



A Quest for Quality Reporting in Aromatic Research

AROMATIC RESEARCH QUALITY APPRAISAL TASK FORCE (ARQAT)

Presented by the members of the ARQAT: Marian Reven, E Joy Bowles, Marilyn Peppers-Citizen, Amanda May-Fitzgerald, Donna Audia, Michelle Cohen, Denise Joswiak, Barb Kurkas Lee, Jerelyn Resnick, Janet Tomaino, Bethany Unger

Introduction

Aromatic research is at a crossroads. In recent years, use of essential oils and aromatics to support the psycho-emotional and physiological needs of the public has increased dramatically. Despite the substantial increase of aromatic research published over the past 20 years (Koo, 2017), many studies lack details of the aromatic interventions used. High-quality aromatic research reporting is necessary to provide the evidence base for safe use and practice.

Without high-quality reporting of aromatic interventions, the scientific evidence base for clinical use of essential oils remains weak (Freeman et al., 2019; Zeng et al., 2018). Full descriptions of the aromatic interventions and essential oil characteristics are often minimal or omitted, preventing replication of the intervention, and making it difficult to translate studies into practice.

As a result, aromatherapy practitioners, educators, scientists, and researchers assembled in January 2021 to assess and determine how to proceed with quality standards for aromatic research creation and reporting. The Aromatic Research Quality Appraisal Task force (ARQAT), pronounced R-Cot, began as "The White Paper Project". In addition to the Whitepaper, work began on creation of a quality appraisal checklist for the essential oil and aroma therapeutic aspects of nonpharmacologic research. The Transparent Reporting for Essential oil and Aroma Therapeutic Studies (TREATS) and an explanatory document evolved over the following year. The ARQAT is a task force actively working to improve creation and reporting of aromatic research through development of TREATS and future reporting guidelines.

See the unabridged ARQAT Whitepaper on our website:

WWW.ARQAT.ORG



Problem Statement

Increased aromatic research is crucial to evidence-informed practice, however, quantity does not always translate into quality. Many countries have limited formal education and verification of expertise in aromatic research. Suboptimal reporting can be traced to the reality that many aromatic practitioners are not trained as researchers. Conversely, healthcare researchers, steeped in scientific methods, are often not trained in aromatic inquiry, and they may not engage (or be able to identify) experts in the field of aromatics to inform their study protocols.

The need for guidance with quality appraisal was identified by the ARQAT President and Founder, Dr. Marian “Marnie” Reven, as she explored literature surrounding aromatherapy in palliative care. While the study design of the randomized controlled trials was often good, the aromatherapy and essential oil parts of the studies were lacking. Many studies were published without information about which essential oils were used, their Latin binomial, their major chemical constituents, or where they were sourced. Essential oils contain dozens, sometimes hundreds, of constituents making identification vital as each constituent has its own characteristics and effects on the body. Because there are many factors influencing essential oil constituents, a full report is recommended (Battaglia, 2018; Buckle, 2015; Tisserand & Young, 2014).

While there was often a clear description of the massage intervention in studies that used both essential oils and massage, there was no indication beyond dilution about which essential oil was applied during massage and why. Many studies failed to report adverse reactions or include a statement that no adverse reactions were reported, and almost none of the studies gave any indication about odor recognition, odor preferences, expectancy, or perceived intensity (Bowles, 2020; Herz, 2016).

These initial realizations led to further investigation of many other reviews found in the Cochrane library and various other databases. Systematic reviews and meta-analyses were available for studies done within the past 20 years. The conclusion of almost every one of these reviews was the same—the evidence for the beneficial effect of aromatherapy in healthcare was inconclusive (Ball et al., 2020; Es-haghee et al., 2020; Freeman et al., 2019). So many details were missing from the original research reports that it was difficult to meta-analyze, generalize, replicate, and create a robust evidence base that would enable healthcare professionals to accept non-pharmacological use of essential oils into mainstream healthcare.

Many would agree that research into modalities such as aromatherapy requires consideration of factors not present in pharmaceutical drug trials. In drug trials, it is possible to a great extent to isolate the impact of a single chemical and compare effects to comparable treatments and placebo. Those wishing to research aromatherapy are challenged in many ways, not least of which is fully considering the sense of smell, which has only within the past 20 years become more fully understood (Bowles, 2020; Herz, 2009, 2016). For therapies involving complex multimodal and multicomponent interventions, such as aromatherapy, research criteria are not clearly defined (Ijaz et al., 2019).

