BASICS OF ESSENTIAL OILS: A Review

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Abstract

India has been considered as treasure house of valuable medicinal and aromatic plant species. They play an important role in the health care of about 80% of world population. The rest 20% also dependent substantially on plant based medicines. It is estimated that more than half of the drugs under clinical use are derived from plants. Aromatics herbs like patchouli, citronella, geranium, vanilla, jasmine, lemon grass, khus, rose oil etc., are being used since long back. (Thanaboripat *et al*., 2000; Bankole and Joda, 2004)[4]. Essential oils are highly concentrated substances extracted from flowers, leaves, stems, roots, seeds, barks, resins, or fruit rinds. These oils are often used for their flavor and their therapeutic or odoriferous properties, in a wide selection of products such as foods, medicines, and cosmetics[3]. Essential oils are used in a wide variety of consumer goods such as detergents, soaps, toilet products, cosmetics, pharmaceuticals, perfumes, confectionery food products, soft drinks, distilled alcoholic beverages (hard drinks) and insecticides. The world production and consumption of essential oils and perfumes are increasing very fast. Production technology is an essential element to improve the overall yield and quality of essential oil[5]. Since ancient times, essential oils are recognized for their medicinal value and they are very interesting and powerful natural plant products. They continue to be of paramount importance until the present day[6].

Keywords: Essential oils, Aromatics, Aromatherapy, Cosmetics, fragrance

INTRODUCTION

A variety of plants with their different shapes, sizes, colors, and scents. They contains compounds they hide within the roots, flowers, seeds, bark, or other areas of the plant. These compounds are known as essential oils. They are highly concentrated, making them extremely potent[1]. Humankind has used plants for healing for many thousands of years, and it's from this tradition of that the use of aromatic plant compounds is medicine began. Oils were used in the embalming process, in medicine and in purification rituals. There are also over 200 references to aromatics, incense and ointments in the Old and New Testaments; Frankincense, Myrrh, Galbanum, Cinnamon, Cassia, Rosemary, Hyssop and Spikenard are noted for being used for anointing rituals and healing of the sick. Research has confirmed centuries of practical use of essential oils, and we now know that the 'fragrant pharmacy' contains compounds with an extremely broad range of biochemical effects. There are about three hundred essential oils in general use today by professional practitioners. With the continual bombardment of viral, bacterial, parasitic and fungal contamination in our world, essential oils are a great benefit to help protect our bodies and homes from this onslaught of pathogens. Immune systems need support and essential oils can give it. Because of the enormous amount of raw product used to make wholly natural essential oils, lots of products on the market have been polluted with lower quality, commercial – grade oils or contain other chemical substances to reduce the cost or increase the profit margin – a fact not usually revealed on the label. This is why it is important to study the chemical composition of the volatile fraction once the essential oil is

extracted. This fraction is characterized by the complexity in the separation of its components, which belong to various classes of compounds and which are present in a wide range of concentrations[3].

1 ESSENTIAL OILS

1.1 How to Use Essential Oils?

The most effective way to use most essential oils is by external application or inhalation, though some can be very beneficial when taken internally. The use of essential oils include body oils, compresses, cosmetic lotions, baths, hair rinses, inhalation by steam, perfumes and room sprays. Essential oils are very potent - some will cause skin irritation or have other harmful effects if not used properly. Unless specifically noted, it is best to dilute all essential oils in a carrier of base oil like Almond, Jojoba or Apricot Kernel before applying to the skin - appropriate dilution is usually only 1 - 10% essential oil in carrier. For inhalation, a diffuser or oil lamp is effective for releasing essential oils into your environment - a very pleasant way of creating a particular atmosphere[3].

1.2 The science behind essential oils

When you hear the word “volatile,” you may think it holds a negative connotation; however, in the case of essential oils, volatility refers to a substance’s ability to change its state quickly. The chemical makeup of volatile aromatic compounds in essential oils allow them to disperse quickly through the air. This is why you can instantly smell the potent aroma of an essential oil from the moment you open the bottle—even from a distance. As volatile aromatic compounds move quickly through the air, the essential oil user will experience the scent when the compounds interact directly with the brain’s olfactory sensors. With over 3,000 types of volatile aromatic compounds discovered so far, it is important to note that these compounds greatly determine the benefit, aroma, and nature of each essential oil. Because of unique chemical makeup, each essential oil will vary from species to species, and even from plant to plant[1].

