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Review Article

Aromatherapy – Scope through Selected Essential Oil Bearing Plants in Jammu and Kashmir (India)

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Abstract

Aromatherapy is one of the major complimentary therapies in which essential oils are used as the major therapeutic agents to treat several diseases and disorders. The essential oils used for this purpose are particularly extracted from aerial parts like flowers, leaves, fruits, stem etc. In this therapy, various combinations of oils are used to get relief from various ailments like headache, insomnia, indigestion, skin ailments, respiratory issues etc. Essential oil bearing plants like rose, lavender, rose scented geranium, clary sage, worm wood, peppermint etc. can contribute immensely towards the development of Aromatherapy based industries in Jammu and Kashmir (India).

Keywords: *Aromatherapy; Essential Oil; Therapeutic Agents*

Introduction

Man has forever sought the use of aromas for a variety of purposes. Higher plants have provided the basic raw material for such aromas. Aromatherapy is an ancient art and science of using natural essential oils derived from aromatic plants to enhance both physical, mental health and beauty. Aromatherapy has been practiced in one form or another since the beginning of civilization. The Egyptians are attributed with the first writings on aromatherapy in about 1580 BC and also appropriately with developing a society and culture deeply connecting to the sense of smell. As Prophet Mohamad (SAW) once remarked "Perfume is the nourishment that stimulates my thinking". The sense of smell has much in common with the sense of taste. Taste and smell combine to produce the complex sensations of flavours. Both smell and taste are known as chemical senses whereas sight, hearing and touch depend on wave vibrations and pressure differences. Both smell and taste function through biochemical means. Taste has four sensations namely bitter, sweet, sour and salty. It is smell which creates innumerable sensations when we eat anything. The field of aroma and smell is so fascinating that Nobel Prize (2004) in physiology and medicine was awarded to unlock secrets of smell at molecular level. The human brain has the power to remember and recognize different odors. The aroma bearing substances pass through nasal passage and are detected by special neurons called olfactory cells sitting in the upper part of nasal epithelium which contains 5 million neurons. The sense of smell also plays a chemical role in our sex lives i.e. body odors of young and old people are different. Since ancient times, and as near as we can tell, from the beginning of recorded history the plant kingdom has provided rare and powerful extracts and essences that have long been prized for their beauty enhancing, medicinal, spiritual, aromatic and therapeutic value. Aromatic plants, essences and oils have been used for ages in ceremony, religious observances, beauty care, food preparation and preservation, as incense, and for perfumes. Aromatic plants have also been the basis for herbal and botanical medicines and remedies for thousands of years. In fact, they're the root of today's pharmaceuticals.

The word Aromatherapy was first used in 1920 by French biochemist Rene-Maurice Gattefosse. Gattefosse badly burned his hand during an experiment in a perfumery plant and plunged his hand into the nearest tub of liquid, which just happened to be lavender essential oil. He was later amazed at how quickly his burn healed and with very little scarring. This started a fascination with essential oils and

inspired him to experiment with them during the First World War on soldiers in the military hospitals. Since then various studies have been directed towards the upliftment of the aromatherapy industry based on essential oils [1,2].

Basically aromatherapy is the treatment of disease by the use of essential oils. Two basic mechanisms are involved to explain the efficacy of the treatment; one is the influence of aroma on the brain through the olfactory system as explained earlier. The other is direct therapeutic effects of essential oils. The bioactive molecules present in essential oils are highly potent medicines benefiting in innumerable ways the health of our bodies, minds and spirits. Essential oils have well documented pharmacological and therapeutic properties [3-5]. They have antibacterial, anti-fungal, relaxant invigorating, digestive, antiviral, anti-inflammatory and immunostimulant properties. More and more clinical evidence is available for the safe application of aromatherapy for the health of our bodies. While precise knowledge between body and essential oils is yet to be proven. However during last one decade clinical studies have shown positive results [5].

