The effects of thymoquinone on spatial and non –spatial memory impairment induced by scopolamine and the brain tissues oxidative damage in rats

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Abstract

Introduction: In the present study, we aimed to examine the potential protective effects of thymoquinone (TQ) on spatial and non –spatial memory impairment induced by scopolamine (Sco) and the brain tissues oxidative damage in rats.

Methods: The rats were divided into four groups: 1) Control, 2) Scopolamine (Sco, 3) Sco- TQ 10 and 4) Sco- TQ 20. Pretreatment with 10 or 20 mg /kg of TQ (dissolved in saline supplemented by ethanol) was done before behavioral test for 2 weeks in groups 3 and 4. Scopolamine (2 mg/kg b.w., i.p.) was administered 30 min before Morris water maze (MWM) test and passive avoidance in groups 2-4. Finally the brains were removed for biochemical assessments.

Results: In MWM, the escape latency in the Sco group was significantly higher while, the time spent in target quadrant lower than control group (both $P<0.001$). Pretreatment with 10 and 20 mg/kg TQ before scopolamine administration improved scape latency compared to Sco group (respectively $P<0.01$, $P<0.001$). Both 10 and 20 mg/ kg of TQ increased the time spent in target quadrant compare with Sco group (respectively $P<0.01$, $P<0.001$). In passive avoidance test, Sco decreased time latency for entering to dark room ($P<0.01$). Both doses of TQ prolonged the latency to enter the dark ($P < 0.05$- $P < 0.001$). Sco increased MDA concentration while, decreased total thiol concentration and superoxide dismutase (SOD) and catalase activity in hippocampus and the brain cortex ($P<0.05$). Treatment by 10 and 20 mg/kg TQ decreased MDA while, increased total thiol, SOD and catalase compared to Sco group ($P<0.05$).

Conclusion: These results allow us to propose that pretreatment with TQ have positive effects on learning and memory. The effect might be due to the anti-oxidative effects.

Key words: Thymoquinone, Scopolamine, Spatial memory, Non-spatial memory, Brain tissues oxidative damage