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Chapter

Aromatherapy as Complementary Medicine

Amira Ahmed Kamal El-din El-Anssary

Abstract

Aromatherapy is the practice of using the natural oils extracted from bark, flowers, stems, roots, leaves, or other parts of a plant to enhance psychological and physical well-being. It is a type of complementary medicine that uses volatile oils and other aromatic compounds with the aim of changing a person's mind and mood. Volatile oils are hydrophobic in nature. Essential oils are extracted by different methods as steam distillation. Some evidence exists that volatile oils may have therapeutic potential. Volatile oils are often absorbed through the skin, where they travel through the bloodstream and might promote whole-body healing. Essential oils are showing a spread of applications, including pain treatments, enhancement of mood, and increased cognitive function. Essential oils are available in a large number, each with its own healing properties.

Keywords: aromatherapy, complementary medicine, essential oils, therapeutic benefits, ketones, ancient civilization, biological activities, distribution

1. Introduction

For a long time, essential oils were well-known for their therapeutic importance. They were used as perfumes and flavors for foods and beverages or to heal both the body and mind for many years [1–4]. They were used in ancient civilizations as Chinese, Indian, and ancient Egyptian and show their uses in many treatments in different forms. The ancient Chinese were the first culture to use aromatherapy in folk medicine, and then the ancient Egyptians created undeveloped distillation machine that is used for the crude extraction. Greece learned a large deal from the ancient Egyptians, and they also learned the therapeutic and aromatic advantages of the aromatic plants [5–8].

Volatile oils consist of very small aromatic molecules that are easily absorbed through the skin and respiratory system. These medicinal compounds next enter the bloodstream and then spread all over the whole body where they can create their useful curing powers. As they are too concentrated, even a small amount of volatile oil is effective. Nowadays aromatherapy is one of the most popular complementary therapies, offering a highly effective treatment to both the acute and chronic diseases. In addition, the continuous use of aromatherapy and home-use products helps our immune system [9].

2. Definition and localization of essential oils

Volatile oils are aromatic compounds which occur only in 10% of the plant kingdom and are stored in plants in specific secretory cells such as glands, hairs, ducts, cavities, or resin ducts [10–13]. Essential oils are hydrophobic in nature; they can be dissolved by polar solvent like alcohols and nonpolar solvents, waxes, and oils. Most of them are pale yellow or with no color with the exception of the blue volatile oil of *Matricaria chamomilla* L., and most are liquid and of low density than water except the essential oil of *Cinnamomum verum* Blume. and *Syzygium aromaticum* L. [14, 15].

Volatile oils are easily oxidizable by light, heat, and air due to the presence of olefenic double bonds and functional groups such as hydroxyl, aldehyde, and ester [16, 17].

3. Extraction of volatile oils

The oils contained within the plant cells are liberated through heat and compression from different organs of the plant, for example, the leaves, flowers, fruit, bark, and gums. The extraction of the oils from different plant organs is achieved by different methods, such as hydro-distillation, which is the most common method of extraction [18, 19]. Essential oils are composed of a mixture of volatile components and consist of about 20–60 individual compounds, and some may contain more than 100 components as jasmine, lemon, and cinnamon volatile oils [20–23].

4. Factors affecting chemical composition of volatile oils

The fragrance and chemical composition of the oils can vary according to different factors as the geo-climatic location and growing conditions (soil type, climate, altitude, and amount of water available), season, and time of day when harvesting is done. Therefore, these factors influence the biochemical synthesis of the oils in a plant, so that the same species of the plant make the same volatile oil but maybe of different chemical compounds, which will affect their therapeutic activities. These different chemical compositions led to different chemotypes. Chemotype is in general a different population of the same species of plant which produces many chemical profiles for a particular class of secondary metabolites. Examples of some chemotypes are shown in **Table 1** [24–27].

5. Distribution of the volatile oils in the plant kingdom

Although only 100 species are widely known for their volatile oils, there are over 2000 plant species widespread over 60 families such as Lamiaceae, which is also

Plant name	Chemotype 1	Chemotype 2	Chemotype 3
Thyme (*Thymus vulgaris* L.)	Thymol	Thujanol	Linalool
Peppermint (*Mentha piperita* L.)	Menthol	Carvone	Limonene
Rosemary (*Rosmarinus officinalis* L.)	1,8 Camphor	Cineole	Verbenone
Dill (*Anethum graveolens* L.)	Carvone	Limonene	Phellandrene
Lavender (*Lavandula angustifolia* Mill.)	Linalool	Linalyl acetate	β-Caryophyllene

Table 1.
Examples of different chemotypes.

