

Additive Benefits of Environmental Enrichment and Voluntary Exercise on Cognition and Motor Coordination in Diabetic Mice

Ebrahim Rajab, MSc, PhD* Ghada Al-Kafaji, MSc, PhD** Hamza Al Enazi, MD***
Narjis Al Qassab, MD*** Amra Sakusic, MD**** Amer Kamal, MD, PhD*****

Objective: To evaluate the effects of voluntary daily exercise and environmental enrichment on spatial memory and learning as well as motor coordination and learning, in diabetic mice.

Setting: College of Medicine and Medical Sciences, Arabian Gulf University, Bahrain.

Design: An Experimental Animal Study.

Method: BALB/C mice (20 g to 25 g) received 55 mg/kg streptozotocin IP daily for five days. Diabetic mice were randomly assigned to one of the following groups for 12 weeks' duration: (1) social isolation; (2) an environmental enrichment; (3) environmental enrichment and voluntary daily exercise. The fourth group consisted of normal controls. At the end of 12 weeks, the mice were assessed by the Morris Water Maze and the Rotarod for cognitive and motor performance respectively.

Result: All diabetic mice showed hyperglycemia. In water maze testing, exercise and environmental enrichment groups showed better learning as evidenced by reductions in time (escape latency) and distance swum to reach a submerged platform compared to diabetic isolated mice. In diabetic mice, exercise itself did not have a significant additional benefit on learning and memory compared to environmental enrichment alone. In rotarod test, motor learning was impaired with isolation but enhanced with environmental enrichment and exercise.

Conclusion: Environmental enrichment and exercise confer significant benefits on cognition and motor performance in diabetic mice.

* Assistant Professor
College of Medical and Health Sciences
Ahlia University
PO Box 10878

** Assistant Professor
Department of Molecular Medicine

*** Medical Student
College of Medicine and Medical Sciences

**** Visiting Medical Student

***** Professor
College of Medicine and Medical Sciences
Arabian Gulf University
P.O. Box 22979, Manama
The Kingdom of Bahrain
E-mail: amerha@agu.edu.bh, erajab@rcsi-mub.com