

Research Article

Aroma therapy in the learning process improves students' focus and memory**Nurul Annisa Aprianti**

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Email: nurulannisaaprianti_1201621037@mhs.unj.ac.id**Abstract**

Aroma therapy has been widely used in a variety of fields, including health and psychology, due to its effects in improving mental and cognitive well-being. In the context of education, aroma therapy has great potential in helping students improve focus and memory during the learning process. Some studies suggest that certain scents, such as peppermint and rosemary, can stimulate the central nervous system and improve cognitive functions related to attention and memory retention. However, despite the overwhelming scientific evidence supporting the benefits of aroma therapy, its use in the education system is still limited. This study aims to analyze the impact of aroma therapy in improving students' focus and memory in the learning process. The method used is a literature study with a qualitative approach, which reviews various previous studies on the effects of essential oils on cognitive performance. Data was collected from a variety of academic sources, including scientific journals, conference proceedings, and relevant research reports in the last five years. The results of the study showed that aroma therapy, especially through the inhalation of essential oils such as peppermint, rosemary, and lavender, can improve focus, reduce anxiety, and improve students' memory retention. This effect is associated with stimulation of the limbic system and increased activity of neurotransmitters that play a role in brain performance. Thus, aroma therapy can be an additional method that can be integrated in the learning environment to increase the effectiveness of students' learning.

Keywords: Aroma Therapy, Focus, Memory.

INTRODUCTION

In the world of education, attention to environmental factors that can improve students' focus and memory is increasing. One aspect that is being researched a lot is the role of aroma therapy in supporting the learning process. Aromatherapy or aromatherapy uses essential oils from specific plants that can provide psychological and physiological effects for individuals who inhale them (Choi et al., 2022). Various studies have shown that certain scents can stimulate the nervous system and improve cognitive function, including attention, working memory, and overall learning capacity (Afghan et al., 2024). This is supported by research by Rezaie et al. (2021) which found that inhalation of lavender oil can improve working memory in individuals with neurological disorders (Rezaie et al., 2021).

Aromatherapy or aromatherapy is an alternative treatment method that uses essential oils from plants to improve physical and mental health. These essential oils can be used through inhalation, massage, or air diffusion to create a relaxing and healing effect (Vora et al., 2024). Recent research suggests that aroma therapy can help reduce anxiety, stress, and improve sleep quality by affecting the limbic system in the brain responsible for emotions and memory (Hedigan et al., 2023). One of the most widely used essential oils is lavender, which has been shown to have a calming effect and can lower levels of cortisol, a hormone associated with stress (Li et al., 2022).

In addition to its psychological benefits, aroma therapy also has a positive effect on physical health. Several studies reveal that inhalation of essential oils such as peppermint and eucalyptus can relieve symptoms of respiratory distress by opening the airways and increasing oxygen flow. Other studies show that the combination of massage therapy with essential oils can help reduce muscle pain and inflammation, especially in patients with arthritis or chronic pain (Shuo-Shin et al., 2020). Despite its many benefits, aroma therapy should be used with caution, especially for individuals with certain allergies or sensitivities to essential oils (Ramsey et al., 2020). With increasing research in this area, aroma therapy continues to be a popular choice in complementary medicine that supports holistic health.

A number of studies have also highlighted that aroma therapy can affect students' mood and stress levels, which ultimately impacts their ability to absorb learning materials. According to Luan et al. (2023), soothing scents, such as lavender

and peppermint, are able to reduce anxiety and increase mental calm, thus creating more optimal learning conditions (Luan et al., 2023). Research by Okuda et al. (2020) shows that olfactory stimulation through aroma therapy can activate neural pathways in the brain related to information processing and long-term memory consolidation (Okuda et al., 2020).

The effectiveness of aroma therapy in improving cognitive function has also been proven through experiments in the learning environment. A study by Cesari et al. (2021) found that the scent of rosemary can improve accuracy and speed in cognitive tasks that require high attention (Malloggi et al., 2021). In addition, research by Ok et al. (2021) showed that the scent of rose oil had a positive effect on short-term memory in college students who underwent academic exams (Ok et al., 2021). This indicates that aroma therapy can not only provide a relaxing effect but also play a role in optimizing brain function when facing intellectual tasks.

Although there is ample evidence to support the benefits of aroma therapy in the context of learning, its application in formal education systems is still limited. Most schools and educational institutions have not integrated aromatherapy as part of their learning strategies, although research shows great potential in improving students' academic performance (Du et al., 2022). Therefore, further research is needed to explore the mechanism of action of aroma therapy in improving students' focus and memory and how its application can be integrated in the daily learning environment.

This research is important considering the increasing need for innovative and neuroscience-based learning strategies to improve student learning effectiveness. In an increasingly competitive educational environment, factors that can help students maintain focus and improve memory are becoming highly relevant (Xiao et al., 2021). Given that aroma therapy is a relatively easy method to implement and does not require complex technological interventions, this research contributes to providing new insights into the potential of aromatherapy as an effective learning aid (Hayes, 2023).

