Association of Monoamine Oxidase A (MAOA) Gene uVNTR and rs6323 Polymorphisms with Attention Deficit and Hyperactivity Disorder in Korean Children

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Abstract

Objective: Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder. The genetic cause of ADHD is still unclear, but the dopaminergic, serotonergic, and noradrenergic pathways have shown a strong association. In particular, monoamine oxidase A (MAOA) plays an important role in the catabolism of these neurotransmitters, suggesting that the MAOA gene is associated with ADHD. Therefore, we evaluated the relationship between the MAOA gene polymorphisms (uVNTR and rs6323) and ADHD.

Materials and methods: We collected a total of 472 Korean children (150 ADHD cases and 322 controls) using the Korean version of the DuPaul Attention Deficit Hyperactivity Disorder Rating Scales (K-ARS). Genotyping was performed by PCR and PCR-RFLP. The Behavior Assessment System for Children Second Edition (BASC-2) was used to evaluate the problem behaviors within ADHD children.

Results: We observed significant associations between the rs6323 and ADHD in girls (p < 0.05) and the TT genotype was observed as a protective factor against ADHD in the recessive model (OR 0.31, 95% CI 0.100–0.950, p = 0.022). The 3.5R-G haplotype showed a significant association in ADHD boys (p = 0.043). The analysis of subtype also revealed that the 4.5R allele of uVNTR was a risk factor for the development of ADHD in the combined symptom among girls (OR 1.87, 95% CI 1.014–3.453, p = 0.031). In the BASC-2 analysis, the MAOA uVNTR polymorphism was associated with activities of daily living in ADHD boys (p = 0.017).

Conclusion: These results suggest the importance of the MAOA gene polymorphisms in the development of ADHD in Korean children. A larger sample set and functional studies are required to further elucidate of our findings.