The onus for improving aromatherapy research reporting rests on the shoulders of aromatherapists with research training and the related community of scientists and researchers with an interest in aromatherapy and aromatic research.

Those wishing to research aromatherapy are challenged in many ways, not least of which is fully considering the sense of smell, which has only within the past 20 years become more fully understood (Bowles, 2020; Herz, 2009, 2016).

The onus for improving aromatherapy research reporting rests on the shoulders of aromatherapists with research training and the related community of scientists and researchers with an interest in aromatherapy and aromatic research.

TREATS Iterations

Data and insight gained through reviews of nonpharmacologic aromatic intervention studies informed inclusion of items on the TREATS checklist. For TREATS, this occurred prospectively through the unpublished systemic review (SR) done by Reven as well as a pre-menstrual syndrome (PMS) SR (Es-haghee et al., 2020). Throughout checklist creation, other studies found within additional SRs confirmed the need for inclusion of further checklist items (Armstrong et al., 2019; Ball et al., 2020; Ballard et al., 2002; Candy et al., 2020; Freeman et al., 2019; Hines et al., 2018; Smith et al., 2011). The results of interrater reliability testing showed that TREATS was used in a highly consistent fashion, with r values ranging from 0.965 to 0.979.

TREATS Checklist Items (Table 1)

Section 1

The primary concern was the inability to locate what we have identified as necessary information about essential oils within studies. Clear identification of which essential oils are used in research is fundamental to being able to replicate studies. The TREATS includes items that prompt complete identification of each essential oil, such as the botanical name, extraction method, plant part, cultivation method, country of origin, source, batch number, and major plant constituents as identified by chemical analysis using methods such as gas chromatography-mass spectrometry (GC-MS). Variations of constituents lead to differences in therapeutic properties illustrated by the calming effect of linalyl acetate and linalool commonly found in *Lavandula angustifolia* (Lavender) though not present in *Lavandula stoechas* (Spanish Lavender, also called French Lavender) with a main chemical constituent of camphor which is not known for calming but instead for clearing sinuses and congestion. Incomplete reporting hinders replication and the application of essential oils into evidence informed practice (Battaglia, 2003, 2018; Bowles, 2003; Buckle, 2015; Tisserand & Young, 2014).

Section 2

Application methods are covered in Sections 2A and B of TREATS. If application methods are not adequately described, replication of the study and inclusion of it in meta-analyses is not possible. Items included are the dose of aromatic delivered (including details of any dilution in excipient or carriers), frequency of treatment, duration of exposure to the essential oil, and delivery systems such as a diffuser or vaporizer. If diluents or carriers are used, full characterization of them is expected as is for the essential oils (Battaglia, 2003, 2018; Bowles, 2020; Buckle, 2015; Kerkhof-Knapp Hayes, 2015; Price & Price, 2012; Tisserand & Young, 2014).

Section 3

To have an aromatic study on which to base evidence-informed decisions, the description of the aromatherapy intervention must be clear and detailed enough to allow for replication by other researchers. Section 3 of TREATS includes the rationale for use of the chosen essential oils and application methods, the choice of a theoretical and conceptual framework, consultation with a qualified aromatherapist, reports of any allergic or adverse reactions, and consideration of safe storage and use of essential oils during the study (Battaglia, 2003, 2018; Boutron et al., 2017; Hoffmann et al., 2014; Lattin, 2019; Ninot, 2021; Tisserand & Young, 2014).

Section 4

The past two decades have seen an increase in understanding and appreciation for olfaction and the sense of smell. Section 4 of TREATS includes olfactory considerations such as pre-trial evaluation of olfactory ability and identification of anosmia, previous exposure to essential oils, evaluation of odor recognition, expectancies about the odor's therapeutic qualities, the perceived intensity of the odor, and any adverse effects from olfactory testing. These aspects of aromatic research are potential sources of bias and information related to causality is enhanced by their inclusion (Bowles, 2020; Herz, 2009, 2016).



