalwood, frankincense, orange blossom, rose, and agarwood essential oils) can significantly reduce the spontaneous activity of experimental animals, reduce latency of sleeping time and prolong duration of sleeping time. The results of enzyme-linked immunosorbent assay showed an increase in the content of serotonin receptors (5-HT) and neurotransmitters in the brain (GABA). This study found that the inhalation of Compound Anshen essential oil has sedative and hypnotic effect [22]. It could be told that aromatherapy, which is a relatively simple, inexpensive and a non-invasive technique, with low side effects, can be used to manage sleep quality [23].

Inhalation of jasmine essential oil could inhibit central nervous system activity to make people feel relaxed [24]. Olfactory stimulation by Hinoki cypress (*Chamaecyparis obtusa*) leaf oil induced a significant reduction in oxyhemoglobin concentration in the right prefrontal cortex and increased parasympathetic nervous activity. These findings indicate that inhalation of Hinoki cypress essential oil induces physiological relaxation [25]. The orange peel essential oil has been attracting interest due to its sedative and relaxing actions. Experiments show that it decreases the level of emotionality of the experimental animals and suggests a possible central action, which is in agreement with the phytochemical profile of the essential oil, where limonene dominate, a component with a wellknown depressant activity on the central nervous system [26].

Aromatherapy with inhalation was shown to be effective for stress relief, as it decreased stress score as a psychological response, and reduced stress index, sympathetic nerve activity, and blood pressure as a physiological response. Therefore, it can be used as a method for relieving stress in both clinical and everyday settings, in which there are greater exposures to diverse stressors [27].

2.2. Mood Enhancement, Balance and Well-Being

The physiological hypothesis proposes that the effects of various aromas on the mood, their physiological effects and effect on behaviour are due to their direct and intrinsic ability to interact and affect the autonomic or central nervous systems [28]. Aromatherapy induced positive feelings during exercise, reduced fatigue during exercise, and improved participants feeling during the recovery period. Aroma has key influence on exercisers feelings, and it can positively influence exercise satisfaction and persistence [17]. Odors like vanillin and citrus fragrances fool the brains glucose level sensors, reducing the subjective feeling of „low energy“ [29]. Bergamot essential oil aromatherapy can be effective adjunct treatment to improve individual's mental health and well-being [30].

Aromatherapy may have particular use in mental health and nursing care home. It has been shown that aromatherapy may improve anxiety and stress-related symptoms as well as agitation associated with dementia [31]. Aromatherapy with lemon balm essential oil is a safe and effective treatment for clinically significant agitation in people with severe dementia with additional benefits for key quality of life parameters [32]. There are many reasons and clinical conditions to integrate the use of essential oils in the early and paliative care of the elderly patients with dementia including Alzheimer's disease [33].

2.3. Relief of Minor Discomfort

Labour pain is an indispensable component of delivery process; however, excessive pain can reduce uterine contractions and delivery progress rate. Study executed to compare the effect of aromatherapy with rose and lavender essential oils on severity of pain in the first phase of delivery in primiparous women show that aromatherapy can reduce the severity of labor pain as an uncomplicated non-pharmacological approach [34]. Furthermore, aromatherapy with lavender essential oil has significant impact in the decrease of pain scores of patients especially at longer periods of exposure. Even if there are various intervening factors associated to pain, aromatherapy can be conclusive non-pharmacologic approach in helping mothers after birth [35]. Furthermore, experiment with lavender and rosemary essential oils suggests that aromatherapy may not elicit a direct analgesic effect but instead may alter affective appraisal of the experience and consequent retrospective evaluation of treatment-related pain [36]. Inhalation of lavender, eucalyptus, rosemary, chamomile and peppermint essential oil is useful reduction of post-operative pain [37].

