EFFECT OF FLAVONOIDS ISOLATED FROM ERYTHRINA VELUTINA ON OXIDATIVE STRESS IN BRAIN OF MICE

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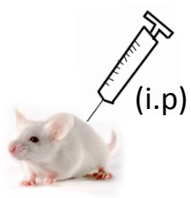
INTRODUCTION

Reactive oxygen species (ROS) are frequently produced and are tightly regulated to maintain a redox balance together with antioxidants under normal physiological circumstances. The formation of excess free radicals leading to abnormal structural alterations of cell is a possible cause mechanism of cell injury involved [1,2]. A potential source of compounds with antioxidant activity can be obtained from plants. Indeed, flavonoids are capable of inhibiting autoxidation reactions and scavenger oxygen and nitrogen free radicals. Previous studies from our research group demonstrated that Erythrina velutina has central nervous system depressant effects, antinociceptive and anticonvulsant activities [3].

PURPOSE

Based on the previously demonstrated antioxidant activity of flavonoids from Erythrina indices, we hypothesized, in the present study, whether the administration of flavonoids isolated from Erythrina velutina (EV) could modify oxidative stress parameters in discrete brain regions such as prefrontal cortex (PFC), striatum (ST) and hippocampus (HC) of mice.

METHODS

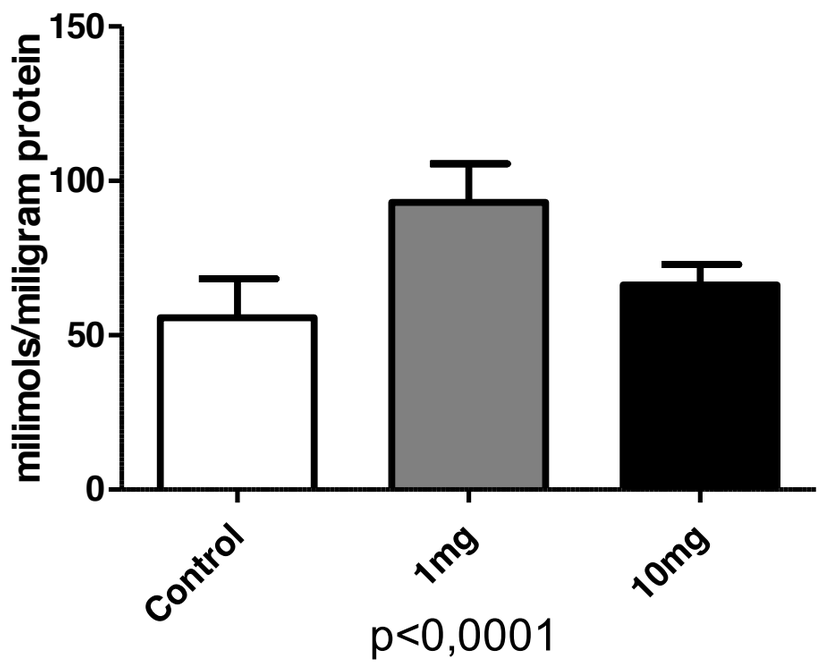


Flavonoids isolated from EV (1 or 10 mg/kg) or saline (control group).

