

A Review on the Effects of Aromatherapy for Patients with Depressive Symptoms

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Abstract

Purpose: We reviewed studies from 2000 to 2008 on using essential oils for patients with depression or depressive symptoms and examined their clinical effects.

Methods: The review was conducted among five electronic databases to identify all peer-reviewed journal papers that tested the effects of aromatherapy in the form of therapeutic massage for patients with depressive symptoms.

Results: The results were based on six studies examining the effects of aromatherapy on depressive symptoms in patients with depression and cancer. Some studies showed positive effects of this intervention among these three groups of patients.

Conclusions: We recommend that aromatherapy could continue to be used as a complementary and alternative therapy for patients with depression and secondary depressive symptoms arising from various types of chronic medical conditions. More controlled studies with sound methodology should be conducted in the future to ascertain its clinical effects and the underlying psychobiologic mechanisms.

Introduction

Depression is a syndrome affecting cognition, behaviors, and the neurovegetative system, which would lead to a significant dysfunction of an individual's daily life and occupation.^{1,2} When an individual suffers from depression, the symptoms include depressed mood, loss of interest, significant change in appetite, weight loss/gain, insomnia/hypersomnia, loss of energy, negative self-concept, difficulties in thinking and concentrating, and recurrent thoughts of death. Unfortunately, depression is a common psychiatric disease around the world.^{3–5} The Medical Outcomes Study found that depression was more debilitating than other chronic medical disorders such as diabetes, arthritis, hypertension, and cardiovascular disease. This is bolstered by the Global Burden of Disease study, which stated that depression would become the second leading cause of death and disability worldwide by 2020.^{6–8} In Hong Kong, it affects 11%–15% of the elderly, which is similar to Western countries such as England, Finland, and the United States.⁹ Depression is closely tied to chronic diseases, for examples, multiple sclerosis, chronic obstructive pulmonary disease, traumatic brain in-

jury, and other neurologic diseases.¹⁰ The treatment of depression has been a major concern among clinicians and researchers.

To date, mainstream treatment of depression mainly relies on medication with the use of tricyclic antidepressants, monamine oxidase inhibitor, and selective serotonin reuptake inhibitor (SSRIs).^{11,12} Unfortunately, nearly one third of the patients abruptly terminated medication treatment due to the unpleasant side-effects such as headache, insomnia, and nausea.^{13–15} In addition, cognitive behavioral therapy is widely used as the psychologic treatment of depression. However, results have not been conclusive.^{16,17} In view of the limitations of the more traditional approaches, attention given to the use of complementary and alternative medicine (CAM) as an adjuvant treatment has recently been escalating. In this review, CAM refers to practices, approaches, knowledge, and beliefs incorporating plant, animal, and mineral-based medicines, spiritual therapies, manual techniques, and exercise that are not presently judged to be part of conventional medicine.^{18,19} CAM adopts a holistic approach to medicine and indicates the treatment of the "whole" person by addressing their physical, mental, and

spiritual attributes rather than focusing on a specific pathogenic process in conventional medicine.^{20,21} In this review, we focused on the use of aromatherapy as an alternative therapy for people with depression.

Depression is one of the most frequent indications for the use of CAM because of the relatively low incidence of adverse effects and dissatisfaction with mainstream medical treatments. A survey in the United States reported that 53.6% of respondents suffering from severe depression reported use of CAM for treatment.²² Another study conducted in Australia indicated that people who experienced mild to moderate depression used CAM such as aromatherapy, meditation, and nutritional supplements.²³

Aromatherapy is a particular kind of CAM widely used around the world for the management of depression or other stress-related disorders.^{24,25} It is defined as the use of essential oils extracted from plants to produce physiologic or pharmacologic effects through the sense of smell or absorption from the skin.^{26,27} Essential oils are defined as the volatile and organic constituents of fragrant plant matters that contribute to the flavor and fragrance. They have been used by doctors in France, China, India, and other countries for many years because of their antibiotic and antiviral properties.^{28,29} In this review, we focused on the use of essential oils by absorption from the skin via massage. There are many types of massage that are commonly used (e.g., Swedish massage, reflexology, sports massage, shiatsu, *effleurage* [stroking], *petrissage* [compression], *tapotement* [percussion], vibration and friction, etc.^{30,31} Although massage exists in a variety of forms, the studies we reviewed mainly used Swedish massage. It consists of five basic strokes which are *effleurage* (light touch), *petrissage* (kneading), *tapotement* (rhythmic tapping), friction (compression), and vibration.^{32,33} As our aim is to determine the effect of aromatherapy on the psychophysiologic functioning of the body, confining ourself to the Swedish style minimizes the confounding effects of other forms of massage, which may also serve to improve the mood of the body.

