A Study about Effects of Osmotic-Controlled Release Oral Delivery System Methylphenidate on Regional Cerebral Blood Flow in Korean Children with Attention-Deficit Hyperactivity Disorder.


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Abstract

OBJECTIVES:
The objective of this study was to examine the effects of osmotic-controlled release oral delivery system methylphenidate on changes in regional cerebral blood flow (rCBF) in children with attention-deficit hyperactivity disorder (ADHD) using single photon emission computed tomography (SPECT).

METHODS:
A total of 26 children with ADHD (21 boys, mean age: 9.2±2.05 years old) were recruited. Each ADHD participant was examined for changes in rCBF using technetium-99m-hexamethylpropylene amine oxime brain SPECT before and after 8 weeks methylphenidate medication. Brain SPECT images of pediatric normal controls were selected retrospectively. SPECT images of ADHD children taken before medication were compared with those of pediatric normal controls and those taken after medication using statistical parametric mapping analysis on a voxel-wise basis.

RESULTS:
Before methylphenidate medication, significantly decreased rCBF in the cerebellum and increased rCBF in the right precuneus, left anterior cingulate, right postcentral gyrus, right inferior parietal lobule and right precentral gyrus were observed in ADHD children compared to pediatric normal controls (p-value<.0005, uncorrected). After medication, we observed significant hypoperfusion in the left thalamus and left cerebellum compared to pediatric normal controls (p-value<.0005, uncorrected). In the comparison between before medication and after medication, there was significant hyperperfusion in the superior frontal gyrus and middle frontal gyrus and significant hypoperfusion in the right insula, right caudate, right middle frontal gyrus, left subcallosal gyrus, left claustrum, and left superior temporal gyrus after methylphenidate medication (p-value<.0005, uncorrected).

CONCLUSION:
This study supports dysfunctions of fronto-striatal structures and cerebellum in ADHD. We suggest that methylphenidate may have some effects on the frontal lobe, parietal lobe, and cerebellum in children with ADHD.