Electroencephalogram power development of cognitive function at age 7 to 12 years: a comparative study between attention deficit hyperactivity disorder and healthy children

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Abstract

Objective:
To compare brain electrical cognitive tasks and brain development between study about 7 to 12 years old attention deficit hyperactivity disorder (ADHD) and normal children.

Method:
Prospective case-control study was used. A total of 110 children with ADHD (63 boys and 47 girls) and 116 normal children (66 boys and 50 girls), were enrolled in this study. The electroencephalogram (EEG) was recorded when attention tasks were conducted, the EEG power was extracted from the original data and comparatively analyzed the absolute power (θ, α, β spectrum) and relative power (θ/total, α/total, θ/α, θ/β).

Result:
(1) Absolute power: ADHD children's absolute power was higher than that of normal children in Pz lead ((52±28) vs. (40±30) μV², t=-3.906, P<0.05), with statistical significance. (2) Relative power: θ/total, θ/α, θ/β in ADHD are higher than normal children (0.23±0.07 vs. 0.20±0.05, 1.35±0.76 vs. 1.00±0.56, 4.75±2.49 vs. 3.56±2.08, t=-2.900 and 3.954 and 3.901, P=0.004 and 0.000 and 0.000), α/total in ADHD is lower (0.21±0.09 vs. 0.24±0.10, t=-2.517, P=0.013). (3) The comparative study of the development of EEG power θ/β between ADHD and normal children showed age-related correlation in both groups (r=-0.378 and -0.398, P=0.000 for both).

Conclusion:
ADHD children's EEG power on slow spectrum was higher than that of the normal children, it was more significant in the parietal region than in frontal region. With the increase of age, the θ relative power in ADHD and normal children gradually declined, in the normal children it linearly related, but in ADHD there was no significant regularity. θ/β can be used as a sensitive index to assess ADHD children's cognitive function.