Once the essential oil enters the bloodstream, the molecular or chemical constituents are absorbed through the lining of the mouth, vagina, anus, or external skin,^{34,35} which then produce measurable psychologic effects such as significant improvement of anxiety and depression.^{36,37} Accumulating evidence showed that essential oils such as lavender, bergamot, and rose had subjective effects on depression alleviation.^{24,38} The pharmacologic effects of these commonly used essential oils nevertheless remain undetermined. Very little scientific evidence is available that explains its underlying physiologic effects.

There have been a few systematic reviews on the antidepressive effects of aromatherapy. A review on the clinical benefits of aromatherapy³⁹ suggested that aromatherapy was pleasant, slightly anxiolytic, and often enjoyable for patients under stressful situations. However, the evidence was not compelling to support the legitimate clinical indications of aromatherapy. Another systematic review on complementary therapies for depression⁴⁰ made a similar conclusion that there was little objective evidence to bolster its effect to treat depression, although aromatherapy was widely used among people with depression. Despite the negative results of earlier reviews in human subjects, research on the effects of aromatherapy using animal models has blossomed

in recent years. Studies found that essential oils produced anxiolytic or antistress effects in rats and mice.^{41–43} Studies suggested that lemon odor had antidepressant properties and antistress effect in rats and mice, while lavender oil and rose oil had anxiolytic effects in rats.^{41–44} Furthermore, the main components of lavender oil were found to facilitate relaxation of the rabbit vascular smooth muscle,⁴⁵ have an impact on autonomic neurotransmission, and reduce blood pressure in rats.⁴⁶ Other than animal studies, research on this area using human subjects has been emerging steadily for the past decade.^{26,39} Aromatherapy research on human subjects had demonstrated improved mood and decreased anxiety after the presentation of chamomile, lavender, spiced apple, eucalyptus, and geranium oil.^{47–53} To our knowledge, there has not been any comprehensive review since 2000. We therefore aimed to conduct a review of the literature to update the evidence as to the antidepressive effects of aromatherapy.

Methods

The search was limited to published English research papers from 2000 to 2008 using MEDLINE,[®] PubMed, CINAHL, PsycInfo, and Cochrane library. Keywords used included aromatherapy, scent or fragrance or essential oil, and depressive disorder or depressive symptoms or depression. Forty-eight (48) papers were extracted following the above-mentioned computerized search for a detailed review. A paper was included in our review if (1) it had a clinical application of aromatherapy that referred to the application of aromatherapy as treatment for people suffering from some kinds of clinical conditions; and (2) the participants suffered from depressive symptoms. The paper was excluded if (1) it studied the chemistry of essential oils; (2) it was a dissertation; and (3) it was a non-English paper. The data extraction was carried by two independent reviewers who are Master's degree students majoring in occupational therapy. Eventually six papers were included in the review. Figure 1 summarizes the screening and selection process.

Results

A summary of the results is presented in Table 1.

General descriptions of the studies

Among the six papers reviewed, two were randomized controlled trials (RCT), three were non-RCTs, and the remaining one was a quasi-experimental study. The total number of subjects involved in these six studies was 387. Two (2) papers^{54,55} described the effectiveness of aromatherapy on patients with depression, three papers^{56–58} studied secondary depressive symptoms of patients with cancer, and one paper⁵⁹ focused on postnatal depression. All studies discussed the effectiveness of aromatherapy massage on depressive symptoms. A 30-minute^{54,58} to 1 hour^{55–57,59} aromatherapy massage was used in the RCTs, non-RCTs, and quasi-experimental studies. Although the papers did not specify the type of massage used in their studies, we identified that Swedish massage was employed in all of the studies according to their descriptions. Lavender oil was adopted in three studies.^{56,57,59} Chamomile oil,⁵⁶ blend of sweet orange, geranium, and basil oils,⁵⁵ and blended oil without

