EXPERIMENTAL EVALUATION OF THE INFLUENCE OF AROMATIC ESSENTIAL OILS ON THE AUTONOMIC REGULATION OF CARDIOVASCULAR AND RESPIRATORY FUNCTIONS

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Relevance

In recent years, the therapeutic potential of essential oils has gained significant attention in both experimental and clinical physiology. Aromatherapy has been recognized as a non-invasive method capable of modulating autonomic functions through olfactory and neurohumoral pathways. However, the comparative physiological effects of lavender, rosemary, and sage essential oils on the cardiovascular and respiratory systems remain insufficiently explored. Clarifying these interactions is of great importance for developing safe and effective complementary approaches to the prevention and management of functional disorders in the autonomic regulation of vital systems.

Objective

The objective of this study was to experimentally evaluate the influence of lavender, rosemary, and sage essential oils on the autonomic regulation of the cardiovascular and respiratory systems in healthy individuals.

Materials and Methods

The experimental study was conducted under controlled laboratory conditions using standardized samples of lavender, rosemary, and sage essential oils. Healthy adult volunteers (n = 30) were included, with exclusion criteria eliminating individuals with cardiovascular, respiratory, or neurological disorders. Physiological parameters were monitored before, during, and after controlled inhalation of essential oil vapors using noninvasive diagnostic methods. Heart rate variability (HRV) analysis, arterial blood pressure, respiratory rate, and oxygen saturation (SpO_2) were continuously recorded. Autonomic regulation was assessed through spectral analysis of HRV, quantifying the balance between sympathetic and parasympathetic activity. Respiratory stability was evaluated by spirometric measurements and thoracic impedance monitoring. All data were statistically processed using descriptive and inferential analysis. The results were interpreted to determine the direction and degree of autonomic modulation induced by each essential oil.

Results

The results of the experimental study demonstrated distinct physiological responses to the inhalation of different essential oils.

Lavender essential oil produced a statistically significant reduction in heart rate (by 8–10%) and systolic blood pressure (by 5–7%), accompanied by an increase in the high-frequency component of HRV, indicating enhanced parasympathetic tone and relaxation.

In contrast, rosemary essential oil caused a mild increase in systolic pressure (by 6–8%) and respiratory rate (by 10–12%), suggesting activation of sympathetic regulation and improved alertness.

Sage essential oil exhibited a stabilizing effect on cardiovascular and respiratory indicators, with no significant deviations from baseline values, reflecting balanced autonomic modulation.

Overall, these findings confirm that aromatic essential oils exert differentiated effects on the autonomic control of vital physiological systems.

Conclusion

Lavender, rosemary, and sage essential oils influence the autonomic regulation of cardiovascular and respiratory functions in diverse ways.

Lavender demonstrates pronounced relaxation and vagotonic effects; rosemary stimulates sympathetic tone and enhances respiratory activity; sage maintains autonomic balance and homeostatic stability.

The obtained data indicate that essential oils can be effectively utilized as supportive, non-pharmacological agents in optimizing autonomic regulation and improving functional adaptation under stress-related conditions.