The relationship of lesion location, resting-state EEG and aphasia severity in post-stroke aphasia

Kimaya Sarmukadam, Roozbeh Behrouzmand
*Speech Neuroscience Lab, Department of Communication Sciences and Disorders, Arnold School of Public Health, University of South Carolina

Background

With up to 64% of stroke survivors meeting criteria for expressive and receptive language difficulties, impairments in speech production after stroke can leave devastating impacts on mental health, daily functioning and overall quality of life.

Resting state electroencephalographic EEG data have the potential to provide insight into the neural mechanisms of speech in participants with post-stroke aphasia. Recent evidence demonstrates that using spectral power, participants with chronic stroke exhibit increased delta (0.5-3.5 Hz) and theta (4-7.5 Hz) and decreased alpha (8-12.5 Hz), beta (13-30 Hz), and gamma (>30 Hz) band activities during resting eyes-closed and opened conditions compared to controls.

Methods (continued)

Data Analysis: EEG data were pre-processed using EEGLAB toolbox. For a more detailed description of the methods, please refer to the study by Ali, M., 2020.

Results

ROI-based lesion mapping analysis revealed that 6 out of 7 aphasia participants had overlapping lesions in the left precentral gyrus (PreCG.L), left inferior frontal gyrus, pars opercularis (IFGop.L), Rolandic operculum (ROLL.L) and left insula (INS.L). These significant (p < .05) positive correlations were based on previous literature regarding implicated networks in speech and language and post-stroke aphasia. Statistical Analysis: Statistical analyses were performed using IBM SPSS (version 28.0).

Conclusions

These preliminary results suggest increased theta power in the left temporal region, and decreased alpha, low- and high-beta, and low-gamma power in the language network as compared to neurologically intact controls. These findings are in line with previous results and demonstrate decreased alpha, low- and high-beta, and low-gamma power in resting state conditions.