IMPACT OF TYPE 2 DIABETES MELLITUS ON OXIDATIVE STRESS AND ON THE ACTIVITY OF BLOOD CHOLINESTERASE AND ITS RESPONSE TO CHEMICAL INHIBITORS

Hussein M. Rashid1, Fouad K. Mohammad2, Daniele S. Persike3
1Department of Pharmacology, College of Pharmacy, University of Duhok, Duhok, Iraq
2Department of Physiology, Biochemistry and Pharmacology, College of Veterinary Medicine, University of Mosul, Iraq
3Department of Medicinal Chemistry, College of Pharmacy, University of Duhok, Duhok, Iraq

Introduction

Several studies have shown that diabetes mellitus, regardless of the cause, may modulate ChE activities in the blood and may cause an imbalance between true and pseudo ChE. It is known that type 2 diabetes mellitus is a metabolic disorder affecting enzymatic systems including cholinesterases. The impact of the disease over the susceptibility of cholinesterases to drugs used as cholinesterase inhibitors is not known.

Objectives

The present study assesses the correlation between oxidative stress and plasma cholinesterase activities in patients with type 2 diabetes mellitus and healthy individuals. Besides that, the in vitro inhibition of plasma and erythrocyte cholinesterase activities by dichlorvos was also evaluated.

Methods

100 healthy subjects and 100 type 2 diabetic patients from Azadi Teaching Hospital, Dohuk, Iraq were enrolled. The enrolled participants were not exposed to organophosphate insecticides or any medication that is known to interfere with cholinesterase activity. The criteria of WHO for diagnosis of type 2 diabetes were applied for confirming the diagnosis. A colorimetric method was used to determine plasma malondialdehyde concentration at 535 nm. Plasma and erythrocyte cholinesterase activities were determined by the Ellman’s spectrophotometric method. A 10-minute cholinesterase-inhibitor incubation method was used to evaluate the inhibitory effect of dichlorvos at 0.5 and 1 µM on plasma and erythrocyte cholinesterase activities.

Conclusions

Diabetes type 2 renders the patients more susceptible to oxidative stress. Patients with diabetes could be more sensitive to toxicity caused by cholinesterase inhibitors. Accordingly, caution should be practiced in patients using cholinesterase inhibitors.