

Aromatherapy practice in nursing: literature review

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Background. The use of aromatherapy in nursing care continues to be popular in many settings. Most of the nursing literature relates to the use of essential oils in low doses for massage or use of the oils as environmental fragrances. Information from the wider literature may add to the evidence base for use of this therapy in nursing.

Aim. This paper reports a literature relating to the use of aromatherapy by nurses and critically evaluates the evidence to support this practice.

Method. Medline, CINAHL, MANTIS and EBSCO Host databases were searched for papers related to use of essential oils and/or aromatherapy. Papers were also obtained through cross-checking of reference lists. A total of 165 articles have been included in this review. Nursing papers were published since 1990 were included, but some references from 1971 onwards relating to scientific research conducted on essential oils were also included. These remain valuable as they are probably the only reference available for a specific oil or property, or show the development of knowledge in this area. Papers were excluded if they consisted only of brief case studies presented in abstract form. The review covers key professional issues and the principal areas of clinical practice where aromatherapy is used.

Findings. Despite calls for more research in the 1980s and 1990s, there is still little empirical evidence to support the use of aromatherapy in nursing practice beyond enhancing relaxation. Its popularity needs to be balanced against the potential risks related to allergies, safety and inappropriate use by inexperienced users.

Conclusions. There is great potential for more collaborative research by nurses to explore the clinical applications in greater detail and to move beyond the low dose paradigm of application of essential oils.

Keywords: aromatherapy, essential oils, nursing, professional practice, literature review

Introduction

Since the 1990s nurses have considered that the increased technology of health care threatens their ability to practise

holistic care, which is positively entrenched in the philosophy of nursing (Keegan *et al.* 1994). Hence, many are attracted to the notion of integrating therapeutic interventions such as aromatherapy into many aspects of patient care (Grainger

1991, Owen 1995, Trevelyn 1996, Rankin-Box 1997, Baum 1998, Chadwick 1999, Wilkinson & Simpson 2002). Despite the concept of integrated care being well established in many hospitals worldwide (Richardson 1996, Ernst & White 2000, Furnham 2000, Berman *et al.* 2001), many professional and practical issues need to be confronted in respect of the use of aromatherapy in nursing practice. This paper critically reviews current practice against existing evidence.

Search methods

The Medline, CINAHL, MANTIS and EBSCO Host and the Cochrane Collection databases were searched for papers related to use of essential oils and/or aromatherapy. Keywords used for searching were aromatherapy, essential oils, aroma, massage, fragrant, fragrance, volatile oil, essence, plant essence and phytotherapy. The search was limited to articles published in English. No date limitations were used except for nursing-related literature, where it was set at 1990 or later. Papers were also obtained through cross-checking of reference lists. Over 250 citations were retrieved through electronic and manual searching. Exclusion criteria were: paper was not written in English; not available by interloan services in New Zealand without considerable expense; lack of reference list unless the paper involved some descriptive comment; or was only a brief client history written in a non-nursing context such as exists in many aromatherapy journals and newsletter-type publications. Inclusion criteria were that the application of aromatherapy related directly to nursing practice; the survey or discussion included aromatherapy; or that the actual properties of essential oils were explored in a scientific manner.

A total of 165 papers were included in the review. Each paper was briefly reviewed to ensure that it met the inclusion criteria and was then categorized according to its content. Twenty-one of the papers reported quantitative nursing research, 64 concerned quantitative non-nursing research, 29 was discussion or descriptive (including surveys), and 51 did not fall into the above classification, including books and comments. Some non-nursing references from 1971 onwards were included because they discussed scientific research conducted on the essential oils. These remain valuable as they are likely to be the only reference for a specific oil or property, or to show the development of knowledge in this area.

Findings

The literature was categorized into the following sections: professional issues (education and research) and practical application of aromatherapy (pharmacokinetics and physio-

logical effects; maternal and child health; critical care environment; pain relief, skin and hair conditions; medical conditions).

Professional issues

Education

While nurses may have had some exposure to aromatherapy in their undergraduate education, many who use essential oils have not undergone formal preparation (Morgan *et al.* 1998, Berman *et al.* 2001, Wilkinson & Simpson 2002). The debate is ongoing as to what is an acceptable level of aromatherapy training for nurses who wish to use aromatherapy (Gaydos 2001, Tovey & Adams 2002). This debate will no doubt continue as the role of the nurse with prescribing rights gains prominence. Nurses in this role will need to apply the same principles of prescribing to essential oils as they do to conventional pharmaceuticals. As regulatory requirements vary internationally, they are recommended to contact their own professional and regulatory bodies as well as to confirm with their employers the accepted parameters for practice (Morgan *et al.* 1998, Stone 1999, Frisch 2001a, 2001b, Sparber 2001). Most importantly, it is crucial that a person does not imply that they have a level of competence they do not actually possess, regardless of the therapy being used (Campbell *et al.* 2001).

Research

With few empirical studies that demonstrate efficacy and safety of essential oils with humans, there is little to guide practice, except perhaps in anxiety reduction (Lis-Balchin 1997, Vickers 1997, Cooke & Ernst 2000, Long *et al.* 2001). Continued calls are being made for more nurse-led research and larger randomized controlled trials to guide evidence-based practice (Wilkinson 1995, Ernst 1997, Biley & Freshwater 1999, Lancet 2001, Ribeaux & Spence 2001, White & Ernst 2001).

Given the complexity of the issues relating to education and research, it is recommended that nurses who have not undergone formal preparation in aromatherapy that meets national accepted standards of practice should adopt only a limited role in the use of essential oils. This use should be supervised and guided by institutional policy, and there remains the potential for error or harm with informal use that is not based on sound understanding of essential oils.

Practical application of aromatherapy

Pharmacokinetics and physiological effects of essential oils

Essential oils are lipid soluble and rapidly absorbed into the bloodstream when applied externally, inhaled or ingested,

and are excreted via the urinary system and in expired CO₂. There is, however, limited understanding of the pharmacokinetics of many essential oils and their potential for interaction with conventional pharmaceuticals (Bronaugh *et al.* 1990, Hotchkiss *et al.* 1990, Jirovetz *et al.* 1992, Buchbauer 1993, Burfield 2000, Kohlert *et al.* 2000). Various factors influence the activity of essential oils, for example metabolism of the constituents prior to excretion (Jager *et al.* 2000, 2001), a function dependent on hepatic cytochrome P450 enzymes (Miyazawa *et al.* 2001). Although the use of essential oils by nurses does not generally involve ingestion, in France medical aromatherapy is also practised and involves the internal use of essential oils (Franchomme *et al.* 2001). With internal use, the pH of gastric juices will also affect absorption (Szentmihalyi *et al.* 2001). The main practical issues for nurses are correct storage and handling of essential oils to prevent oxidation, bacterial contamination or accidental overdose (Tibballs 1995, Gouin & Patel 1996, Anapalahan & Le Couteur 1998, Darben *et al.* 1998, Maudsley & Kerr 1999, Botma *et al.* 2001). Although most studies are based on animal models, which may not necessarily translate to clinical human practice, there are consistent findings that essential oils are readily cleared and it is unlikely that oils or their component chemicals accumulate within body tissue (Kohlert *et al.* 2000). Caution is advised though in patients who have renal or hepatic disorders.