Class of compounds	Example	Bioactivities	References
Ketones	Carvone, menthone, pulegone, fenchone, camphor	Mucolytic, cell regenerating, sedative, antiviral, neurotoxic, analgesic, spasmolytic	[38–40]
Aldehydes	Citral, myrtenal, cuminaldehyde, citronellal, cinnamaldehyde, benzaldehyde	Antiviral, antimicrobial, tonic, vasodilators, hypotensive, calming, antipyretic, sedative	[26, 41]
Phenols	Thymol, eugenol, carvacrol, chavicol	Antimicrobial, spasmolytic, immune stimulating	[26, 40]
Alcohols	Linalool, menthol, borneol, santalol, nerol, citronellol, geraniol	Antimicrobial, antiseptic, tonifying, spasmolytic	[26, 40]
Lactones	Nepetalactone, bergaptene	Antimicrobial antiviral, antipyretic, sedative, hypotensive, analgesic	[26, 40]
Hydrocarbons	Limonene, myrcene, pinene, sabinene, cymene, myrcene, phellandrene	Stimulant, antiviral, antitumor, decongestant, antibacterial, hepatoprotective	[26, 40]
Esters	Linalyl acetate, geraniol acetate, eugenol acetate, bornyl acetate	Spasmolytic, sedative, antifungal, anti-inflammatory	[26, 40]
Oxides	Bisabolone oxide, linalool oxide, sclareol oxide	Anti-inflammatory, expectorant, stimulant	[26, 40]

Table 2.
Different classes of volatile oils and their biological activities.

called the mint family. It is one of most important plant families in the plant kingdom. This family is rich in essential oils, especially menthol thyme, Rosemary, and Oregano. Apiaceae or Umbelliferae is a family of mostly aromatic flowering pla nts, which contains economically important plants as caraway, coriander, cumin, and fennel [28–31]. Volatile oils contribute in a lot of industries as food products, drinks, perfumes, pharmaceuticals, and cosmetics [32–34]. The production and consumption of essential oils increase rapidly all over the world [35]. Regardless of the high costs because of the large amounts of plant material needed, volatile oil production has been increasing. The expected world production of the oils ranges from 40,000 to 60,000 tons/year and represents a market of approximately 700 million US$ [36, 37]. Examples of some classes of essential oils their medical uses and structures are illustrated in (**Table 2**), (**Figures 1** and **2**) [26, 38–41].

6. Therapeutic benefits of essential oils

Many plant essential oils are used as medicine for hundreds of years and have demonstrated several health benefits, including effects on infectious, chronic, and acute diseases. The medical preparations made with plant essential oils as well as their single constituents applied in the therapy of human infectious diseases are well documented. However, the selection of suitable safe oil and the determination of the best efficient dose should be taken into consideration to avoid any side effects when they are applied [41]. The action of volatile oils begins by entering the human body through three possible ways including direct absorption through inhalation, ingestion, or diffusion through the skin tissue.

