Aromatherapy for pain relief and psychological problems

Systematic Review

Ludwig Boltzmann Institut
Health Technology Assessment

Decision Support Document Nr. 16
ISSN online 1998-0469

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Vienna, February 2008

Institut für Health Technology Assessment
der Ludwig Boltzmann-Gesellschaft

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Publisher:
Ludwig Boltzmann Gesellschaft GmbH
Operngasse 6/5. Stock, A-1010 Vienna
http://www.lbg.ac.at/gesellschaft/impressum.php

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Decision Support Document Nr. 16
ISSN online 1998-0469

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Table of Contents

Figures

Tables

Summary

aromatherapy claimed to have healing properties

Aromatherapy is the most widely used complementary therapy in nursing practice, and uses essential oils from fragrant plants to relieve health problems and improve quality of life in general. The healing properties of aromatherapy are claimed to include relaxation and sleep, pain relief and the reduction of depressive symptoms.

this review evaluates the evidence about aromatherapy

This systematic review evaluates the evidence about aromatherapy in order to determine whether or not aromatherapy is effective for pain relief and psychological problems, and how safe it is.

heterogeneous results

Ten randomised controlled trials (RCTs) of fair to good quality are identified and included in the review. The indications covered by these studies are procedural anxiety, anxiety in cancer patients, agitation in dementia and pain. According to the evidence, aromatherapy is useful for some conditions, such as agitation in dementia, but not for others, including procedural anxiety. The evidence as to the safety of aromatherapy is inadequate. Extensive and good quality RCTs are required to obtain a clear picture as to whether aromatherapy is effective for psychological problems or pain, and whether it is a safe treatment.

1 Aromatherapy for pain relief and psychological problems

1.1 Background

Aromatherapy is the most widely used complementary therapy in nursing practice [1], and is part of the discipline of phytotherapy (the use of whole plants or parts of plants for medicinal purposes). It uses essential oils from fragrant plants (such as Peppermint, Sweet Marjoram and Rose) to help relieve health problems and improve quality of life in general. The healing properties of aromatherapy are claimed to include relaxation and sleep, pain relief and reduction of depressive symptoms [2].

aromatherapy claimed to have healing properties

It is often hailed as a relatively inexpensive and safe treatment compared with conventional methods, and thus, if a clinically relevant benefit could be demonstrated, it might become more widely used. However, aromatherapy is regarded by many as a quack treatment, no more effective than a placebo. As healthcare becomes increasingly driven by evidence-based practice, there is a need to objectively evaluate the efficacy of aromatherapy [1]. This systematic review summarises and analyses the evidence available as to the effect of aromatherapy on psychological problems and pain compared with conventional treatment and placebo. Its conclusion is based on the GRADE system for evaluating evidence (see [3]).

there is a need to establish whether aromatherapy is more effective than placebo

this review evaluates the evidence

1.2 Description of treatment

The essential oils can be used in oil burners, in bath water, be massaged into the skin, inhaled through an oxygen facemask, or simply inhaled. Thus the aroma stimulates the olfactory senses, or the oils are absorbed into the skin [4]. Aromatherapy is thought to affect mood by promoting the release of neurotransmitters, which reduce pain and create a feeling of well-being [1]. Due to the pleasant fragrances and methods of application, aromatherapy is often said to be a very pleasant treatment.

aromatherapy is said to affect mood by promoting the release of neurotransmitters

1.3 Indication and therapeutic aim

The indications covered in this review are pain, in any patient, and psychological problems related to anxiety and depression. The therapeutic aim is the reduction of any of these symptoms.

indications: pain and pschological problems

therapeutic aim: improvement of symptoms

1.4 Treatment costs

While the costs of aromatherapy treatment will vary according to the type and duration of the treatment, it is assumed that they are low compared with

the treatment costs are assumed to be low

conventional treatments, or will not add a significant cost if used in addition to other treatments. Wiebe [5] reflects that aromatherapy is 'relatively inexpensive', and as such this appears to be an argument used to encourage people to try aromatherapy, though its precise effects are unknown. At the same time, one ought to consider that if aromatherapy is used in conjunction with, for example, massage, the overall costs may increase.

2 Literature search and selection

2.1 PICO questions

PICO questions

1. Is aromatherapy effective in the treatment of stress, anxiety, and depression, both in general and in comparison to conventional treatments or placebo?

