Research

Reading and identifying good quality studies/choosing the parameters to consider when conducting clinical aromatherapy research.

What is Research?

Research is a systematic and scientific evaluation of a certain topic, which is aimed at acquiring new knowledge, developing new theories, or testing existing ones. In the context of studying essential oils, research will involve studying the chemical composition, the properties and health benefits of essential oils.

It is important for several reasons:

- It helps us to understand the scientific basis of the therapeutic properties of essential oils, hence, by studying the chemical components of oils and their effects on the body, researchers can identify the active ingredients responsible for their therapeutic effects and develop evidence-based advice for their use.
- Research also helps us evaluate the safety and efficacy of essential oils. Many people use essential oils for their health benefits, however, there is limited scientific evidence supporting their use in some cases. By conducting meticulous scientific studies, researchers can evaluate the efficacy of different oils and help guide them in their clinical practice.
- Research also helps identify new uses for essential oils. As scientific knowledge advances, researchers may discover new therapeutic applications for essential oils or identify novel chemical compounds with therapeutic potential.

All this helps in the field of studying and using essential oils to help deepen our understanding of their properties, safety, and therapeutic uses.

What is the difference between Qualitative and Quantitative research?

Qualitative and quantitative research are two distinct approaches to studying phenomena, including the properties and effects of essential oils.

Qualitative research focuses on exploring subjective experiences, perceptions and attitudes related to a topic. In the case of essential oils, qualitative research might involve collecting data through methods such as interviews, focus groups or observations to understand how individuals use and distinguish the oils.

Quantitative research, on the other hand, focuses on collecting numerical data and analysing it statistically. In the context of essential oils, quantitative research might involve measuring the chemical composition of oils, evaluating their physiological effects on the body, or conducting controlled experiments to assess their therapeutic potential.

In summary, qualitative research is concerned with understanding subjective experiences and attitudes, while quantitative research is concerned with collecting and analysing numerical data. Both approaches can be valuable in studying essential oils, depending on the research questions and objectives.

Choosing qualitative and quantitative research methodologies

Your research will dictate the kinds of research methodologies you use to underpin your work and methods you use in order to collect data. If you wish to collect quantitative data, you are probably measuring variables and verifying existing theories or hypotheses or questioning them. Data is often used to generate new hypotheses based on the results of data collected about different variables. One's colleagues are often happier about the ability to verify quantitative data as many people feel safe only with numbers and statistics.

However, often collections of statistics and number crunching are not the answer to understanding meanings, beliefs, and experience, which are better understood through qualitative data. And quantitative data, it must be remembered, are also collected in accordance with certain research vehicles and underlying research questions. Even the production of numbers is guided by the kind of questions asked of the subjects, so essentially subjective, although it appears less so than qualitative research data.

What is the difference between scientific research versus a google search?

Scientific research is a systematic and conscientious process of inquiry that involves the collection and analysis of data to answer a specific research question or hypothesis. It involves following a set of standardised methods and procedures, and it typically requires a deep understanding of the subject matter and the scientific method.

On the other hand, a Google search is a simple process of using the Google search engine to find information on the internet. While it can be a useful tool for gathering information, it does not necessarily involve a careful and systematic approach to inquiry, and the information found through a Google search may not always be reliable or accurate.

In summary, scientific research involves a structured and precise approach to inquiry, while a Google search is a more informal way of gathering information that does not necessarily involve a careful approach.

How to read a research paper?

Here are some general guidelines on how to read a research paper:

- Start by reading the abstract: The abstract should give you an overview of the paper, including the research question, trial design, methods, results, and conclusions.

- Read the introduction: The introduction should provide the background and context for the research question, a brief literature review, explaining why the research is important (the objective). This should be written in a clear and objective way.

- Look at the methodology section: The methodology section should carefully describe the methods used to collect and analyse the data. Make sure that the methods are appropriate for the research question and are described in enough detail to be replicable.

- Examine the results: Look at the results section to see what the authors found. Make sure that the results are presented clearly and accurately, and that the data support the authors' conclusions.

- Read the conclusion and discussion: The conclusion and discussion should summarise the main findings of the study and provide insights into their implications.

Other information to look at

- Assess the journal or the publication in which the paper appears. Browse the content they publish for quality and the topics' relevance. Reputable (biomedical) journals will be indexed by PubMed, Emboss, Google Scholar, for example.

- Take note of the authors' credentials and their institutional affiliations. It is important that any source of funding and other support be highlighted.

- Read critically. Do not assume that the authors are correct.

- Assess the quality of the study and the strength of evidence levels by using recognised international guidelines and checklists (such as those found in the CONSORT for herbal interventions, the ARQAT group guidelines and the TREATS tools). This will help you to critically assess the quality of the evidence provided.

