The Effect of Single Dose Methylphenidate on Neurometabolites according to COMT Gene Val158Met Polymorphism in the Patient with Attention Deficit Hyperactivity Disorder: A Study Using Magnetic Resonance Spectroscopy.


Abstract

OBJECTIVE: Attention deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental disorder. Thus, the present study aimed to determine the effects of a single dose of methylphenidate (Mph) on neurometabolite levels according to polymorphisms of the catechol-O-methyltransferase (COMT) gene.

METHODS: This study evaluated the neurometabolite levels including N-acetylaspartate (NAA), creatine (Cr), and choline (Cho) of ADHD patients, before and after treatment with Mph (10 mg) according to the presence of COMT polymorphisms. The spectra were obtained from the dorsolateral prefrontal cortex (DLPFC), anterior cingulate cortex (ACC), cerebellum, and striatum.

RESULTS: The NAA levels of the val/val and val genotype carriers (val/val and val/met genotypes) increased in the DLPFC and ACC, respectively, following Mph treatment. The NAA/Cr ratio was lower in the DLPFC of val carriers than in the met/met genotype carriers prior to Mph administration. The Cho levels of the val/met genotype and val carriers increased in the striatum following Mph treatment. Following Mph treatment, the Cr levels of the met/met genotype carriers were higher than those of the val/met genotype and val carriers. Additionally, after Mph treatment, there was a significant increase in Cr levels in the DLPFC of the met/met genotype carriers but a significant decrease in such levels in the striatum of val/val genotype carriers.

CONCLUSION: These findings suggest that polymorphisms of the COMT gene can account for individual differences in neurochemical responses to Mph among ADHD patients. Therefore, further studies are needed to fully characterize the effects of the Val158met polymorphism of the COMT gene on treatment outcomes in patients with ADHD.