Aromatherapy with lavender, orange and tea tree essential oil reduced some of complications of hemodialysis, including anxiety, fatigue, pruritus, pain of arteriovenous fistula puncture, sleep quality, depression, stress and headache. Considering the complications and heavy costs of managing complications in patients undergoing hemodialysis, it appears that aromatherapy can be used as an inexpensive, fast-acting and effective treatment to reduce complications in hemodialysis patients [38]. Inhalation of lavender oil leads to pain relief in patients after coronary artery bypass surgery [39]. Even if the inhalation of lavender essential oil to reduce anxiety, prior to a scheduled colonoscopy or esophagogastroduodenoscopy did not show effective patients did generally report lavender scent to be pleasurable [40].

There is a significant effect of deep breathing relaxation techniques with lavender aromatherapy on preoperative patient anxiety [41]. One of the most common surgical complications is nausea. Investigations show that inalation of 10% and 30% peppermint essential oils are equally effective on the severity of nausea [42]. Aromatherapy treatment with blends of the essential oils of ginger, spearmint, peppermint and cardamom is promising as an inexpensive, non-invasive treatment for postoperative nausea that can be administered and controlled by patients as needed [43]. However, inhalation of mixture in equal proportion of lavender, spearmint, peppermint and ginger have a small non-significant effect in the treatment of postoperative nausea and vomiting in children [44].

2.4. Boosting the Immune, Respiratory and Circulatory Systems

Essential oils are known as potential antimicrobials and as anti-inflammatory agents to alleviate symptoms and signs of respiratory tract diseases including respiratory tract infections [45], such as flu, cold, sinus congestion and fever [46]. Based on the current knowledge, essential oils and the inhalation aromatherapy could be effective against pandemic SARs-CoV-2 virus and its inflammatory complications [47]. Aromatherapy with rose hydrolate can reduce of apnea attacks, bradycardia and pulse oximetry in premature infants, along with other routine treatments [48].

3. Essential Oils Used in Inhalation Aromatherapy

Essential oils can also be classified based on aroma into seven groups: 1) citrus, 2) herbaceous, 3) camphorous, 4) floral, 5) woody, 6) earthy, 7) minty and spicy [49]. The most recent used essential oils in inhalation aromatherapy are shown in Table 1, together with aromas and indications for applications.

Table 1. Plants used in aromatherapy.

Latin name	Common name	Odor and flavor	Aromatherapy (inhalation)
<i>Anthemis nobilis</i>			
	ROMAN CHAMOMILE	sweet herbal green cognac spicy woody	Anxiolytic [50] Analgetic (treating earache, menstrual pains) [51] Against depression [51]
<i>Boswellia sp.</i>			
	FRANKINCENSE	balsamic, earthy, sweet, honey-like and woody aroma	Relieve stress and anxiety [52] Decreases pain intensity during labor [53] Eases breathing, for treatment of asthma [54] Anti-depressant [22]
<i>Citrus aurantium</i> var. <i>amara</i>			
	BITTER ORANGE PEEL	characteristic fruity, pleasant aroma	Better sleep quality [23] Treats sore throat [51] Decreases pain intensity during labor [53] Treat anxiety and stress [52] Acts as sedative and a relaxant [26]
<i>Citrus aurantium</i> var. <i>amara</i>			
	BITTER ORANGE FLOWER (NEROLI)	sweet, fresh and floral odor	Sedative, soothing, calming, and motor relaxant [55] Anxiolytic and antidepressant [55] Promotes a positive mood [52]
<i>Citrus bergamia</i>			
	BERGAMOT	fresh, with hints of citrus and spice	Positive feelings [30] Against psychological stress and anxiety [56] Against migraine [51] To treat anxiety and depression [52]