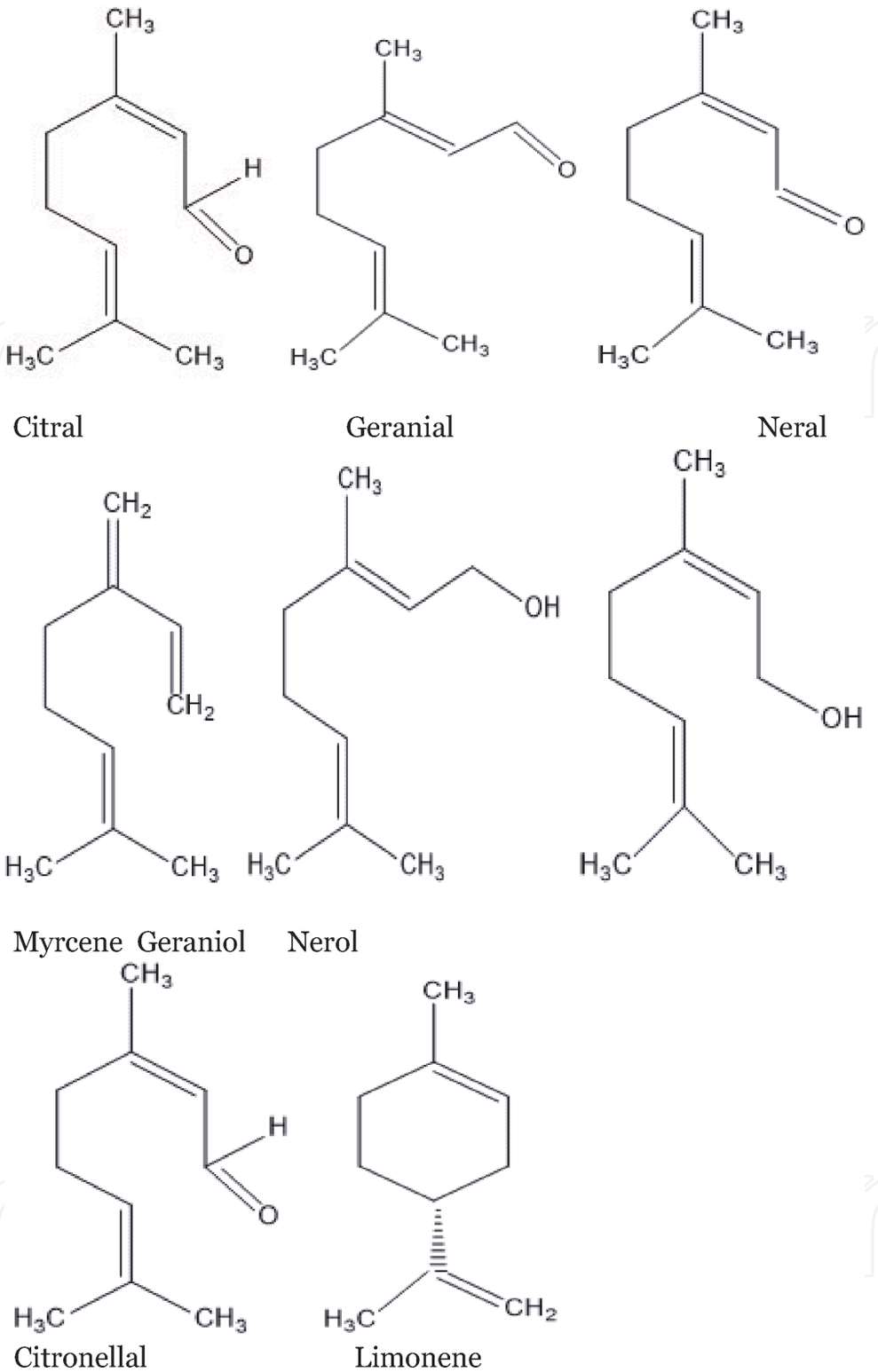
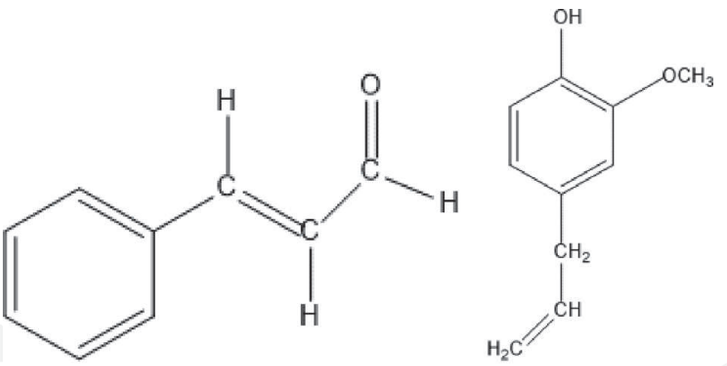


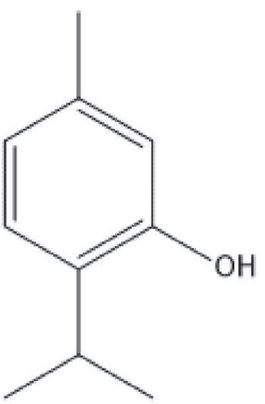
Figure 1.
Different classes of volatile oil.

6.1 Absorption through the skin

Volatile oil components are lipid soluble, so they have the ability to penetrate the membranes of the skin before being captured by the micro-circulation and drained into the systemic circulation, reaching all target organs [42, 43]. An example of this are the inflammatory disorders which are associated with pain, redness, and swelling, leading to loss of vital functions. Tea tree oil has been shown to increase monocytic differentiation in vitro and reduce inflammation, therefore assisting the healing of chronic wounds [44].



Cinnamaldehyde Eugenol



Thymol

Figure 2.
Different classes of volatile oil.

