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Aromatherapy in gynaecology and obstetrics: a systematic review of clinical applications

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ABSTRACT

Objective. Aromatherapy, a practice based on the use of essential oils, is increasingly employed in gynaecology and obstetrics as a complementary therapy to relieve pain and anxiety, especially during labour and childbirth but also in many other gynaecological conditions. The aim of this review is to provide a general overview of the clinical applications of aromatherapy, across obstetrics, gynaecology, and other medical fields in a cross-disciplinary manner.

Materials and Methods. The studies included evaluate the effectiveness of aromatherapy in reducing pain and/or anxiety during labour and childbirth or in patients affected by gynaecological cancer, in minimizing menopause symptoms or its use in other fields of medicine. Studies were excluded if they were irrelevant, methodologically weak, or based on non-representative samples. Randomized clinical trials, systematic reviews, and meta-analyses published up to 2024 were included.

Results. According to the analysed studies, aromatherapy can significantly reduce pain and anxiety during labour, improve the childbirth experience, and contribute to woman's overall psychophysical well-being. Among the 33 studies included, 84% reported significant reductions in labour pain, and 76% showed reduced anxiety levels with aromatherapy interventions, particularly with lavender and peppermint oils.

Conclusions. Aromatherapy appears to be a safe, low-cost adjunct to conventional care and may be especially valuable in settings with limited access to pharmacologic pain relief, underscoring its potential contribution to global maternal health strategies. To establish reproducibility and long-term sustainability, large-scale multicentre randomized controlled trials utilizing standardized essential oil formulations and validated outcome measures are essential.

INTRODUCTION

In recent decades, interest in complementary therapies in medicine has grown significantly [1]. Aromatherapy is defined as the science of using highly concentrated essential oils or essences distillated from plants to utilize their therapeutic properties [3]. Unlike herbal medicine, which uses whole

plants to achieve a therapeutic effect, essential oils used in aromatherapy are highly concentrated extracts derived from plant roots, leaves, bark, seeds and flowers. The concentrated chemicals in the oils give them different properties (relaxing, stimulating, pain-relieving) that can be harnessed for beneficial effect. Essential oils, which can be applied in a variety of ways, can directly reach the neocortex of the brain through connections extending to the limbic system and the hypothalamus through scent. Essential oils cross the blood-brain barrier and affect the cerebral cortex, thalamus and limbic system, the part of the brain that deals with emotions and memories. In this way, they reduce symptoms of anxiety, depression and improve sleep quality [3]. Essential oils can be divided into three types of absorption: via the skin and mucous membranes, olfactory and oral [2]. In medical and nursing contexts, absorption mostly works through the olfactory via inhalation or room scenting, or through skin and mucous membranes via percutaneous massages and embrocation [3]. A distinction can be made between psychological and pharmacological mechanisms of aromatherapy. The psychological effect, triggered by the olfactory intake of the essential oils, can be divided into three areas that control the individual scent reaction: subjective evaluation (hedonic valence), conditioning (semantic mechanism) and expectancy (placebo effect) [4]. Hence, the personality and the cultural imprint of the person smelling play a decisive role on the specific, olfactory-triggered effect. In this regard, choosing a fragrance that is personally appealing may offer individualized benefits. The pharmacological effect, however, is based on the absorption of the essential oil components via the skin and mucous membranes and the specific composition of the respective oil, and acts similar in each user. Depending on the mode of application (skin *vs* olfactory absorption), essential oils can trigger significantly different effects [5].

In gynaecology and obstetrics, aromatherapy has been adopted as a non-pharmacological method to manage pain and anxiety associated with labour and childbirth [6]. Labour pain and peripartum anxiety are among the most common concerns reported by labouring women worldwide, prompting growing interest in integrative approaches that support maternal comfort without pharmacological side effects [7]. A recent study suggests that aromatherapy can positively influence the childbirth experience by reducing pain perception and improving the emotional state of birthing women [8]. This review summarizes the available evidence on the effectiveness of aromatherapy in gynaecology and obstetrics and explores its role in other fields of medicine.

MATERIALS AND METHODS

A systematic literature review was conducted using the following databases: PubMed, Google Scholar, Scopus, Embase and Web of Science. The keywords used included: "aromatherapy", "essential oils", "labor pain", "anxiety", "gynecology", "pregnancy" and "obstetrics." Randomized clinical trials, systematic reviews, and meta-analyses published up to 2024 were included.

