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EEG Upper/low alpha frequency power ratio relates to temporo-Parietal brain atrophy in mild cognitive impairment

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Objective: Temporo-parietal cortex thinning is associated to mild cognitive impairment (MCI) due to Alzheimer disease (AD). The increase of EEG upper/low alpha power ratio has been associated with AD-converter MCI subjects. We investigated the association of alpha3/alpha2 ratio with patterns of cortical thickness in MCI.

Methods: 74 Adult subjects with MCI underwent clinical and neuropsychological evaluation, electroencephalogram (EEG) recording and high resolution 3D magnetic resonance imaging (MRI). Alpha3/alpha2 power ratio as well as cortical thickness was computed for each subject. Three MCI groups were detected according to increasing tertile values of upper/low alpha and difference of cortical thikness among the groups estimated. Pearson's was used to assess the topography of the correlation between cortical thinning and memory impairment.

Results: High upper/low alpha group had total cortical grey matter (CGM) volume reduction of 471 mm2 than Low upper/low alpha group ($p<0.001$). Upper/low alpha group showed a similar but less marked pattern (160160 mm2) of cortical thinning when compared to Middle upper/low alpha group ($p<0.001$). Moreover, high upper/low alpha group had wider cortical thinning than other groups, mapped to the Supramarginal and Precuneus bilaterally. Finally, in High upper/low alpha group temporo-parietal and frontal cortical thickness was correlated to memory performance. No significant cortical thickness differences were found between middle and low upper/low alpha groups.

Conclusion: High EEG alpha3/alpha2 ratio was associated with temporo-parietal cortical thinning and memory impairment in MCI subjects. The combination of EEG upper/low alpha ratio and cortical thickness measure could be useful for identifying individuals at risk for progression to AD dementia and may be of value in clinical context.

Biography

Moretti Davide Vito is consultant neurologist, chief of the clinical neurophysiology service and researcher at the National Institute of Research and Cure for Mental disorders and Dementia S john of God, Brescia, Italy. He received his medical degree from Catholic University in Rome and completed his residency in neurology and fellowship in movement disorders at University of Trieste, Italy. Moreover, he received the PhD in neurophysiology at La Sapienza University (tesis title "Quantitative EEG in Alzheimer's disease"). He is currently involved in research and care of subjects with Alzheimer's disease and dementia in the Memory Clinic/Alzheimer Operative Unit of the S. John of God Institute. Moreover, he is the chief of the clinical neurophysiology unit. His research is primary concerned about quantitative EEG evaluation of Alzheimer's patients both in prodromic and clinically evident phase of the disease.

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