6.2 Inhalation

Volatile oils enter the body through the respiratory system. Due to their volatile ability, they can be inhaled easily through the upper respiratory tract and enter the lungs, by which it can be spread to the blood stream. In general, the respiratory tract is considered to be the most easiest way of entry, followed by the dermal pathway [45]. Inhalation of essential oils has given rise to olfactory aromatherapy, where simple inhalation has resulted in enhanced emotional wellness, calmness, relaxation, or rejuvenation of the human body. The release of stress is welded with pleasurable scents which unlock odor memories. Essential oils are complemented to medical treatment and can never be taken as a replacement for it [46–48].

6.3 Ingestion

Oral ingestion of essential oils needs to be done carefully due to the possible toxicity of some oils. Ingested volatile oil compounds and/or their metabolites may then be absorbed and delivered to the rest of the body and then distributed to different organs. Once volatile oil are entered in to the body, they create their therapeutic effect through physiological functions (**Table 3**). For example, *Roman chamomile* is extensively used to relieve pain from physical conditions, menstrual cramps, and tension with its application on the lower abdomen [49–52].

No.	Name	Active compounds	Ref.	Biological activities	Ref.
1.	Chamomile essential oil (*Matricaria chamomilla* L.)	Bisabolol and chamazulene	[53, 54]	Anti-inflammatory Anti-allergic Anti-pruritic Decongestive Antispasmodic	[55–57]
2.	Anise essential oil (*Pimpinella anisum* L.)	Anethole	[58]	Antispasmodic 2-Emmenagogue Stomachic Carminative Diuretic	[59, 60]
3.	Nutmeg essential oil (*Myristica fragrans* Houtt.)	Sabinene, 4-terpineol, myristicin	[61]	Antimicrobial Pesticidal activity General tonic Antioxidant	[62, 63]
4.	Cedar essential oil (*Cedrus libani* (A. Rich.))	Limonene	[64]	Larvicidal Lymphotonic Powerful diuretic Regenerative blood Astringent Scalp tonic Antifungal	[65, 66]
5.	Garlic essential oil (*Allium sativum* L.)	Diallyl disulfide	[67, 68]	Protects and maintains the cardiovascular system Hypoglycemic Regulates blood pressure Antimicrobial	[67, 69, 70]
6.	Clove essential oil (*Syzygium aromaticus* L.)	Eugenol, eugenyl acetate	[71, 72]	Antiviral Antimicrobial Antifungal Aphrodisiac	[73, 74]
7.	Cinnamon essential oil (*Cinnamomum cassia* (Blume))	Cinnamaldehyde	[75, 76]	Powerful antibacterial Antiviral Antifungal	[77, 78]
8.	Eucalyptus essential oil *(Eucalyptus globulus* Labill.)	1,8-Cineole	[79, 80]	Anticatarrhal Expectorant and mucolytic Antimicrobial and antiviral	[81, 82]
9.	Peppermint essential oil *(Mentha piperita* L.*)*	Menthol and menthone	[83, 84]	Tonic and stimulant Decongestant Anesthetic and analgesic Antipruritic Expectorant	[85, 86]
10.	Lavender essential oil *(Lavandula officinalis* Chaix)	Linalool and linalyl acetate	[87, 88]	Antispasmodic Sedative Relaxing Analgesic and anti-inflammatory	[89, 90]
11.	Tea tree essential oil (*Melaleuca alternifolia* Cheel)	Terpinene-1-ol-4	[91]	Antimicrobial Antiviral Antiasthenic Neurotonic	[92–94]

No.	Name	Active compounds	Ref.	Biological activities	Ref.
				Decongestant Radioprotective	
12.	Lemon essential oil (*Citrus limonum*) (L.) Osbeck	Limonene	[95, 96]	Strengthen natural immunity Tonic nervous system Antimicrobial and antiviral	[97–99]

Table 3.
Therapeutic properties of some essential oils.

7. Conclusion

There is a significant and growing interest to find safe and effective methods of treatment. Aromatherapy is one of the most usable methods across the world. It has gained popularity due to its safety, easy accessibility, and effective effects. From previous data we can notice that essential oils have a lot of pharmacological effects and can help in the treatment of many diseases.

Author details

Amira Ahmed Kamal El-din El-Anssary
Pharmacognosy Department, Pharmaceutical Science Division, National Research Center, Giza, Egypt

*Address all correspondence to: amiraelanssary@yahoo.com

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