Heart Rate Variability in Children with Attention-Deficit/Hyperactivity Disorder: A Pilot Study.

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Abstract

BACKGROUND:
Attention deficit/hyperactivity disorder (ADHD) is a common childhood neuropsychiatric disorder. Autonomic nervous system plays a vital role in attention, self-regulation, emotional stability and social affiliation, which are affected in ADHD. The prefrontal cortex, which is vital for attention, motor control, emotional regulation and higher order autonomic control, is hypofunctional in ADHD. In addition, catecholamine dysregulation is there.

PURPOSE:
We hypothesized that there is autonomic dysfunction: reduction in overall heart rate variability (HRV) and sympathovagal imbalance in children with ADHD.

METHODS:
Study criteria were drug-naïve ADHD children who were 7-12 years of age of either gender who fulfilled DSM-IV criteria for ADHD and did not have any associated comorbid psychiatric/neurological/medical disorders. Two hundred and seventy ADHD children were screened out of which only 12 were found eligible and 10 participated. Sample size was 20 (cases = 10, age- and gender-matched healthy controls = 10). Short-term HRV of both time and frequency domains were assessed by recording lead II electrocardiogram after using Tell-Show-Do, a behavior shaping technique. Comparison between groups was done using Mann-Whitney and Wilcoxon test. Demographic variables like age, height, weight and body mass index were similar between groups.

RESULTS:
Among time domain parameters, SD of all NN intervals, square root of the mean of the sum of squares of differences between adjacent NN intervals and percentage of count of number of pairs of adjacent NN intervals differing by more than 50 ms were reduced in ADHD group with p < 0.05. Among frequency domain parameters, total power was reduced in ADHD group with p < 0.05, high frequency power (HF) was reduced in ADHD group with p < 0.01 and low frequency power to HF ratio was higher in ADHD group with p < 0.01.

CONCLUSION:
There is autonomic dysfunction in children with ADHD - reduction in overall HRV with sympathovagal imbalance with sympathetic dominance.