1.3 What are Essential Oils?

- Essential oils are concentrated volatile aromatic compounds produced by plants - the easily evaporated essences that give plants their wonderful scents. Each of these complex precious liquids is extracted from a particular species of plant life. Each plant species originates in certain regions of the world, with particular environmental conditions and neighboring fauna and flora.
- Essential oils are frequently referred to as the “life force” of plants. Unlike fatty oils, these "essential" oils are volatile, highly concentrated, substances extracted from flowers, leaves, stems, roots, seeds, bark, resin or fruit rinds. The amount of essential oils found in these plants can be anywhere from 0.01 percent to 10 percent of the total. That's why tons of plant material are required for just a few hundred pounds of oil. These oils have potent antimicrobial factors, having wide range of therapeutic constituents. These oils are often used for their flavor and their therapeutic or odoriferous properties, in a wide selection of products such as foods, medicines, and cosmetics. Beware of imitations. Essential oils cannot be substituted with synthetics[3].

2 COMPOSISTION OF ESSENTIAL OILS

- Essential oils are complex mixtures of naturally occurring compounds, carotenoids, mostly monoterpenes and sesquiterpenes, different chemical groups of terpenes, aromatics hydrocarbons and their oxidized derivatives such as aldehydes, ketones, alcohols and esters. The aromatic plants are a valuable source of a huge array of chemical compounds. Many species of plants synthesize and accumulate extractable organic substances in sufficient quantities which are economically useful raw materials for various commercial applications[4].

- An essential oil is a concentrated hydrophobic liquid containing volatile aroma compounds from the plant. They are also known as aromatic oils, fragrant oils, steam volatile oils, ethereal oils, or simply as the "oil of" the plant material from which they were extracted, such as oil of clove[2].
- The advantages of essential oils are their flavor concentrations and their similarity to their corresponding sources. The majority of them are fairly stable and contain natural antioxidants and natural antimicrobial agent as on citrus fruits (Somesh *et al*., 2015). Essential oils are usually colorless, particularly when fresh. Nevertheless, with age essential oil may oxidize which resulting the color becomes darker. Therefore, essential oil needs to be stored in a cool, dry place tightly stoppered and preferably full in amber glass containers[2].

3 USES OF ESSENTIAL OILS

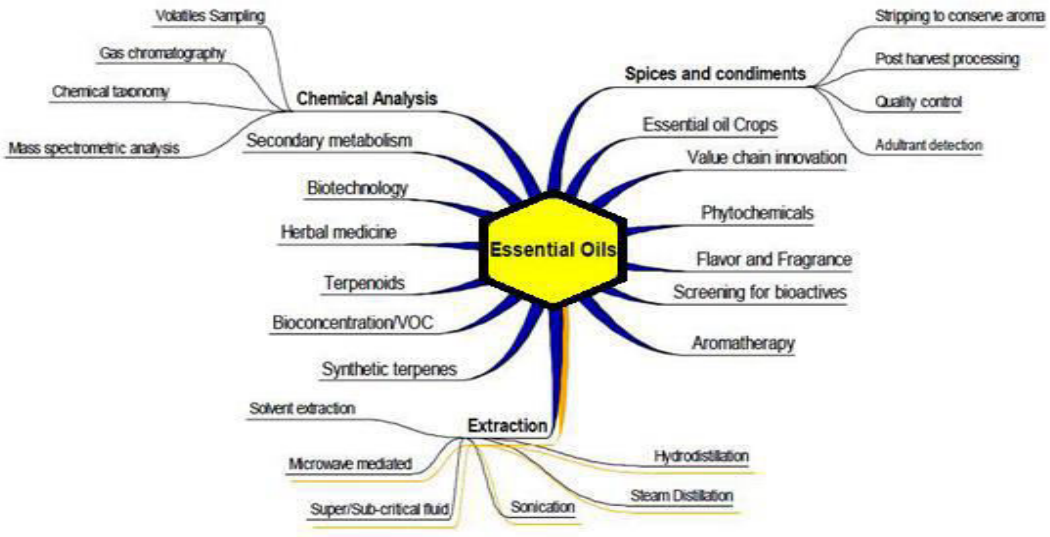
- Essential oil is used in perfumery, aromatherapy, cosmetics, incense, medicine, household cleaning products and for flavoring food and drink. They are valuable commodities in the fragrance and food industries. More than 250 types of essential oils. A number of countries produce different kinds of essential oils. India ranks second in the world trade of essential oils (Rao *et al.*, 2005)[2].
- Essential oils are derived from various sections of plants. An essential oil is usually separated from the aqueous phase by a physical method that does not lead to significant change in its chemical composition (Figure 1). Essential oils could be then subjected to an appropriate further treatment[2].

