Original Paper

Effect of donepezil hydrochloride on reference and working memory impairment after bilateral electrical lesion of nucleus basalis magnocellularis in rats model of Alzheimer disease

Azade Eskandary (M.Sc)[1], Ahmad Ali Moazedi (Ph.D)*[2]
Hossein Najaphzadevarzi (Ph.D)[3,4], Mohamad Reza Akhond (Ph.D)[5]

[1]Ph.D Candidate in Animal Physiology, Department of Biology, Faculty of Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran. [2]Professor, Department of Biology, Faculty of Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran. [3]Professor, Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran. [4]Professor, Department of Pharmacology, Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran. [5]Assistant Professor, Department of Statistics, Faculty of Mathematical Sciences and Computer, Shahid Chamran University of Ahvaz, Ahvaz, Iran.

Abstract

Background and Objective: Dysfunction and loss of basal forebrain cholinergic neurons and their cortical projections are the earliest pathological events in the pathogenesis of alzheimer disease (AD). This study was done to evaluate the effect of donepezil hydrochloride on reference and working memory caused by mutual electrical lesion of the nucleus basalis magnocellularis (NBM) in animal model of AD.

Methods: In this experimental study, 56 adult male Wistar rats were allocated into 8 group (n=7) including: control (intact), NBM lesion group, which received electrically- induced lesion (0.5 m A, 3s) in NBM, Sham group (the electrode was impaled in to the NBM with no lesion), donepezil groups (lesion + 0.1, 1, 5, 10 mg/kg/bw of donepezil hydrochloride) and vehicle group (NBM lesion+ saline). Acquisition and retention testing were done by using an eight-radial arm maze, in which, the patterns of arm entries in each group was recorded for calculating correct choice, working memory errors, reference memory error and latency.

Results: The spatial learning of animals in the lesion of NBM group significantly reduced in compared to controls ($P<0.05$). Moreover, no effect on spatial learning was seen in the sham group compared with the lesion group. The post-lesion treatment with donepezil hydrochloride in dose-dependent manner improved the parameters of spatial memory errors in the acquisition and retention tasks in comparision with the lesion group ($P<0.05$).

Conclusion: Treatment with donepezil hydrochloride, dose-dependently improves cognitive impairment induced by the destruction of the nucleus basalis magnocellularis.

Keywords: Alzheimer disease, Nucleus Basalis Magnocellularis, Memory, Donepezil hydrochloride, Rat

*** Corresponding Author: Moazedi AA (Ph.D), E-mail: moazedi.a@gmail.com**

Received 11 Mar 2017 **Revised** 28 Aug 2017 **Accepted** 16 Sep 2017

Ahmad Ali Moazedi (https://orcid.org/0000-0003-1346-2426)

Cite this article as: Eskandary A, Moazedi AA, Najaphzadevarzi H, Akhond MR. [Effect of donepezil hydrochloride on reference and working memory impairment after bilateral electrical lesion of nucleus basalis magnocellularis in rats model of Alzheimer disease]. J Gorgan Univ Med Sci. 2018 Spring; 20(1): 36-42. [Article in Persian]