ANTHOCYANINS SUPPRESS THE SECRETION OF PROINFLAMMATORY MEDIATORS, OXIDATIVE STRESS AND RESTORE ION PUMP ACTIVITIES IN DEMYELINATION INDUCED BY ETHIDIUM BROMIDE

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Introduction and Goals: Multiple sclerosis (MS) is a chronic inflammatory disease of the nervous system that predominately affects young adults, and the degeneration of demyelinated axons is a major cause of the irreversible neurological decline in MS. Anthocyanins (ANT) are phytoneutrients that have phenolic groups in their structure and have been widely studied due to the antioxidant and neuroprotective properties. The aim of this study was to investigate the protective effect of ANT (Vitis vinifera) on oxidative and inflammatory parameters, as well as ion pump activities in the pons of rats experimentally demyelinated with ethidium bromide (EB).

Methods: Rats were divided in six groups: control, ANT30 mg/kg, ANT100 mg/kg, EB (0.1%), EB plus ANT30 mg/kg, and EB plus ANT100 mg/kg. The EB cistern pons injection occurred on the first day. On day 7, there was a peak in the demyelination. During the 7 days, the animals were treated once per day with vehicle or ANT.

Results: It was observed that demyelination reduced Na⁺,K⁺-ATPase and Ca²⁺-ATPase activities and increased HNE-His, MDA, protein carbonyl and NOx levels. In addition, a depletion of GSH/NPSH content and a decrease in SOD activity was also seen. The dose of 100 mg/kg showed a better dose-response to the protective effects. The demyelination did not affect the neuronal viability, but did increase the inflammatory infiltrate (myeloperoxidase activity) followed by an elevation in IL (interleukin)-1β, IL-6, tumor necrosis factor (TNF)-α and interferon (IFN)-γ levels. ANT promoted a reduction in cellular infiltration and pro-inflammatory mediators. Furthermore, ANT restored the levels of IL-10. LFB staining confirmed the loss of myelin in the EB-group and the protective effect of ANT100 mg/kg.

Conclusion: In conclusion, this study was the first to show that ANT are able to restore ion pump activities and protect cellular components against the inflammatory and oxidative damages induced by demyelination.

Keywords: Anthocyanins; Multiple Sclerosis; Neuroinflammation.