2. Is aromatherapy effective for pain relief compared with conventional treatment or placebo?

3. Is aromatherapy in the treatment of the above conditions safe, in comparison to conventional treatments or placebo?

2.2 Inclusion criteria

Table 2.2-1 Inclusion criteria

inclusion criteria

Population	Patients with pain. Patients with psychological problems.
Intervention	Any aromatherapy treatment.
Comparison	Conventional treatment. Placebo.
Outcomes	Pain reduction. Improvement of psychological problems.
Study design	Prospective studies with control group of good or fair quality. N ≥ 20.

2.3 Literature search

literature search

The systematic literature search was carried out on 14.11.07 in the following databases.

- Medline via Ovid
- Embase via Ovid
- CCRCT (Cochrane Library) via Ovid
- CDSR (Cochrane Library) via Ovid
- NHS EED-Datenbank des CRD York
- HTA - Datenbank des CRD York
- DARE - Datenbank des CRD York

The search was limited to English and German language literature and covered the entire time span of the databases.

After the removal of duplicates, 351 bibliographical references were available. The exact search strategy can be requested at the LBI for HTA.

By means of a hand search, 244 additional references were identified, which raised the overall number of hits to 595.

2.4 Literature selection

literature selection

Overall, 595 Articles were available for the literature selection. The selection process is depicted in Figure 2.4-1 below.

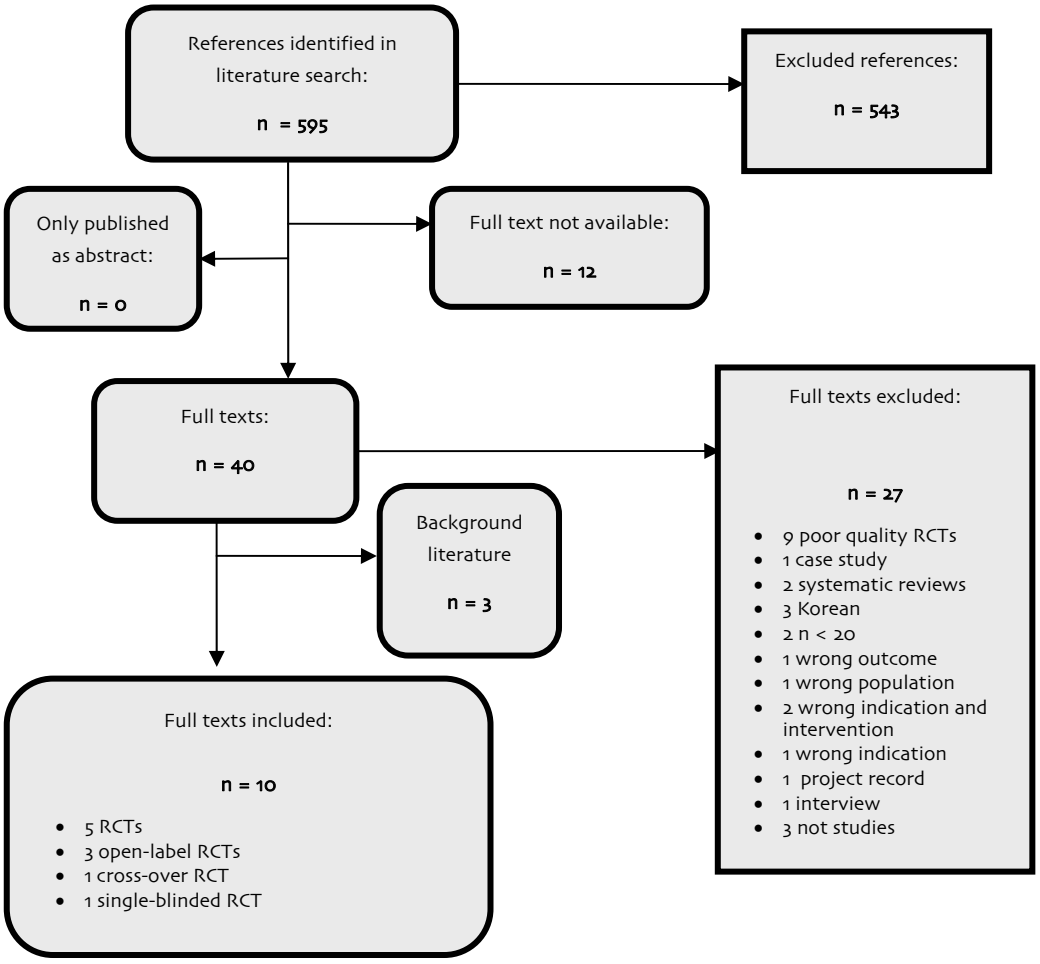

Figure 2.4-1: Depiction of the selection process (QUORUM tree)

