The impact of synapsin III gene on the neurometabolite level alterations after single-dose methylphenidate in attention-deficit hyperactivity disorder patients.


Abstract

OBJECTIVE:
To investigate the neurometabolite level changes according to synapsin III gene rs133945G>A and rs133946C>G polymorphisms by using magnetic resonance spectroscopy (MRS) in patients with attention-deficit hyperactivity disorder (ADHD).

METHODS:
Fifty-seven adults diagnosed with ADHD were recruited for the study. The participants were examined by single-voxel (1)H MRS when medication naïve and 30 minutes after oral administration of 10 mg methylphenidate (Mph). Those who had been on a stimulant discontinued the medication 48 hours before MRS imaging. Spectra were taken from the anterior cingulate cortex, dorsolateral prefrontal cortex, striatum, and cerebellum, and N-acetylaspartate (NAA), choline, and creatine levels were examined. For genotyping of the synapsin III gene polymorphisms, DNA was isolated from peripheral blood leukocytes. The effects of age, sex, and ADHD subtypes were controlled in the analyses.

RESULTS:
After a single dose of Mph, choline levels increased significantly in the striatum of rs133945G>A polymorphism-GG genotypes (P=0.020) and NAA levels rose in the anterior cingulate cortex of rs133946C>G polymorphism-CG genotypes (P=0.014). Both rs133945G>A and rs133946C>G polymorphisms were found to statistically significantly affect the alteration of NAA levels in response to Mph in dorsolateral prefrontal cortex with two-way repeated measure of analysis of variance. Post hoc comparisons revealed a significant difference between CG and GG genotypes of rs133946C>G polymorphisms after Bonferroni adjustment (P=0.016).

CONCLUSION:
Synapsin III gene polymorphisms may be affecting the changes in neurometabolite levels in response to Mph in adult ADHD patients. Future studies are needed to confirm our findings.