Effect of vagus nerve stimulation on focal transient cerebral ischemia and reperfusion in adult male White New Zealand rabbits

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Abstract:

Background: Oxidative stress has been implicated in the pathophysiology of cerebral ischemia. Pentraxin-3 plays an important role in innate immune responses and in inflammatory diseases. Our aim was to evaluate pentraxin-3 serum level on focal transient cerebral ischemia and reperfusion model in rabbits and to assess the anti-inflammatory and anti-oxidant effects of vagus nerve stimulation. Materials and Methods: Focal transient cerebral ischemia and reperfusion was induced by occlusion of the right common carotid artery for 2 hours followed by reperfusion for one hour. Stimulating electrodes were implanted on the cervical part of the right vagus nerve. Vagus nerve stimulation was started 30 min following right common carotid artery ligation for a period of one hour. The stimulation signals were delivered every five minutes for 30 seconds. All the procedures were duplicated but no stimulus was delivered in the control group. Serum level of pentraxin-3, lipid peroxide and total thiols were determined at baseline, at end of ischemia and at end of reperfusion and the animal decapitated and neuronal damage was evaluated. Results: We found that vagus nerve stimulation caused reduction of the ischemic features with revival of the cell shape and size. It also resulted in decreased serum levels of pentraxin-3 and lipid peroxide whereas the level of total thiols was increased. Conclusion: We concluded that the observed diversity in pentraxin-3, lipid peroxide and total thiols serum levels in cerebral ischemia and reperfusion may reflect relative roles in the biology. Anti-inflammatory and anti-oxidant role of vagus nerve stimulation in cerebral ischemia and reperfusion may represent a marker of altered cerebral function, and may provide potential therapeutic applications.

Keywords:

Cerebral ischemia and Reperfusion, pentraxin-3, Vagus nerve stimulation.

Published In:

Ibnosina J Med BS, 5(2), 73-82.