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Early postnatal treatment effect of methylphenidate on spontaneous and reward alteration and neuronal morphology of hippocampus in rats

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Original article

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Abstract

Background: Attention Deficit Hyperactivity Disorder (ADHD), is one among the most common neuropsychiatric disorders in children. It is associated with other mental illness like anxiety and mood related disorders, which can continue into adulthood. Methylphenidate (MPH) is the primary choice of treatment, and has been so for many years. MPH is effective in relieving the symptoms of ADHD. The early exposure effects of MPH on cognition are of concern, since this drug is inappropriately used in paediatrics. The present study examines the long-term effect of early exposure of MPH on the spatial memory, and histomorphological changes in the hippocampus of normal rats. **Methods:** Rats received 2 mg/kg or 5 mg/kg dose of MPH or saline during postnatal days 7-35. Rats were subjected to a battery of cognitive tests on postnatal day 90 (PND90). The histomorphological study of various regions of the hippocampus and dentate gyrus were performed on postnatal day 90 or 135. **Results:** In the cognitive function test, the mean percentage of correct response was not altered in MPH treated rats as compared to their normal untreated counterparts, but the spontaneous alteration test revealed an improvement in learning ability during adulthood. At PND90, the neuronal loss was confined to CA4 hippocampal region and the dentate gyrus, but at PND135, there was significant neuronal loss in CA3, CA2, CA1 regions but not in the dentate gyrus. **Conclusion:** Early exposure to MPH in rats can adversely affect the survival of the adult neurons. Further, sensitive cognitive tests during adulthood is required to substantiate the neuronal loss observed in this study.

Key words: Attention deficit hyperactivity disorder, hippocampal neurons, dentate gyrus

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