3 Assessment of the quality of the studies

The evaluation of the quality of the studies was carried out by two reviewers, independently of each other. Conflicting views were settled by means of discussion and consensus, or through the involvement of a third person. An exact list of the criteria that were used for the evaluation of the internal validity of the studies can be found in the internal manual of the LBI-HTA [6].

quality assessment of studies carried out by two reviewers

4 Data extraction

The extraction of data was carried out by one person. A second person checked the completeness and accuracy of the data.

data extraction carried out by one person

4.1 Presentation of the study results

Ten randomised controlled trials (RCTs) [5, 7-15] were included to answer the PICO questions (see Chapter 2.1).

10 RCTs included

Table 4.1-1: Study results

Author, Year, Reference number	Ballard et al. 2002 [7]	Graham et al. 2003 [8]	Han et al. 2006 [9]	Lin et al. 2007 [10]	Muzzarelli et al. 2006 [11]	Shin et al. 2007 [12]	Soden et al. 2004 [13]	Wiebe et al., 2000 [5]	Wilkinson et al. 1999 [14]	Wilkinson et al. 2007 [15]
Country	UK	Australia	Korea	China	USA	Korea	United Kingdom	Canada	United Kingdom	United Kingdom
Sponsor	Mental Health Foundation	NR	NR	NR	NR	NR	Foundation for Integrated Medicine	NR	NR	Cancer Research UK, Marie Curie Cancer Care, Macmillan Cancer Support, Dimbleby Cancer Care
Study design	RCT	RCT	RCT	Cross-over RCT	open-label RCT	open-label RCT	open-label RCT	RCT	RCT	single-blinded RCT
Quality	Fair	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair
Number of patients	72	313	67	70	118	30	42	66	103	288
Lost to follow up	1.4%	6-9%	0%	0%	Not reported	0%	14%	0%	15.5%	23%
Study Population	Nursing home patients with dementia and clinically significant agitation	Patients undergoing radiotherapy	College students experiencing dysmenorrhea	Nursing home patients with dementia and agitation	Patients scheduled for elective gastrointestinal endoscopic procedure	Stroke patients with hemiplegic shoulder pain	Patients with advanced cancer	Women waiting for surgical abortions	Patients with cancer	Patients with advanced cancer
∅ Patient age	Intervention:77.2 Control: 79.6	65	Aromatherapy: 25 Massage: 20 No Intervention: 22	78	52	Intervention: 60.6 Control: 63.1	73	Intervention:26.9 Control: 26.1	53.1	52.1
Indication for aromatherapy	Agitation in severe dementia	Anxiety during radiotherapy	Dysmenorrhea	Agitation in dementia	Preprocedural anxiety	Hemiplegic shoulder pain	Physical and psychological symptoms in patients with advanced cancer	Preoperative anxiety	Anxiety in patients with cancer	Anxiety or depression in patients with cancer

