Neural oscillations in resting state EEG in ADHD children-A preliminary study.

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Abstract:
Background:
Children with attention-deficit hyperactivity disorder (ADHD) have several cognitive deficits such as inattention, poor working memory and behavioral disinhibition. Electroencephalography (EEG) signals are related to better understanding the neuronal functions in children with ADHD.

Aims:
The aim of this study was to examine resting-state EEG power and identify specific neural abnormalities through oscillatory patterns in ADHD children.

Method:
A total of 18 subjects between the age of 8 to 12 years participated with 9 children diagnosed with ADHD and 9 matched healthy participants (HP). Conner's Parent Rating Scale (CPRS) was administered to establish a behavioural profile for the ADHD group. Using 19 channels, EEG was recorded in eyes-closed conditions. EEG power spectral analysis was used. Wilcoxon-Mann-Whitney test was used to compare EEG signals of the ADHD and HP group. The critical value for significance was set at 0.05 and 0.01 levels.

Result:
The ADHD group had elevated absolute power in gamma1 band at the right hemispheric frontal and central channels. With relative power measures, children with ADHD had elevated levels of delta and gamma bands in the central and frontal regions. The ADHD group showed decreased relative power for alpha frequency in the occipital region, and decreased relative theta activity.

Conclusion:
Increased relative delta activity suggests cortical underarousal and decreased theta may related to cognitive impairment in ADHD children. Elevated gamma activity in ADHD children denotes their enhanced level of neuronal excitation with unspecific activation of processing resources. A distinct neural pattern distinguishes the ADHD group from the HP.