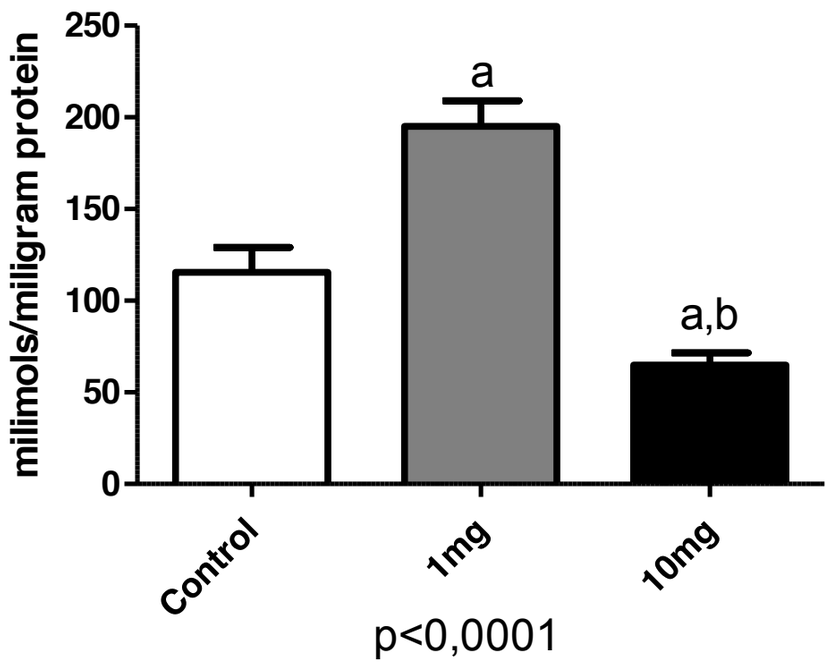
After 30 minutes, the animals were sacrificed by decapitation and the brain areas (HC, PFC, or ST) dissected and homogenized for measurement of oxidative stress parameters (lipid peroxidation (measured as malondialdehyde (MDA)), nitrite, and catalase) by spectrophotometry. The results were analyzed by analysis of variance (ANOVA) with Tukey test (post hoc) by GraphPad Prism 5.0 version for Windows, GraphPad Software. Differences were considered statistically significant at $p < 0.05$.

RESULTS

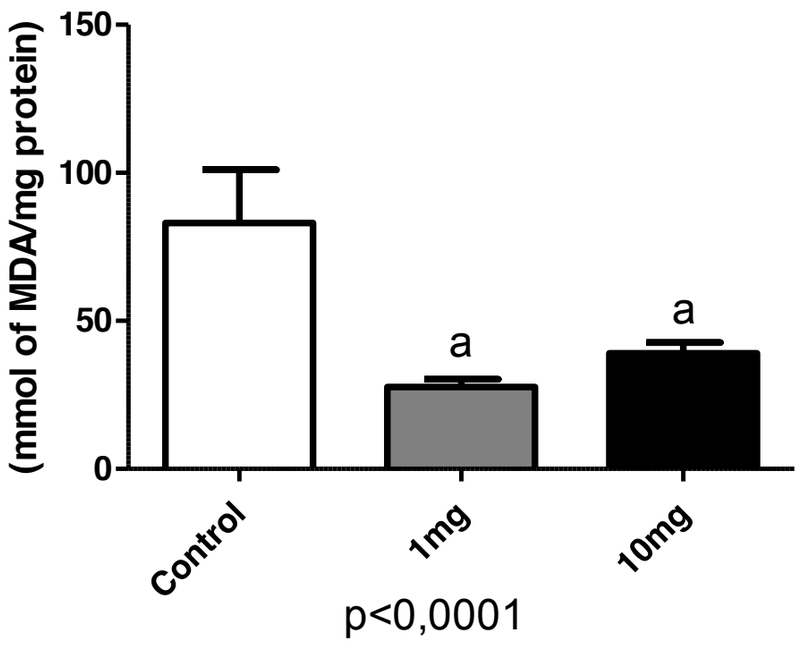
Catalase - ST



Catalase - PFC



TBARS - PFC



CONCLUSION

The results demonstrated that the administration of flavonoids from Erythrina velutina decreased lipid peroxidation, whilst increased catalase activity in prefrontal cortex and striatum, with no alteration in nitrite content. The brain is particularly vulnerable to oxidative stress because of its elevated consumption of oxygen and the consequent generation of large amounts of ROS. The results, thus, indicate an antioxidant effect of Erythrina velutina.