<i>Citrus limon</i>		LEMON	distinctive lemony aroma	Anxiolytic [50] Antidepressant [7]
<i>Citrus sinensis</i>		ORANGE	sweet citrus fragrance	Anxiolytic [50] Against migraine [51] Decreases pain intensity during labor [53]
<i>Cupressus sempervirens</i>		CYPRESS	fresh wood <i>scent</i> similar to pine fragrance	For treatment of asthma [52]
<i>Eucalyptus sp.</i>		EUCALYPTUS	strong aromatic, camphoraceous <i>scent</i>	Helps ease nasal congestion [7] Common colds symptoms of upper respiratory tract with persisting mucus [57] Treatment of catarrh and asthma [57] Against migraine [52]
<i>Foeniculum vulgare</i>		FENNEL	herbal, anise- tinged <i>scent</i>	Bronchitis [52]
<i>Hyssopus officinalis</i>		HYSSOP	warm aromatic sharp camphoraceous <i>scent</i>	Against allergy [52] Sedative [58]
<i>Jasminum officinale</i>		JASMINE	sweet, exotic and richly floral <i>scent</i>	Relaxation [24] Decreases pain intensity during labor [53]
<i>Lavandula angustifolia</i>		LAVANDER	characteristic odor and sweet floral aroma	Attenuates behavioural and psychological symptoms of dementia in patients with Alzheimer's disease [59] Post-operative pain relives [39] Reduces procedural stress [40] Against migraine [51] Decrease stress and anxiety [60] Decreases pain intensity during labor [53]

<i>Lavandula latifolia</i>		SPIKE LAVENDER	strong camphoraceous odor	Pain reliever (headache) [61] Relaxation and stress relief [61] Nose and throat infections [61]
<i>Matricaria recutita</i>		GERMAN CHAMOMILE	sweet herbaceous odour and bitter aromatic flavor	Decreases stress and anxiety [60] Decreases pain intensity during labor [53] Busts the immune system [52]
<i>Melissa officinalis</i>		LEMON BALM	fresh, herbaceous odour with a typical lemon- citronella note	Attenuates behavioural and psychological symptoms of dementia in patients with Alzheimer's disease [59] Treatment for the management of agitation in severe dementia [32]
<i>Mentha piperita</i>		PEPERMINT	minty type odor that's cool and refreshing	Cold and flu symptoms [51] Against migraine [51] Decreases pain intensity during labor [53] Treat exhaustion [52] Against nausea [42]
<i>Myrtus communis</i>		MYRTLE	herbaceous, camphorated odour	Alleviates the symptoms of whooping cough, bronchitis and other respiratory infections [51]
<i>Ocimum basilicum</i>		BASIL	warm, spicy- sweet <i>aroma</i>	Against migraine [51] To treat anxiety and depression [52]
<i>Pelargonium spp.</i>		ROSE-SCENTED GERANIUM	strongly rose- scented	Anxiolytic [50] Decreases pain intensity during labor [53]
<i>Pogostemon cablin</i>		PATCHOULI	musky, sweet, spicy <i>aroma</i>	Against migraine [51]
<i>Rosa damascena</i>		ROSE	typical rose odour	Anxiolytic [50] Decreases pain intensity during labor [53] Tachycardia [52] Anti-depressant [22]

<i>Rosmarinus officinalis</i>		ROSEMARY	strong, warm, woody, balsamic aroma	Treats low blood pressure and headache [51] Bronchitis [52]
<i>Salvia sclarea</i>		CLARY SAGE	musky, warm, herbaceous scent, bears a similarity to hay, with an amber note	Anxiolytic [50] Regulating menstrual cycle [51] Controlling high blood pressure [51] Against panic [52]
<i>Santalum album</i>		SANDALWOOD	sweet, balsamic and woody scent	Anxiolytic [50] Sedative-hypnotic effects [22]
<i>Syzygium aromaticum</i>		CLOVE	strong, pungent, and spicy odor	Decreases pain intensity during labor [53]

7. Conclusions

Essential oils in aromatherapy are mainly applied through inhalation. In this case, through the respiratory system or olfactory nerves they are able to optimize the mood or otherwise benefit the state of mind adversely affected by life factors and the subsequent effects of the illnesses like anxiety, depression and stress, as well as physical disorders associated with immune system dysfunction. Essential oils can also be classified based on aroma into seven groups: citrus, herbaceous, camphorous, floral, woody, earthy, minty and spicy.

Acknowledgments: This research was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, grant number: 451-03-9/2021-14/200032.

Conflicts of Interest: The authors declare no conflict of interest.

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