Animal studies have demonstrated that some essential oils have spasmogenic effects on smooth muscle, and others have spasmolytic effects on smooth and skeletal muscle. It is thought that these effects may be mediated by a reduction in available cellular calcium (Lis-Balchin *et al.* 1997a, 1997b, Lis-Balchin & Hart 1997). Other exploratory research into the therapeutic potential of essential oils includes the hepatoprotective, antioxidant, anti-inflammatory, hyperglycaemic and insulin inhibiting effects, and antimutagenic properties in both human and animal cells of various different extracts of *Rosmarinus officinalis* (Rosemary) (Hoefler *et al.* 1987, Englberger *et al.* 1988, Schwarz *et al.* 1992, al-Hader *et al.* 1994, Huang *et al.* 1994, Haraguchi *et al.* 1995, Fahim & Esmat 1999). Human *in vitro* studies have found that boswellic acids, from frankincense essential oil, have strong anti-inflammatory properties through inhibiting human leukocyte elastase (HLE) action. This enzyme has been implicated in several respiratory diseases, including cystic fibrosis, acute bronchitis, glomerular nephritis and rheumatoid arthritis (Safayhi *et al.* 1997).

Collectively, the range of experimental work that is being undertaken to explore the therapeutic potential of essential oils contributes to greater knowledge and understanding of their actions. It is unclear at this stage, however, what the

implications are for human clinical situations, particularly through the dermal application mainly used by nurses.

Maternal and child health

The main concerns for maternal and child health are whether essential oils have a hormone-like effect on the mother, whether they are abortifacient or whether they may cause malformation to the developing foetus (Battaglia 1996). Whilst claims exist that aromatherapy may also help with some of the minor symptoms associated with pregnancy, such as morning sickness, stretch marks, varicose veins, heartburn, haemorrhoids, backache and exhaustion, none are supported by empirical evidence (Guenier 1992, Smith 1993, Mason 1996, Mercer 1996). A number of studies have explored the value of aromatherapy in labour and found that women who used a range of essential oils often coped better and required less analgesia (Burns & Blamey 1994, Jeffries 1996, Burns *et al.* 2000). Although these studies did not include massage as an intervention, it is worthwhile noting that there is conflicting evidence as to the benefits of massage during labour when compared with other interventions such as transcutaneous electrical nerve stimulation (TENS), sterile water injections and mobilization (Labrecque *et al.* 1999, Brown *et al.* 2001). However, Field *et al.* (1997) found that massage was more effective than breath coaching in reducing pain and anxiety levels. Clearly, more research is needed in this area to ascertain the effectiveness of massage and also to study other ways of using essential oils. The evidence remains inconclusive as to whether lavender oil in low doses is more effective than conventional treatment in assisting perineal repair; however, women who use it report it to be comforting (Cornwell & Dale 1995).

Critical care environment

In the United Kingdom (UK), approximately 50% of critical care units use some form of complementary therapy, with neonatal units having the highest rate with baby massage (Hayes & Cox 1999). Earlier evidence suggests that short massage of the legs, feet or back, with or without essential oils, has some measurable but transient relaxation effects which have not reached statistical significance; however, subjective patient feedback has been positive and no adverse reactions have been noted (Stevenson 1992, Woolfson & Hewitt 1992, Buckle 1993, Dunn *et al.* 1995). Large clinical trials have yet to be conducted in this area, particularly with respect to dose and method of dilution of the oils.

Pain relief

As massage has been demonstrated to stimulate endorphin production for people who are in pain it has value as a

pain-relieving tool, especially in chronic or muscular pain (Puustjarvi *et al.* 1986, Day *et al.* 1987, Kaada & Torsteinbø 1988, Shipton 1995). Whether the addition of essential oils increases the pain-relieving benefits beyond an anxiety reduction value has yet to be demonstrated. Lavender and its main constituents, linalyl acetate and linalool, have been identified as having local anaesthetic effects in animal *in vitro* models (Ghelardini *et al.* 1999). Oxides, which are present in many essential oils including eucalyptus species and cajeput, also have an anaesthetic effect (Ghelardini *et al.* 2001). The effects of linalool also include anti-convulsant activities due to inhibition of several chemical pathways (Brum *et al.* 2001). Whilst it is not possible to extrapolate results from these animal studies to a human clinical environment, there may be potential to use essential oils such as lavender in the management of pain; however, further *in vivo* patient research is needed to confirm doses, routes of application and treatment times.

Cancer care

Several studies support the ongoing use of aromatherapy as part of an integrated approach to cancer and palliative care (Crowther 1991, Madelin 1994, Cooper 1995, Corner *et al.* 1995, Wilkinson 1995, Gurba 1996, Bell & Sikora 1996, Millar 1996, Peace & Simons 1996, Kite *et al.* 1998, Wilkinson *et al.* 1999, Abel 2000, De Valois & Clarke 2001). Aromatherapy is primarily used to help cope with anxiety and fear and to support symptom control, rather than as an alternative to conventional treatment (Lampic *et al.* 1994). For example, patients who are diagnosed with a brain tumour often have a poorer diagnosis and more debilitating symptoms than those with other forms of cancer, and using therapies such as massage and aromatherapy may help sufferers to deal with such serious issues and cope with the emotional effects of the high doses of steroids required (Salander *et al.* 1996, Fox & Lantz 1998, Hadfield 2001). Whilst specialized lymph massage is well accepted to reduce lymphoedema (Mortimer *et al.* 1990, Ikomi *et al.* 1996, Le Vu & Mourisse 1997), there is no evidence that adding essential oils will improve the physical effects of the massage.

Patients may experience uncomfortable side effects related to cancer therapy, and the treatment for these side effects can be quite unpleasant. Various essential oils have been explored as possible alternatives in treating some side effects, but have had mixed effects. Although a blend of tea tree and bergamot oil was just as effective as a conventional mouth wash for mucositis, it had higher patient compliance due to the pleasant taste and aroma (Gravett *et al.* 1995). However, aromatherapy was not useful in relieving skin rashes, infections or nausea associated with high dose chemotherapy

(Gravett *et al.* 1995). Later studies suggest that essential oils may help reduce that the duration of gastrointestinal symptoms (Gravett 2001a); however, they are no more effective than conventional treatment for infected Hickman lines (Gravett 2001b).

