**Sub-themes/relevant fields:** Drug Discovery and Personalized Medicine

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Utilizing Binaural Beats to Combat Mental Fatigue in Corporate Employees for Enhanced Cognitive Performance and Sustained Productivity

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# Abstract

**Background:** Mental fatigue and sleep deprivation are some of the most common problems that occur in corporate settings and are associated with impaired cognitive performance, lower productivity, and health consequences. The requirements of modern work, combined with continuous mental stress, are increasing these problems. The present study investigates the utilization of binaural beats-non-invasive auditory tools that effect brainwave activity-for the mitigation of mental fatigue to improve cognitive functioning. Binaural beats are a perception of sound generated in the brain when slightly different frequencies of sound are presented separately to each ear, processing it for such states as focus, relaxation, and sleep. It is hypothesized that regular use of specific, targeted binaural beat frequencies will reduce fatigue, increase focus, and enhance productivity in corporate employees.

**Methods:** The study employs a controlled experimental design with two groups: an experimental group exposed to binaural beats and a control group without exposure. Specific frequencies—beta waves (13–30 Hz) for focus and alpha waves (8–12 Hz) for relaxation as well as theta waves (4-8 Hz)—are administered to the experimental group during work and rest intervals over a four-week period. Participants undergo cognitive performance assessments, self-reported fatigue evaluations, and productivity metrics before and after the intervention. The tools will include standardized tests for attention span, memory recall, and task efficiency, along with questionnaires measuring perceived stress and sleep quality.

**Result:** These results show that there is a significant enhancement in cognitive performance, attention span, and efficiency of performing tasks by individuals exposed to binaural beats. The experimental group reported a noticeable decrease in fatigue and level of stress compared to the control group. Besides, regular exposure to alpha wave frequencies improved sleep quality, which contributed to sustained cognitive benefits throughout the workday.

**Conclusion:** These findings underscore the potential for neuro-auditory interventions to improve workplace well-being and productivity. Future research could explore long-term effects and integration into organizational wellness programs.

**Key words:** Mental fatigue, binaural beats, corporate employees, cognitive performance, productivity, workplace well-being, brainwave entrainment.

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