


## Use of the essential oils of *Lavandula angustifolia* Mill. in the treatment of anxiety: Systematic review of the literature

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### ABSTRACT

Traditional knowledge about the use of medicinal plants is fundamental, but it is equally important to highlight scientific research based on academic tools. This article is a systematic review of the literature on the effects of lavender essential oil (EO) in the treatment of anxiety. The methodology used was the search for scientific articles using keywords Lavender, herbal medicines, aromatherapy, anxiety, alone or together in the Google Scholar, Lilacs, PubMed and Scielo databases, without a determined period, including complete studies with conclusive results that addressed the theme directly and excluding inconclusive articles, reviews or articles that did not directly address the proposed theme. We describe here the results presented by the authors and their conclusions about the benefits of this essential oil from a clinical and therapeutic point of view.

**Keywords:** Alternative medicine, Medicinal plants, Anxiety, Aromatherapy.

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## INTRODUCTION

The human species has used plants as tools in natural therapy methods since ancient times [1]. With the advance of industrialization, products extracted from plant matter have gained prominence in the medicinal area, with the intention of assisting in human health.

Alternative medicine has been using essential oils for several decades to relieve the symptoms of various mental health-related problems [2]. The enormous advance of therapeutic practices that use natural resources in the treatment of diseases is visible, arousing the interest of professionals in this area of science [3][4].

Traditional science has collaborated in the formulation of pharmaceutical medicines, using medicinal plants and their therapeutic properties as material. According to the World Health Organization (WHO), medicinal plants with characteristics considered beneficial to human health are used by 80% of the population, seeking to relieve injuries or negative symptoms in the body, since these natural medicines are easily accessible and less expensive [5].

Also according to the WHO, medicinal plants are understood as any native or cultivated plant organism used for phytotherapeutic purposes, due to active ingredients, which, when applied correctly, act with the purpose of medicating human health [5].

The use of medicinal plants is a common practice among people as a way to improve their quality of life, but there is still a huge gap between the use and scientifically proven information about different properties of plants, considering that knowledge about this type of organism is still precarious for the population in general. The dissemination of knowledge about different properties of plants and how to identify them is extremely important for the preservation and conservation not only of traditional knowledge, but also of biodiversity [1][6].

Anxiety is characterized as a disease of the 21st century, and together with depression it is considered a serious health problem, affecting a large part of the population [7]. Anxiety is an emotional state that comprises both psychological and physiological components, constituting a set of different human experiences and responsible for stimulating performance [8].

A disorder is understood when the affected individual is unable to develop skills or activities, interfering with their daily life [9]. Anxiety is an adjunct problem of various degrees of discomfort, which can cause personal problems such as racing thinking, insomnia, difficulty concentrating, among other health problems [10].

In Brazil, about 9% of the population suffers from anxiety disorder, and on average 3% of the world's population has some degree of this disorder [11].

In this scenario, there is an increase in treatments for anxiety by alternative medicine, such as medicinal plants, widely used and known for their role in therapy, as the active ingredients found in plants allow the treatment and cure of various diseases [12][13]. Integrative and Complementary



Health Practices have been included in the Unified Health System (SUS) since 2006, having been approved by Ordinance No. 971, of May 3, 2006 [5], and aromatherapy inserted in the Unified Health System through Ordinance No. 702, on March 21, 2018 [14]. Aromatherapy stands out because it aims to promote the health and well-being of the body, mind, and emotions, through the therapeutic use of the natural aroma of plants through their essential oils. Aromatherapy can be defined as an integrative practice capable of stimulating the central nervous system through the use of aromas present in essential oils, which can be used olfactory or dermal [15][16].

In general, lavender originates in the Mediterranean basin, in regions of rocky and limestone soil. Its occurrence is recorded throughout North Africa, the Mediterranean, Western Europe, and India [17]. The species belonging to the genus are erect, aromatic shrubs or subshrubs with stems, most often woody. The leaves are opposite, single, whole, toothed, pinnate or bipinnate. The trichomes of the leaves are usually branched connected to glands. The inflorescence is a terminal spike, single or branched, dense and compact or long and wide with a rectangular or square peduncle. They can be green, red, purple, white. The fertile bracts are opposite, alternating or spiral, intertwined or arranged in vertical rows. The sterile bracts form a large plume or similar structure above the spike, present in the subgenus *Stoechas*. In *the Lavandula section* there is the presence of bracteoles. The flowers are sessile or have short pedicels. The corolla of the flowers is tubular, and the outermost part of the tube is dilated, with five short lobes or two larger lobes and the others smaller. The color of the corolla varies from violet, white, purple to dark blue. The calyxes are also tubular forming an appendage over the corolla before opening in some sections, such as the *dentata* [18][19].