Skin and hair conditions

As the main route of administration for essential oils is via the skin, there is potential for their use to treat or prevent exacerbation of common skin conditions, or for application to the hair. Some evidence exists that essential oils can help with hair loss when massaged regularly into the scalp (Hay *et al.* 1998). In two well-designed trials, several different essential oils have also been found to have effect on head lice, especially when used in conjunction with a vinegar rinse (Veal 1996, Lahlou *et al.* 2001). Animal studies have found that alpha-bisabolol from chamomile essential oil, has strong anti-phlogistic (anti-inflammatory) effects with very low toxicity and low sensitivity when applied to the skin (Isaac 1979, Jakovlev *et al.* 1979, Lawrence & Reynolds 1987). However, the few human trials exploring skin healing effects of essential oils are inconclusive or poorly designed. For example, whilst one controlled trial suggested that essential oil might help children with atopic eczema, so many essential oils were used that it was unclear which were effective, or whether the effects were a spontaneous remission in the symptoms. Those who had used the essential oils also had a higher return rate of the eczema after the trial, possible due to allergic reactions to the essential oils (Lis-Balchin 2000). Of note is that massage without essential oils, when given on a regular basis, has been found to reduce the symptoms of atopic dermatitis in children (Schacher *et al.* 1998). The use of essential oils of lavender (*Lavandula angustifolia*) and German chamomile (*Matricaria recutita*) was explored in a small trial with eight patients with chronic leg ulcers. Three received conventional wound care and five received twice daily dressings of a 6% mixture of the above oils in grape-seed oil. Due to the small sample size and inability to have a matched control group the authors were unable to draw any definitive recommendations. They noted, however, that four of the five aromatherapy-treated wounds healed completely and the fifth wound was progressing towards healing. Those in the conventional wound care group had variable healing times due to a number of factors, such as poor patient compliance (Hartman & Coetzee 2002).

The use of essential oils in the management of psoriasis has been explored by various authors. The case studies and small trials involved all used different essential oils applied with massage, and all had inconclusive results. Of note is that bergamot, or *Citrus bergamia*, was used for anxiety reduction

in all cases (Weaver 1991, Walsh 1996, Darrell 1997). Bergamot contains bergapten, a psoralen, which is phototoxic when the skin is exposed to sunlight (Zaynoun *et al.* 1977, Naganumu *et al.* 1985). Psoralens are sometimes used in psoriasis to enhance the effects of the phototherapy by reducing basal cell mitosis (Mantik Lewis & Cox Collier 1987). This possible use of bergamot oil has not been explored in psoriasis treatment.

Medical conditions

While there are numerous case studies presented in the literature involving the use of essential oils to treat various medical conditions, these alone are insufficient to guide evidence-based practice. The potential again seems to be in reduction of stress, especially in chronic conditions such as fibromyalgia, Guillain-Barré syndrome and AIDS (Wilson 1989, Styles 1997, Buckle 1998, Grace 2001, Shirreffs 2001).

Neurological conditions

A study by Betts (1995) highlighted the potential to use essential oils in seizure control as part of a conditioned response for people who know their triggers. Essential oils can also assist in coping with the social and emotional aspects of such a condition (Asjes 1993). Data in this area are conflicting, with one author suggesting that rosemary reduced seizures in a patient (Crouton 1991) while animal studies found that rosemary essential oil has been used to induce tonic-clonic seizures [attributed to the high eucalyptol (1,8-cineole) content]. *In vitro* animal studies have also shown that camphor, which is a major constituent of rosemary essential oil, lowers sodium and potassium concentrations in cerebral cortex tissue, which affects oxygen consumption by the brain and thus increases the risk of convulsions (Steinmetz *et al.* 1987). Accidental ingestion of camphor in various forms has been implicated in seizures in children (Weiss 1973). Peppermint oil and eucalyptus oil have been shown to have muscle relaxing effects as well as analgesic effects for the relief of headaches. They are most effective when used in combination to relieve muscle activity, and peppermint is most effective as an analgesic when combined with ethanol. Both oils also have the ability to improve cognitive functioning (Gobel *et al.* 1994).

Respiratory conditions

Essential oils are frequently used to alleviate respiratory conditions, and there is some evidence that a number have broncholytic, antispasmodic and secretolytic properties (Schafer & Schafer 1981, Goeb 1995). Oils from eucalyptus species are popular for this purpose; however,

there is some controversy about their actual effectiveness as bronchodilators, decongestants and antitussives. There is also concern at the number of accidental poisonings associated with eucalyptus oil (Tibballs & James 1995). In response to these criticisms, Balacs (1997) critiqued many articles on eucalyptus and concluded that there remains great therapeutic potential for the external use of cineole-rich eucalyptus oils, such as *E. globulus*, *E. smithii*, *E. polybractea* and *E. radiata*. *In vitro* studies have found that eucalyptus oil (type unstated) has the potential for use in neonatal respiratory distress syndrome, due to its ability to improve surfactant function (Zanker *et al.* 1980, Banerjee & Bellare 2001). The oxidative properties of eucalyptus oils may be exploited when used to treat respiratory pathogens (Grassmann *et al.* 2000). Measurement of ciliary beat frequency (CBF) is one way of assessing the effectiveness of an inhaled substance on the respiratory system. Inhaled pine, menthol and eucalyptus oils (types unstated) significantly reduce CBF both in combination and alone; however, the therapeutic range is limited by the potential to damage ciliary cells (Riechelmann *et al.* 1997). Animal studies also suggest that *Rosmarinus officinalis* essential oil inhibits tracheal muscle contraction (Aqel 1991) and *in vitro* studies using human bronchial cells showed that rosemary extracts had a significant role in inhibiting carcinogenic activity (Offord *et al.* 1995).

Digestive disorders

Peppermint essential oil has been widely researched for its potential in gastro-intestinal disorders, including reducing colonic spasm during colonoscopy (Asao *et al.* 2001) and for the symptoms of irritable bowel syndrome (Pittler & Ernst 1998, Jailwala *et al.* 2000). As these involve internal applications, they are beyond the scope of nursing and aromatherapy practice; however, the data are suggestive that peppermint may be useful as a digestive anti-spasmodic (Lech *et al.* 1988, Nolen & Friend 1994, Beesley *et al.* 1996, Cerrato 1999, Freise & Kohler 1999, Kline *et al.* 2001).

Aromatherapy and mental health

Several human trials in mental health settings have indicated that there are positive emotional effects of using aromatherapy and, given that at least 60% of visits to doctors are stress-related (Charlesworth 1995), there is great potential in this area; several mental health services already incorporate aromatherapy into patient care (Garnett-Ore 1996, Moore 1999). Inhaled essential oils may increase alertness and reduce anxiety (Morris *et al.* 1995, Lehrner *et al.* 2000, Ilmberger *et al.* 2001), as well

as having positive effects on physical parameters of the autonomic nervous system, enhancing relaxation (Heuberger *et al.* 2001). Inhaled chamomile oil (type unstated) has been found to reduce adrenocorticotrophic hormone (ACTH) in rats, leading to induced stress (Yamada *et al.* 1996), and studies in humans have suggested that inhaled chamomile oil has a positive effect on mood when compared with a placebo (Roberts & Williams 1992). Inhaling lavender or melissa essential oils has also been found to reduce some symptoms associated with dementia, especially restlessness (Burns *et al.* 2000). Several dementia care units have reported regular use of various aromatherapy measures (Henry 1993, Mitchell 1993, Moate 1995, Kobbe 1996, Brooker *et al.* 1997). Reductions in agitation have also been noted in children with attention deficit-hyperactivity disorder (ADHD), which affects between 4 and 20% of school age children in the Western world (Godfrey 2001). It has also been found to be calming in patients with serious learning and sensory disorders (Callis 1993, Sanderson 1993). The use of *Lavandula angustifolia* at a 0.05% dilution gives a weak relaxation response, as well as increased peripheral circulation, demonstrated through several changes in cardiovascular parameters (Saeki 2000).