TABLE 1 Main Components of Essential oil

Sr. No.	Name of oil	Main component
1.	Geranium oil	Geraniol, Citronellol, Geranyl Acetate, Citronellyl Formate
2.	Citronella oil	Citronellal, Citronellol, Geraniol, Limonene
3.	Palmrosa oil	Geraniol, Citronellal, Farnesol
4.	Spearmint oil	Carvone, Phyllandrene, l-Limonene
5.	Peppermint oil	Pinene, Camphene, Cadinene
6.	Lemongrass oil	Citral, Geraniol, Linalol
7.	Eucalyptus oil	Eucalyptol, Phellandrene, Piperitone, Sesquiterpene
8.	Patchouli oil	β-patchoulene, Eugenol, Cinnamic Aldehyde
9.	Basil oil	Methyl- Chavicol, limnonene, Citral, citronellal
10.	Cardamom oil	Cineol, α-Terpinyl Acetate, Nerol, α-Pinene

Source: [4]

Figure 1 Show the copious branching of specializations in the work of consequential oils.



Source: [2]

4 CLASSES OF ESSENTIAL OIL COMPOUNDS AND THEIR BIOLOGICAL ACTIVITIES

4.1 Hydrocarbons:

The majority of essential oils fall into this category; these contain molecules of hydrogen and carbon only and are classified into terpenes (monoterpenes: C10, sesquiterpenes: C15, andditerpenes: C20). These hydrocarbons may be acyclic, alicyclic (monocyclic, bicyclic or tricyclic) or aromatic. Limonene, myrcene, p-menthane, α-pinene, β-pinene, α-sabinene, pcymene, myrcene, α–phellandrene, thujane, fenchane, farnesene, azulene, cadinene and sabinene are some examples of this family of products. These compounds have been associated with various therapeutic activities (Table 2)[6].

4.2 Esters:

Esters are sweet smelling and give a pleasant smell to the oils and are very commonly found in a large number of essential oils. They include for example, linalyl acetate, geraniol acetate, eugenol acetate and bornyl acetate. Esters are anti-inflammatory, spasmolytic, sedative, and antifungal (Table 2)[6].

4.3 Oxides:

Oxides or cyclic ethers are the strongest odorants, and by far the most known oxide is 1,8-cineole, as it is the most omnipresent one in essential oils. Other examples of oxides are bisabolone oxide, linalool oxide, sclareol oxide and ascaridole. Their therapeutic benefits are expectorant and stimulant of nervous system (Table 2)[6].

Table 2 Different classes of essential oils compounds and their bioactivities

Class of Compounds	Example	Bioactivities	Literature
Hydrocarbons	Limonene, myrcene, pinene, pinene, sabinene, cymene, myrcene, phellandrene.	Stimulant, antiviral, antitumour, decongestant, antibacterial, hepatoprotective	Ozbek, 2003; Pengelly, 2004; Bowles, 2003; Svoboda & Hampson, 1999; Deans et al., 1992; Griffin et al., 1999; Edris, 2007; Baser & Buchbauer, 2010
Esters	linalyl acetate, geraniol acetate, eugenol acetate, bornyl acetate	spasmolytic, sedative, antifungal, anaesthetic, antiinflammatory.	Pengelly, 2004; De Sousa et al., 2011; Sugawara et al., 1998; Peana et al., 2002 ; Ghelardini et al., 1999; De Sousa, 2011.
Oxides	bisabolone oxide, linalool oxide, sclareol oxide, ascaridol	anti-inflammatory, Expectorant, Stimulant	Pengelly, 2004; Ghelardini et al., 2001; De Sousa, 2011.
Lactones	nepetalactone, bergaptene, costuslactone, dihydronepetalactone, alantrolactone	Antimicrobial; antiviral; Antipyretic, sedative,hypotensive; analgesic	Pengelly, 2004; De Sousa, 2011; Miceli et al., 2005 ; Gomes et al., 2009.
Alcohols	linalol, menthol, borneol, santalol, nerol, citronellol, geraniol	Antimicrobial, antiseptic, tonifying, balancing, spasmolytic, anaesthetic; antiinflammatory.	Pengelly, 2004; Sugawara et al., 1998; De Sousa, 2011; Ghelardini et al., 1999; Peana et al., 2002.
Phenols	thymol, eugenol, carvacrol, chavicol	antimicrobial,spasmolytic, anaesthetic, irritant, immune stimulating	Pengelly, 2004; Ghelardini et al., 1999; De Sousa, 2011.
Aldehydes	citral, myrtenal, cuminaldehyde, citronellal, cinnamaldehyde, benzaldehyde	Antiviral, antimicrobial, tonic, vasodilators, hypotensive, calming, antipyretic, sedative, spasmolytic	Dorman & Deans, 2000; Pengelly, 2004;

