

ABSTRACT

Introduction: Neurodegenerative and cognitive disorders are increasing recently and research on the etiology and new therapeutic strategies are going on. Trientine (TETA), as a copper chelator, has been shown to have beneficial effects in different human chronic diseases such as diabetic cardiomyopathy and neuropathy. Here, we examined the effects of TETA on AlCl_3 -induced neurocognitive dysfunctions and molecular changes in the hippocampus of rats.

Materials and methods: Thirty-six male Wistar rats (weighing 200-250 g) were randomly divided into four groups including control, TETA (100 mg/kg/day), AlCl_3 (100 mg/kg/day), and AlCl_3 (100 mg/kg/day) + TETA (100 mg/kg/day) and received chemicals by gavage for 30 days. At the end of the treatment, the open field maze, elevated plus maze, novel object recognition memory test and shuttle box test were conducted. Then after, we evaluated brain derived neurotrophic factor (BDNF), glycogen synthase kinase-3 β (GSK-3 β), cholinesterase activity, oxidative stress markers and inflammatory mediators in the hippocampus.

Results: AlCl_3 increased anxiety like behaviors, impaired the recognition memory and short-term memory. TETA was able to improve AlCl_3 -induced anxiety-like behaviors and short-term memory. In AlCl_3 treated group, there was a significant increase in GSK-3 β , oxidative damages, pro-inflammatory and pro-apoptotic markers, and a decrease in BDNF in the hippocampus. Co-administration of TETA was able to decrease the gene expression of lipid peroxidation and inflammation biomarkers, GSK-3 β , and cholinesterase activity, and increase BDNF in the hippocampus compared with AlCl_3 -treated rats.

Discussion: It can be concluded that TETA is able to improve learning and memory through protecting against the gene expression of oxidative stress and inflammation biomarkers and pro-apoptotic pathway leading to normalization of BDNF and GSK-3 β .

Keywords: Aluminium, Alzheimer, Cognitive, Inflammation, Oxidative Stress