Discussion

Whilst it is clear that there is a growing body of evidence about the practice of aromatherapy, there remain few empirical data to guide nursing practice in large number of areas. First, nurses need to be able to understand and interpret the scientific results from studies conducted in other professions. These then need to be translated into a clinical application, possibly through further research. Methods of application and doses may need to be changed, depending on the context. There is little evidence that adding essential oils at a low (2% or less) dilution intensifies the effects of massage. Studies need to be conducted to explore the effects of higher doses, compare blends of oils with single formulations, study the volatile nature of the oils more in the clinical environment, and investigate the application of oils directly to a specific body area.

The lack of large-scale clinical trials measuring patient outcomes remains a stumbling block for widespread adoption of aromatherapy in nursing practice. Many studies have been hampered by small sample sizes, imprecise measuring tools, difficulties in blinding participants and researchers to treatments, incorrect or absent statistical analysis, and varied doses or methods of application of the essential oil. However, these studies do provide valuable information for future researchers in that they help narrow the focus, explore

differing doses or use various ways of collecting data. It certainly seems clear that more than one research approach is used. Nurses need to be able to provide evidence to guide their practice in all aspects of patient care, and can be guided by existing practice guidelines (Campbell *et al.* 2001, Frisch 2001a, 2001b).

There is clear indication that the scientific community is taking serious interest in the potential healing properties of essential oils, and this will further add to the information-base from which nurses can draw. Whether the findings of these studies become incorporated into holistic aromatherapy, or whether the essential oils become fragmented into their isolated constituents which then become part of pharmacotherapy, is only conjecture at this stage. Nevertheless, there is enormous potential for research in this area. While at this time there are insufficient data to warrant a meta-analysis, it is envisaged that this type of analysis will, in the future, provide further evidence about which uses of aromatherapy are best as part of nursing practice. This would be especially valuable in the interpretation of research in mental health, due to the number of studies exploring the anxiety-reducing effects of essential oils.

Conclusions

While there is inconclusive evidence about whether the addition of essential oils at 2.5% or lower improves the physiological effects of massage, aromatherapy has been shown to improve anxiety and stress-related symptoms and the agitation associated with dementia. With this in mind, aromatherapy may have particular use in mental health and aged care environments. Cineole-rich essential oils, such as eucalyptus, have the potential to assist with a number of minor respiratory conditions through their expectorant and anti-tussive properties. There is also some evidence that the internal use of essential oils has great potential within certain clinical areas; however, this requires considerably more research before it can be incorporated into nursing practice.

Nurses should at least have a basic understanding of the chemical structure and physical properties of essential oils, as well as knowledge of the safe application of a few commonly available oils, if they plan to use them in any way in their practice. Ideally, if nurses plan to use essential oils with patients or clients rather than just as environmental fragrances, then they should consider undergoing formal education as aromatherapists. At all times they should be guided by the professional and legislative requirements of the registering body in their state or country.

What is already known about this topic

- Aromatherapy is widely used within both community and health care settings, but many therapeutic claims about essential oils are not supported by empirical evidence.
- Some essential oils have been demonstrated to enhance relaxation, reduce anxiety or to have antimicrobial properties.
- The use of essential oils, in dilutions of 1–5%, does not appear to improve significantly the outcome of massage when compared with massage with a plain carrier oil.

What this paper adds

- Nurses need to be aware of practising within their scope according to legislative requirements.
- Further studies are needed to build on *in vivo* trials to enhance clinical relevance particularly in the areas of wound care, inflammatory and respiratory disorders.
- Validates need for caution of some essential oils although it is unlikely that individual constituents accumulate for long periods of time within the body.
- Most positive effects are recorded in the elevation of mood and reduction of stress especially in women's health and mental health areas.

References

- Abel J. (2000) Complementary therapy programme at St Luke's hospice, Plymouth. *Complementary Therapies in Nursing & Midwifery* 6, 116–119.
- al-Hader A.A., Hasan Z.A. & Aqel M.B. (1994) Hyperglycaemic and insulin release inhibitory effects of *Rosmarinus officinalis*. *Journal of Ethnopharmacology* 43(3), 217–221.
- Anapalahan M. & Le Couteur D.G. (1998) Deliberate self poisoning with eucalyptus oil in an elderly woman. *Australia New Zealand Journal of Medicine* 28(1), 58.
- Anonymous (2001) Editorial Complementary medicine: time for critical engagement. *Lancet* 356(9247), 2023.
- Aqel M.B. (1991) Relaxant effect of the volatile oil of *Rosmarinus officinalis* on tracheal smooth muscle. *Journal of Ethnopharmacology* 33(1–2), 57–62.
- Asao T., Mochiki E., Suzuki H., Nakamura J., Hirayama I., Morinaga N., Shoji H., Shitara T. & Kuwano H. (2001) An easy method for the intraluminal administration of peppermint oil before colonoscopy and its effectiveness in reducing colonic spasm. *Gastrointestinal Endoscopy* 53(2), 172–177.
- Asjes E. (1993) Managing epilepsy. *The International Journal of Aromatherapy* 5(3), 16–19.
- Balacs T. (1997) Cineole rich eucalyptus. *International Journal of Aromatherapy* 8(2), 15–21.
- Banerjee R. & Bellare J.R. (2001) In vitro evaluation of surfactants with eucalyptus oil for respiratory distress syndrome. *Respiratory Physiology* 126(2), 141–151.
- Battaglia S. (1996) Essential issues: pregnancy: how safe are essential oils. *Aromatherapy Today* 2, 16–18.
- Baum M. (1998) What is holism? The view of a well-known critic of alternative medicine. *Complementary Therapies in Medicine* 6, 42–44.
- Beesley A., Hardcastle J., Hardcastle P.T. & Taylor C.J. (1996) Influence of peppermint oil on absorptive and secretory processes in rat small intestine. *Gut* 39(2), 214–219.
- Bell L. & Sikora K. (1996) Complementary therapies and cancer care. *Complementary Therapies in Nursing and Midwifery* 2, 57–58.
- Berman B.M., Owen D.K., Lewith G. & Stephens C.R. (2001) Can doctors respond to patients' increasing interest in complementary and alternative medicine? *British Medical Journal* 322(7279), 154–158.
- Betts T. (1995) Practical experience of using aromatherapy in people with epilepsy; an effective counter measure. *AROMA '95 Conference Proceedings*. Aromatherapy Publications, Brighton.
- Biley F.C. & Freshwater D. (1999) Trends in nursing and midwifery research and the need for change in complementary therapy research. *Complementary Therapies in Nursing and Midwifery* 5, 99–102.
- Botma M., Colquhoun-Flannery W. & Leighton S. (2001) Laryngeal oedema caused by accidental ingestion of oil of wintergreen. *International Journal of Pediatric Otorhinolaryngology* 58(3), 229–232.
- Bronaugh R.L., Wester R.C., Bucks D., Maibach H.I. & Sarason R. (1990) In vivo percutaneous absorption of fragrance ingredients in rhesus monkeys and humans. *Food and Chemical Toxicology* 28, 369–374.
- Brookner D.J.R., Snape M., Johnson E., Ward D. & Payne M. (1997) Single case evaluation of the effects of aromatherapy and massage on disturbed behaviour in severe dementia. *British Journal of Clinical Psychology* 36, 287–296.
- Brown S.T., Douglas C. & Flood L.P. (2001) Women's evaluation of intrapartum non-pharmacological pain relief methods used during labor. *Journal of Perinatal Education* 10(3), 1–8.
- Brum L.F., Elisabetsky E. & Souza D. (2001) Effects of linalool on [(3)H]MK801 and [(3)H] musimol binding in mouse cortical membranes. *Phytotherapy Research* 15(5), 422–425.
- Buchbauer G. (1993) Molecular interaction: biological effects and modes of action of essential oils. *International Journal of Aromatherapy* 5(1), 11–14.
- Buckle J. (1993) Aromatherapy: does it matter which lavender essential oil is used? *Nursing Times* 89(20), 32–36.
- Buckle J. (1998) Fibromyalgia and aromatherapy. *Aromatherapy Today* 8, 26–29.
- Burfield T. (2000) Safety of essential oils. *The International Journal of Aromatherapy* 10(1/2), 16–29.
- Burns E. & Blamey C. (1994) Soothing scents in childbirth. *The International Journal of Aromatherapy* 6(1), 24–28.
- Burns E., Blamey C., Ersser S.J., Barneston L. & Lloyd A.J. (2000) An investigation into the use of aromatherapy in intrapartum midwifery practice. *Journal of Alternative and Complementary Medicine* 6(2), 141–147.