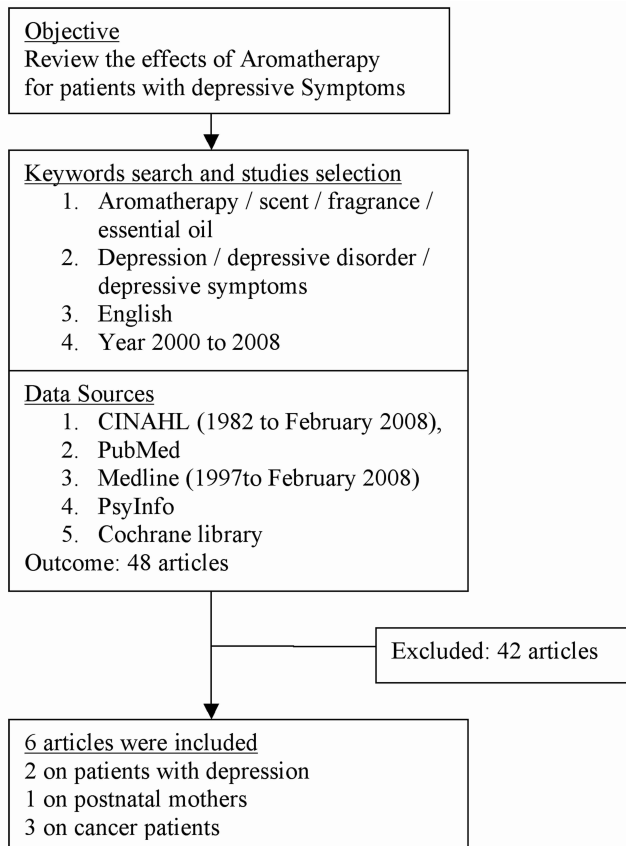


FIG. 1. Flow of the literature search process. Cumulative Index to Nursing and Allied Health Literature (CINAHL).

specification^{54,58} were used in another two studies. Table 1 shows the summary of the six reviewed studies.

Effectiveness on depression

Two (2) non-RCT studies^{54,55} reported positive effects of aromatherapy massage on depression. As mentioned earlier, Swedish massage was used in both studies. In one study,⁵⁵ all of the 5 subjects had a diagnosis of 296.21 Major Depressive Disorder, Single Episode, and Mild (not including psychotic features) based on *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV)*.⁶⁰ The 17-item Hamilton Depression Rating Scale (HAM)⁶¹ and Profile of Mood States (POMS)⁶² were used to measure the depression level before and after the massage. Eight (8) sessions of aromatherapy massage with each lasting for 30 minutes resulted in a positive effect on patients with major depressive disorder. All patients had a significant drop in their depression scores from 14.8 ± 2.39 to 8.8 ± 3.63 ($p = 0.039$) based on the HAM and their confusion-bewilderment scores of POMS from 62.2 ± 13.07 to 51.6 ± 8.05 ($p = 0.043$). In another study,⁵⁴ all of the 8 subjects had an International Classification of Diseases Volume 10 diagnosis⁶³ of schizophrenia, psychotic depression, or anxiety with depression. The Hospital Anxiety and Depression Scale (HADS)^{64,65} was used to measure the level of anxiety and depression prior to the first massage and after the final massage. A 10-cm visual analogue, which was developed by the author and had not been tested for validity or reliability, was used to measure the levels of

mood, anxiety, and relaxation before and after each massage and 6 weeks after the last massage. Certain improvement was reported on the depressive mood of the patients. Six (6) of 8 participants showed improvement in their depression, which was reflected by scores of HADS after treatment. The analysis of the results from the visual analogue scale scores showed a 30% improvement in the level of mood between the rating scales that were completed before and after each massage. A comparison of results of the first massage visual analogue score and the 6-week postmassage score showed a 10% improvement in the level of mood.

