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# Possible neuroprotective mechanisms of ginseng and rutin in experimental model of head injury induced cognitive dysfunction

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**Introduction:** Head injury is a major cause of disability and death. Possible role of neuroinflammation, nitric oxide, microglia and oxidative stress have been suggested in the pathophysiology of traumatic brain injury related complications such as cognitive dysfunction.

**Objective:** Therefore, the present study was designed to explore the possible role of ginseng and rutin and its interaction with nitric oxide modulator and microglial inhibitor against experimental of head injury induced behavioral, biochemical and molecular alterations.

**Materials & Methods:** Wistar rats were exposed to head injury by using weight-drop method. Following injury and a post-injury rehabilitation period of two weeks, animals were administered vehicle/drugs for another two weeks.

**Results:** Traumatic brain injury caused significant memory impairment in Morris water maze task as evident from increase in escape latency and total distance travelled to reach the hidden platform. Time spent in target quadrant and frequency of appearance in target quadrant was also significantly decreased in head trauma rats. Further, there was a significant increase in oxidative stress (elevated malondialdehyde, nitrite concentration and decreased reduced glutathione, superoxide dismutase and catalase levels), neuroinflammation (TNF-α and IL-6) and acetylcholinesterase levels in both cortex and hippocampal regions of traumatized rat brain. Ginseng (100-200 mg/kg), rutin (20-80) treatment for two weeks significantly attenuated all these behavioral, biochemical and molecular alterations, suggesting their neuroprotective effect. Further, combination of sub effective doses of ginseng (50 and 100 mg/kg) or rutin (40, 80) with microglia inhibitor as well as nitric oxide modulators significantly modulates their protective effect, respectively. The present study suggests that these flavonoids produce their neuroprotective effect by involving microglial as well as nitric oxide pathways.

**Conclusion:** The study further provides a hope that these flavonoids could be used effectively for the management of brain traumatic injury and related complication.

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