

ABSTRACT

The decline in sustained attention due to the development of digital technology is a significant problem that impacts academic and professional productivity. This study aims to address the challenge of objectively measuring attention by developing an integrated system to evaluate the effect of aromatherapy on cognitive function. The main problem faced is the lack of tools that can combine precise behavioral measurements with neurophysiological data to assess the effectiveness of interventions such as aromatherapy.

This research develops a sustained attention analysis system consisting of two main components: a website-based Sustained attention to Response Task (SART) stimulus application and an Electroencephalography (EEG) signal analysis system. The SART application is designed to present visual stimulus with high time precision and is able to record response time and timestamp accurately. The EEG analysis system is implemented to process brain signal data, perform filtering, segmentation, and classification using machine learning to identify Event-Related Potential (ERP) components, which are neural markers of the attentional process.

The developed web-based stimulus system has been successfully validated through User Acceptance Testing (UAT), where all 19 functionality and interface parameters were declared 100% successful by a team of psychologists, so the system was declared suitable for testing. After implementation, the EEG analysis results showed that the control group had an average detection of Event-Related Potential (ERP) components P200, P300, and P500 of 61.545% in channels AF7 and AF8, while the experimental group only reached 47.66%. Specifically, on channel AF7, the experimental group's P200 component dropped significantly to 41.36%. Such results may be influenced by psychological factors such as the placebo effect, where participants' negative beliefs or expectations may decrease therapeutic outcomes, even if the active compound is actually effective. In addition, inadequate session duration and frequency may not have a significant impact, so consistent intervention is required to achieve optimal effects. The implication is that aromatherapy has not been shown to significantly improve focus or sustained attention in this study, although it needs to be further explored with variations in scent type, duration, or intensity to determine conditions that might provide positive benefits.

Keywords: Aromatherapy, Sustained Attention, EEG, ERP, SART