Quantitative EEG in Children and Adults With Attention Deficit Hyperactivity Disorder: Comparison of Absolute and Relative Power Spectra and Theta/Beta Ratio.

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Abstract

In recent decades, resting state electroencephalographic (EEG) measures have been widely used to document underlying neurophysiological dysfunction in attention deficit hyperactivity disorder (ADHD). Although most EEG studies focus on children, there is a growing interest in adults with ADHD too. The aim of this study was to objectively assess and compare the absolute and relative EEG power as well as the theta/beta ratio in children and adults with ADHD. The evaluated sample comprised 30 male children and 30 male adults with ADHD diagnosed according to DSM-IV criteria. They were compared with 30 boys and 30 male adults matched by age. The mean age (±SD) of the children's group was 9 (±2.44) years and the adult group 35.8 (±8.65) years. EEG was recorded during an eyes-open condition. Spectral analysis of absolute (μV2) and relative power (%) was carried out for 4 frequency bands: delta (2-4 Hz), theta (4-8 Hz), alpha (8-13 Hz), and beta (13-21 Hz). The findings obtained for ADHD children are increased absolute power of slow waves (theta and delta), whereas adults exhibited no differences compared with normal subjects. For the relative power spectra there were no differences between the ADHD and control groups. Across groups, the children showed greater relative power than the adults in the delta and theta bands, but for the higher frequency bands (alpha and beta) the adults showed more relative power than children. Only ADHD children showed greater theta/beta ratio compared to the normal group. Classification analysis showed that ADHD children could be differentiated from the control group by the absolute theta values and theta/beta ratio at Cz, but this was not the case with ADHD adults. The question that should be further explored is if these differences are mainly due to maturation processes or if there is a core difference in cortical arousal between ADHD children and adults.