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Cognitive impairments induced by adolescent binge-like ethanol intoxication in rats: neuroprotective role of argon oil

El Mostafi Hicham[1], Touil Tarik[1, 2], Kaarouche Bilal[1], Laaziz Abderrahim[1], Ouichou Ali[1], Elhessni Aboubaker[1] and **Mesfioui Abelhalim[1]**
[1]Ibn Tofail University, Morocco
[2]Higher Institute of Nursing and Health Professions of Rabat, Morocco

Adolescent alcohol binge drinking constitutes a major vulnerability factor to develop cognitive disorders. However, the pathways of treatment or prevention against this susceptibility remain less explored. Argon oil (AO), commonly used in traditional Moroccan medicines, is rich in oleic and linoleic acids, polyphenols, sterols, and tocopherols. This composition gives it numerous beneficial pharmacological effects of mental health. In the current study, we evaluated the short-term and long-term AO effects on; memory and learning deficits induced by adolescent binge-like ethanol intoxication; the oxidative status of the hippocampus and the prefrontal cortex (PFC) in Wistar rats. To model binge-like ethanol intoxication, every 2 days, rats received an ethanol injection (3.0 g/kg) for 2 consecutive days across 14 days either from postnatal day 30 (PND30) to 43 (early adolescence). Two weeks before the onset of ethanol intoxication (21PND), rats were daily administered by oral gavage with AO (1 ml/100 g/day), for 5 (PND 53) or 20 (PND 160) weeks. The Y-Maze, Object Recognition and Morris water maze tests were used to assess the working memory, recognition memory, spatial learning and memory performance in adolescent (PND53) or adult (PND160) animals. Also, the catalase and superoxide dismutase (SOD) activities, the lipid peroxidation and nitrite concentrations were measured using spectrophotometric methods. AO pretreatment increased the performance of working memory, recognition memory and spatial memory in rats previously intoxicated by ethanol, regardless of the age and sex of the animals. These behavioral improvements were accompanied by stress oxidative marked changes in hippocampus and CPF. AO pretreatment produces significant decrease of the lipid peroxidation and nitrite levels. On the contrary, AO increased the catalase and SOD activities in adolescent and adult animals. For the first time, our results suggest that AO pretreatment is capable of attenuating cognitive impairments and oxidative stress in the hippocampus and CPF of Wistar rats. This indicates that AO may exhibit a neuroprotection against the toxicity of ethanol in brain adolescent rats. Further investigations are in progress to confirm this pharmacological property.

elmostafihicham@gmail.com