Included studies were those evaluating the effectiveness of aromatherapy in reducing pain and/or anxiety during labour and childbirth or in patients affected by gynaecological cancer, in minimizing menopause symptoms or its use in other fields of medicine. Studies were excluded if they were irrelevant, methodologically weak, or based on non-representative samples. **Figure 1** reports the PRISMA diagram illustrating the studies selection process.

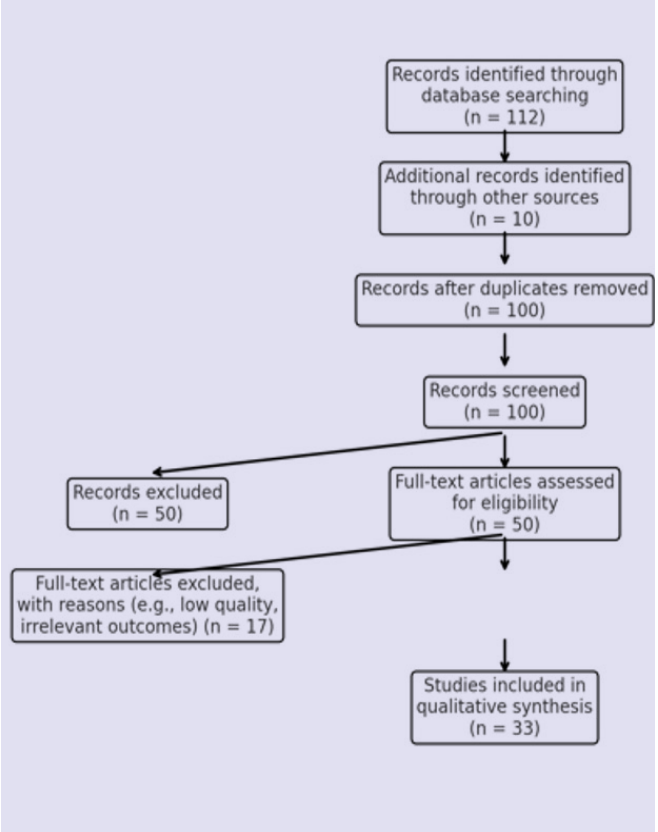

Figure 1. *PRISMA diagram.*

RESULTS

Included studies

A total of 33 studies were included, 27 of which were conducted in Iran, all assessing the effectiveness of aromatherapy in reducing pain and anxiety during labour [5]. The most used essential oils were:

- Lavender: used in 13 studies, it showed positive effects in reducing both pain and anxiety [9].
- Geranium: found to be effective in reducing labour-related anxiety [9].
- Chamomile: associated with reduced pain and anxiety [9].
- Peppermint: demonstrated both analgesic and anxiolytic properties [9].
- Sweet and bitter orange: used for their anxiety-reducing effects [9].
- Frankincense and clove: used for their calming and sedative properties [9].

Figure 2 reports the frequency of essential oil use in clinical studies.

Administration methods

Aromatherapy was primarily administered through inhalation or massage. Some studies used aromatic baths, compresses, or room diffusers [9].

Efficacy

Most of the studies reported a statistically significant reduction in pain and anxiety among women who received aromatherapy compared to control groups [9]. Lavender oil, in particular, was frequently associated with beneficial outcomes [9]. However, some studies did not report significant differences, highlighting the need for further investigation [9].

Safety

None of the studies included reported serious side effects associated with the use of aromatherapy during labour and delivery. This suggests that aromatherapy is a safe practice when used appropriately [9].

DISCUSSION

Aromatherapy in obstetrics

During pregnancy

The use of aromatherapy during pregnancy has attracted increasing attention, especially as a tool for relieving common symptoms such as nausea, anxiety, insomnia, and muscle pain [10]. Aromatherapy applied via inhalation to pregnant women improves sleep quality and reduces fatigue levels. According to these findings, lavender oil aromatherapy can be recommended to improve sleep quality and reduce fatigue levels in pregnant women during the third trimester [11]. In fact lavender is commonly used to reduce anxiety and improve sleep quality, thanks to its sedative and anxiolytic properties [10]. On the other hand, several studies

