

Abstract

Title: Brain Activity Changes During Walking Affected by Visual and Auditory Cueing in Parkinson's Disease Patients – sLORETA Study.

Objectives: The aim of this dissertation is to determine the changes in brain source activity during walking with visual and auditory cueing compared to normal walking in patients with Parkinson's disease and to investigate whether there is a difference between brain electrical activity during walking with visual and auditory cueing between patients with Parkinson's disease and healthy controls.

Methods: The study sample consisted of 15 patients with Parkinson's disease and 15 healthy controls. Brain activity was recorded in all participants using scalp EEG during a 3-minute walking task on 9-meter track under three conditions: 1) walking without stimuli, 2) walking with visual cueing (black lines taped on the floor at the distance 10% greater than the baseline step length) and 3) walking with auditory cueing (a metronome set to a frequency 10% higher than the baseline cadence). Statistical analysis of intra-individual differences in brain activity across conditions within the experimental group and inter-individual differences in brain activity between experimental and control group were conducted using the tests within the statistical module of sLORETA.

Results: Visual cueing during walking in patients with Parkinson's disease showed a trend of increased current density in the premotor cortex. Similarly, auditory cueing during walking in this group showed a trend of increased current density in the limbic lobe. However, neither of these results reached statistical significance. Comparing gait with visual cueing between experimental and control group revealed statistically significant reduction in current density in the alpha-1, beta-2, and theta frequency bands within the motor and somatosensory cortical areas. Similarly, gait with auditory cueing in experimental group compared to control group showed a statistically significant reduction in current density in the alpha-1, alpha-2, beta-1, and beta-2 frequency bands in the motor, somatosensory, and limbic cortical areas.

Keywords: Parkinson's Disease, cueing, EEG, sLORETA, Brodmann's areas