

The effect of nitric oxide on prefrontal cortex of rats impress with stress of immobilization

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Abstract

Background & Objective: In this research, we study the simultaneous effects of Nitric Oxide (NO) and stress on prefrontal cortex of rats. Nitric Oxide is an unstable small molecule that involved in many physiological and pathological conditions. Brain's prefrontal cortex has important role on personality and mental state. Its development continues after birth and this period is the most sensitive time for brain's cortex to response to environmental parameters such as psychological stresses.

Materials & Methods: In this study Wistar male rats received L-arginine (200 mg/kg) as NO precursor, L-NAME (20mg/kg) and 7-nitroindazole (25mg/kg) as non specific and specific NO sentries inhibitors. L-arginine and L-NAME were injected intra peritoneal (IP) and 7-nitroindazole injected subcutaneously (S.C) during one month per day. Rats divided in two groups (with stress and without stress). The kind of stress was immobilization every day for one month during injection of materials. Brains were removed after this period and each brain with a coronal section manner divided in two parts .Anterior part of brain fixed by formalin and tissue processing was done. By using rotatory microtome 10 μ serial cross sections were obtained and stained with H & E. Posterior part of brain homogenized with such solution then amount of NO in obtained solution was measured by spectrophotometer with 540 nm wavelength.

Results: Statistical analysis of light microscopic findings indicated that stress of immobilization with use of L-NAME and 7-nitroindazole result in decrease of thickness of prefrontal cortex , numbers of Betz cells and NO production in rats' brain, it means L-NAME and 7-nitroindazole exaggerate the brain damage and from other hands L-arginine with stress can convert these results.

Conclusion: On the basis of these results we believe that stress of immobilization damages prefrontal cortex and also NOS inhibitors can aggravate the cortical damage. On the other hand although NO precursor (L-arginine) decreases the cortical damage in rats that impress with stress, it can result in these changes in rat's brain without stress.

Key Words: Nitric oxide, Immobilization Stress, Prefrontal Cortex, N-nitro-L-arginine methyl ester (L-NAME)