- Callis L. (1993) Feel nice and go to sleep teaching aromatherapy to those with learning difficulties. *The International Journal of Aromatherapy* 5(1), 6–7.
- Campbell L., Pollard A. & Roeton C. (2001) The development of clinical practice guidelines for the use of aromatherapy in a cancer setting. *Australian Journal of Holistic Nursing* 8(1), 14–22.
- Cerrato P. (1999) Peppermint oil can soothe irritable bowel. *RN* 62(1), 84.
- Chadwick D. (1999) What are the reasons for nurses using complementary therapy in practice? *Complementary Therapies in Nursing and Midwifery* 4, 144–148.
- Charlesworth H. (1995) Aromatherapy and stress related health disorders. *The Aromatherapist* 2(4), 9–23.
- Cooke B. & Ernst E. (2000) Aromatherapy: a systematic review. *British Journal of General Practice* 50, 493–496.
- Cooper E. (1995) The use of aromatherapy in palliative care for patients with advanced cancer. *The Aromatherapist* 2(3), 26–36.
- Corner J., Cawley N. & Hildebrand S. (1995) An evaluation of the use of massage and massage with the addition of essential oils on the wellbeing of cancer patients. *AROMA'95 Conference Proceedings*. Aromatherapy Publications, Brighton.
- Cornwell S. & Dale S. (1995) Lavender oil and perineal repair. *Modern Midwife* March 31–33.
- Crouton T. (1991) Oils for epilepsy. *The International Journal of Aromatherapy* 3(3), 22–23.
- Crowther D. (1991) Complementary therapy in practice. *Nursing Standard* 5(23), 25–27.
- Darben T., Cominos B. & Lee C.T. (1998) Topical eucalyptus oil poisoning. *Australasian Journal of Dermatology* 39(4), 265–267.
- Darrell N. (1997) Psoriasis. *The Aromatherapist* 4(1), 26–29.
- Day J.A., Mason R.R. & Chesrown S.E. (1987) Effect of massage on serum level of β -endorphin and β -lipotropin in healthy adults. *Physical Therapy* 67(6), 926–930.
- De Valois B. & Clarke E. (2001) A retrospective assessment of 3 years of patient audit for an aromatherapy massage service for cancer patients. *The International Journal of Aromatherapy* 11(3), 134–143.
- Dunn C., Sleep J. & Collett D. (1995) Sensing and improvement: an experimental study to evaluate the use of aromatherapy, massage and periods of rest in an intensive care unit. *Journal of Advanced Nursing* 21, 34–40.
- Englberger W., Hadding U., Etschenberg E., Graf E., Leyck S., Winkelmann J. & Parnham M.J. (1988) Rosmarinic acid: a new inhibitor of complement C3-convertase with anti-inflammatory activity. *International Journal of Immunopharmacology* 10(6), 729–737.
- Ernst E. (1997) Evidence based complementary medicine. *Complementary Therapies in Nursing and Midwifery* 3, 42–45.
- Ernst E. & White A. (2000) The BBC survey of complementary use in the UK. *Complementary Therapies in Medicine* 8, 32–36.
- Fahim F.A. & Esmat A.Y. (1999) Allied studies on the effect of *Rosmarinus officinalis* L. on experimental hepatotoxicity and mutagenesis. *International Journal of Food Sciences and Nutrition* 50(6), 413–428.
- Field T., Hernandez-Reif M., Taylor S., Quintino O. & Burman I. (1997) Labor pain is reduced by massage therapy. *Journal of Psychosomatic Obstetrics and Gynaecology* 18, 286–291.
- Fox S. & Lantz C. (1998) The brain tumour experience and quality of life: a qualitative study. *Journal of Neuroscience Nursing* 30(4), 245–262.
- Franchomme P., Jollois R. & Péroël D. (2001) *L'aromathérapie exactement*. Roger Jollie, Bayeux, France.
- Freise J. & Kohler S. (1999) Peppermint oil-caraway oil fixed combination in non-ulcer dependent dyspepsia-comparison of the effects of enteric preparations (abstract). *Pharmazie* 54(3), 210–215.
- Frisch N.C. (2001a) Standards for holistic nursing practice: a way to think about our care that includes complementary and alternative modalities. *Online Journal of Issues in Nursing* 6(2), http://www.nursingworld.org/ojin/topic15/tpc15_4.htm, last accessed 18 May 2002.
- Frisch N.C. (2001b) Nursing as a context for alternative/complementary modalities. *Online Journal of Issues in Nursing* 6(2), <http://www.nursingworld.org/ojin> (retrieved 18 May 2002)
- Furnham A. (2000) How the public classify complementary medicine: a factor analytic study. *Complementary Therapies in Medicine* 8, 82–87.
- Garnett-Ore L. (1996) Aromatherapy within mental health services. *The Aromatherapist* 3(1), 17–33.
- Gaydos H.L.B. (2001) Complementary and alternative therapies in nursing education: trends and issues. *Online Journal of Issues in Nursing* 6(2), http://www.nursingworld.org/ojin/topic15/tpc15_5.htm, last accessed 18 May 2002.
- Ghelardini C., Galeotti N. & Mazzanti G. (1999) Local anaesthetic activity of the essential oil of *Lavandula angustifolia*. *Planta Medica* 65, 700–703.
- Ghelardini C., Galeotti N. & Mazzanti G. (2001) Local anaesthetic activity of monoterpenes and phenylpropanes of essential oils. *Planta Medica* 67(6), 564–566.
- Gobel H., Schmidt G. & Soyka D. (1994) Effect of peppermint and eucalyptus oil preparations on neurophysiological and experimental algesimetric headache parameters. *Cephalgia* 14(3), 228–234.
- Godfrey H. (2001) The role of essential oils in the treatment and management of attention deficit hyperactive disorder. *The International Journal of Aromatherapy* 11(4), 193–199.
- Goeb P. (1995) Broncho-pulmonary pathologies. *Le Cahiers de l'aromathérapie records* 1, 67–81.
- Gouin S. & Patel H. (1996) Unusual cause of seizure. *Pediatric Emergency Care* 12(4), 298–300.
- Grace U.-M. (2001) Treating fibromyalgia syndrome with essential oils. *The International Journal of Aromatherapy* 11(1), 20–25.
- Grainger K. (1991) The alternative approach. *Nursing* 4(46), 9–11.
- Grassmann J., Hippeli S., Dornisch K., Rohnert U., Beuscher N. & Elsner E. (2000) Antioxidant properties of essential oils. *Arzneimittelforschung* 50(2), 135–139.
- Gravett P. (2001a) Aromatherapy treatment for patients with Hickman line infection following high dose chemotherapy. *International Journal of Aromatherapy* 11(1), 18–19.
- Gravett P. (2001b) Treatment of gastrointestinal upset following high-dose chemotherapy. *The International Journal of Aromatherapy* 11(2), 84–86.
- Gravett P.J., Finn M. & Hallesey S. (1995) An investigation of the use of essential oils for the treatment of chemotherapy-induced side effects in a group of patients undergoing high dose chemotherapy, with stem cell rescue for breast cancer. *AROMA '95 Conference Proceedings*. Aromatherapy Publications, Brighton.

