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Effect of Enalapril on Hyoscine-Induced Memory Impairment and Oxidative Stress Parameters in Male Rats Using Passive Avoidance Test

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ABSTRACT

Introduction: Numerous pre-clinical and clinical studies have indicated that angiotensin-converting enzyme inhibitors such as Enalapril can reinforce memory and learning. Therefore, this study aimed to investigate memory impairment induced by hyoscine in young male rats and to evaluate the effects of enalapril as a treatment for improving memory affected by hyoscine using passive avoidance and shuttle box methods.

Methods and Materials: A total of 30 male Wistar rats were randomly divided into five groups, each including six rats. The groups included control, regular saline recipient, and hyoscine recipient interventions (enalapril 0.5 mg/kg, enalapril 1 mg/kg, and enalapril 2 mg/kg). Hyoscine ampules were used as an intraperitoneal injection at a dose of 0.5 mg per kg for five days to induce memory impairment in the studied animals. All groups were tested and compared in a shuttle box after five days by passive avoidance method.

Results: The data obtained from the passive avoidance test in the shuttle box in hyoscine-treated groups showed that enalapril consumption significantly improved memory and learning parameters in diabetic male rats (p = 0.05). The effect of different drug regimens on total antioxidant capacity was analyzed as mean ± standard deviation. The obtained data were as follows: normal saline (0.16 ± 0.715), hyoscine (0.07 ± 0.973), hyoscine + enalapril (0.5 mg/kg; 0.05 ± 0.565), hyoscine + enalapril (1 mg/kg; 0.11 ± 0.532), and hyoscine + enalapril (2 mg/kg; 0.02±0.328). The effect of different drug regimens on malondialdehyde was also analyzed as mean ± standard deviation. The obtained data were as follows: normal saline (0.22 ± 1.93), hyoscine (0.12 ± 2.13), hyoscine + enalapril (0.5 mg/kg; 0.17 ± 1.58), hyoscine + enalapril (1 mg/kg; 0.19 ± 1.93), and hyoscine + enalapril (2 mg/kg; 0.085 ± 1.5).

Conclusion and Discussion: The administration of enalapril in rats improved memory disorder, which is caused by its effects on oxidative stress, inflammatory factors, and the control of complications caused by hyoscine in these animals. Also, regarding learning and memory, the passive avoidance test increased the recall of information in animals. With further studies, there is a high probability of repurposing ACE inhibitors such as enalapril for memory malfunctions.

Keywords: Enalapril, Memory and learning tests, Oxidative stress