Effectiveness on secondary depressive symptoms in patients with cancer

Cancer is a disease difficult to be cured completely by modern medicine. Thus, this has caused a dramatic increase in the use of complementary therapies, which were observed to be able to improve patients' sense of well-being and quality of life, instill a sense of control and empowerment, and foster hope.^{66,67}

Two (2) RCTs were reviewed^{57,58} where the subjects had experienced aromatherapy massage for a weekly treatment course lasting for 4 weeks with each session lasting for 30–60 minutes. All the subjects had a diagnosis of cancer. The majority of subjects suffered from breast cancer with a figure of 36% in one study⁵⁷ and 76% in another study.⁵⁸ The subjects had varying levels of physical and psychologic symptoms⁵⁷ or clinical anxiety and/or depression according to the modified DSM-IV criteria.⁵⁸ In Wilkinson et al.⁵⁸ the subjects were classified as full case, borderline, or noncase anxiety or depression. Symptoms of anxiety and depression were assessed using a shortened version of the Structured Clinical Interview (SCID).⁶⁸ Interview and questionnaire measures were administered at baseline, 6 and 10 weeks after interventions. Their results showed that patients receiving aromatherapy massage had significant improvement in anxiety and/or depression at 6 weeks postrandomization compared with those receiving usual care; however, significant improvement was not found at 10 weeks postrandomization. In another study,⁵⁷ HADS was used to measure anxiety and depression at baseline, and final assessment was measured 1 week after the last massage. Some statistically significant improvements on depression scores were found in the control group (massage group) but not in the aromatherapy massage group. In a nonrandomized controlled trial study,⁵⁶ 8 subjects who had a diagnosis of a primary malignant brain tumor and who had completed a course of radiotherapy were recruited. The blood pressure, pulse, and respiratory rate of the subjects were measured before and after the aromatherapy massage. They also completed HADS and a semistructured interview 24 hours and 1 week after receiving aromatherapy massage, respectively. Although the HADS results did not show any psychologic benefit from aromatherapy massage, there was a statistically significant reduction in four physical parameters including systolic blood pressure, diastolic blood pressure, heart rate, and respiratory rate. The "relaxation response" is involuntary, which results in decreased activity of the sympathetic nervous system and thus a lowering of heart rate, respiratory rate, and blood pressure.^{56,69} This suggested that aromatherapy massage may affect the autonomic nervous system and induce relax-

TABLE 1. SUMMARY OF THE SIX STUDIES ON AROMATHERAPY MASSAGE

Study	Participant	Randomization/ Non-randomization	Type of intervention	Outcome measure	Outcome
Edge, 2003 ⁵⁴	N = 8 ICD-10 Diagnosis of schizophrenia, psychotic depression, or anxiety with depression	Nonrandomized study	Initial consultation, 1 hr aromatherapy massage for 6 sessions (essential oils blended specifically for each session/individual client)	(i) Hospital Anxiety and Depression Scale (HADS) (ii) 10-cm visual analogue scale	(i) In HADS (after 6 wks), 6/8 subjects showed improvement in depression dimension, 2 showed no change (ii) In visual analogue scale (after each session), 30% improved in level of mood (iii) In visual analogue scale (6 wks after last session), 10% improved in level of mood
Okamoto et al., 2005 ⁵⁵	N = 5 Diagnosis of 296.21 Major Depressive Disorder, Single Episode, and Mild (not including psychotic features) of DSM-IV	Nonrandomized study	30-min aromatherapy massage (sweet orange, geranium, and basil) twice for 4 wks	(i) Hamilton Depression Rating Scales (HAM) (ii) Profile of Mood States (POMS)	(i) HAM scores improved from 14.8 ± 2.39 to 8.8 ± 3.63 ($p = 0.039$) (ii) Confusion-bewilderment (C-B) score (subscale of POMS) improved from 62.2 ± 13.07 to 51.6 ± 8.05 ($p = 0.03$)
Hadfield, 2001 ⁵⁶	N = 8 Diagnosis of primary malignant brain tumor	Nonrandomized study	30-min aromatherapy massage (lavender or Roman chamomile) with Enya's music	(i) Physical parameters: systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), respiratory rate (RR) (iii) Hospital Anxiety and Depression Scale (HADS) (iv) Semistructured interview	(i) Significant reduction in all four physical parameters (after aromatherapy massage). (ii) HADS (24 hr after aromatherapy massage) showed no significant psychologic benefit (iii) In semistructured interview (1 wk after aromatherapy massage), subjects all felt "relaxed" or "less tense"