- Guenier J. (1992) Essential obstetrics. *The International Journal of Aromatherapy* 4(1), 6–8.
- Garba S. (1996) Nonpharmacologic pain management in terminal care. *Clinics in Geriatric Medicine* 12(2), 301–311.
- Hadfield N. (2001) The role of aromatherapy massage in reducing anxiety in patients with malignant brain tumours. *International Journal of Palliative Nursing* 7(6), 279–285.
- Haraguchi H., Saito T., Okamura N. & Yagi A. (1995) Inhibition of lipid peroxidation and superoxide generation by diterpenoids from *Rosmarinus officinalis*. *Planta Medica* 61(4), 333–336.
- Hartman D. & Coetzee J.C. (2002) Two US practitioners' experiences of using essential oils for wound care. *Journal of Wound Care* 11(8), 317–320.
- Hay I.C., Jamieson M. & Ormerod A.D. (1998) Randomized trial of aromatherapy. Successful treatment for alopecia areata. *Archives of Dermatology* 134(11), 1349–1352.
- Hayes J.A. & Cox C.L. (1999) The integration of complementary therapies in North and South Thames Regional Health Authorities' critical care units. *Complementary Therapies in Nursing and Midwifery* 5, 103–107.
- Henry J. (1993) Dementia aroma groups improve the quality of life in Alzheimer's disease. *International Journal of Aromatherapy* 5(1), 27–29.
- Heuberger E., Hongratanaworakit T., Bohm C., Weber R. & Buchbauer G. (2001) Effects of chiral fragrances on human autonomic nervous system parameters and self-evaluation. *Chemical Senses* 26(3), 281–292.
- Hoeffler C., Fleurentin J., Mortier F., Pelt J.M. & Guillemin J. (1987) Compartive choleric and hepatoprotective properties of young sprouts and total plant extracts of *Rosmarinus officinalis* in rats. *Journal Ethnopharmacology* 19(2), 133–143.
- Hotchkiss S.A., Chidgey M., Rose S. & Caldwell J. (1990) Percutaneous absorption of benzyl acetate through rat skin in vitro. Validation of an in vitro model against in vivo data. *Food and Chemical Toxicology* 28, 443–447.
- Huang M.T., Ho C.T., Wang Z.Y., Ferraro T., Lou Y.R., Stauber K., Ma W., Georgiadis C., Laskin J. & Conney A.H. (1994) Inhibition of skin tumorigenesis by rosemary and its constituents carnosol and ursolic acid. *Cancer Research* 54(3), 701–708.
- Ikomi F., Hunt J., Hanna G. & Schmid-Schonbein G.W. (1996) Interstitial fluid, plasma protein, colloid, and leukocyte uptake into initial lymphatics. *Journal of Applied Physiology* 81(5), 2060–2070.
- Ilmberger J., Heuberger E., Mahrhofer C., Desovic H., Kowarick D. & Buchbauer G. (2001) The influence of essential oils on human attention. I: alertness. *Chemical Senses* 26(3), 239–245.
- Isaac V.O. (1979) Pharmacological investigations with compounds of chamomile I. On the pharmacology of (–)-alpha bisabolol and bisabolol oxides [abstract]. *Planta Medica* 35, 118–124.
- Jager W., Mayer M., Platzer P., Reznicek G., Dietrich H. & Buchbauer G. (2000) Stereoselective metabolism of the monoterpenes carvone by rat and human liver microsomes. *Journal of Pharmacy Pharmacology* 52(2), 191–197.
- Jager W., Mayer M., Reznicek G. & Buchbauer G. (2001) Percutaneous absorption of the monoterpene carvone: implication of stereoselective metabolism on blood levels. *Journal Pharmacy and Pharmacology* 53(5), 637–642.
- Jailwala J., Imperiale T.F. & Kroenke K. (2000) Pharmacologic treatment of irritable bowel syndrome; a systematic review of randomized, controlled trials. *Annals of Internal Medicine* 133(2), 136–147.
- Jakovlev V., Isaac O., Thiemer K. & Kunde R. (1979) Pharmacological investigations of camomile components. *Planta Medica* 35, 125–140.
- Jeffries J. (1996) A holistic approach to childbirth. *Aromatherapy Today* 2, 19–20.
- Jirovetz L., Buchbauer G., Jager W., Woidich A. & Nikiforov A. (1992) Analysis of fragrance compounds in blood samples of mice by gas chromatography, mass spectrometry, GCFTIR and GCAES after inhalation of sandalwood oil. *Biomedical Chromatography* 6(3), 133–134.
- Kaada T. & Torsteinbø O. (1988) Increase of plasma β -endorphins in connective tissue massage. *General Pharmacology* 20, 487–489.
- Keegan L., Rosen S. & Messervy L. (1994) Holistic nursing in New Zealand. *Journal of Holistic Nursing* 12(3), 343–349.
- Kite S., Maher E.J., Anderson K., Young T., Young J., Wood J., Howells N. & Bradburn J. (1998) Development of an aromatherapy service at a cancer centre. *Palliative Medicine* 12, 171–180.
- Kline R.M., Kline J.J., Di Palma J. & Barbero G.J. (2001) Enteric coated, pH dependent peppermint oil capsules for the treatment of irritable bowel syndrome in children. *Journal of Pediatrics* 138(1), 125–128.
- Kobbe G. (1996) A better quality of life. *Aromatherapy Quarterly* 49, 9–11.
- Kohlert C., van Rensen I., Marz R., Schindler G., Graefe E.U. & Veit M. (2000) Bioavailability and pharmacokinetics of natural volatile terpenes in animals and humans. *Planta Medica* 66(6), 495–505.
- Labrecque M., Nouwen A., Bergeron M. & Rancourt J.F. (1999) A randomized controlled trial of nonpharmacologic approaches for relief of pain during labour. *Journal of Family Practice* 48(4), 259–263.
- Lahlou M., Berrada R., Agoumi A. & Hmanouchi M. (2001) The potential effectiveness of essential oils in the control of human head lice in Morocco. *The International Journal of Aromatherapy* 10(3/4), 108–122.
- Lampic C., Wennberg A., Schill J-E., Brodin O., Glimelius B. & Sjoden P-O. (1994) Anxiety and cancer related worry of cancer patients at routine follow-up visits. *Acta Oncologica* 33(2), 119–125.
- Lawrence B.M. (1987) Progress in essential oils. *Perfumer and Flavorist* 12, 35–52.
- Lawrence B. & Reynolds R.J. (1987) Chamomile oil. *Perfumer & Flavorist* 12(1), 35–389.
- Le Vu B. & Mourisse H. (1997) Efficacie du massage et de la mobilisation du membre superieur apres traitement chirurgical du cancer du sein (abstract). *Bulletin Cancer* 84(10), 957–961.
- Lech Y., Olesen K.M., Hey H., Rask-Pedersen E., Vilien M. & Ostergaard O. (1988) Treatment of irritable bowel syndrome with peppermint oil. A double-blind study with a placebo (abstract). *Ugeskr Laegar* 150(40), 2388–2389.
- Lehrner J., Eckersberger C., Walla P., Potsch G. & Deecke L. (2000) Ambient odor of orange in a dental office reduces anxiety and improves mood in female patients. *Physiology Behavior* 71(1–2), 83–86.