It has now been proved that various bioactive molecules of the essential oils are translated into a signal by the receptor cells in the nose when inhaled. This signal is then sent to the olfactory bulb and then on the limbic and hypothalamus parts of the brain. Brain uses neurochemicals like serotonin, endorphins, etc. to communicate with our nervous and other body systems. The aroma signals cause release of a certain neurochemical bringing about desired change and feeling of relief. The aroma of calming oil would cause release of serotonin. Similarly, a euphoric oil will cause release of endorphin and stimulating oil will cause release of noradrenalin, thus bringing in the desired effect on the mind and the body. When used topically/externally, like while taking bath or a massage, the oils are absorbed through skin and carried by body fluids to the main body systems, such as the nervous and muscular systems for a healing effect. Antifungal, antibacterial properties of the essential oil play important role in topical application of the oil in cuts, burns and wounds, etc. due to their proven anti-aging and antioxidant properties, they find use in rejuvenating and restorative preparations having cosmetic and curative values. Presently, aromatherapy represents a multi-billion-dollar business globally and is ever expanding. Aromatherapy has now assumed an important position in the holistic approach towards better health and cure. In the increasing instances of modern day's stress, depressions, and psychosomatic disorders, aromatherapy has come to stay and proliferate.

Essential oils and carrier oils

The essential oils are the natural odoriferous volatile constituents of aromatic plants obtained by hydro/steam distillation, solvent extraction or super critical CO_2 extraction. They form the backbone of aromatherapy in addition to their use in perfumery, flavour and cosmetic industry and other traditional system of medicines. In view of resurgence in the use of natural flavours and because of the fact of toxicity of synthetic flavours they have become the major sectors of trade in developing and developed countries.

Essential oils are a mixture of organic compounds belonging to different chemical entities such as terpenes, phenols, aliphatic compounds, benzenoid and heterocyclic compounds. Terpenes are the major building blocks of essential oils and are classified as mono-, sesquiterpenes and diterpenes based on isoprene rule. Oxygenated monoterpenes are the main odour carriers of essential oils. A simple essential oil contains not less than 50 chemical constituents whereas the complicated one may be made up of more than 1000 chemical components. Biosynthesis of these bioactive molecules is now thought to follow both mevalonic acid and non- mevalonate pathway (DOXP Pathway) and is also influenced by many factors i.e. geography, photoperiod and soil conditions [6,7]. They are liquid lipophile (soluble in vegetable oils) with a characteristic smell. They evaporate very fast when exposed to the atmosphere at an ordinary temperature and so they are called ethereal oils. As they are volatile in nature, they vaporize when exposed to the atmosphere and this allows them to penetrate the skin easily and work into the body by dissolving the body fats. Because of their multiple effects on the body i.e. physical, physiological and psychological they are much more effective than drugs of other chemical nature.

Carrier oils are also known as base oils or vegetable oils. They are triglycerides of higher fatty acids. The fatty acids are mostly linoleic, stearic, palmitic or oleic acid. Carrier oils provide the medium for essential oils or their absolutes. Essential oils in the pure state are too concentrated to be used directly in aromatherapy. Carrier oils provide necessary lubrication to allow the hands to move freely over skin and thus carry essential oils into the body. They are mostly obtained by "cold pressing" and also by hot extraction. In aromatherapy we should always buy cold processed carrier oils so that vitamins, minerals and other essential fatty acids remain intact. Unlike essential oils carrier oils do not evaporate or smell as strongly as essential oils.

Tools Used in Aromatherapy

Essential oils are most effective through inhalation or absorption through the skin into the body. They are therapeutically least effective when taken orally. They are very far efficient in leaving the body through exhalation and perspiration, and are generally non-toxic.

Diffusers and Atomizers

These are the usual way of putting an essential oil mist into the air for breathing. Diffusers, either the electric or candle variety, heat the essential oil until it evaporates into a mist or fog, dispersing the aroma into the air. Atomizers are affixed to the top of a bottle of water mixed with an essential oil. Also available are ceramic rings that fit around light bulbs. They have an indentation to hold a few drops of oil, which heats up with the light bulb and diffuses into the air.

Lotions and Oils

Lotions and oils can be applied directly to the skin. Before applying on the skin, they must first be put into an oil-based carrier first. Full strength application of oil onto sensitive skin may induce irritation. Dilution in carrier oil protects skin from a reaction, spreads the oil over a large area and thus stimulates a greater response. Essential oil tend to increase circulation at the surface of the skin, opening up the pores. This is the key to overall absorption, and consequently to the overall health of the skin. Some of the commonly used oils for dilution are jojoba oil, grape seed oil, sweet almond oil and apricot kernel oil etc.

