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Chronic fluoxetine treatment during adolescence enhances BDNF mRNA expression in the hippocampus and prefrontal cortex of adult rats in a sex-dependent manner

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Background and Aim : Fluoxetine, a common selective serotonin reuptake inhibitor, is used in adolescents with psychiatric disorders and there are controversial results in different studies about the effects of fluoxetine on the brain-derived neurotrophic factor (BDNF) level in the central nervous system. The present study was designed to examine the effects of adolescent fluoxetine exposure on hippocampal and prefrontal cortex BDNF mRNA expression in adult male and female rats.

Methods : We examined the sex-dependent effects of adolescent (postnatal days 21-60) administration of fluoxetine (5mg/kg/day, gavage) on the BDNF level in the hippocampus and prefrontal cortex. After treatment with fluoxetine, the hippocampi and prefrontal cortex of the rat's brain were removed under deep anesthesia for the determination of BDNF mRNA expression. The expression of BDNF mRNA was evaluated by quantitative reverse transcriptase-polymerase chain reaction (RT-PCR).

Results : Our findings showed that adolescent fluoxetine treatment significantly increased hippocampal mRNA expression of BDNF in males, meanwhile this treatment up-regulates the BDNF in the prefrontal cortex in adult female animals. Therefore, adolescent fluoxetine administration has different effects on different areas of the brain.

Conclusion : These findings indicate that the BDNF level as an important synaptogenesis factor alters following adolescent manipulation of the serotonergic system.

Keywords : Fluoxetine, Gender differences, Brain-derived neurotrophic factor (BDNF), Hippocampus, Prefrontal cortex