[1] Aguiar, C.C., Almeida, A.B., Araújo, P.V., de Abreu, R.N., Chaves, E.M., do Vale, O.C., Macêdo, D.S., Woods, D.J., Fonteles, M.M., Vasconcelos, S.M. 2012 Oxidative stress and epilepsy: literature review Oxid Med Cell Longev. 1-12.
[2] Duan, J., Kasper, D.L. 2011 Oxidative depolymerization of polysaccharides by reactive oxygen/nitrogen species. Glycobiology, 21:401-409.
[3] Vasconcelos, S.M., Lima, N.M., Sales, G.T., Cunha, G.M., Aguiar, L.M., Silveira, E.R., Rodrigues, A.C., Macedo, D.S., Fonteles, M.M., Sousa, F.C., Viana, G.S. 2007 Anticonvulsant activity of hydroalcoholic extracts from Erythrina velutina and Erythrina mulungu. J Ethnopharmacol, 110, 271-214.

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This poster is financially supported by an educational grant from CNPq, CAPS and FUNCAP.

P.4.c.005

Effect of flavonoids isolated from Erythrina velutina on oxidative stress in mouse brains

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Reactive oxygen species (ROS) are frequently produced and are tightly regulated to maintain a redox balance together with antioxidants under normal physiological circumstances. The formation of excess free radicals leading to abnormal structural alterations of cell is a possible cause mechanism of cell injury involved [1,2]. Oxidative injury in the brain is recognized as a common pathway of cellular injury in numerous neurologic insults (acute or chronic). A potential source of compounds with antioxidant activity can be obtained from plants. Indeed, flavonoids are capable of inhibiting autoxidation reactions and scavenger oxygen and nitrogen free radicals. The flavonoids and related polyphenolic compounds from *Erythrina indica* possesses significant antioxidant activity as well. Previous studies from our research group demonstrated that *Erythrina velutina* has central nervous system depressant effects, antinociceptive and anticonvulsant activities [3]. Based on the previously demonstrated antioxidant activity of flavonoids from *Erythrina indica*, we hypothesized, in the present study, whether the administration of flavonoids isolated from *Erythrina velutina* could modify oxidative stress parameters in discrete brain regions such as prefrontal cortex, striatum and hippocampus of mice.

The present study was designed to analyze the effects of flavonoids isolated from *Erythrina velutina* (EV) in the oxidative stress parameters in brain areas such as hippocampus (HC), prefrontal cortex (PFC), and striatum (ST). Swiss mice (25–30g) were administered a single i.p. dose of flavonoids isolated from *Erythrina velutina* (1 or 10mg/kg) or saline (control group). After 30 minutes, the animals were sacrificed by decapitation and the brain areas (HC, PFC, or ST) dissected and homogenized for measurement of oxidative stress parameters (lipid peroxidation, nitrite, and catalase) by spectrophotometry. The catalase activity, nitrite/nitrate level and lipid peroxide, measured as malondialdehyde (MDA), in the hippocampus, prefrontal cortex and striatum of Male Swiss mice were determined. The results were analyzed by analysis of variance (ANOVA) with Tukey test (post hoc) by GraphPad Prism 5.0 version for Windows, GraphPad Software. Differences were considered statistically significant at $p<0.05$.

The *Erythrina velutina* in the dosages of 1mg/kg and 10mg/kg decreased MDA levels as compared to control group in prefrontal cortex [$F(2,24)=14.3$, $p<0.001$]. Nevertheless, alterations were not detected in the HC and ST. Similarly in relation to dosage of nitrite, no alteration in nitrite content in the prefrontal cortex, hippocampus and striatum, when compared to the control group. However, the administration of *Erythrina velutina* 1mg/kg increased catalase activity as compared to control group in prefrontal cortex [$F(2,21)=41.06$, $p<0.001$] and striatum [$F(2,22)=8.55$, $p<0.01$], without alteration in the hippocampus.

The results obtained in the present research demonstrated that the administration of flavonoids from *Erythrina velutina* decreased lipid peroxidation, whilst increased catalase activity in prefrontal cortex and striatum, with no alteration in nitrite content. The brain is particularly vulnerable to oxidative stress because of its elevated consumption of oxygen and the consequent generation of large amounts of ROS. The results, thus, indicate an antioxidant effect of *Erythrina velutina*.

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Disclosure statement: Acknowledgments: CNPq, CAPES, FUNCAP-Brazil.

Citation: Eur Neuropsychopharmacol. 2014;24(Suppl 2):S608

Keywords

Animal models
Natural products
Stress