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Comparative Analysis of in vitro Release profile for Escitalopram and Escitalopram Loaded Nanoparticles

Authors : Rashi Rajput, Manisha Singh

Abstract : Escitalopram oxalate (ETP), an FDA approved antidepressant drug from the category of SSRI (selective serotonin reuptake inhibitor) and is used in treatment of general anxiety disorder (GAD), major depressive disorder (MDD).When taken orally, it is metabolized to S-demethylcitalopram (S-DCT) and S-didemethylcitalopram (S-DDCT) in the liver with the help of enzymes CYP2C19, CYP3A4 and CYP2D6. Hence, causing side effects such as dizziness, fast or irregular heartbeat, headache, nausea etc. Therefore, targeted and sustained drug delivery will be a helpful tool for increasing its efficacy and reducing side effects. The present study is designed for formulating mucoadhesive nanoparticle formulation for the same Escitalopram loaded polymeric nanoparticles were prepared by ionic gelation method and characterization of the optimised formulation was done by zeta average particle size (93.63nm), zeta potential (-1.89mV), TEM (range of 60nm to 115nm) analysis also confirms nanometric size range of the drug loaded nanoparticles along with polydispersibility index of 0.117. In this research, we have studied the in vitro drug release profile for ETP nanoparticles, through a semi permeable dialysis membrane. The three important characteristics affecting the drug release behaviour were – particle size, ionic strength and morphology of the optimised nanoparticles. The data showed that on increasing the particle size of the drug loaded nanoparticles, the initial burst was reduced which was comparatively higher in drug. Whereas, the formulation with 1mg/ml chitosan in 1.5mg/ml tripolyphosphate solution showed steady release over the entire period of drug release. Then this data was further validated through mathematical modelling to establish the mechanism of drug release kinetics, which showed a typical linear diffusion profile in optimised ETP loaded nanoparticles.

Keywords : ionic gelation, mucoadhesive nanoparticle, semi-permeable dialysis membrane, zeta potential
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