Massage

This is the most effective method of using the oils, combining their properties with the therapeutic power of touch. A lotion is made by diluting the oil with odorless carrier oil, such as grape seed, sweet almond or peach kernel. A dilution of 3% essential oil to carrier oil is recommended as a starting point. Though the absorption of essential oils through skin is debatable. However it has been recently reported that sesquiterpenes present in lavender, tea tree, Lemongrass and thyme oils are absorbed better than monoterpenes. β-caryophyllene, farnesol, nerolidol and ⁽bisabolol ⁾has been reported to exhibit highest adsorption [8]. Massage is an age old, tested, and reliable way to reduce stress. Particular oils mixed directly into the bath water or the massage oil have been reported to increase the stress reducing effectiveness of these therapies [8].

It has been shown that those oils that do have penetrative effects are also those that are likely to be sensitizers or irritants their by showing that the skin is working in stopping contaminants getting through the skin. Still, massage is an age old, tested, and reliable way to reduce stress. Particular oils mixed directly into the bath water or the massage oil have been reported to increase the stress reducing effectiveness of these therapies.

Baths

Using oils in the baths is a simple, effective and pleasant way to relax and receive the therapeutic effects. Water itself has therapeutic value, which enhances the powers of the oils. Few drops of essential oils (or a blend) is mixed to the surface of the water which has already been run. It has the double action of physical application as well as inhalation of the vapour while taking bath.

Inhalations

In inhalations, few drops of essential oils are mixed into a bowl of steaming water, vapour of which is then inhaled for few minutes.

Vaporisation

All essential oils are antiseptic and evaporate easily, so that they make very good air- fresheners. Different oils create different atmospheres. For example, relaxing sandal wood or clary sage are good for parties; or Peppermint to clear mind when one needs to work. There are many vaporizers in the market, from the simple bowl of water on the radiator with the few drops of oil on the surface, to vaporiser light bulb rings and specially made vaporiser bowls which sit above candle holders. Best way of dispersing essential oils is to use a diffuser.

Perfumes

Tailor made perfumes are another effective way of practicing aromatherapy. Various combinations based on the aromatherapy effects can be experimented to suit an individual or collective need, which can be mixed with a carrier oil or non- fragrant alcohol.

Types of aromatherapy and aromatherapy benefits

The benefits of essential oils are introduced through cosmetic, massage and olfactory aromatherapy. The three types of aromatherapy benefits can be experienced in a variety of ways.

Cosmetic aromatherapy

Cosmetic aromatherapy uses essential oils in facial, skin, body and hair care products. Essential oils can be toning, cleansing, drying or moisturizing. Certain oils are appropriate for various skin and hair types. An aromatherapy facial demonstrates the ability of the essential oils in promoting healthy skill. A full body or foot bath is a simple way to experience cosmetic aromatherapy on a personal level. A few drops of appropriate oil in warm bath will create a rejuvenating, revitalizing experience.

Massage aromatherapy

Essential oils supplement the healing touch of massage therapy. Few drops of aromatic oil is added to carrier oil, such as almond, grape seed or jojoba and applied liberally during massage. Massage therapy is most popular in health spas and resorts in Europe and USA.

Olfactory aromatherapy

The benefits of olfactory aromatherapy are experienced when essential oils are inhaled. Direct inhalation or diffusion will enhance emotional wellness, induce feeling of relaxation and rejuvenate. Pleasurable scents unlock old memories, trigger emotions and release stress. Essential oils bring the body back into harmony with itself by encouraging, the natural forces within to realign.

Storing of Essential Oils

Essential oils are natural materials; they need to be stored safely to retain their potency or the active chemical profile. Essential oil should be freed from moisture and clarified, stored in well filled tightly closed containers at low temperature and protected from light. A layer of CO_2 or Nitrogen blown into the container to replace the layer of air above the oil. All essential oils to be packed in coloured glass bottles (amber or blue coloured) or aluminum bottles. Keep them in cool dark place. They can be refrigerated to avoid spoilage. They need not to be freezed. General reactions for spoilage are oxidation, resinification, Polymerization, hydrolysis of esters and some re-arrangements. These reactions are activated by heat, air moisture and catalyzed by exposure to light. Caps of the bottles should not be off for longer periods as they are volatile oils. Most essential oils can be kept for a long time. We have found that Lavender oil even after 15 years storage under proper conditions was pretty good. However oils with high content of terpenes are prone to spoilage probably due to oxidation and presence of moisture (Citrus oils, Juniper oils, Pine needle oil etc). Fatty acids are prone to oxidation which can be prevented by addition of antioxidants.