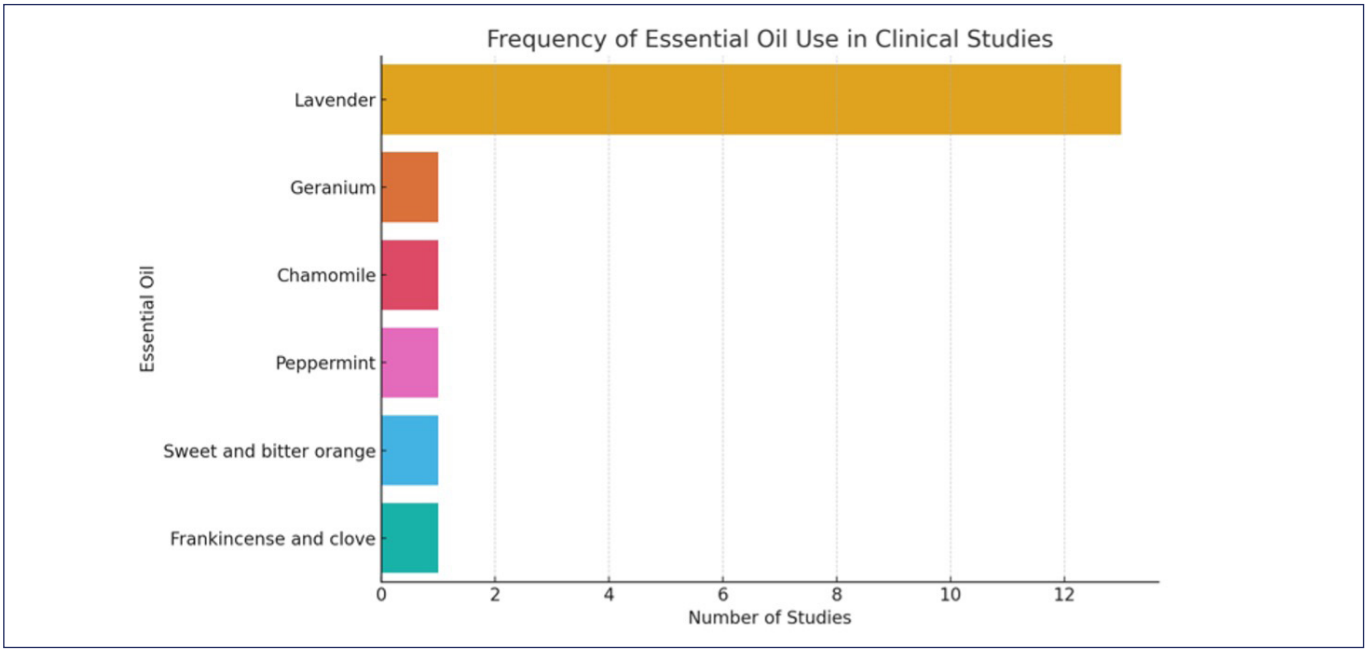

Figure 2. *Frequency of essential oil use.*

document the effectiveness of lemon and ginger essential oils in reducing morning sickness, with minimal side effects [10]. Other studies show that Rosa damascena is as effective as Metoclopramide in controlling nausea and vomiting in pregnant patients and do not negatively effects sleep quality [12]. However, the use of essential oils during pregnancy requires caution: certain oils may exhibit uterotonic effects or be contraindicated, particularly during the first trimester [10]. Rose oil should be avoided until the late third trimester due to a possible mild emmenagogic effect (herbal emmenagogues were traditionally used as abortifacients) [13]. Clary sage, also, should be avoided until term of pregnancy due to a possible effect on uterine contractions [13]. Guidelines recommend controlled use and consultation with healthcare professionals experienced in phytotherapy [10].

During labour

Aromatherapy is widely used during labour as a non-pharmacological support to manage pain and anxiety [9]. It does not have an effect on the risk of intrapartum caesarean and does not influence newborn APGAR scores, suggesting that aromatherapy can be safely administrated intrapartum [4]. Inhalation of lavender, geranium, and frankincense has demonstrated effectiveness in lowering cortisol levels and improving mood among labouring women [9]. Lavender has been associated with a significant reduction in pain perception and agitation during the early stages of labour [9], while limonene is capable of modulating neurotransmission systems associated with pain and anxiety, being effective in reducing these symptoms during labour too [14]. Also, *Camellia sinensis* essential oil reduces pain and anxiety during labour, indicating its possible applicability in good labour practice [14]. Other studies have shown how aromatherapy with narcissus flower essence can reduce the intensity of labour pain thanks to linalool compounds, making the childbirth process a more pleasant experience [15]. Aromatherapy significantly reduces pain intensity over time, especially for pregnant women in stage 1 dilatation and primiparous [14]. It also reduces the duration and pain of the latent transition and active phase of birth as well as anxiety in the active and transition phase [16]. Exposure to the aroma of sweet orange during labour also reduces mean blood pressure, heart rate, respiratory rate of pregnant women and foetal heart rate [14]. Some randomized controlled trials have shown a lower demand for analgesics among women who received aromatherapy compared to control groups [9]. Additionally, massages with essential oils contributed to a more positive birth experience and improved interactions between patients and healthcare staff [9].

