Abstract

Increased fructose concentrations are the biochemical hallmark of fructosemia, a group of inherited disorders on the metabolic pathway of this sugar. The main clinical findings observed in patients affected by fructosemia include neurological abnormalities with developmental delay, whose pathophysiology is still undefined. In the present work we investigated the in vitro and in vivo effects of fructose on acetylcholinesterase (AchE) activity in brain structures of developing rats. For the in vitro experiments, fructose was added at increasing concentrations to the incubation medium. It was observed that fructose provoked an inhibition of acetylcholinesterase activity in cerebral cortex of 30-day-old-rats, even at low concentrations (0.1 mM). For the in vivo experiments, rats were killed 1 h after a single fructose administration (5 mol/g). Control group received the same volume of saline solution. We found that AchE activity was increased in cerebral cortex of 30- and 60-day-old rats receiving fructose administration. Finally, we observed that AchE activity was unaffected by acute fructose administration in cerebral cortex, striatum or hippocampus of 15- and 90-day-old rats. The present data suggest that a disruption in cholinergic homeostasis may be involved in the pathophysiology of brain damage observed in young patients affected by fructosemia.

Keywords

Acetylcholinesterase, brain, fructose, hereditary fructose intolerance.