The plants popularly known as lavender follow the following taxonomic classification: Reino Plantae; Phylum Magnoliophyta; Class Eudicots; Subclass Asteridae; Order Lamiales; Family Lamiaceae; Genus *Lavandula* [20], according to the current classification of the APG System.

As general characteristics within the genus *Lavandula*, it has a shrubby or subshrub habit, opposite leaves, single, whole or scalloped and trichomate. The flowers are pentamerous, sessile or pedicillate, corolla joined and bilabiate, with the color varying between violet, white, purple or blue and the calyx is also joined and usually green [18][19]. The genus *Lavandula* comprises forty-seven species [21] whose common name is "Lavender".

The species *Lavandula angustifolia* Mill., popularly known as French lavender, is the species with the greatest economic importance for the production of essential oil, used as a natural remedy, since studies have already proven the reduction of anxiety from its essential oil, in addition to its sedative and antibacterial properties [22][23]. According to Maier (2021)[24], the European Pharmacopoeia describes linalool, linalyl acetate and terpine-4-ol as major constituents of lavender



essential oil, with other components found in lower concentrations being  $\alpha$ -pinene, camphene,  $\alpha$ -pinene,  $\beta$ -pinene, p-cymene, limonene, terpinen-4-ol and cryptone.

It is important to note that some lavenders do not have a sedative effect, but a stimulating effect due to the presence of camphor in their composition, as is the case of Brazilian lavender or *Lavandula dentata* L, popularly known as lavender [25]. This species has distinct characteristics, such as a leaf with a scalloped margin, the presence of bracteoles at the base of the inflorescence, the stem has a grayish green color, the plant can reach 0.9 to 1 meter in height, and its inflorescence reaches 30 centimeters [18][19][26], so it is important to characterize the species to be used in treatments for anxiety.

The objective of this study was to develop a systematic literature review on the use of *Lavandula angustifolia* Mill essential oils in the treatment of anxiety.

## METHODOLOGY

This article is a systematic review of the literature carried out through the definition of criteria that ranged from the analysis of these articles to the presentation of the results obtained through the research.

When studying a topic, we should rely only on the best quality studies on the subject. According to Galvão and Pereira (2014) [27], based on the principle of searching for and analyzing these studies, a systematic review of the literature "emerges". It is a type of investigation focused on well-defined questions, which aims to identify, select, evaluate and synthesize the relevant evidence available on the proposed topic. Also according to these authors:

Systematic reviews should be comprehensive and unbiased in their preparation. The criteria adopted are disseminated so that other researchers can repeat the procedure. Good quality systematic reviews are considered the best level of evidence for decision-making. Because it follows an explicit scientific method and presents new results, the systematic review is classified as an original contribution in most clinical research journals [27].

Systematic reviews differ from narrative or traditional reviews, the latter are broad and provide general information about the topic in question, being common in textbooks. They are also different from integrative reviews, in which different designs are used in the same investigation, in addition to expressing the author's own opinion [27].

The bibliographic research was carried out using different databases such as *Google Scholar*, *Lilacs*, *PubMed* and *Scielo*. The scientific articles selected were articles in English, Portuguese or Spanish, with the use of keywords (*Lavandula angustifolia*, essential oils, anxiety, alone or combined).

The research was carried out with the inclusion of complete studies with conclusive results without a determined period that address the theme directly and any inconclusive article or that did not directly address the proposed theme was excluded from the elaboration of this work.

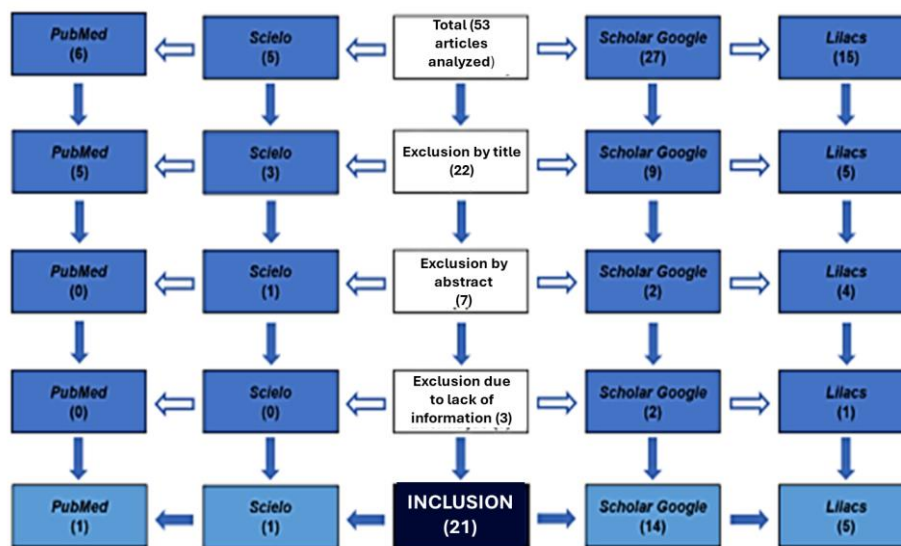
The criteria for the exclusion of articles in this review were: literature review articles, books, simple or expanded abstracts published in congresses and/or conferences, incomplete articles without text presentation, authors or/and full title.

