Ex vivo effect of Hypericum caprifoliatum on Na⁺,K⁺-ATPase activity in hippocampus and cortex of mice.

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Introduction: The Na⁺, K⁺-ATPase is an enzyme present in the plasma membrane of all mammalian cells. Earlier studies have shown that Na⁺, K⁺-ATPase activity is decreased in patients with depression and other psychiatric disorders (Wood et al., J Affect. Disord., 21, 199, 1991). It has already been demonstrated that Hypericum caprifoliatum extracts have potential antidepressant effect (Viana et al. Neuropharmacology 49, 1042, 2005). The molecular mechanisms by which these extracts exert antidepressant-like action remains unclear. This study was undertaken to verify the effect of acute and repeated administration of HC1, an enriched phloroglucinol fraction obtained from H. caprifoliatum, on Na⁺, K⁺ ATPase activity in the cerebral cortex and hippocampus of mice submitted or not to a swim session. Experimental part: In acute treatment, different groups of mice (n=6) were treated with a single administration of HC1 (360 mg/kg, p.o.) or vehicle. In repeated treatment, different groups of mice (n=6) were treated once a day with HC1 (360 mg/kg, p.o.) or vehicle, during 3 days. In each of the preceding groups, the animals were submitted to a single 6 minutes forced swimming session, 1 hour after the single or the last of the third treatments. One hour after the swimming session, the animals were sacrificed and the hippocampus and the cerebral cortex were removed. In another set of experiments, mice were treated as described above but not submitted to the swimming session. They were sacrificed by decapitation two hours after the single or the last of the third treatments. Data were expressed as mean ± SEM of the mean, and were analyzed by Student’s t test. Results/Discussion: Animals treated for 3 consecutive days with HC1 and sacrificed 2 hours after the third administration, presented a significant increase in the enzyme activity, both in cerebral cortex [t (8) = 4.455, P < 0.005] and hippocampus [t (10) = 5.607, P < 0.001]. When animals were treated acutely or for three days with a daily dose of HC1 and exposed to the forced swimming session, there was no significant alteration in Na⁺,K⁺-ATPase activity. Animal models of depression are associated with decreased Na⁺, K⁺-ATPase activity and antidepressants concurrently prevent depressive-like behavior and increase Na⁺, K⁺ ATPase activity (Crema et al. Neurochem Res. 35, 1787, 2010). Thus, we suggest that HC1 counteracts the decrease in Na⁺, K⁺ ATPase activity induced by forced swimming stress. This assumption is under investigation. Conclusion: These results suggest that the modulation of Na⁺, K⁺ ATPase activity may be one of the mechanisms of action in the antidepressant-like effect of HC1. Financial support: CNPq.