Intervention	Twice daily active aromatherapy treatment with Melissa oil combined with base lotion applied to face and arms	Inhalation of: essential oils of lavender, bergamot, and cedarwood during radiotherapy	Abdominal massage using essential oils of lavender, clary sage, and rose	Inhalation of essential lavender oil using a aroma diffuser	Inhalation of essential Lavender oil	Aromatherapy with essential oils of rosemary, lavender, and peppermint plus acupressure	Weekly massages with lavender essential oil	Sniffing mixture of bergamot and geranium oils	Massage using carrier oil plus Roman chamomile essential oil	Individualized aromatherapy massage with various essential oils
Control	Twice daily application of sunflower oil combined with base lotion to face and arms	Inhalation of: 1) carrier oil (almond cold pressed vegetable oil) as a non-fragrant placebo 2) fractionated oils of lavender, bergamot, and cedarwood with carrier oil as a fragrant placebo during radiotherapy	1) abdominal massage using almond oil 2) No treatment	Inhalation of sunflower oil using a aroma diffuser	Inhalation of grapeseed oil	Acupressure	1) Weekly massages with inert carrier oil 2) No intervention	Sniffing hair conditioner containing Brazil nut oil	Massage using carrier oil	Usual supportive care
Duration of treatment	4 weeks	15-20 minutes	15 minutes	Nightly treatments over 3 weeks,	5 minutes	20 minutes twice daily over 2 weeks	30 mins per week, 4 weeks	10 minutes	3 massages over 3 weeks	1 hour massage weekly across 4 weeks
Main outcome measures	Change in total CMAI scores	HADSA for anxiety	VAS for menstrual cramps. Verbal multidimensional scoring system for dysmenorrhea symptoms.	Chinese CMAI	State component of STAI	Korean verbal pain rating system, 0-8 (0 = not at all)	VAS of pain intensity. Hospital Anxiety and Depression Scale (HAD).	10-point scale rating subjective anxiety (0 = no anxiety)	STAI	Change in clinical and self-reported anxiety and/or depression based on a shortened version of the Structured Clinical Interview

Results	Higher reduction in CMAI scores with aromatherapy than with placebo: (-35% vs. -11%; P<0.001)	Fewer patients on non-fragrant placebo had HADSA scores ≥7 than those on essential oils or fragrant placebo (13% vs. 26% (P = 0.04) vs. 23% (P = 0.04)	Women on aromatherapy reported greater reductions of cramps on the second day of menstruation than those with massage or no intervention (-4.5, vs. -0.5 vs. 0.0; P= NR)	Patients on aromatherapy had a greater change of CCMAI scores than those on placebo (-4.4 vs. -0.04; P = NR)	No significant difference in SA between pre- and post-treatment in control or experimental groups (Data NR).	Significantly greater changes in pain scores with aromatherapy (-4.0 vs. -2.0; P =0.001)	No significant differences of changes in VAS (0.19 vs. 0.32 vs. 0.78; P = NR) or HAD (Anxiety: -0.5 vs. 0.0 vs. 0.0; P = NR) from baseline to endpoint among aromatherapy, massage, and no intervention groups	Similar reduction in anxiety scores between intervention and control groups (-1.1 vs. -1.0 points; P=0.71)	Statistically significant reduction in SA between pre- and post-treatment after each massages in experimental and control and groups (1st massage: -14.49 vs. -14.46; P= NR. 2nd massage: -11.65 vs. -14.73; P= NR. 3rd massage: -13.79 vs. -12.23; P= NR)	Patients who received aromatherapy massage had a significantly greater improvement of clinical anxiety and/or depression after 6 weeks post-randomisation (OR 1.4 95% CI 1.1 to 1.9; P=0.01) The difference was not statistically significant after 10 weeks post-randomisation (OR 1.3, 95% CI 0.9 to 1.7; P = 0.1)
Adverse events	NR	NR	None.	None.	NR	NR	NR	NR	NR	NR

Abbreviations:

NR: Not reported
OR: Odds ratio
CI: Confidence interval
CMAI: Cohen-Mansfield Agitation inventory
HADS: Hospital Anxiety and Depression Scale
HADSA: Hospital Anxiety and Depression Scale – Anxiety score
VAS: Visual analogue scale
CCMAI: Chinese Cohen-Mansfield Agitation inventory
STAI: State-Trait Anxiety Inventory
SA: State Anxiety

4.2 Efficacy

effiacy of aromatherapy evaluated for 4 indcations

The populations included in the trials varied, and included patients with preprocedural anxiety, agitation in dementia, anxiety in cancer patients and various types of pain. The efficacy of aromatherapy is evaluated for each indication.

4.2.1 Efficacy of aromatherapy for procedural anxiety

3 RCTs on aromatherapy for procedural anxiety

Two good quality RCTs [5, 8] and a fair quality open label RCT [11] reported on the efficacy of aromatherapy in reducing procedural anxiety for a variety of procedures compared with placebo. Details of these are summarised in table 4.1-1. No studies compared aromatherapy for procedural anxiety with conventional treatment.

