EVALUATION OF THE NEUROPROTECTIVE EFFECTS OF SIMVASTATIN AGAINST ALCOHOL-INDUCED DAMAGE TO THE SCIATIC NERVE AND THE SOMATOSENSORY BARRELS IN ADOLESCENT C57BL/6J MICE

ABSTRACT

Alcohol is a commonly used and abused drug among adolescents which has an adverse effect on the body's overall health, especially on the developing brain. It causes neurodevelopmental, neurobehavioral, neurocognitive, and social problems because alcohol exerts its neurodegenerative effects by up-regulating oxidative stress which is responsible for neuronal death. The rising prevalence of alcohol-related diseases and disabilities and the cost to the government necessitates investigation into interventions that could protect the neurons against the damaging effects of alcohol. One drug with antioxidant properties is Simvastatin, a U.S. Food and Drug Administration (FDA) approved drug for lowering blood cholesterol levels. The neuroprotective effects of Simvastatin against alcohol neurotoxicity were evaluated on the sciatic nerves and the somatosensory barrel cortices of adolescent mice. 40 four–week old C57BL/6J male and female mice were administered 20% alcohol (i.p.), 5 or 10 mg/kg Simvastatin orally followed by 20% alcohol (i.p.) or the controls (i.e. 5 mg/kg Simvastatin only or non-treated) consecutively for 28 days. The axonal density, myelin thickness and g-ratio of the sciatic nerves were assessed as well as the sizes of the Posteromedial barrel subfield (PMBSF) barrels. The results confirmed alcohol neurotoxicity on the axonal density and myelination in both sexes. At the same time, Simvastatin was effective against the onset of alcohol nerve damage. For the somatosensory barrels, alcohol did not significantly reduce the mean areas of (I) the PMBSF barrels, (II) the enclosure, or (III) the septal portion in both sexes. However, the barrel-to-barrel comparison revealed alcohol toxicity on specific barrels in specific rows and arcs of the PMBSF barrels. Both concentrations of Simvastatin were also effective against alcohol–induced damage on those specific barrels. These may explain the reasons for the sensory-motor delays that are often seen in alcoholics due to possible delays in the relaying of sensory input and the processing and interpreting of information from the somatosensory cortex. Simvastatin seems to have the ability to protect against the damaging effect of alcohol on the peripheral nerves and the somatosensory cortex and this may be beneficial in reducing the prevalence of alcohol-related diseases or disabilities, especially in adolescents that are prone to abusing alcohol.