Postpartum period

In the postpartum period, aromatherapy has been used to manage depressive symptoms, anxiety, insomnia, and to promote relaxation [17]. Back massage with essential oils turned out to be more effective than inhalation in improving the reduction of anxiety and pain in the postpartum period, while inhalation is also found to be more effective than no intervention [18]. So, aromatherapy can be defined as a successful non pharmacological method for reducing soreness and enhancing comfort in this phase of women's life, especially after a caesarean section [18]. Rose essential oil has been associated with a reduction in symptoms of postpartum depression in some clinical studies [17]. The use of aromatic baths and massages with essential oils has shown beneficial effects on psychological well-being and physical recovery in new mothers [17]. Preliminary evidence also suggests that aromatherapy may help strengthen the mother-infant bond and improve sleep quality, although longitudinal studies are needed to confirm these findings [17]. As well as during pregnancy and labour, the use of lavender can be useful also in the postpartum period. In fact, its regular inhalation or addition to bathwater may have beneficial effects on wound healing and pain after episiotomy [19]. Lavender oil can also be helpful to reduce dyspareunia in these women [19].

Aromatherapy in gynaecology

Premestrual syndrom (PMS)

Premenstrual syndrome, characterized by a combination of emotional and physical symptoms, affects a large portion of women of reproductive age [20] and significantly impacts their lives. Aromatherapy has demonstrated effectiveness in managing the psycho-emotional symptoms of PMS, such as irritability, mood swings, appetite changes and breast tenderness [20]. Lavender and rose essential oils are frequently used for inhalation or abdominal massages, improving mood and reducing stress [20]. Some studies also report a decrease in the intensity of breast pain and menstrual cramps [20]. Grapefruit and bergamot essential oils have

notable effects on anxiety, fatigue, bloating and sleep disturbance PMS-related, thanks to their active components like limonene, which influences the central nervous system. [21]. Coping strategies for menstrual symptoms and somatic complaints can be also reduced by the use of essential oils [21]. Therefore, aromatherapy can play an effective role in PMS as a non-invasive and safe method.

Dysmenorrhoea

Dysmenorrhoea is a gynaecologic condition that negatively affects women's social relations, daily lives, business lives, academic achievements and quality of life. For the treatment of primary and secondary dysmenorrhea, aromatherapy has often been combined with massage techniques, yielding promising results [22]. Essential oils such as lavender, clary sage, fennel, and marjoram have been used in several studies, demonstrating a significant reduction in menstrual pain [22]. The proposed mechanisms include muscle relaxation in the uterine smooth muscle and stimulation of endorphin release [22]. Several studies revealed the antimicrobial, anti-inflammatory and antioxidant properties of Rosa damascena which can be a good option for self-treatment of primary dysmenorrhea [23]. Administered by inhalation, it can be used to reduce the consumption of non-steroidal anti-inflammatory drugs, avoiding their adverse effects. Rosa damascena essential oil can be used either alone or as an additional method [23]. The calming effects of aromatherapy may also help alleviate the anxiety component often associated with chronic pain [22].

