Comparison of QEEG Findings between Adolescents with Attention Deficit Hyperactivity Disorder (ADHD) without Comorbidity and ADHD Comorbid with Internet Gaming Disorder.

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Abstract

Internet gaming disorder (IGD) is often comorbid with attention deficit hyperactivity disorder (ADHD). In this study, we compared the neurobiological differences between ADHD comorbid with IGD (ADHD+IGD group) and ADHD without comorbidity (ADHD-only group) by analysing quantitative electroencephalogram (QEEG) findings. We recruited 16 male ADHD+IGD, 15 male ADHD-only adolescent patients, and 15 male healthy controls (HC group). Participants were assessed using Young's Internet Addiction Scale and ADHD Rating Scale. Relative power and inter- and intra-hemispheric coherences of brain waves were measured using a digital electroencephalography (EEG) system. Compared to the ADHD-only group, the ADHD+IGD group showed lower relative delta power and greater relative beta power in temporal regions. The relative theta power in frontal regions was higher in the ADHD-only group compared to HC group. Interhemispheric coherence values for the theta band between F3-F4 and C3-C4 electrodes were higher in the ADHD-only group compared to HC group. Intra-hemispheric coherence values for the delta, theta, alpha, and beta bands between P4-O2 electrodes and intrahemispheric coherence values for the theta band between Fz-Cz and T4-T6 electrodes were higher in ADHD+IGD group compared to the ADHD-only group. Adolescents who show greater vulnerability to ADHD seem to continuously play Internet games to unconsciously enhance attentional ability. In turn, relative beta power in attention deficit in ADHD+IGD group may become similar to that in HC group. Repetitive activation of brain reward and working memory systems during continuous gaming may result in an increase in neuronal connectivity within the parietooccipital and temporal regions for the ADHD+IGD group.