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How Aromatherapy Can Promote Alertness and Wakefulness

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Abstract

This study delves into the impact of aromatherapy on influencing both sleep and wakefulness via the use of essential oils including lavender and peppermint. Firstly, the study challenges the misconception that scents can't wake people up by supplying evidence that bodies naturally respond to smells, even when in a state of slumber. Further, through the expansion of numerous studies, the paper reveals how aromatherapy significantly impacts drowsiness and alertness, alongside the numerous advantages that ensue including increased sleep quality, increased energy during the daytime, alleviation of fatigue, and a positive modification of circadian rhythm. Ultimately, this study attests to the significance of essential oils.

Keywords: aromatherapy; wakefulness; alertness; wakefulness; essential oils.

1. Introduction

Aromatherapy has been widely used for centuries to promote relaxation, alleviate stress, and improve sleep quality. However, essential oils' impact on sleep and wakefulness remains a topic of interest and controversy. This study delves into the relationship between aromatherapy and sleep, exploring the effects of essential oils such as lavender and peppermint on levels of drowsiness and alertness. By challenging the misconception that scents cannot wake people up, this research paper provides evidence that our bodies naturally respond to smells, even when in slumber. The study aims to expand the existing knowledge on the influence of aromatherapy on bodily processes and highlight the advantages that ensue from the use of essential oils.

2. Materials and Methods

Within this paper, several studies have been gathered and analyzed. The studies specifically addressed regard aromatherapy's impact on promoting wakefulness and alertness. This paper aims to qualify prior beliefs on essential oils' effects on the body, particularly when in a state of slumber.

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3. Research

A. Background Information

While people can't recognize scents when asleep, they still have prevalent impacts on the body in that state as they can facilitate the falling asleep and waking up processes. The sense of smell is handled by the Olfactory bulb, located in the forebrain. "It receives neural input about odors detected by cells in the nasal cavity" [1]. One's ability to smell changes throughout the day according to their circadian rhythm which highly influences one's levels of drowsiness and wakefulness [3]. Circadian rhythms are essentially physical and mental changes that transpire throughout a 24 hour cycle.

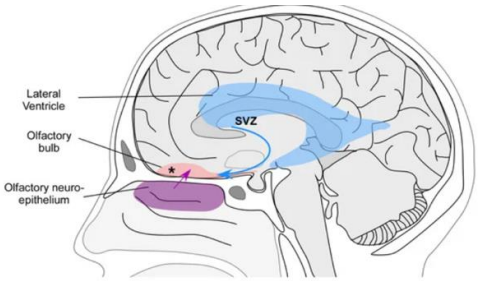

Figure 1: Diagram of the Brain and the Location of the Olfactory Bulb.

Odors don't generally wake up people from sleep on their own as one's sensitivity to smell reduces overnight [4]. According to a Brown University study that was conducted in 2004, smell can't necessarily wake someone up [12]. However, scents still play a key role in amplifying both the falling asleep and wake-up processes.

Within this study, researchers from Brown University attempted to find how well participants could detect odors during slumber in comparison to being awake. To effectively do this, they gathered six participants in their early twenties and studied the effects of peppermint, a pleasant scent, and pyridine, a repulsive odor. The researchers found that no one woke up from either of the scents during their sleep, ranging from moderately deep sleep to REM (rapid eye movement) sleep. Considering that this study's primary focus was to see if scents can wake people up, it disregards the effectiveness scents have on people's bodies even when in a state of slumber and failed to elaborate on the changes that did occur when the participants were asleep.

B. Research Qualification

Although a person's ability to recognize scents is hindered when asleep, aromatherapy still inherently has positive impacts on the body in that state— making it a pivotal strategy in combatting insomnia and promoting healthier sleep. In a pilot study led in 2021 by Li-Wei Ko along with other scientists, research was conducted on how to enhance slow wave sleep, more commonly regarded as deep sleep, with the use of essential oils [14]. In this period of sleep, the body is in its most restful state since one's brainwaves are working the slowest. Within this study, the aroma was emitted when the participants were asleep, making it a blindfolded experiment that minimized the participants' physiological expectations. The study was conducted on nine young, healthy

participants who obtained a regular lifestyle and had no issues with sleep. After the participants had been exposed to the lavender aroma during their sleep, they all reported that they had improved sleep quality as well as more energy during the daytime. Additionally, by emitting a lavender scent, the scientists observed an increase in SWS (slow wave sleep or deep sleep) [6], which leads to improved sleep quality. This deep sleep stage is critical as it is responsible for the consolidation of memories, processing learning, physical recovery, and energizing the immune system. Ultimately, through emitting relaxing scents such as lavender, people can be in a deep sleep stage for a longer period, in turn making them feel more energized after waking up.