Wiebe [5] reported an insignificant difference between the intervention group and the control group: A 1.1 point reduction in subjective anxiety score (10 point rating) in the intervention group compared with a 1.0 point reduction in the control group, with a p-value of 0.71. Muzzarelli et al. [11] reported that there was no significant difference in SA between pre- and post-treatment in control or experimental groups, but the data was not reported. In the largest of the RCTs (n=313) Graham et al. [8] found that post-treatment HASDA scores were significantly lower in the non-fragrant placebo group than in the essential oils or fragrant placebo group (13% vs. 26% vs. 23%; P=0.04).

aromatherapy is not more effective than placebo

strength of evidence is moderate

Thus there is consistency across studies: Aromatherapy is not more effective than placebo in reducing procedural anxiety. The duration of inhalation appears to make no difference, as the result was the same with a 5 minute inhalation [11] as for a 15-20 minute inhalation [8]. The strength of the evidence is moderate.

4.2.2 Efficacy of aromatherapy for agitation in dementia

2 RCTs on aromatherapy for agitation in dementia

One RCT [7] and one cross-over RCT [10] , both of fair quality, and similar in sample size and duration, reported on the efficacy of aromatherapy in reducing agitation in dementia patients compared with placebo. Details of these are summarised in table 4.1-1. No studies compared aromatherapy with conventional treatment in the treatment of agitation in dementia patients.

Ballard [7] reported that the aromatherapy group had a 35% reduction in Cohen-Mansfield agitation inventory (CMAI) scores than the placebo group, where the reduction was 11%. The difference was statistically significant ($P < 0.001$). This particularly large effect may have been influenced by poor cluster randomisation was used. However, the result corresponds to that found by Lin et al. [10], where patients on aromatherapy experienced a

greater change in Chinese CMAI than those on placebo (4.4 vs. 0.04). However, as the p-value was not reported, it is not certain whether this difference is statistically significant.

aromatherapy more effective than placebo.

The treatment effect is consistent across studies, with aromatherapy reducing agitation to a greater extent than placebo, but methodological flaws may have biased results. The strength of the evidence is moderate.

strength of evidence is moderate

4.2.3 Efficacy of aromatherapy for anxiety in cancer patients

3 RCTs on aromatherapy for anxiety in cancer patients

One RCT [14], one open label RCT [13] and one single-blind RCT [15], all of fair quality, reported on the effects of aromatherapy on anxiety in cancer patients. Details of these are summarised in table 4.1-1.

Wilkinson et al. 1999 [14] reported a statistically significant reduction in SA between pre- and post-treatment in aromatherapy and placebo groups, but no p-value as to the statistical difference between the two groups. Soden et al. [13] reported that there was no significant difference in the change in the anxiety score of the Hospital Anxiety and Depression Scale (HADSA) between aromatherapy, massage (placebo) and no intervention, but also gave no p-value. Small sample sizes (103 in Wilkinson et al. 1999 and 42 in Soden et al.) may have led to inaccurate results.

In the largest of the three trials (n=288), Wilkinson et al. 2007 [15] compared aromatherapy with usual supportive care and found that patients receiving aromatherapy had a significantly greater improvement in clinical anxiety and/or depression 6 weeks post-randomisation (OR 1.4 95% CI 1.1 to 1.9; P = 0.01) but not 10 weeks post-randomisation (OR 1.3, 95% CI 0.9 to 1.7; P = 0.1.

inconsistent results

All three studies are of fair quality, but unfortunately the results for comparisons between aromatherapy and placebo are inconsistent. Also, one fair quality study comparing aromatherapy with conventional supportive care for cancer patients is not sufficient to determine the comparative effects of aromatherapy on cancer patients. More RCTs are required to establish the effect of aromatherapy on anxiety in cancer patients. The strength of the evidence is very low.

strength of evidence very low

4.2.4 Efficacy of aromatherapy for pain

3 RCTs on aromatherapy for pain

Two open label RCTs [12, 13] and one RCT [9], all of fair quality, report on the effectiveness of aromatherapy for pain compared with placebo. Details of these are summarised in table 4.1-1.

Soden et al. [13] looked at aromatherapy for pain in cancer patients and found no significant differences in changes in VAS between the aromatherapy group (0.19 point reduction) and the placebo group (0.32). The p-value was not reported. Han et al. [9] reported that women on aromatherapy reported a greater reduction in cramps on the second day of menstruation than those with massage or no intervention (-4.5 vs. -0.5 vs. 0.0). However, the statistical significance of this difference was not reported. For hemiplegic shoulder pain, Shin et al. [12] found significantly greater changes in aromatherapy recipients than the placebo group (4.0 vs. 2.0; P=0.001).

