

Montmorillonite nanocomposite for oral controlled delivery of donepezil

N. Tavakoli^{1,*}, J. Varshosaz¹, M. Abbasi Niko²

¹*Department of Pharmaceutics, School of Pharmacy and Novel Drug Delivery Systems Research Center, Isfahan University of Medical Sciences*

²*Department of Pharmaceutics, School of Pharmacy, Isfahan University of Medical Sciences*

Background and Aims: The aim of this study was to prepare oral nanocomposites of donepezil (DON) with the ability of controlled drug release in order to reduce DON side effects such as nausea, diarrhea, anorexia, muscle cramps, etc.

Methods: DON was intercalated into montmorillonite (MMT), a smectite clay, and the resultant DON-MMT hybrids were characterized by XRD, FTIR and DSC. The surface morphology of formulations was analyzed by scanning electron microscope (SEM). The drug release profiles of DON were examined by UV-vis spectrophotometry at 270 nm. In order to increase drug release from hybrids, four different types of polymers i.e. carbomer, chitosan, sodium alginate and Eudragit L-100 55 were included separately into the DON-MMT hybrid.

Results The results of XRD, FTIR and DSC experiments showed that DON molecules were stabilized in the interlayer space of MMT. The rate of drug release from DON-MMT-Carbomer, DON-MMT-Chitosan, DON-MMT-Na alginate and DON-MMT-Eudragit was increased compared to DON-MMT hybrid alone in both hydrochloric acid (pH=1.2) and phosphate buffer (pH=7.4) solutions.

Conclusions: The MMT was successfully used for the intercalation of donepezil hydrochloride. The release rate of the drug from hybrid could be manipulated by the presence of commonly used polymers.

Keywords: Donepezil; Nanocomposite; Montmorillonite