**Abstract**

Plant polysaccharides present some activities involving the central nervous system, such as neuroprotective, antidepressant, antioxidant and anti-inflammatory. We aim to evaluate the anticonvulsant and anti-inflammatory effects of the polysaccharide rich extract from G. americana leaves in mice. The leaf dry powder (5 g) was depigmented in methanol and the polysaccharide-rich extract (PRE) obtained by extraction with NaOH followed of precipitation in absolute ethanol. PRE was dissolved in 0.9% NaCl and administered (9 mg/kg) in male Swiss mice (25-35 g) by intraperitoneal (i.p.) route, 30 min before seizures induced by a single dose of pentylenetetrazol (PTZ: 70 mg/kg, i.p.); n=7/group. The synergism of PRE effect was evaluated by its association with diazepam (DZP: 0.01 mg/kg). After euthanasia, the prefrontal cortex (CPF), hippocampus (HC) and striatum (E) were removed for the quantification of myeloperoxidase levels (MPO) by o-dianisidine method. Experimental protocols was approved by Animal Ethics Committee (Uece No 2451142/2014). The PRE increased the seizure latency (9 mg/kg: 171.7 ± 29.62 versus saline: 62.00 ± 4,709 s) and death latency (9 mg/kg: 597.4 ± 101,5 versus saline: 150.0 ± 14.52). The association of PRE with diazepam potentiated the protective effect of DZP, increasing seizure latency (DZP: 128.3 ± 24.62 versus PRE + DZP: 222.4 ± 47.57), without altering in death latency. MPO levels was reduced in hippocampus (PRE: 34.2 ± 7.16; DZP: 42.27 ± 5.99 and DZP + PRE: 31.26 ± 5.726 versus saline + PTZ: 81.91 ± 11.70) and striatum (PRE: 17,89 ± 3,310, DZP + PRE: 18.69 ± 3.776 versus saline + PTZ: 37.27 ± 5.169). However there was no difference between groups (DZP; PRE or DZP + PRE) in each brain area. We conclude that PRE of G. americana leaves protects against seizures and promote anti-inflammatory effects in brain.

**Introduction**

Epilepsy is the second most common neurological disorder, affecting from 0.5% to 1% individuals at all ages of the world population (Trinka et al., 2010). The current antiepileptic treatment of epilepsy often fails, being in most cases palliative (Bidwell et al., 2010). The experimental animal model for the investigation the effectiveness of antiepileptic drugs was Pentylenetetrazol (PTZ) that widely accepted (Fisher, 1989). In this context, biomolecules of plant origin could be considered as an alternative therapy. Plant polysaccharides present some activities involving the central nervous system, such as neuroprotective, antidepressant, antioxidant and anti-inflammatory. Nonato, 2018 identified a heteropolysaccharide in the polysaccharide-rich extract (PRE) obtained from G. americana, that possesses central inhibitory effect, anticonvulsant and antioxidant activity. The objective of this study was evaluate the synergism when associated with diazepam and anti-inflammatory effects of the polysaccharide rich extract from G. americana leaves in mice.

**Methods and Materials**

**Materials**

- Leaf dry powder of G. americana (3 g)
- Depigmented in methanol
- Extraction with NaOH
- Precipitation in absolute ethanol
- dialyzed and centrifuged
- polysaccharide-rich extract (PRE)

**Methods**

- PTZ (70 mg/kg)
- - Seizure latency
- - Death latency
- Euthanasia

**Results**

The PRE increased the seizure latency (9 mg/kg: 171.7 ± 29.62 versus saline: 62.00 ± 4,709 s) and death latency (9 mg/kg: 597.4 ± 101,5 versus saline: 150.0 ± 14.52). The association of PRE with diazepam potentiated the protective effect of DZP, increasing seizure latency (DZP: 128.3 ± 24.62 versus PRE + DZP: 222.4 ± 47.57), without altering in death latency. MPO levels was reduced in hippocampus (PRE: 34.2 ± 7.16; DZP: 42.27 ± 5.99 and DZP + PRE: 31.26 ± 5.726 versus saline + PTZ: 81.91 ± 11.70) and striatum (PRE: 17,89 ± 3,310, DZP + PRE: 18.69 ± 3.776 versus saline + PTZ: 37.27 ± 5.169). However there was no difference between groups (DZP; PRE or DZP + PRE) in each brain area.

**Discussion**

- Epilepsy is a chronic neurological disease with significative impact on life quality of patients. In general, drugs used to control this condition possessing central inhibitory effects and produce sedation as its major adverse effect (Leão et al., 2015).
- The epileptogenesis induced by PTZ is a great model to study the new therapeutic drugs engaged in epilepsy and with a few adverse effects (Dhir, 2012).
- Natural products, such as plant polysaccharides, are a good alternative source of different substances with inhibitory action on central nervous system.
- Here, we showed, for the first time, the anticonvulsant effect of G. americana in PTZ mice model. Additionally, we observed that this effect is caused in part by its anti-inflammatory action.
- In fact, the injection of G. americana increased the seizure and death latency, besides reducing the MPO levels in hippocampus and striatum.
- MPO is an enzyme present in neutrophils and its mensuration is an indirect tool to evaluate migration of these cells to focus of inflammation (Hickey et al., 2011).
- A single injection of PTZ induces the blood-brain barrier (BBB) disruption and neutrophils infiltration, which contributes to epileptogenesis (Lenz et al., 2014).
- The anti-inflammatory action of G. americana could be attributed to flavonoids present in its composition (Alves et al., 2017), which can be investigated in future studies.

**Conclusions**

We conclude that PRE of G. americana leaves protects against seizures and promote anti-inflammatory effects in brain.

**Future Directions**

More investigations can be carried out to elucidate the action mechanisms of G. americana in the protection of seizures such as cytokine levels on central nervous system and oxidative stress.

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**References**

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