The criteria for inclusion of articles were: information about lavender essential oils associated with anxiety in the title, abstract or text.

## RESULTS AND DISCUSSION

Based on the criteria defined in the methodology, 53 articles were analyzed, and of these, 21 were selected and read in full, and only nine were used for the preparation of the systematic review, following the inclusion/exclusion criteria (Figure 1).

Fig. 1. Flowchart of the results obtained in the search for articles



The nine selected articles presented studies on the use of EO to control anxiety and its action potential, in isolation or comparatively, which is the object of this review and are described in Table 1.

Table 1 - Potential action of the essential oil of *Lavandula angustifolia* Mill. in the treatment of anxiety according to the literature consulted.

N.	Título	Autores	Tipo de pesquisa	Objetivo
1	Massagem com aromaterapia: efetividade sobre a ansiedade de usuários com transtornos de personalidade em internação psiquiátrica	Domingos e Braga 2015 [28]	Exploratória	Investigar a efetividade da massagem com aromaterapia utilizando óleos essenciais de <i>Lavandula angustifolia</i> e <i>Pelargonium graveolens</i> (0,5%) para diminuição da ansiedade de pacientes com Transtornos de Personalidade durante a internação psiquiátrica
2	Lavender and the Nervous System	Kouviladet al. 2013 [29]	Descritiva	Fazer um levantamento do estado atual do conhecimento experimental e clínico sobre o efeito da lavanda no sistema nervoso.
3	O Uso do Óleo Essencial de Lavanda Para Crianças com TEA: Estudo de Caso Sobre o Impacto na Qualidade do Sono e Ansiedade	Velez 2023 [30]	Qualitativa	Aplicar o Protocolo de Uso do Óleo Essencial de Lavanda para Crianças com TEA, e Identificar o efeito da aplicação do protocolo no sono e comportamento de duas crianças no município de Currais Novos/RN.
4	Uso de Óleos Essenciais No Tratamento Para Ansiedade	Morais e Vilete 2022 [31]	Exploratória	Analisar o uso de óleo essencial de lavanda no tratamento da ansiedade a partir de uma pesquisa de campo.
5	Exploring Pharmacological Mechanisms of Lavender ( <i>Lavandula angustifolia</i> ) Essential Oil on Central Nervous System Target	López et al. 2017 [32]	Exploratória	Avaliar os efeitos do óleo essencial de lavanda ( <i>Lavandula angustifolia</i> ) no sistema nervoso central
6	Óleos Essenciais: Aspectos Gerais e usos em Terapias Naturais	Machado e Fernandes 2011 [33]	Descritiva	Relatar aspectos gerais sobre os óleos essenciais bem como sua utilização em terapias naturais como a aromaterapia.
7	Aromaterapia Para a Ansiedade e Estresse de Professores de Enfermagem	Dias et al. 2019 [34]	Quantitativo, exploratório-descritivo	Investigar a efetividade do uso da aromaterapia com os óleos essenciais de lavanda ( <i>Lavandula angustifolia</i> ) ou ylang-ylang ( <i>Cananga odorata</i> ), associada à massagem, para o alívio da ansiedade e do estresse.
8	Efeitos do Óleo Essencial de <i>Lavandula angustifolia</i> Associado a Massagem com Auxílio de Pedras Quentes na Redução de Ansiedade e Perda de Peso em Mulheres Obesas	Nunes et al. 2021 [35]	Qualitativa, quantitativa	Investigar a relação do uso do óleo essencial de <i>Lavandula angustifolia</i> na redução do escore de ansiedade e perda de peso em mulheres obesas.
9	Efeitos da Aromaterapia Com Óleos Essenciais de Lavanda e Bergamota sobre a Qualidade do Sono, Ansiedade e Estresse em Profissionais da Enfermagem Frente à Pandemia da COVID-19	Maier 2021 [24]	Exploratória, quantitativa, qualitativa	Demonstrar os benefícios da massagem relaxante associada a aromaterapia para auxiliar no combate da ansiedade.

Source: the authors 2024.