While people can't recognize scents when sleeping, as the Brown study revealed, calming essential oils still have a powerful effect. In a further display that people's bodies inherently react to scents, researchers have conducted a study to see how people in a state of slumber react when pleasant and unpleasant odors are emitted into a room7. When sleeping subjects were exposed to an unpleasant smell, they breathed minimally, meanwhile, when a pleasant smell was emitted, the participants inhaled deeply. As the study progressed, the subjects continued to alter their breathing patterns in response to the scents being emitted although they had no recollection of smelling it when awake. Therefore, it is further verified that people inherently react to scents while sleeping despite being unable to acknowledge that they have smelled them [7]. Further, by breathing in the pleasant smells, the participants are more receptive to experiencing the benefits of the aromas throughout the day, as illustrated on in the prior study. Arousing scents like peppermint can nearly wake people up with a significantly increased intensity, making it significantly facilitate the wake-up process. This type of smell activates the trigeminal nerve. As illustrated by the diagram, the trigeminal nerve is the fifth cranial nerve that is responsible for transmitting sensory information from the face, head, and mouth to the brain. Therefore, if someone is entirely anosmic (unable to smell), they can differentiate the smells based on physical sensation. The olfactory and the trigeminal systems are closely related. Considering that most odorants stimulate the trigeminal nerve, scents with such properties can amplify the wake-up process as well. Some examples of trigeminal olfactory stimuli include peppermint and eucalyptus. When these compounds encounter the mucus membranes in the nose, they can activate the trigeminal nerve, leading to a cooling or tingling sensation. This is why peppermint and eucalyptus have a "cooling" effect on the nasal passages. While it is important to use scents that trigger the trigeminal nerve to amplify the waking process, using other odors is still helpful as they are processed by the brain and can positively modify one's circadian rhythm.

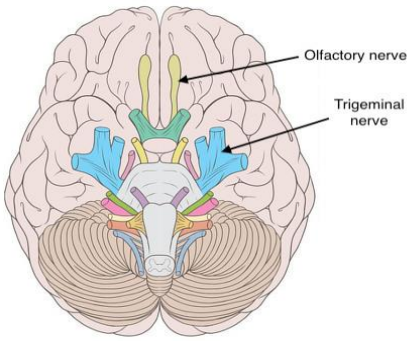

Figure 2: Diagram of the Brain and the Location of the Trigeminal Nerve in Relation to the Olfactory Nerve.

Despite aromatherapy being popularly utilized during the nighttime as it can promote a relaxing environment, various energizing essential oils have been proven to increase attentiveness and productiveness throughout the day. Scents such as peppermint can wake people up and promote alertness during the day due to their energizing properties. Moreover, these scents have been demonstrated to effectively boost alertness levels and enhance wakefulness. In a study conducted in 2017, scientists analyzed essential oil's impact on alleviating fatigue with the concentration being around peppermint [15]. The results revealed that inhaling the peppermint essential oil can greatly relieve exhaustion and can promote alertness [11]. While the primary focus of this study was to investigate the impact of essential oils on exercise-induced fatigue, the findings can be generalized to common fatigue. This is because the participants experienced a heightened sense of alertness after being exposed to the essential oils, even though they were initially feeling tired. This works as the scent of peppermint stimulates the hippocampus area of the brain which controls mental clarity and memory, essentially triggering the brain to focus [11]. Therefore, based on the energizing and alertness-promoting properties of essential oils, as supported by this study and others, it can be inferred that the findings related to exercise-induced fatigue can be applied to general fatigue experienced in daily life. Inhaling energizing essential oils, like peppermint, can help alleviate fatigue and promote alertness, regardless of the underlying cause of tiredness.

4. Limitations

While the studies discussed in this article provide valuable insights into the potential benefits of aromatherapy for promoting sleep and wakefulness, there are several limitations to consider. Firstly, the lack of control over the participants' sleeping environment, noise levels, and ambient lighting could have also impacted the study results. This could make some of the results unreliable, especially considering that the studies reviewed within this research paper were largely conducted on small sample sizes (with most having under ten participants, and one having 48). This limits the generalizability of the findings. Furthermore, the studies had different demographics and thereby the results may only be applicable to that group's gender and age. For example, the Brown study was conducted on healthy people in their early 20s, meaning that the procedures potentially could have had a different result if performed on children or people above that age group due to a differentiation in their sensitivity to smell. Similarly, the final study hadn't specified the age of the 48 males and thus could have had randomized, unspecific results. There was also a potential placebo effect for this study, as the individuals were aware of the scent they inhaled, in turn making the results potentially biased. It is important to note that the effects of aromatherapy may vary depending on individual differences, such as age, gender, and health status.

5. Conclusion

The studies highlighted in this article demonstrate that aromatherapy has a significant impact on promoting wakefulness, even when individuals are asleep. The research shows that aromatherapy can facilitate the process of falling asleep and waking up by stimulating the olfactory system and activating structures in the brain, such as the hippocampus area. Calming scents, such as lavender, have been shown to increase the amount of deep sleep individuals experience, leading to improved sleep quality and greater energy levels during the day. Additionally, energizing scents like peppermint can increase alertness and productivity during the day. While individuals may not consciously recognize scents while sleeping, people's bodies still subconsciously react to

them, leading to numerous advantages. Therefore, the use of essential oils in aromatherapy should be considered a viable strategy for improving sleep and wakefulness and promoting overall wellness.

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