Introduction: Cardiotonic steroids such as ouabain, digoxin and marinobufagenin are well-characterized inhibitors of the Na⁺/K⁺-ATPase. In addition, cardiotonic steroids are synthesized endogenously and are active at nanomolar concentrations. In the present work we investigated the effect of rats treated with digoxin on the activity of Na⁺/K⁺ ATPase, Ca²⁺-ATPase and acetylcholinesterase (AChE). Methodology: Male adults Wistar rats with 200g were divided into five groups and received an intraperitoneal administration of saline or digoxin (control, 32.5, 65, 130, 260 µg/Kg). Sixty minutes after administration, animals were sacrificed and hippocampus was removed. The Na⁺/K⁺-ATPase and Ca²⁺-ATPase activities were obtained by quantifying phosphate release (Fiske, 1925), using different reaction medium and AChE activity it was determined according to method of Ellman (1961). Results and discussion: We observed an increase (57.5%, p < 0.05) in Na⁺/K⁺-ATPase activity only in 130 µg/Kg digoxin treatment. No significant alterations were observed for Ca²⁺-ATPase and AChE. Conclusion: The results show that treatment with digoxin altered only Na⁺/K⁺-ATPase activity in the 130 µg/Kg treatment. The results of this study suggest that cardiotonic steroids, including digoxin, can be used to up-regulate the Na⁺/K⁺-ATPase hippocampus activity. Increased Na⁺/K⁺-ATPase activity could either prevent the loss of ionic gradients or promote a more rapid restoration of pumping. The demonstration of the up-regulation effect of cardiotonic steroids could potentially assist in the treatment of diseases such as epilepsy since digoxin, in low-dose, can be administered at the concentrations that increase Na⁺/K⁺-ATPase activity, providing a neuroprotective effect.

Keywords: Cardiotonic steroids, digoxin, activity ATPase, neuroprotection.

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References