Protective Effects of Nigella Sativa on Synaptic Plasticity Impairment Induced by Lipopolysaccharide

Farimah Beheshti1, 4, Akbar Anaeigoudari1, Fatemeh Norouzi2, Azam Abareshi3, Azita Aaghaei3, Mohammad Naser Shafei3, Zahra Gholamnezhad5, Mahmoud Hosseini6*

1Department of Basic Sciences and Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2Department of Physiology, Esfarayen University of Medical Sciences, Esfarayen, Iran
3Pharmacological Research Center of Medicinal Plants, Mashhad University of Medical Sciences, Mashhad, Iran
4Department of Physiology, School of Medicine, Jiroft University of Medical Sciences, Jiroft, Iran
5Neurogenic Inflammation Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
6Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Published: 17 April, 2018

Abstract

In the present study the protective effect of Nigella sativa (N. sativa) on synaptic plasticity impairment induced by lipopolysaccharide (LPS) in rats was investigated. Fifty-eight rats were grouped and treated as follows: 1) control (saline), 2) LPS, 3) LPS-N. sativa, and 4) N. sativa. In a Morris water maze test, the escape latency and travelled path to find the platform as well as time spent and the travelled distance in target quadrant (Q1) were measured. Long term potentiation (LTP) from CA1 area of hippocampus followed by high frequency stimulation to Schafer collateral was studied and slope, slope 10-90% and amplitude of field excitatory field potential (fEPSP) were calculated. The escape latency and traveled path in LPS group were significantly higher than those in the control group while, in LPS-N. sativa group these parameters were significantly lower than those in LPS group. In LPS group the rats spent less time and travelled shorter distance in Q1 than the rats in the control group while, in LPS-N. sativa group the rats spent more time and travelled longer distance than the rats in LPS group. LPS significantly decreased slope, slope 10-90% and amplitude of fEPSP while, in LPS-N. sativa group these parameters increased compared to LPS group. The results indicated that the hydro-alcohol extract of N. sativa protected against synaptic plasticity and spatial learning and memory impairment induced by LPS in rats.

Keywords: Lipopolysaccharide, Long Term Potentiation, Nigella Sativa L, Spatial Memory, Synaptic Plasticity

*Corresponding Author: Mahmoud Hosseini
E-mail: hosseinim@mums.ac.i