The results of these studies are inconsistent, but one ought to take into the consideration the fact that they all report on different types of pain. Also, the sample sizes in all three RCTs were small, between 30 and 70. Further RCTs are required to establish the pain reducing effect of aromatherapy. The strength of the evidence is low.

inconsistent results, but for different types of pain

strength of evidence low

4.3 Safety of aromatherapy

Few of the studies make references to side-effects or the general safety of aromatherapy. However, this seems to reflect the fact that aromatherapy is regarded as relatively safe. Wiebe [5] mentions the safety of aromatherapy in passing ('relatively safe'). Two report no side effects [9, 10], and one [7] reports that there were no significant side effects but does not describe the side effects that were experienced. The strength of the evidence is low.

adverse events under-reported.

aromatherapy likely to be safe

strength of evidence is low

5 Strength of the Evidence

GRADE system

The GRADE system is used to evaluate the strength of the (see [3]). GRADE uses the following classifications and definitions to evaluate the strength of the evidence.

- high: further research is very unlikely to change our confidence in the estimate of effect
- Moderate: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
- Low: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
- Very low: any estimate of effect is very uncertain

The evidence profile of aromatherapy including GRADE ratings is shown in table 5-1 below.

Table 5-1: Evidence profile of aromatherapy

Number of studies/patients	Design	Methodological quality	Consistency of results	Directness	Size of effect	Other modificatory factors	Strength of the collective evidence
Outcome: Reduction of procedural anxiety (compared with control)							
3/226	RCT	Fair[1]	Yes	Yes	No significant differences between aromatherapy and placebo	None.	Moderate
Outcome: Reduction of agitation in dementia (compared with control)							
2/142	RCT	Fair[2]	Yes	Yes	Significantly higher reduction in agitation with aromatherapy than with placebo	None.	Moderate
Outcome: Reduction of anxiety in cancer patients (compared with control)							
3/433	RCT	Fair[3]	No	Yes	Significant or no significant differences between aromatherapy and placebo	None.	Very low
Outcome: Reduction in pain (compared with control)							
3/139	RCT	Fair [4]	No	Yes	Significant or no significant differences between aromatherapy and placebo	None.	Low
Outcome: Safety							
2/137	RCT	Fair[5]	Yes	Yes	No side-effects	None.	Moderate

1. Muzzarelli: No Table 1; flawed randomisation
2. Ballard: Flawed cluster randomisation
   Lin: No p-value
3. Wilkinson 1999: No description of blinding
   Wilkinson 2007: High drop-out rate
   Soden et al.: Low power
4. 4 Soden et al.: Low power
   Han: Inadequate blinding and randomisation; no allocation concealment
5. Lin: No p-value
   Han: Inadequate blinding and randomization; no allocation concealment

6 Conclusion

overall, heterogeneous results

Aromatherapy is used for many different conditions and it seems unlikely that it works equally well, if at all, for all of them. According to the evidence, it is more effective than placebo for agitation in dementia but not for procedural anxiety. This suggests that while it is useful for certain conditions, in others it has no effect, or at least no effect beyond that of placebo.

good quality RCTs required for all indications

Thus aromatherapy needs to be evaluated in good quality RCTs for all indications for which it is said to have a beneficial effect. Obtaining comprehensive evidence on aromatherapy will therefore be time-consuming and costly.

aromatherapy appears to be a low-cost treatment with few side-effects

On the other hand, aromatherapy is regularly cited as a low-cost treatment and appears to have few side effects (though again, further RCTs are required to demonstrate this). Therefore, there is little to discourage individuals from experimenting with aromatherapy for pain relief and relaxation.

there is little evidence about aromatherapy for pain and psychological problems

Overall, the evidence about aromatherapy for pain relief and the reduction of psychological problems is limited, and results largely heterogeneous. RCTs suggest that aromatherapy may well be effective for certain conditions. However, for the various indications for which RCTs exist, the strength of the evidence is never better than moderate. Extensive RCTs are required to obtain a clear picture of whether aromatherapy is effective for psychological problems or pain, and whether it is a safe treatment.

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