Menopause

Menopause is a natural biological process marking the end of a woman's reproductive years, characterized by the cessation of ovarian functions and the progressive decline of estrogen and progesterone levels until the stop of their production. Menopausal and postmenopausal women often experience many physical and psychological symptoms such as hot flushes, fatigue, decreased libido, headache, mood changes, anxiety, depression and sleep disturbance that can significantly impact their quality of life. Nowadays, hormone replacement therapy (HRT) is the conventional treatment of these symptoms but concerns about its safety have led many women to seek alternative approaches [24]. Essential oils can alleviate anxiety, induce relaxation and potentially alleviate stressful menopausal symptoms. Several studies shown the beneficial use of lavender oil inhalation in reducing insomnia [25] and hot flushing [26, 27]. Further research revealed that aromatherapy massage is more effective than massage alone in reducing both physical and psychological symptoms [28]. Inhalation and topical use of essential oils such as clary sage, fennel and wild orange are widespread and offer beneficial effects in alleviating menopausal symptoms and hot flushes [24]. Peppermint oil is another beneficial essential oil. In fact, aromatherapy massage with peppermint and lemon essential oil may help alleviate hot flushes and discomfort associated with menopause symptoms [29].

Osteoarthritis with associated chronic knee pain is another relevant issue experienced by women during menopausal period. Chronic pain adversely affects the quality of life impeding functionality, daily life activities, sleep quality, mental health, social relationships and the ability to fullfil occupational responsibilities [30]. Aromatherapy can be utilized as a complementary therapy in the treatment of joint diseases such as knee osteoarthritis. The components of essential oils used during aromatherapy massage are reported to reduce pain by affecting the release of neurotransmitters such as dopamine, endorphins, norepinephrine and serotonin through lymph and blood vessels in the epidermis [30]. Lavender, ginger, eucalyptus and rosemary oil is reported to be applied in the treatment of osteoarthritis with noticeable benefits [31]. Also, the use of bergamot essential oil has been widely documented for its pharmacological antinociceptive efficacy [30].

Current evidence suggests that aromatherapy alone may not be sufficient as a stand-alone treatment for managing menopausal symptoms [24]. However, incorporating aromatherapy into other intervention may offer additional relief and noticeable benefits [24].

Gynaecologic oncology

Women with gynaecological cancer, including breast cancer, often experience cancer and therapy-related side effects such as pain, fatigue, stress, sleep disturbance, cognitive impairment, neuropathy, psychological distress, changes in sexuality or clusters of several symptoms [32]. Symptomatic side effects usually do not vanish post chemotherapy but continue into aftercare and can have a strong negative impact on women's daily lives and general well-being [32]. Therefore, gynaecological

oncology patients need supportive strategies that are adapted to their individual needs and circumstances [32]. In oncology patients, aromatherapy has mainly been studied for the management of secondary symptoms such as chemotherapy-induced nausea, anxiety, insomnia, and chronic pain [33]. Although not curative, aromatherapy is recognized as a valuable palliative intervention [33]. Peppermint essential oil is frequently used for nausea control, while lavender and neroli are used to reduce anxiety and improve sleep quality [33]. In addition, it was shown that the use of aromatherapy during intracavity brachytherapy for women with cervical cancer may help reducing pain and anxiety [34]. In palliative care settings, aromatherapy has also been shown to improve quality of life and overall well-being [33]. However, in oncology, it is essential that the use of essential oils is supervised by qualified professionals, as some botanical substances may interfere with chemotherapy drugs [33] or may cause side effects themselves (lavender-based products can be associated with breast swelling or irritation of nasal mucosa) [32]. Consider patients' odour preferences and aversions is also important because they have a clear impact on motivation and perceived effects. The smell of the product alone can cause strong reactions, physical or mental responses such as nausea or vomiting and even behavioural changes. The effect of the odour alone is considered to be even more important than the effect of the chemical components [32]. Offering multiple and various fragrances and applications that cover the individual needs and patient's living circumstances represent a challenging item on which future aromatherapy researches should be focused.

Limitations and critical issue in literature

Despite the promising evidence, the literature on aromatherapy in gynaecology and obstetrics presents several limitations [9]. Many studies have small sample sizes, non-standardized methodologies, and a lack of appropriate control groups [9]. The influence of placebo effects is also not consistently accounted for [9]. Additional limitations include variability in the quality of the essential oils used and the methods of administration [9]. Moreover, the subjective perception of well-being can influence outcomes, making it challenging to objectively assess the actual effectiveness of the intervention [9].

Table 3. *Essential oils and clinical use.*

Essential oil	Primary use
Lavender	Anxiety, insomnia, labour pain
Geranium	Labor-related anxiety
Chamomile	Menstrual pain, anxiety
Peppermint	Nausea, pain relief, stimulant
Sweet Orange	Anxiety and relaxation
Rose	Postpartum depression
Ginger	Pregnancy-related nausea

Many trials combine other complementary therapies with aromatherapy, making difficult or impossible separating the effects of aromatherapy from the others. [4] In addition, the majority of trials on aromatherapy during the peripartum period were conducted in the Middle East, most notably Iran, which may limit generalizability to other populations with different perinatal practices [4]. Finally, another limitation is that very few studies have been conducted for several of the clinical indications [4] (**Table 1**).

