The Relation of Blood Iron Level with Frontal Function in Children with Attention-Deficit/Hyperactivity Disorder

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Abstract

Objectives
Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder showing many neuropsychological deficits. Many environmental risk factors have been thought to increase the risk for the disorder. We examined blood iron levels in children with ADHD and a control group to find an association between iron deficit and diagnosis, neuropsychological characteristics and clinical features.

Methods
An ADHD group (n=50) and control group (n=45) of children 6–12 years of age were recruited. Both groups were diagnosed by semi-structured interview, and they were evaluated using the Korean version of the ADHD Rating Scale (K-ARS), Korean version of IOWA Conner's Rating Scale (K-IOWA), intelligence quotient (IQ), and neurocognitive function tests (continuous performance test, children's color trails test, Stroop color-word test). Iron levels in blood were determined using the inductively coupled plasma mass spectrometry instrument. Independent t-test and correlation were used to determine the relation of blood iron levels with symptom ratings and neurocognitive function. Logistic regression was performed to determine the diagnostic value of blood iron levels.

Results
Blood iron levels were significantly lower in ADHD than in control and showed negative correlation with K-ARS and K-IOWA scores. Blood iron levels showed positive association with IQ and Stroop color-word test results and negative association with results of continuous performance testing. Low blood iron levels predicted the diagnosis of ADHD.

Conclusion
Lower levels of blood iron were associated with ADHD symptom severity, IQ, and frontal lobe-mediated neurocognitive function. As blood iron levels may influence ADHD, measurement of iron levels in blood may be useful for evaluation of symptoms and neurocognitive function in ADHD.