Scope of aromatherapy in Jammu and Kashmir (India)

Jammu and Kashmir State is very rich in essential oil bearing plants. Kashmir valley represents the temperate region, Jammu area represents tropical and subtropical and Ladakh represents the cold desert region. Kashmir valley has a great potential of establishing an industry for frontline essential oils having commanding position in aromatherapy. Indian Institute of Integrative Medicine has developed end to end technology of prominent essential oils. These natural oils rank among the top ten essential oils used in aromatherapy. A brief description of that these essential oil bearing plant species along with quality profiles and therapeutic potential is given below:

Rose (*Rosa damascena* Mill):): The Rose is not a symbol of beauty, love and purity but is one of the oldest and most valuable sources of rose oil, rose concrete, rose absolute and rose water. Rose oil and rose water of international standards is being produced from Kashmir on the technical know how of the institute [9]. Rose oil has anti-bacterial, anti-depressant, antiseptic, antispasmodic properties. It is a wonderful skin toner and anti-wrinkling agent. Exposure to rose oil inhalation at various concentrations produced an anxiolytic effect like DZP, a reference drug [10]. Anti-anxiety effects of rose oil investigated by Geller and Vogel test were found mainly due to PEA (Phenyl ethyl alcohol) and l- citronellol [11]. Oil also showed anti-bacterial effects against three strains of *Xanthomonas* species [12]. Potent relaxant effects were reported from rose oil on tracheal chains of guinea pigs and comparable to Theophylline [13].

The main constituents of Kashmir rose oil are l- citronellol (31.86%), geraniol (24.91 to 33.12%), nerol (10.95 - 11.5%), linalool (1.9 to 3.83%) cis-rose oxide (0.3 to 0.57%), trans-rose oxide (0.13. to 0.16%) Phenyl ethyl alcohol (0.30 to 1.5%). The unique soil and climatic conditions of Kashmir are stimulating for rich, saturated and unique aroma of rose.

Lavender (*Lavandula angustifolia* Mill.) syn. *L. officinalis* chaix): Use of Lavender oil and Lavender water is as popular today as down the centuries in the past. Pure Lavender oil is the frontline essential oil for aromatherapy. Oil can be used without carrier oil. The oil is traditionally used as antibacterial, anti-fungal, carminative, sedative, anti-depressive and effective for burns and insect bites [14]. The Institute has developed a cultivar through selection highly suitable for temperate conditions of Kashmir, hilly areas of Himachal Pradesh, Uttaranchal. Forty nine (49) constituents have been identified from steam distilled oil from Kashmir [14]. The main constituents are linalool (25.27%), linalyl acetate (44.98%), α- terpineol (1.49%), camphor (1.07%), 1,8 cineole (2.10%), borneol (2.70%), lavandulyl acetate (3.44%) and β- caryophyllene (1.85%). It is evident that Kashmir Lavender oil with linalool > 25%, Linalyl acetate > 44% is of international standards. Lavender oil produced from Kashmir is now being sold for aromatherapy sector in U.K, E.U Countries and USA regularly. Biological activities of Lavender oil are well documented [15]. Smelling Lavender and rosemary oil has been reported to increase free radical scavenging activity and decreased cortisol level in Saliva. It is reported that mental stress impairs coronary circulation and inhalation of Lavender oil has improved coronary flow velocity reserve in healthy men which was evaluated by non-invasive Transthoracic Doppler Echocardiography [16].

Linalool and Linalyl acetate are reported to be involved in anti-conflict effects of Lavender oil followed by borneol and camphene Linalyl acetate has been reported to relax vascular smooth muscle through dephosphorylation of myosin light chain [17].

Clary sage (*Salvia sclarea*): This plant was successfully introduced from Bulgaria in Kashmir. Oil from Kashmir has major components as linalool (18 - 20%), linalyl acetate (52 - 70%), followed by α- terpineol (7.2%), neryl acetate (2.0%), geranyl acetate (3.8%), sclareol (0.5%) [18]. Clary sage oil is useful in digestive disorders, muscular cramps, supports the nervous system and menstrual complaints. The oil has well reported analgesic, anti-inflammatory, anti-microbial and anti-platelet activity [19].