Reviewer:
Article reviewed:
Delivery method: Topical ___ Inhalation ___ Both ___

Category (see Explanatory document for more details of each item)	Met = 1 or *N/A	Partially met = 0.5 (Explain)	Not Met = 0	Explanations/ Comments/ Questions
Section 1: Essential oils (EO)				
1 Essential oil (EO) binomial (botanical) name (<i>Genus species</i>)				
2 Extraction method				
3 Plant part				
4 Cultivation Method				
5 Country of Origin				
6 Source				
7 Batch number of the EO				
8 Identification of plant constituents				
Total Section 1 (possible points = 8)				
Section 2A: Topical Application- Complete ONLY if topical delivery method used				
1 Dilution of EO (if applicable)				
2 Dose of EO				
3 Body surface area EO contacts				
4 Frequency of EO				
5 Duration of EO				
6 Description of control or placebo				
7 Carrier(s) name, including full binomial				
8 Source of carrier or delivery system				
Total Section 2A (possible points = 8)				
Section 2B: Inhalation- Complete ONLY if inhalation delivery method used				
1 Mode of inhalation				
2 Dose of EO				
3 Frequency of EO				

Our task force is a dedicated, passionate team focused on improving the quality of aromatic research and reporting.

Explanatory Statement

Lessons learned from trials of TREATS led to creation of an Explanatory Statement document to be used with TREATS. This document assists users and promotes consistent use of TREATS. The ARQAT recommends use of the Explanatory Statement document by all users, even those experienced in aromatherapy.

Table 1. TREATS Checklist showing sections 1, 2A and part of 2B. To request a full copy of TREATS and the Explanatory Statement, please visit www.arqat.org and click the join button to write to us.

Conclusion

Our task force is a dedicated, passionate team focused on improving the quality of aromatic research and reporting. From the beginning the ARQAT kept the authors and readers of aromatic research in mind, desiring to help them evaluate the quality of studies. The TREATS quality appraisal checklist is our first creation. We have evaluated the robustness of TREATS and look forward to sharing it with the public.

Our next step will be to conduct a Delphi process to elicit expert consensus on items needed for an aromatic research reporting guideline. Other complementary therapies have similar guidelines for the conduct of their research, and such criteria would be equally as relevant to the study of aromatherapy.

The field of integrative health science requires quality research and reporting to enable practitioners to utilize results in evidence-informed care. Watch for updates on our website www.arqat.org and LinkedIn ARQAT. Aromatic research truly is at a crossroads, and we welcome you on the journey!