- Read some of the references listed in the article. It will give you a better understanding of the research and past investigations.

- Make a template, noting the main points of the article, the strength and biases, and your observations.

In vitro research

"In vitro" is Latin for "in glass" and refers to the fact that these experiments typically involve cells or tissues that have been removed from an organism and are being studied in a test tube or an artificial environment. In vitro research refers to scientific experiments or studies that are conducted outside of

a living organism, such as in a laboratory setting.

In vitro research can be used to investigate a wide range of biological processes and phenomena including the effects of essential oils and toxins on cells, the mechanism of disease and the behaviour of proteins or other biomolecules. This type of research is often used to test hypotheses and develop new treatments or therapies before they are tested on animals or humans.

In vitro research can be used in combination with in vivo research, which involves studies conducted in living organisms, to gain a more complete understanding of a particular biological process or occurrence.

In vivo research

The term "in vivo" is Latin for "within the living" and refers to the fact that these experiments are performed within the context of a whole organism, rather than in a laboratory dish or other artificial environment. In vivo research refers to scientific experiments or studies that are conducted inside a living organism, such as a human, animal, or plant.

In vivo research can be used to investigate a wide range of biological processes and circumstances, including the effects of drugs or toxins on a whole organism, the mechanisms of disease, and the behaviour of cells or tissues within the context of a living organism. This type of research is often used to test hypotheses and develop new treatments or therapies before they are tested in humans.

Common techniques used in in vivo research include animal studies, where experiments are conducted on living animals, and clinical trials, which involve testing new drugs or therapies on human subjects. In vivo research can also be used in combination with in vitro research, which involves studies conducted outside of a living organism, to gain a more complete understanding of a particular biological process or phenomenon.

While in vivo research can provide valuable insights into complex biological systems, it also raises ethical concerns about the treatment of animals and humans in research. As a result, the use of in vivo research is carefully regulated and subject to ethical review to ensure that it is conducted in a responsible and ethical manner.

In silico research

In silico studies represent a relatively new way of research. They are performed entirely in a virtual setting and based on computer simulations. In silico studies complement or precede in vitro and in vivo studies. Although they are not replicates of living organisms, these studies have notably contributed to biomedical research and drug discovery such as during the COVID-19 pandemic. In examining aromatic compounds, in silico studies could identify for example those compounds most effective against a specific virus. In silico studies provide a time-efficient, cost-effective and scalable method.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9710407/#:~:text=Depending%20on%20the%20study%20design,for%20example%20by%20time%20relationships

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Ethics of conducting research

When most people think of ethics (or morals), they think of rules for distinguishing between right and wrong, such as the Golden Rule "Do unto others as you would have them do unto you". A code of professional conduct like the Hippocratic Oath "First of all, do no harm", or the sayings of Confucius. This is the most common way of defining ethics and to distinguish between acceptable and unacceptable behaviour.

Most people learn ethical norms at home, at school, or other social settings. Although most people acquire their sense of right and wrong during childhood, moral development occurs throughout life and human beings pass through different stages of growth as they mature. Ethical norms are so universal that one might be tempted to regard them as simple common sense. On the other hand, if morality were nothing more than common sense, then why are there so many ethical disputes and issues in our society?

Ethical norms also serve the aims or goals of research and apply to people who conduct scientific research or other scholarly or creative activities. There are several reasons why it is important to adhere to ethical norms in research. First, norms promote the aims of research such as knowledge, truth, and avoidance of error. Second, since research often involves a great deal of co-operation and co-ordination around many different people, ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness. Third, many of the ethical norms help to ensure that researchers can be held accountable to the public.

Things to consider when using ethical research

- Honesty
- Objectivity
- Integrity
- Carefulness
- Openness
- Confidentiality
- Responsible publication
- Responsible mentoring
- Respect for colleagues
- Non-Discrimination
- Competence
- Legality

Endpoints in clinical research

In clinical trials, an endpoint is an event or outcome that can be measured objectively to determine whether the intervention being studied is beneficial. The endpoints of a clinical trial are usually included in the study objectives. Some examples of endpoints are improvements in quality of life and relief of symptoms.

https://www.cancer.gov/publications/dictionaries/cancer-terms/def/endpoint

Quantitative/qualitative evaluation criteria

When defining your research endpoints, choosing the most appropriate evaluation criteria is crucial. There are two types of evaluation criteria: quantitative and qualitative.

In aromatherapy, many of the efficacy endpoints are qualitative, such as the measurement of anxiety or pain. Although these are subjective to the patient, standardised questionnaires and criteria have been established for measuring these quantitative endpoints. Some examples of standardised qualitative criteria that can be used include:

- For pain: the Visual Analog Scale (VAS), the self-assessed Numerical Scale (NRS).
- For anxiety: the Spielberger STAI (Spielberger State-Trait Anxiety Inventory) questionnaire, the Hamilton scale, and the GAD 7 (Generalised Anxiety Disorder assessment).