Soden et al., 2004 ⁵⁷	N = 42 Majority (36%) were diagnosed with breast cancer	Randomized study	30-min aromatherapy back massage group (lavender oil), inert oils back massage group & a control group (no massage). Performed weekly for 4 wks	(i) Hospital Anxiety and Depression Scale (HADS)	(i) Patients in the massage group scored significantly better on depression subscore of HADS after both 2nd and 4th treatment
Wilkinson et al., 2007 ⁵⁸	N = 288 Majority (76%) were diagnosed with breast cancer. Classified as full case, borderline, or noncase of anxiety or depression using modified SCID	Randomized study	1 hr aromatherapy massage weekly for 4 weeks and usual supportive care (20 essential oils) or usual supportive care alone	(i) Shortened version of the Structured Clinical Interview (SCID) (ii) Center for Epidemiological Studies Depression (CES-D) scale	(i) in SCID: a) 6 wks after: 55% patients ± had improvement, more patients in aromatherapy massage group had an improvement than usual care only group (64% vs. 46%; OR, 1.4; 95% CI, 1.1 to 1.9; <i>p</i> = 0.01) b) 10 wks after: 63% patients had improvement. No difference in the improvement between aromatherapy massage group and usual care only group (68% vs. 58%; OR, 1.3; 95% CI, 0.9–1.7; <i>p</i> = 0.1) (ii) In CES-D scale, no significant difference in improvement between 2 groups at 6 or 10 wks postrandomization
Imura et al., 2006 ⁵⁹	N = 36 First-time mothers with vaginal delivery of a full-term, healthy infant	Quasi-experimental design. Clinical control trial	30-min whole body aromatherapy massage group with Neroli and Lavender oils or control group	(i) Maternity Blues Scale (Japanese version) (ii) Profile of Mood States (Japanese version)	Significant lower scored in Maternity Blues Scale and in 5 of the 6 subscales of Profile of Mood States in aromatherapy massage group comparing with the control group

ICD-10, International Classification of Diseases to Diagnosis.

ation. This conclusion was also supported by the positive comments from the patients during the interview.

Effectiveness on depressive symptoms in postnatal mothers

In 2006, Imura⁵⁹ implemented a clinical control study investigating the effect of aromatherapy massage among postpartum mothers. The results showed a significant drop in the scores of the Japanese version of Maternity Blues Scale^{70,71} and in five (Tension–Anxiety, Anger–Hostility, Depression–Dejection, Fatigue, and Confusion) of six subscales of the Japanese version of Profile of Mood States^{72,73} in the aromatherapy massage group when compared with the control group.

Discussion

CAM has been emerging as an alternative treatment for depression worldwide.^{74–76} Aromatherapy is one of the most popular CAM modalities among individuals with depression.^{56,58,77} Our results suggest that aromatherapy has an alleviation effect on the mood of patients with depressive symptoms; however, there is a notable lack of studies on its use among people with depression. Most of the studies we reviewed in this paper examined the effects of aromatherapy on depressive symptoms in various types of clients; however, these studies had limitations on their designs. In fact, very few well-controlled RCTs were available. However, some studies showed positive effects of aromatherapy in people with depression^{54,55} and cancer,^{57,58} and in mothers after giving birth.⁵⁹

HADS, which was used in three studies,^{36,38,39} was the most commonly used scale for measuring depression among the six reviewed papers. HADS is a well-validated self-assessment tool designed specially for hospital use to detect anxiety and depression.^{54,57} Profiles of Mood States (POMS) was used in another two studies^{55,59} for rating moods. Comparing with HADS, POMS rates four more categories in addition to anxiety and depression. The six categories are Tension–Anxiety, Depression–Dejection, Anger–Hostility, Vigor, Fatigue, and Confusion.⁵⁹ The 13-item Japanese version of Maternity Blues Scale, which adopts 0–1 to 0–5 Likert scores with possible scores ranging from 0 to 26, was used in the Imura study⁵⁹ to measure maternity blues. The HAM in the Okamoto et al. study⁵⁵ was used to measure depression while the shortened version of the SCID was used to elicit symptoms of anxiety and depression in the Wilkinson et al. study.⁵⁸

