

PROTOCOLOS DE INVESTIGACIÓN - MEDICINA

ANALYSIS OF THE EFFECTS OF PHOTOBIMODULATION ON COGNITIVE PERFORMANCE IN RATS EXPOSED TO ALCOHOL DURING DEVELOPMENT

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Alcohol exposure during early development is a significant risk factor for cognitive deficits and neurobehavioral alterations. Animal studies have shown that high doses of ethanol rapidly induce the expression of pro-inflammatory cytokines in the brain, as well as hypolocomotion and loss of postural reflexes—effects that closely mimic binge drinking patterns observed in humans. Despite growing interest in photobiomodulation (PBM) as a therapeutic strategy for neurological disorders such as Alzheimer's, Parkinson's disease, and depression, few studies have investigated its potential to reverse cognitive impairments induced by early-life alcohol exposure. In this context, the present study aimed to compare the effects of transcranial PBM on cognitive performance in spontaneously hypertensive rats (SHR) and Wistar rats exposed to alcohol during early development. A total of 30 rats (15 SHR and 15 Wistar) were randomly assigned to four experimental groups per strain: control, alcohol, PBM, and alcohol + PBM (n = 5 per group). Ethanol exposure was performed via

intraperitoneal injection (5 g/kg; 25%) on postnatal days (PN) 2, 4, 6, and 8, between 08:00 and 12:00, in accordance with the animals' circadian rhythm. PBM was applied on PN3, PN5, PN7, PN9, and again on PN100 using an 808 nm laser (100 mW; 4.8 J; 48 s) directed at the frontal region. Cognitive function was assessed during PN45–59 and PN70–83 using the Y-Maze, open field test, and tail suspension test. On PN100, animals were again exposed to acute ethanol (5 g/kg, i.p.), followed by behavioral testing and subsequent euthanasia. Brains were collected, dissected, stored at –80 °C, and analyzed via quantitative PCR and histological examination. Data were processed using GraphPad Prism v8.0.1.

Palavras-chave: photobiomodulation; cognitive dysfunction; neuroinflammation.