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Fluvoxamine- An antidepressant drug with anti-inflammatory and oligodendrogenesis effects in rat model of monophasic multiple sclerosis: Studies in vivo and in vitro

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Multiple sclerosis (MS) is associated with a neuropsychiatric problem, of which depression is the commonest. Also, antidepressant drugs are known to impact on the immune system and CNS cells. Aim of present study was to introduce an antidepressant drug with ameliorative effects on experimental autoimmune encephalomyelitis (EAE) severity, an animal model of MS, including spinal cord inflammation and demyelination. In this study, the protective effect of fluvoxamine, a selective serotonin reuptake inhibitor (SSRI), was investigated in cultured embryonic neural stem cells (ENSCs) and rat model of acute EAE. First, we examined the effect of fluvoxamine on proliferation and differentiation of cultured ENSCs. Next, its immunomodulatory and oligodendrogenesis properties were investigated in EAE model of Lewis rats. Results showed that fluvoxamine increases the viability and proliferation of ENSCs. Moreover, treatment of NSCs by fluvoxamine resulted in a significant increase in differentiation towards oligodendrocyte cells (MBP positive cells) and also astrocyte cells (GFAP positive cells). In vivo results of EAE rats, demonstrated that clinical outcomes of EAE were ameliorated in fluvoxamine- versus PBS-treated EAE rats. Fluvoxamine caused a significant decrease in serum IFN- γ , in comparison to PBS-treated EAE rats, while significantly increased serum IL-4 level. Furthermore, histopathological observations showed statistically decreased lymphocyte infiltration with no demyelinated surface area in the lumbar spinal cord of fluvoxamine-treated, in comparison to PBS-treated EAE rats. Finally, immunofluorescent analysis clearly showed decrease in number of activated astrocytes (GFAP positive cells) and increase in area of mature oligodendrocyte (MBP positive cells) in fluvoxamine treated EAE groups, in comparison to PBS treated EAE rat. In conclusion, for the first time, our results indicated a positive impact of fluvoxamine on proliferation and differentiation of cultured ENSCs. Moreover, high potential of fluvoxamine in EAE improvement was confirmed by indication of its anti-inflammatory and oligodendrogenesis activities. Our data suggest that fluvoxamine could be one of the anti-depression drugs in MS patient with anti-inflammatory and remyelination effects, which needs further clinical studies.

Biography

Majid Gharghani is a Post-graduate student in the field of Neuroimmunology and Neural Stem Cell Culture. He has worked as a Research and Teaching Assistant at Yasuj University of Medical Sciences, Iran. He also has attended several workshops to enhance his practical understanding of various in vivo and in vitro techniques including immunohistochemistry, immunofluorescence, neural stem cell culture and EAE models.

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