PHYSIOLOGICAL EFFECTS OF LAVENDER, ROSEMARY, AND SAGE ESSENTIAL OILS ON THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS

Shirmatova Madinabonu Odiljon kizi
Master's student at Fergana State University

Mukhamedieva Irodakhon Bakhtiyorkhoja Kizi
PhD, Central Asian Medical University

Relevance

In recent years, research in phytotherapy and aromatherapy has provided growing scientific evidence of the multifaceted physiological effects of essential oils on the human body. The regulation and restoration of cardiovascular and respiratory system functions through natural bioactive compounds have become an important area of modern medical science. Essential oils derived from lavender, rosemary, and sage possess calming, spasmolytic, bronchodilatory, and antioxidant properties. Their ability to influence autonomic regulation via the central nervous system and to maintain normal circulatory and respiratory activity represents a promising direction in both experimental and clinical physiology. Therefore, studying the complex effects of these essential oils on cardiovascular and respiratory systems, as well as determining their preventive and therapeutic potential, is of significant relevance to contemporary physiological and clinical practice.

Research Aim

The aim of this study is to investigate the physiological effects of lavender, rosemary, and sage essential oils on the cardiovascular and respiratory systems. The research seeks to assess how these essential oils influence heart rate, blood pressure, vascular tone, and respiratory parameters, as well as to determine their potential regulatory and protective roles in maintaining functional stability of these systems. By identifying the specific mechanisms through which these natural compounds exert their effects, the study aims to provide scientific justification for their use in preventive and therapeutic practices within modern medicine.

Materials and Methods

The study was conducted on clinically healthy volunteers aged 20 to 40 years who had no history of cardiovascular or respiratory diseases. Each participant was examined under standardized laboratory conditions to ensure physiological stability and eliminate external influencing factors. Aromatherapeutic exposure was performed using standardized 100% pure essential oils of Lavandula angustifolia (lavender), Rosmarinus officinalis (rosemary), and Salvia officinalis (sage). Inhalation was carried out through controlled vapor diffusion for 10–

15 minutes, with each essential oil administered separately at a consistent concentration. Cardiovascular parameters—including heart rate, arterial blood pressure, and pulse wave amplitude—were monitored using a digital sphygmomanometer and photoplethysmography. Respiratory indicators such as respiratory rate, tidal volume, and oxygen saturation (SpO_2) were measured using spirometry and pulse oximetry. All measurements were recorded before, during, and after aromatherapy exposure to evaluate both immediate and short-term physiological responses. Statistical analysis was performed using standard biomedical data processing methods to determine the significance of observed changes ($p < 0.05$).

Results

The analysis of physiological parameters revealed that inhalation of lavender, rosemary, and sage essential oils produced distinct yet beneficial effects on both the cardiovascular and respiratory systems. Lavender essential oil demonstrated a mild sedative and stabilizing influence, leading to a significant decrease in heart rate and systolic blood pressure ($p < 0.05$), indicating its parasympathetic activation and stress-reducing effect. Rosemary essential oil caused a moderate increase in pulse amplitude and respiratory rate, suggesting mild stimulation of the sympathetic nervous system and enhanced respiratory drive. Sage essential oil exhibited balancing properties, normalizing fluctuations in heart rate variability and improving oxygen saturation levels. Overall, the short-term aromatherapeutic exposure to these essential oils contributed to improved circulatory and respiratory efficiency without adverse hemodynamic reactions. The obtained data indicate that these oils can modulate autonomic tone and enhance physiological adaptation mechanisms in healthy individuals.

Conclusion

The present study demonstrates that short-term inhalation of lavender, rosemary, and sage essential oils exerts measurable and distinct modulatory effects on cardiovascular and respiratory physiology in healthy adult volunteers. Lavender produced a statistically significant reduction in heart rate and systolic blood pressure consistent with parasympathetic predominance and anxiolytic/sedative action. Rosemary elicited mild stimulatory changes—manifested by increased pulse amplitude and respiratory rate—indicative of augmented sympathetic drive and respiratory activation. Sage showed a stabilizing effect on autonomic variability and a modest improvement in oxygen saturation, suggesting regulatory (homeostatic) properties. Collectively, these results indicate that targeted aromatherapeutic exposure can modulate autonomic tone and short-term cardiorespiratory function without inducing adverse hemodynamic responses in healthy subjects. Such effects have potential relevance for adjunctive, non-invasive interventions aimed at stress reduction, promotion of respiratory comfort, and short-term modulation of autonomic balance. Limitations include

short-term exposure, a sample of healthy young adults, and controlled laboratory conditions. Future research should employ randomized, double-blind, placebo-controlled trials with larger and clinically diverse cohorts to define dose–response relationships and elucidate underlying mechanisms. In summary, the study provides evidence that lavender, rosemary, and sage essential oils differentially modulate cardiovascular and respiratory function and warrant further controlled investigation to determine their therapeutic potential and clinical applications.