See the unabridged ARQAT Whitepaper on our website:
WWW.ARQAT.ORG



References

- Armstrong, M., Flemming, K., Kupeli, N., Stone, P., Wilkinson, S., & Candy, B. (2019). Aromatherapy, massage and reflexology: A systematic review and thematic synthesis of the perspectives from people with palliative care needs. *Palliative Medicine*, 33(7), 757–769. <https://doi.org/10.1177/0269216319846440>
- Ball, E. L., Owen-Booth, B., Gray, A., Shenkin, S. D., Hewitt, J., & McCleery, J. (2020). Aromatherapy for dementia. *Cochrane Database of Systematic Reviews*, 8. <https://doi.org/10.1002/14651858.CD003150.pub3>
- Ballard, C. G., Psych, M. R. C., Reichelt, K., & Perry, E. K. (2002). Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: The results of a double-blind, placebo-controlled trial with melissa. *Journal of Clinical Psychiatry*, 6. <https://doi.org/10.4088/jcp.v63n0703>
- Battaglia, S. (2003). *The complete guide to aromatherapy*. (2nd Edition). International Centre of Holistic Aromatherapy. ISBN 0 646 42896 9
- Battaglia, S. (2018). *The complete guide to aromatherapy*. (3rd Edition, Vol. 1). Black Pepper Creative. ISBN: 0648260607 / 978-0648260608
- Boutron, I., Altman, D. G., Moher, D., Schulz, K. F., Ravaud, P., & for the CONSORT NPT Group. (2017). CONSORT statement for randomized trials of nonpharmacologic treatments: A 2017 update and a CONSORT extension for nonpharmacologic trial abstracts. *Annals of Internal Medicine*, 167(1), 40. <https://doi.org/10.7326/M17-0046>
- Bowles, E. J. (2003). *The chemistry of aromatherapeutic oils* (3rd ed). Allen & Unwin. ISBN:174114051X
- Bowles, E. J. (2020). *Dr Joy's aromatherapy: Use essential oils with confidence for psyche, skin, medicine and health*. <https://nla.gov.au/nla.obj-2918800428>
- Buckle, J. (2015). *Clinical aromatherapy: Essential oils in healthcare* (3rd ed.). Elsevier. ISBN:9780702054402
- Candy, B., Armstrong, M., Flemming, K., Kupeli, N., Stone, P., Vickerstaff, V., & Wilkinson, S. (2020). The effectiveness of aromatherapy, massage and reflexology in people with palliative care needs: A systematic review. *Palliative Medicine*, 34(2), 179–194. <https://doi.org/10.1177/0269216319884198>
- Es-haghee, S., Shabani, F., Hawkins, J., Zareian, M. A., Nejatbakhsh, F., Qaraaty, M., & Tabarrai, M. (2020). The effects of aromatherapy on premenstrual syndrome symptoms: A systematic review and meta-analysis of randomized clinical trials. *Evidence-Based Complementary and Alternative Medicine*, 2020, 1–13. <https://doi.org/10.1155/2020/6667078>
- Freeman, M., Ayers, C., Peterson, C., & Kansagara, D. (2019). Aromatherapy and essential oils: A map of the-evidence [Essential oil evidence summary]. Department of Veterans Affairs. <https://www.hsrd.research.va.gov/publications/esp/aromatherapy.pdf>
- Herz, R. S. (2009). Aromatherapy facts and fictions: A scientific analysis of olfactory effects on mood, physiology and behavior. *International Journal of Neuroscience*, 119(2), 263–290. <https://doi.org/10.1080/00207450802333953>
- Herz, R. S. (2016). The role of odor-evoked memory in psychological and physiological health. *Brain Sciences*, 6(3). <https://doi.org/10.3390/brainsci6030022>
- Hines, S., Steels, E., Chang, A., & Gibbons, K. (2018). Aromatherapy for treatment of postoperative nausea and vomiting. *Cochrane Database of Systematic Reviews*, 3. <https://doi.org/10.1002/14651858.CD007598.pub3>
- Hoffmann, T. C., Glasziou, P. P., Boutron, I., Milne, R., Perera, R., Moher, D., Altman, D. G., Barbour, V., Macdonald, H., Johnston, M., Lamb, S. E., Dixon-Woods, M., McCulloch, P., Wyatt, J. C., Chan, A.-W., & Michie, S. (2014). Better reporting of interventions: Template for intervention description and replication (TIDieR) checklist and guide. *BMJ*, 2014;348: g1687 <https://doi.org/10.1136/bmj.g1687>
- Ijaz, N., Rioux, J., Elder, C., & Weeks, J. (2019). Whole systems research methods in health care: A scoping review. *The Journal of Alternative and Complementary Medicine*, 25(S1), S21–S51. <https://doi.org/10.1089/acm.2018.0499>
- Kerkhof-Knapp Hayes, M. (2015). *Complementary nursing in end of life care: Integrative care in palliative care: Handbook for nurses and health care professionals: Aromacare, massage, aquacare, relaxation*. Kicozo - Knowledge Institute for Complementary Nursing.
- Koo, M. (2017). A bibliometric analysis of two decades of aromatherapy research. *BMC Research Notes*, 10, 46. <https://doi.org/10.1186/s13104-016-2371-1>
- Lattin, A. (2019). Aromatherapy in the context of holism: Homeostasis, terrain, and the individual. *International Journal of Professional Holistic Aromatherapy*, 8(3), 5–23.
- Ninot, G. (2021). Defining non-pharmacological interventions (NPIs). In G. Ninot, *Non-Pharmacological Interventions* (pp.1–46). Springer International Publishing. https://doi.org/10.1007/978-3-030-60971-9_1
- Price, S., & Price, L. (Eds.). (2012). *Aromatherapy for health professionals* (4th ed). Churchill Livingstone/Elsevier.



- Smith, C. A., Collins, C. T., & Crowther, C. A. (2011). Aromatherapy for pain management in labour. Cochrane Database of Systematic Reviews, 7. <https://doi.org/10.1002/14651858.cd009215>
- Tisserand, R., & Young, R. (2014). Essential oil safety: A guide for health care professionals (2nd ed.). Elsevier Ltd. ISBN:9780443062414
- Zeng, Y. S., Wang, C., Ward, K. E., & Hume, A. L. (2018). Complementary and alternative medicine in hospice and palliative care: A systematic review. Journal of Pain and Symptom Management, 56(5), 781-794.e4. <https://doi.org/10.1016/j.jpainsymman.2018.07.016>



“Aromatic research truly is at a crossroads, and we welcome you on the journey!”