Various studies have proven the benefits of aroma therapy on cognitive function. A study by Choi et al. (2022) highlights how scents in the classroom can improve students' mood and learning performance. Another study by Agatonovic-Kustrin et al. (2020) discusses how certain essential oils are able to improve the speed

and accuracy of cognitive performance in memory-based tasks (Agatonovic-Kustrin et al., 2020). Meanwhile, a study by Ansariniaki et al. (2022) tested the effect of clove oil aromatherapy on improving memory function in patients undergoing electroconvulsive therapy, with results showing a significant improvement in post-therapy recallability (Ansariniaki et al., 2022).

This study aims to analyze the impact of aroma therapy on improving students' focus and memory in the learning process. Specifically, this study will explore the types of scents that are most effective in improving attention and memory retention, as well as how the mechanism of aroma therapy in the central nervous system supports cognitive function. In addition, this study aims to provide recommendations for the application of aroma therapy in a formal learning environment, so that it can be integrated as an additional strategy in supporting student learning effectiveness.

RESEARCH METHODS

This study uses a qualitative approach with the type of literature study research (library research), which aims to analyze and synthesize various scientific studies related to the effectiveness of aroma therapy in improving students' focus and memory. The literature study was chosen because it allows researchers to explore findings from various existing academic sources in order to gain a comprehensive understanding of this research topic (Snyder, 2019).

The data sources in this study come from secondary literature that includes scientific journal articles, academic books, conference proceedings, and research reports relevant to the theme of aroma therapy in the learning process. The literature used was obtained from various scientific databases such as Google Scholar, ScienceDirect, Springer, and PubMed. The criteria for selecting data sources include publications published in the last five years (2019–2024) to ensure relevance to the latest developments in education and neuroscience (Booth et al., 2021).

The data collection technique is carried out through the documentation method by identifying, reviewing, and grouping literature based on its relevance to the research. The literature selection process is carried out systematically by considering the credibility of the source, the research method used in the reference, and the suitability with the focus of this research (Bowen, 2009). The keywords used in the literature search include aromatherapy and cognitive function, essential oils for learning and memory, and aromatherapy in education.

The collected data was analyzed using the content analysis method, namely by examining patterns, trends, and main findings in various previous studies. The analysis was carried out by identifying the relationship between the use of aroma therapy and the improvement of focus and memory in the educational context. The selected literature is then categorized based on the main theme, such as the type of aroma used, the mechanism of action of aroma therapy on cognitive function, and the results of research on its effectiveness in the learning environment (Krippendorff, 2018). From the results of this analysis, this study is expected to provide theoretical insights and practical recommendations related to the application of aroma therapy in the learning process to improve students' focus and memory.

RESULT AND DISCUSSION

The Impact of Aroma Therapy on Improving Students' Focus and Memory

Aroma therapy or aromatherapy has long been used as a natural method to improve mental and emotional well-being. In the context of education, the use of certain scents is believed to affect cognitive function, including improved focus and memory. Some studies have shown that certain scents can stimulate the central nervous system, improve concentration, as well as improve memory retention in students.

The main mechanism underlying these benefits has to do with how certain scents affect the limbic system in the brain, which plays a role in the processing of emotions and memory. When aroma molecules are inhaled, they interact with olfactory receptors in the nose which then send signals to the brain, especially to the hippocampus and amygdala, which play an important role in memory formation and attention regulation.

In addition, certain scents can also stimulate the production of neurotransmitters such as dopamine and acetylcholine, which have an important role in focus and the learning process. For example, acetylcholine plays a role in improving critical thinking and decision-making skills, while dopamine is associated with increased motivation and attention.

The Most Effective Types of Scent in Improving Focus and Memory Retention

Aromatherapy has been shown to have significant benefits in improving students' focus and memory during the learning process. Its main mechanism has to

do with the stimulation of the central nervous system through the interaction of scents with olfactory receptors in the nose, which then sends signals to the brain, especially to the hippocampus and amygdala. These parts of the brain play an important role in memory processing and attention regulation. In addition, certain scents can also stimulate the production of neurotransmitters such as dopamine and acetylcholine, which contribute to improved concentration, information processing, and resistance to external distractions during studying.

Some scents have been shown to be more effective in supporting focus and memory than others. Peppermint, for example, is known to increase alertness and reduce mental fatigue. The menthol compounds contained in it play a role in increasing blood circulation to the brain, which has an impact on improving cognitive function. Meanwhile, rosemary contains a compound 1,8-cineole that has the ability to increase memory capacity and speed up information processing. Some studies show that individuals exposed to the scent of rosemary perform better in memory-based tasks than those who do not.

In addition, lavender, which is commonly associated with relaxation effects, can also help maintain emotional balance, which indirectly favors improved focus. The combination of lavender with a more stimulating aroma such as peppermint can provide an optimal effect for students. The scent of lemon is also known to have a refreshing effect that helps improve concentration and reduce stress. Studies show that the scent of lemon can improve accuracy in cognitive tasks, making it a good choice for supporting learning effectiveness. Meanwhile, the aroma of cinnamon has a stimulating effect that can increase attention as well as speed up information processing. The compounds in cinnamon have also been linked to improved brain executive function, including decision-making and problem-solving abilities.