Almost all of the studies employed aromatherapy massage instead of aromatherapy alone. Other methods of applying essential oils in aromatherapy were not mentioned, such as internal/oral application and inhalation. This review thus posed a query about the results of studies in terms of whether the effects were due to aromatherapy alone or its interaction effect with massage. A similar question was also raised by Imura.⁵⁹ Since the use of aromatherapy massage consists of three channels of stimulations (i.e., olfactory stimulation, somatosensory stimulation, and tactile stimulation), the positive effects of aromatherapy massage might have been due to the integrated therapy consisting of these three components. It is difficult to understand the pure effects of aromatherapy and essential oils based on extant literature. Fur-

thermore, the significant effects of aromatherapy massage seen in lower scores on depression were consistent with other massage studies of depressed clients. One study reported that there were no significant differences between massage with and without aroma.⁵⁷ A conclusion could be drawn at this stage is that it remains unknown whether the effects came from aroma intervention, massage intervention, or an interaction of these two interventions.

Similarly, the psychobiologic mechanism underlying the effect of depression alleviation remains enigmatic. Previous studies suggested that depression may be caused by monoamine deficiency or imbalance.^{78,79} Diminished activity of serotonin (5-HT) pathways was believed to play a role in the pathophysiology of depression.^{78,80} In addition, γ -aminobutyric acid (GABA) was found to be diminished in the hippocampus, and this decrease was reversed by antidepressant drugs.^{81,82}

The antidepressant effects of aromatherapy were shown in animal studies. In an animal study,⁴² lemon oil, which is a kind of essential oil, was found to significantly accelerate the metabolic turnover of 5-HT in the prefrontal cortex and striatum. This is similar to the effect of SSRIs, which are commonly used as antidepressants to ameliorate depressive symptoms by increasing 5-HT function.^{78,83} Perry et al.²⁴ suggested that essential oils such as bergamot, jasmine, lavender, rose, and geranium had antidepressant effects. As to the anti-anxiety mechanism of linalool in lavender, studies in rats showed that the benzodiazepine binding site in the GABA_A receptor was likely implicated. In addition, other animal studies found that the pharmacologic effect of lavender was similar to that of diazepam, which also acts as a GABA agonist.^{24,84,85}

Recently, it had been found that patients with depression had a reduced sensitivity to odors.^{86–88} Many studies on depression demonstrated an abnormal activation in various brain regions including the amygdala, anterior cingulate, and prefrontal cortex.^{89–91} The relationship between reduced olfactory sensitivity and depressive symptoms was suggested to be associated with dysfunction of brain structures subserving primary olfactory processing such as amygdala and piriform cortex, which were shown to be involved in depression.^{87,92} In the study by Pause et al.,⁸⁶ the hedonic ratings for 10 odors were evaluated. Citrus, which consisted of 95% citral, was evaluated as more pleasant by the depressive subjects but not by the control subjects. Many studies^{24,44,93–95} reported that citral is an important component of essential oils that produces relaxation and antidepressant effects. Thus, the use of aromatherapy to improve depression lies in the hypothesis that providing stimulations by essential oils may help reduce the blockage of the olfactory pathways. However, this postulation remains to be tested.

Despite the intriguing findings of this review, there are a few limitations that need to be observed. First, sample sizes were small in half of the studies ($N = 8^54$; $N = 5^55$; $N = 8^56$) and only six studies were reviewed. Although most of the studies mentioned details of aromatherapy massage provided to the patients, it is not known whether the variations in type and length of massage between studies would have influenced the outcomes. Second, as the studies used different kinds of essential oils, it remains uncertain whether the effects were due to the particular essential oil used or to the general properties of aromatherapy. Third, due to restriction

imposed by the selection criterion to include studies for people with depression, only two studies were RCTs and the others were either non-RCTs or quasi-experimental design. Given the small number of available studies that suited the selection criteria, we did not adopt any scoring system or quality assessment for data extraction. Although we did not include a "reasons for exclusion" table, we excluded studies that had no baseline assessments and non-peer-reviewed publications such as dissertations and non-English papers.

Conclusions

Although the evidence on the effects of aromatherapy on depressive symptoms is insufficient, it is suggested that it may continue to be used as a complementary and alternative therapy for depression, patients cancer with depressive symptoms, and postnatal depression. A reasonable generalization here is that it may be considered by therapists for use among patients with secondary depression arising from various types of chronic medical conditions. Nevertheless, therapists should be fully aware of the safety issue, although the literature has suggested its good safety record.⁹⁶

Disclosure Statement

No competing financial interests exist.

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