Source: [6]

Table 3 Some compounds of essential oils with physical properties and biological Application

Some compounds of essential oils with physical properties and biological applicationsEO components	Chemical Formula	Molecular Weight	Boiling point C0	Refractie index (20 C0)	Plant source	Some biological application	References
Ketones alcohols Camphor	$C_{10}H_{16}O$	152.23	204	-	Lavendula stoechas	Antispasmodic, sedative, diuretic antirheumatic, anti-inflammatory, anti-anxiety	(Braden *et al*., 2009)
g-Terpinène	$C_{10}H_{16}$	136.23	183	1.474	Origanum vulgare	Antioxidant	(Ruben Olmedo, 2014)
Terpenic oxides 1,8-Cineole	$C_{10}H_{18}O$	154.25	176	1.457	Eucalyptus poly bractea	Antiinflammatory activity (asthma)	(Juergens *et al*., 2003)
Oxygenated sesquiterpenes a-Bisabolol	$C_{15}H_{26}O$	222.37	153	1.496	Matricaria recutita	Anti-irritant, anti Inflammatory, antimicrobial	(Joseph M. Mwaniki *et al*., 2015)
Terpenic oxides Cis-Rose oxide	$C_{10}H_{18}O$	154.25	70–71	1.454	Rosa damascena	Antiinflammatory, Relaxant	(Nonato *et al*., 2012; Boskabady *et al*., 2006)
Cinnamaldehyde	C_9H_8O	132.16	248–250	1.621	Cinnamomum, Zeylanicum	Bactericide, fungicide, insecticide	(Ye *et al*., 2013)
Monoterpenes D-Limonène	$C_{10}H_{16}$	136.23	175.4	1.473	Citrus limon	Antifungal, Antioxidant	(Singh *et al*., 2010)

Source: [6]

Table 4 Major Raw Material Used In Extraction Of Essential Oil[3]

Leaves	Flowers	Peel	Seeds	Wood
Basil, Bay leaf Cinnamon, Eucalyptus Lemon Grass, Melaleuca, Oregano, Patchouli, Peppermint, Pine, Rosemary, Spearmint, Tea Tree, Wintergreen, Thyme	Chamomile Clary Sage, Clove, Geranium, Hyssop, Jasmine, Lavender, Manuka, Marjoram, Orange, Rose, Ylang-Ylang	Bergamot Grape fruit Lemon, Lime Orange Tangerine	Almond Anise Celery Cumin Nutmeg Oil	Camphor Cedar Rosewood Sandalwood
Berries	**Bark**	**Resins**	**Rhizome**	**Root**
Allspice, Juniper	Cassia, Cinnamon	Frankincense, Myrrh	Ginger	Valerian

Source: 3

CONCLUSION

Essential oils are very basic need of cosmetics, pharmaceuticals, food industries. Day by day the demand and trend towards the cosmetics and aromatherapy are leading business. As the use of Essential oils in stress removal it is helpful for current situation of fast life of working people. By knowing basic content of different Essential oils it will be beneficial for which kind of raw material we needed for which purpose. And according to that we will decide for the more and more grow up of plants for particular oil's raw material. So it will be beneficial to the future economy of India.

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