Other clinical applications of aromatherapy

General oncology

In addition to gynaecologic oncology, aromatherapy is widely used as palliative treatment for cancer patients to alleviate symptoms related to therapies (*e.g.*, nausea, fatigue, insomnia, and anxiety) [35]. Ginger essential oil is commonly used to counter chemotherapy-induced nausea, while lavender, frankincense, and neroli are used to reduce anxiety and improve sleep quality [35]. Studies conducted in oncology centres have shown that aromatherapy, when integrated with conventional medicine, improves the patient's subjective experience and can reduce the need for anxiolytics [35].

Neurology and mental health

The use of essential oils in neurological and psychiatric contexts is well documented, particularly for the treatment of anxiety, mild depression, chronic stress, and insomnia [36]. Lavender essential oil (*Lavandula angustifolia*) in particular has demonstrated anxiolytic effects comparable to some pharmacological anxiolytics in several randomized controlled trials, with no significant side effects [36]. Lemon and Melissa (lemon balm) have also been studied for their mood-enhancing properties

and their role in cognitive stimulation in patients with mild depression or dementia [36].

Intensive care and anaesthesiology
In intensive care units, aromatherapy has been introduced as a non-invasive technique to reduce anxiety in intubated patients or those undergoing invasive procedures [37]. The use of room diffusers with lavender or chamomile oils can create a more relaxing environment and improve physiological parameters such as heart rate and blood pressure [37]. Preliminary studies suggest that aromatherapy may reduce the need for sedatives or anxiolytics in pre- and post-operative settings [37].

Rheumatology and chronic pain
In managing musculoskeletal and rheumatic pain, aromatherapy has shown anti-inflammatory and analgesic properties [38]. Eucalyptus, rosemary, and pine essential oils are often used in combination with physiotherapy massage to relieve joint pain, muscle stiffness, and inflammation [38]. Regular use in patients with fibromyalgia or rheumatoid arthritis has led to improvements in quality of life, sleep, and pain perception [38].

Dermatology
Topical use of essential oils has found applications in managing dermatitis, acne, psoriasis, and skin infections [39]. Tea tree oil has demonstrated antibacterial and antifungal activity and is used in the treatment of mild acne and fungal infections [39]. Lavender and chamomile are employed for their soothing properties on irritated or inflamed skin and promote tissue regeneration [39].

Paediatrics
Aromatherapy is also used in children, although with greater caution due to their skin and respiratory sensitivity [40]. In paediatric care, it has been used to improve sleep, calm night crying, and reduce irritability [40]. Oils such as chamomile, mandarin, and lavender are preferred for their gentle action [40]. Administration is mainly through diffusion or diluted massage [40].

Sports medicine
In sports medicine, aromatherapy has been used to accelerate muscle recovery, reduce cramps, and stimulate concentration before competitions [41]. Rosemary and peppermint are commonly used oils due to their energizing effects, while eucalyptus is known for its decongestant and anti-inflammatory properties [41, 42].

CONCLUSIONS

Aromatherapy represents a valuable complementary approach across multiple medical disciplines. Although it is not a first-line treatment, it can be integrated into clinical protocols as a holistic approach cantered on the patient's overall well-being. The documented effectiveness in various clinical settings supports the need for appropriate training of healthcare professionals, as well as the development of specific guidelines for each field of application.
Aromatherapy may be especially valuable in settings with limited access to pharmacologic pain relief, underscoring its potential contribution to global maternal health strategies.
To establish reproducibility and long-term sustainability, large-scale multicentre randomized controlled trials utilizing standardized essential oil formulations and validated outcome measures are essential.

COMPLIANCE WITH ETHICAL STANDARDS

Authors' contribution
A.M., A.L.: Writing – original draft. A.M., I.G., E.D., A.L.: Writing – review & editing. V.R., L.L., B.M.: Supervision.

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Disclosure of interests
The authors declare that they have no conflict of interests.

Ethical approval
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Informed consent
N/A.

Data sharing
Data are available along with the review.

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