- Lis-Balchin M. (1997) Essential oils and 'aromatherapy': their modern role in healing. *Journal of Royal Society of Health* 117(5), 324–329.
- Lis-Balchin M. (2000) Evaluation of massage with essential oils on childhood atopic eczema. *Phytotherapy Research* 14(6), 452–456.
- Lis-Balchin M. & Hart S. (1997) A preliminary study of the effect of essential oils on skeletal and smooth muscle in vitro. *Journal of Ethnopharmacology* 58(3), 183–187.
- Lis-Balchin M., Deans S.G. & Hart S. (1997a) A study of the variability of commercial peppermint oils using antimicrobial and pharmacological parameters. *Medical Science Research* 25, 151–152.
- Lis-Balchin M., Hart S. & Roth G. (1997b) The pharmacological activity of the essential oils of scented Pelargoniums (Geraniaceae). *Phytotherapy Research* 11(8), 583–584.
- Long L., Huntley A. & Ernst E. (2001) Which complementary and alternative therapies benefit which conditions? A survey of the opinions of 223 professional organisations. *Complementary Therapies in Medicine* 9, 178–185.
- Madelin L. (1994) An integrated care programme. *The International Journal of Aromatherapy* 6(4), 8–10.
- Mantik Lewis S. & Cox Collier I. (1987) *Medical Surgical Nursing Assessment and Management of Clinical Problems*, 2nd edn. McGraw-Hill, New York.
- Mason M. (1996) Aromatherapy midwifery. *Aromatherapy Quarterly* 50, 17–19.
- Maudsley F. & Kerr K.G. (1999) Microbiological safety of essential oils used in complementary therapies and the activity of these compounds against bacterial and fungal pathogens. *Support Cancer Care* 7(2), 100–102.
- Mercer B. (1996) Aromatherapy during pregnancy – a fragrant and nurturing experience. *Aromatherapy Today* 2, 7–8.
- Millar R. (1996) The use of aromatherapy in hospitals for patients with cancer. *The Aromatherapist* 3(2), 14–29.
- Mitchell S. (1993) Dementia aromatherapy's effectiveness in disorders associated with dementia. *The International Journal of Aromatherapy* 5(2), 20–23.
- Miyazawa M., Shindo M. & Shimada T. (2001) Oxidation of 1,8-cineole, the monoterpene cyclic ether originated from eucalyptus polybractea, by cytochrome P450 3A enzymes in rat and human liver microsomes. *Drug Metabolism Disposition* 29(2), 200–205.
- Moate S. (1995) Anxiety and depression. *The International Journal of Aromatherapy* 7(1), 18–21.
- Moore J. (1999) Complementary therapy in mental health. *International Journal of Alternative and Complementary Medicine* September, 20–21.
- Morgan D., Glanville H., Mars S. & Nathanson V. (1998) Education and training in complementary and alternative medicine; a postal survey of UK universities, medical schools and faculties of nurses' education. *Complementary Therapies in Medicine* 6, 64–70.
- Morris N., Birtwistle S. & Toms M. (1995) Anxiety reduction. *The International Journal of Aromatherapy* 7(2), 33–37.
- Mortimer P.S., Simmonds R., Rezvani M., Robbins M., Hopewell J.W. & Ryan T.J. (1990) The measurement of skin lymph flow by isotope clearance-reliability, reproducibility, injection dynamics, and the effect of massage. *The Journal of Investigative Dermatology* 95, 677–682.
- Naganumu M., Hirose S., Nakayama Y., Nakajima K. & Someya T. (1985) A study of the phototoxicity of lemon oil. *Archives of Dermatological Research* 278(1), 31–36.
- Nolen H.W. III & Friend D.R. (1994) Menthol-beta-D-glucuronide: a potential prodrug for treatment of the irritable bowel syndrome. *Pharmacy Research* 11(12), 1707–1711.
- Offord E.A., Mace K., Ruffieux C., Malnoe A. & Pfeifer A.M.A. (1995) Rosemary components inhibit benzo pyrene-induced genotoxicity in human bronchial cells. *Carcinogenesis* 16(9), 2057–2062.
- Owen A. (1995) Surveying the alternatives. *Nursing Times* 91(36), 42.
- Peace G. & Simons D. (1996) Completing the whole. *Nursing Times* 92(25), 52–54.
- Pittler M.H. & Ernst E. (1998) Peppermint oil for irritable bowel syndrome: a critical review and meta-analysis. *American Journal of Gastroenterology* 93(7), 1131–1135.
- Puustjarvi K., Hanninen O. & Leppaluoto J. (1986) Effect of massage on endorphin levels and some physiological parameters. *Acta Physiologica Hungarica* 68, 243.
- Rankin-Box D. (1997) Therapies in practice: a survey assessing nurses' use of complementary therapies. *Complementary Therapies in Nursing and Midwifery* 3(4), 92–99.
- Ribeaux P. & Spence M. (2001) CAM evaluation: what are the research questions? *Complementary Therapies in Medicine* 9, 188–193.
- Richardson J. (1996) Non-conventional therapy in the NHS: can it work? *International Journal of Alternative and Complementary Medicine* July, 20–21.
- Riechelmann H., Brommer C., Hinni M. & Martin C. (1997) Response of human ciliated respiratory cells to a mixture of menthol, eucalyptus oil and pine needle oil [abstract]. *Arzneimittelforschung* 47(9), 1035–1039.
- Roberts A. & Williams J.M. (1992) The effect of olfactory stimulation on fluency, vividness of imagery and associated mood: a preliminary study. *British Journal of Medical Psychology* 65(pt 2), 197–199.
- Saeki Y. (2000) The effect of foot bath with or without the essential oil of lavender on the autonomic nervous system: a randomized trial. *Complementary Therapies in Medicine* 8, 2–7.
- Safayhi H., Rall B., Sailer E.R. & Ammon H.P. (1997) Inhibition by boswellic acids of human leukocyte elastase. *The Journal Pharmacology and Experimental Therapeutics* 281(1), 460–463.
- Salander P., Bergenheim T. & Henriksson R. (1996) The creation of protection and hope in patients with malignant brain tumours. *Social Science and Medicine* 42(7), 985–996.
- Sanderson H. (1993) Interactive massage. *Aromatherapy Quarterly* 37, 3–4.
- Schacher L., Field T., Hernandez-Reif M., Duarte A.M. & Krasnegor J. (1998) Atopic dermatitis symptoms decreased in children following massage therapy. *Pediatric Dermatology* 15(5), 390–395.
- Schafer D. & Schafer W. (1981) Pharmacological studies with an ointment containing menthol, camphene and essential oils for broncholytic and secretolytic effects [abstract]. *Arzneimittelforschung* 31(1), 82–86.
- Schwarz K., Ternes W. & Schmauderer E. (1992) Antioxidative constituents of *Rosmarinus officinalis* and *Salvia officinalis* Linn.