The qualitative approach may be used in combination with the quantitative methodology. In fact, it can help define the endpoints and determine the pre-requisites of a quantitative study.

What is a study design?

It is the research method chosen when conducting research. Generally speaking, there are two main types of clinical study design: Observational studies and Interventional studies.

- Observational studies are usually hypothesis generating and ask the following questions: what, who, where, when. They usually consist of case studies, case reports, cohort studies.

- Interventional studies are hypothesis testing, with the aim of studying the effect of an intervention. They consist of control groups (comparison to placebo, another intervention). Controlled trials allow discrimination of the patient outcome from an outcome caused by other factors (such as natural history, chance, or patient expectation). Thus, the results are more accurate and valid. The demonstration of efficacy is based on comparative statistical analysis. Interventional studies consist of Non-Randomised Control Trials and Randomised Control Trials. The “gold standard” in clinical trials are the randomised double-blind control trials which have the highest level of evidence.

Depending on the study hypothesis or research question, it might not be necessary to use comparison groups. Sometimes, due to constraints such as cost, insufficient resources, or insufficient patient numbers, conducting a group comparison is not possible. In that case, it is safe to choose a group of patients that is as homogeneous as possible (similar pathology, treatments, symptoms, etc). Many papers in aromatherapy research report observational studies. This approach can be of great value if the description of the intervention follows rigorous methodology and guidelines.

Evidence-based research in Aromatherapy

Good clinical research must be reproducible, measurable, and reliable. Protocols, data and findings are shared worldwide within the scientific and health care community, and studies need to be replicable, otherwise their trustworthiness is put into question.

The purpose of clinical research is to evaluate the efficacy, benefit or safety of a method or treatment. This is done by following a systematic and rigorous approach, using an evidence-based method, in order to inform decision-making and improve practice in the relevant field.

Aromatherapy research must be conducted along the same principles as conventional clinical research, using the most rigorous study possible and a reproducible evidence-based method that addresses a specific problem.

Despite the challenges of clinical research in aromatherapy - mainly conducting clinical studies tailored to the constraints and specificity of aromatherapy and essential oils - following quality criteria in writing scientific articles will greatly improve the quality of clinical aromatherapy research.

In order to replicate a solid evidence base when conducting an aromatherapy clinical research, here are some steps you can follow:

- Start by defining a clear and concise research question or hypothesis and by setting the study objective(s).

- Conduct a thorough literature search, so you can know what work has already been done on the topic. Use databases such as PubMed, CINAHL, Google scholar, Embase and Cochrane Library. Use appropriate search terms and keywords in relation to your research subject.

- Evaluate the quality of the studies. This will help you to assess the strength of the evidence level and their applicability. You can do that using some internationally recognised guidelines (the CONSORT for herbal intervention, ARQAT and TREATS tools).

- Summarise the findings (you can make your own template).

- Develop a well-designed methodology pertaining to the hypothesis. Give a clear description of the study conditions, the patient(s) characteristics, and a detailed explanation of your aromatic protocol. This is important for the reproducibility of the study and for the validation of the findings. It will also help future comparative studies. For example, list the complete characteristics of the essential oil(s) used, give details of how the essential oils are used (percentage, carrier) and administered (dose, frequency) and the safety information. Follow evidence-based guidelines such as the CONSORT for herbal interventions, the ARQAT guidelines and the TREATS tool.

- Select the research method (study design): Observational study or Interventional study. Whatever the method chosen, always follow rigorous guidelines such as those already mentioned.

- Choose the most appropriate evaluation criteria for your endpoints. There are two types of evaluation criteria: quantitative and qualitative. If the endpoints are qualitative, use the many standardised questionnaires now available. This will facilitate the scientific approach.

- Analyse your findings (visualisation tools, statistical analyses when possible) and share your results.

- Discuss the limitations of the study and any implications or future recommendations that could improve the knowledge in the field or guide other aromatherapists in their practice.

- Abide by the ethical principles and guidelines throughout the entire research process (ethic committee approval, patient informed consent, funding, transparency in reporting, study withdrawal).

Following rigorous research methods will contribute to raise the level of evidence of aromatherapy studies and help other aromatherapists make informed decisions in their clinical practice.

It is only through delivering high quality studies, with a solid methodology and validated guidelines, tools, and questionnaires that we will encourage the use of aromatherapy as an evidence-based approach in integrative medicine.

Above all, it is with the contribution of each and every one of us that aromatherapy research will move forward.

Links and references

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