Rosemary (*Rosmarinus officinalis*): Rosemary oil has analgesic, anti-depressant, anti-rheumatic, antiseptic, antispasmodic properties [20]. Antimicrobial and anti-bacterial properties are reported due to presence of 1, 8 cineole and camphor. It has well documented antioxidant properties due to the presence of rosemarinic, carnosic and caffeic acid. Rosemarinic acid is well absorbed from gastrointestinal tract and from skin. It increases the production of Prostaglandin E2 and reduces the production of leukotriene B4 in human white blood cells thus inhibits the complement system. This makes rosemarinic acid a strong anti-inflammatory agent [21]. Major chemical compounds from rosemary oil cultivated in Kashmir are α-pinene (16%) β-pinene (6.04%), 1, 8 cineole (20.12%), camphor (21.49%) and verbenone (2.67%).

Worm Wood (*Artemisia annua*): The plant species is popular due to the presence of artemisinin, a sesquiterpene lactone quite effective in cerebral and multi drug resistant malaria [22]. Artemisia oil has been reported to have antimicrobial, anti-bacterial, dermatological and specific fungicidal properties. It is quite helpful in the treatment of skin moulds [22]. Fifty five constituents have been identified from the oil. The major constituents are α- pinene (5.2%), camphene (1.5%), artemisia ketone (52.9%), camphor (6.0%) and caryophyllene oxide (4.3%).

Rose Scented Geranium (*Pelargonium graevolens*): Rose scented geranium was successfully introduced in Kashmir by IIIM Srinagar. The oil has antibacterial, insecticidal, antifungal, antispasmodic, diuretic and anti-depressant properties. The oil is traditionally used to staunch bleeding, healing of wounds, ulcers, skin disorders and colic. GC and GC-MS analysis of the oil from Kashmir led to the identification of 53 constituents representing 96% of the total oil [23]. Major chemical constituents are linalool (11.94%), citronellol, nerol (25.55%), geraniol (20.81%), citronellyl formate (8.04%), geranyl formate (5.18%) and 10-epi γ- eudesmol (2.89%).

Peppermint (*Mentha piperita*): Mints have played an important role in human civilization for a long period. Peppermint oil has a pleasant cooling effect, muscle relaxing properties, traditionally used in bronchitis, headache, indigestion, colic and nausea, asthma, travel sickness and gingivitis. Treatment with oil helps in patients with irritable bowel syndrome [24]. Major constituents reported from Kashmir oil are α- pinene (1.4%), β- pinene (1.8%), limonene (2.5%), 1.8-cineole (7.5%), methane (1.8%), menthol (40.0%) and methyl acetate (3.6%).

Major essential oil crops along with harvesting period under Kashmir conditions are shown below:

Crop	Harvesting Period
Rosemary (1st Cutting)	1st May- 15th May
Rose	15th May- 15 June
Peppermint (1st cutting)	20th June-20th July
Lavender	25th June-25th July
Clary sage	------- do----------
Rosemary (2nd cutting)	5th- 15th August
Rose geranium (1st cutting)	15th August- 15th September
A. annua	15th September-30 September
Rose geranium (2nd cutting)	5th October- 15th October
Peppermint (2nd cutting)	1st November- 20th November
Tagetes minuta	1st November- 20th November

It can be seen that the cultivated crops will keep the distillation plant running for about 8 months a year. During the remaining period alternative essential oils used in aromatherapy can be processed in the same distillation plant. Notable among them are *Angelica, Juniperus, Valeriana, Chamomile, Thymus, Tagetes* and *Oregano* oil. Carrier oils which form an important segment of aromatherapy can also be produced in Kashmir. The selected carrier oils are sweet almond, apricot, evening prim rose, olive, Rose hip and walnut oil.

Conclusions

Aromatherapy is fast expanding due to the resurgence in the use of natural essential oils. Pharmacological properties of essential oils and their active constituents are being examined vigorously throughout the world. For effective therapeutic use it is crucial to have quality control on essential oils. Green chemistry which is the slogan of the day, should be involved in the extraction of these fragrant materials from plant species. More R and D efforts are to be directed towards post-harvest management techniques and chemical standardization. A word of caution, not all essential oils or carrier oils are beneficial to health. The essential oils of calamus, Tansy, Thuja, Wintergreen and carrier oils of bitter almond, horsedish, mustard are not used in aromatherapy. In Kashmir cultivation of Lavender can be thought of around Dal Lake to give boost to eco-tourism. Lavender tour and Lavender festivals are the major tourist attractions in USA and Europe. Given proper conditions like incentives during the gestation period, Kashmir valley can become a major bio business centre for aromatherapy.

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