- Stability of phenolic diterpenes of rosemary extracts under thermal stress as required for technological processes [abstract]. *Zeitschrift für Lebensmittel-untersuchung und -forschung* 195(2), 104–107.
- Shipton H. (1995) Stroking away the pain. *The International Journal of Aromatherapy* 7(1), 4–5.
- Shirreffs C.M. (2001) Aromatherapy massage for joint pain and constipation in a patient with Guillan Barre. *Complementary Therapies in Nursing and Midwifery* 7, 78–83.
- Smith R.H. (1993) Lavender helps burned boy. *International Journal of Aromatherapy* 5(4), 6–9.
- Sparber A. (2001) State boards of nursing and scope of practice of registered nurses performing complementary therapies. *Online Journal of Issues in Nursing*, available at <http://www.nursingworld.org/ojin/topic6/tpc.htm>.
- Steinmetz M.D., Vial M. & Millet Y. (1987) Actions of essential oils of rosemary and certain of its constituents (eucalyptol and camphor) on the cerebral cortex of the rat in vitro. *Journal Toxicological Clinical Experiments* 7(4), 259–271.
- Stevenson C. (1992) Orange blossom evaluation. *International Journal of Aromatherapy* 4(3), 22–25.
- Stone J. (1999) Using complementary therapies within nursing: some ethical and legal considerations. *Complementary Therapies in Nursing and Midwifery* 5, 46–50.
- Styles J.L. (1997) The use of aromatherapy in hospitalised children with HIV disease. *Complementary Therapies in Nursing and Midwifery* 3(1), 16–20.
- Szentmihalyi K., Forgacs E., Hajdu M. & Then M. (2001) In vitro study on the transfer of volatile components. *Journal of Pharmaceutical Biomedical Analysis* 24(5–6), 1073–1080.
- Tibballs J. (1995) Clinical effects and management of eucalyptus oil ingestion in infants and young children. *Medical Journal of Australia* 163(4), 177–180.
- Tibballs J. & James A. (1995) Eucalyptus oil: medicinal therapy or folk remedy? *Australian Journal of Hospital Pharmacy* 25(6), 516–519.
- Tovey P. & Adams J. (2002) Towards a sociology of CAM and nursing. *Complementary Therapies in Nursing and Midwifery* 8, 12–16.
- Trevelyn J. (1996) A true complement? *Nursing Times* 2(5), 42–44.
- Veal L. (1996) The potential effectiveness of essential oils as a treatment for head lice, *Pediculus humanus capitis*. *Complementary Therapies in Nursing and Midwifery* 2, 97–101.
- Vickers A. (1997) Yes, but do we know it's true? Knowledge claims in massage and aromatherapy. *Complementary Therapies in Nursing and Midwifery* 3, 63–65.
- Walsh D. (1996) Using aromatherapy in the management of psoriasis. *Nursing Standard* 11 (13/14), 53–56.
- Weaver J. (1991) Chronic psoriasis. *The International Journal of Aromatherapy* 3(1), 20–21.
- Weiss J. (1973) Camphorated oil intoxication in pregnancy. *Paediatrics* 52, 713–714.
- White A. & Ernst E. (2001) The case for uncontrolled clinical trials: a starting point for the evidence base for CAM. *The International Journal of Aromatherapy* 11(4), 201–205.
- Wilkinson S. (1995) Aromatherapy and massage in palliative care. *International Journal of Palliative Nursing* 1(1), 21–30.
- Wilkinson J.M. & Simpson M.D. (2002) Personal and professional use of complementary therapies by nurses in NSW, Australia. *Complementary Therapies in Nursing & Midwifery* 8(3), 142–147.
- Wilkinson S., Aldridge J., Salmon I., Cain E. & Wilson B. (1999) An evaluation of aromatherapy massage in palliative care. *Palliative Medicine* 13, 409–417.
- Wilson L. (1989) Aromatherapy in the care of AIDS patients. *International Journal of Aromatherapy* 2(3), 12.
- Woolfson A. & Hewitt D. (1992) Intensive aromacare. *International Journal of Aromatherapy* 4(2), 12–13.
- Yamada K., Miura T., Mimaki Y. & Sashida Y. (1996) Effect of inhalation of chamomile oil vapour on plasma ACTH level in ovariectomized-rat under restriction stress. *Biological Pharmacy Bulletin* 19(9), 1244–1246.
- Zanker K.S., Tolle W., Blumel G. & Probst J. (1980) Evaluation of surfactant-like effects of commonly used remedies for colds. *Respiration* 39(3), 150–157.
- Zaynoun S.T., Johnson B.E. & Frain-Bell W. (1977) A study of the oil of bergamot and its importance as a phototoxic agent. *British Journal of Dermatology* 96, 475–482.