In their work, Domingos and Braga (2015) [28] aimed to investigate the effectiveness of aromatherapy associated with massage on the anxiety of patients diagnosed with personality disorder. The study was presented as an uncontrolled clinical trial, carried out in a psychiatric clinic in São Paulo. Essential oils of *Lavandula angustifolia* (lavender) and *Pelargonium graveolens*



(geranium) were used to characterize calming and tranquilizing actions, both indicated for anxious situations.

The efficacy analysis of the intervention was carried out in two stages, first measuring the heart rate and then the respiratory rate before and after each aromatherapy massage session. The results indicated that there was a statistically significant decrease ( $p < 0.001$ ) in the mean heart and respiratory rates after each intervention session, as well as in the inventory score.

Kouveland et al. (2013) [29] reported an increase in the popularity of alternative medicine and the use of natural products, generating interest in the use of *Lavandula angustifolia essential oils*. The author demonstrated that although lavender may have a significant clinical potency as a therapy for different disorders, there is a lack of research and information necessary to confirm the beneficial effect of this plant on neurological disorders, even though many compounds found in lavender oil have demonstrated therapeutic potential, there is still a search for new treatments for different diseases.

Velez (2023)[30] in their research, carried out a qualitative study in order to apply the use of lavender essential oils for the purpose of relieving the symptoms of people with autism spectrum disorder (ASD), such as difficulty in communication and social interaction, since the core symptoms of ASD interfere with the resistance to fall asleep, anxiety and drowsiness.

For data collection, a field diary was made, where the testimony of the mothers of the children with ASD indicated for the project was described, performing a quantitative and qualitative analysis. The results obtained took into account the description of the field diaries, where the protocols for the use of lavender essential oil for the treatment of children with ASD were applied.

Morais and Vilete (2022) [31] addressed in their study an exploratory research, applying questions about the daily routine and knowledge about essential oils through a questionnaire. Through the answers obtained to the questionnaire, the author came to the conclusion about the positive efficacy of the use of lavender essential oil aromatherapy in the treatment of anxiety, as well as how it can be used to prevent other crises, diseases and to reduce stress. The results of the research also show that the use of aromatherapy is almost non-existent in popular daily life, as well as its benefits are unknown.

López et al. (2017) [32] demonstrated that lavender exerts an action on receptor binding affinity with N-methyl D-Aspartate (NMDA) activity. The study also states that lavender's calming and antidepressant effects may be related to at least part of the NMDA receptor. Another aspect observed was that lavender essential oil protected the neuroblast cell lines of human nervous tissue (SH-SY5Y) from hydrogen peroxide-induced neurotoxicity.

Machado and Fernandes (2011)[33] explored in their article the use of essential oils, presenting their wide variety of biological actions, as well as their application in different areas of



use. The author demonstrates new possibilities for research and use of essential oils in the treatment and prevention of diseases, thus highlighting aromatherapy as an option with a better therapeutic potential.

Dias et al. (2019)[34] developed their work in a public institution of higher education in the interior of the State of São Paulo, where they performed six aromatherapy massage sessions. Essential oils of *Lavandula angustifolia* and *Cananga odorata* were used in this study, both used with 3% in their concentration. The effectiveness of the massages was verified using psychological and biophysiological parameters as a reference.

Aromatherapy has shown partial effectiveness in reducing stress and anxiety, as it was considered to decrease blood pressure in isolated massage sessions with aromatherapy, but analyzing the heart rate did not decrease enough to obtain significant results.

Nunes et al. (2021)[35] addressed in their article an intervention study without a control group, composed of obese women, in the region of Santa Maria, RS. The study used sociodemographic data such as age, occupation, and marital status in its assessment.

There was a significant reduction in anxiety levels, as well as a reduction in weight, but there was no reduction in body mass index. The study shows that the reduction in anxiety in obese women can be complemented with the use of lavender EO, as it decreased binge eating caused as an anxiety condition.

The study by Maier (2021)[24] was conducted in a private hospital in the city of Ponta Grossa, where there were 18 beds for COVID-19 patients. The project participants were selected based on an authorial questionnaire, applied online. The volunteers were divided into three groups, where the essential oils of lavender, bergamot and the control group that used almond oil would be applied.

It was verified within this project that the professionals who presented signs of sleep disorder, anxiety and stress, when receiving these essential oils of lavender or bergamot demonstrated reductions in symptoms, and it was verified that the bergamot EO demonstrated greater efficiency in helping sleep in terms of quality in the criteria of sleep duration and latency, However, lavender showed a higher percentage of reduction in sleep disturbances in relation to sleep interruption, as well as health factors such as stress, depression, anxiety and insomnia.

## CONCLUSION

The literature review is of paramount importance in the formation of any study involving research, focusing on scientific articles with studies based on serious experiences that cover a range of topics on the subject.





Scientific studies indicate that lavender EO has positive effects when used with the intention of preventing or mitigating anxiety and other emotional disorders.



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