The application of aroma therapy in the learning environment can be done in various ways. One of the most common methods is the use of diffusers in the classroom to diffuse scents that support concentration and memory during the learning process. In addition, personal methods such as aromatherapy inhalers or scent stickers that can be attached to the study desk can also be an effective alternative. Teachers and educators can also integrate aroma therapy in learning activities through a more interactive approach, for example by providing tissues or cloths that have been dripped with essential oils before the learning session begins.

Overall, aromatherapy has great potential as an additional strategy in supporting students' learning effectiveness. By utilizing the right type of scent and applying it in an educational setting systematically, learners can reap optimal benefits in improving their focus, memory, and cognitive performance. However, for maximum results, a balanced approach and the use of scents that suit individual needs and preferences are required.

The Working Mechanism of Aroma Therapy in Supporting Cognitive Function

The mechanism of action of aroma therapy in supporting cognitive function is closely related to the interaction of aroma with the limbic system in the brain, the part that controls a person's emotions, memory, and level of alertness. When aroma molecules are inhaled, olfactory receptors in the nose send signals to the brain, especially to the hippocampus which plays an important role in the formation and recall of memories. Stimulation of this part allows for increased information retention, so that the learning process becomes more effective.

In addition, certain scents have the ability to increase the activity of neurotransmitters that play a role in cognitive function. For example, peppermint and rosemary are known to increase levels of acetylcholine in the brain, a chemical that plays an important role in memory and focus. Meanwhile, citrus-like scents like lemons are associated with increased production of serotonin and dopamine, two neurotransmitters that function in maintaining a positive mood and increasing motivation to learn. Thus, the use of certain scents can have a wider effect, not only improving memory, but also building a mental state that supports the learning process.

Not only does aroma therapy play a role in brain stimulation, but it also contributes to the regulation of stress and anxiety, two major factors that often hinder concentration and memory. Scents such as lavender, known for their relaxing effects, can help lower stress levels and provide mental calm, making it easier for students to concentrate on the subject matter. In addition, some types of scents have a stimulating effect that can improve blood circulation to the brain. Peppermint and cinnamon, for example, are known to speed up cognitive processes and improve focus by increasing blood flow that carries oxygen and nutrients to the brain.

With these various mechanisms, aroma therapy has great potential in

improving cognitive function, especially in the context of learning. Its effect of strengthening memory, improving concentration, and reducing stress makes it an additional strategy that can be integrated in the educational environment to support students' learning effectiveness.

Recommendations for the Implementation of Aroma Therapy in the Learning Environment

The application of aroma therapy in the learning environment can be done in various ways so that the benefits can be felt optimally. One of the most common methods is the use of diffusers in the classroom to diffuse scents that support concentration and memory during the learning process. The scent chosen should be adjusted to the needs of the student, for example peppermint or rosemary to improve focus during the exam, as well as lavender to create a more relaxed atmosphere. In addition, teachers can also integrate aroma therapy in learning materials by providing tissues or cloths that have been dripped with essential oils, so that students can inhale scents that help increase alertness before starting lessons.

For students who need a personalized solution, a portable aromatherapy inhaler or scent sticker that can be attached to a study desk can be a practical alternative. Certain scent combinations can also be used for a more optimal effect, such as rosemary and lemon to enhance focus or peppermint and lavender to balance concentration and calmness. However, in its use, it is necessary to pay attention to the right timing so as not to cause sensory fatigue. Aroma therapy is most effective if applied before or during a learning session for a sufficient duration, without overdoing it, so it can help students stay focused and comfortable during the learning process.

CONCLUSION

This study highlights the role of aroma therapy in improving students' focus and memory during the learning process. Based on the results of the literature analysis, it was found that some essential oils, such as peppermint and rosemary, have a stimulating effect on the nervous system that can improve concentration and speed up information processing. In addition, essential oils such as lavender have a calming effect that can reduce anxiety and create more optimal learning conditions. The mechanism of action of aroma therapy involves the activation of the limbic system in

the brain, which plays a role in the regulation of emotions, memory, and attention. Nonetheless, the effectiveness of aroma therapy can vary depending on the individual and the type of academic task being performed. Therefore, a more systematic implementation strategy is needed so that the benefits can be obtained optimally in the formal education environment.

To increase the effectiveness of aroma therapy in learning, several steps can be implemented. First, educational institutions can consider using essential oil diffusers in classrooms to create a more conducive learning environment. Second, teachers and educators can educate students about the benefits of aroma therapy and integrate it as part of stress management techniques before exams or assignments. Third, more research is needed to determine the most effective combination of scents in improving focus and memory retention based on students' age levels and academic needs.

Further research can be conducted using an experimental approach to measure the impact of aroma therapy on academic performance under different learning conditions. In addition, it is necessary to conduct an analysis of individual variations in responding to aroma therapy as well as the potential side effects of long-term use of essential oils. The study of how aroma therapy can be combined with other learning techniques, such as meditation or breathing exercises, could also be the focus of future research to create more effective and holistic learning strategies.

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