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Histomorphometric and immunohistochemistry studies of effect of lycopene on dopamine receptors and GABA neurons in fetus and offspring of Parkinson's rat mothers

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Parkinson's Disease (PD) is a multifactorial disease which among its important causes can mention to dispersion of dopamine receptors and GABA neurons and existence of free radicals. On the other hand, since anti-Parkinson medications may have adverse effects on fetus so finding a suitable antioxidant is necessary to improve diseases improvement in mothers and prevention from changes in dopamine receptors and GABA neurons in fetus brain. A total number of 56 adult female rats were used in this study and randomly divided into eight groups; including: Control group (without receiving any material); patient group (6-hydroxydopamine was unilaterally injected into right side of substantia nigra by Hamilton syringe); sham group (0.02% ascorbic acid was injected into right side of substantia nigra); lycopene control group (received 0.5 ml/kg lycopene by gavage); lycopene treatment group (induction of Parkinson's disease +0.5 ml/kg lycopene); Levodopa (an anti-Parkinson's drug) treatment group (induction of Parkinson's disease +10 mg/kg Levodopa by intraperitoneal injection) and lycopene and Levodopa treatment group (induction of Parkinson's disease +0.5 mg/kg lycopene+10 mg/kg Levodopa). After mating operations in all the above groups and observation of vaginal plug, the first day of pregnancy was approved. At 15th and 19th embryonic day, 2 mothers were daily anesthetized and their fetuses removed. A total number of 4 mothers in each group had a vaginal delivery. The offspring rats were then anesthetized with Nesdonal drug at 15th and 30th day of the experiment and their brains were removed completely and transferred into a 4% buffered formalin solution. Following complete fixation, the tissue sections were stained with hematoxylin-eosin (H&E) staining. Immunohistochemical method was used for determination of neurons including D1 and D2 receptors and GABA. The highest density of neurons containing dopamine receptors and GABA is related to 15th day of embryonic period and after that the highest densities are related to 19th day of embryonic period and 15th and 30th days after birth, respectively. It was also found that the most reduction in density of neurons containing dopamine receptors and GABA in the groups with Parkinson's disease occurred in the amygdale, hippocampus, substantia nigra, thalamus, the brain cortex and cerebellar cortex regions, respectively. On the other hand, an increase in neurons containing dopamine receptors and GABA was observed in the treated groups with lycopene and Levodopa. Therefore, it was found according to the above that maternal Parkinson's disease causes impairs in the number of neurons containing dopamine receptors and GABA due to disorders in dopaminergic and GABAergic pathways. Lycopene, due to its antioxidant properties, as well as Levodopa medicine as a dopamine activator leads to reduction of Parkinson's disease complications and cause neuronal disorders in fetuses and newborn rat pups born to mothers with Parkinson's.

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