Encapsulation of Sertraline Biodegradable Polymeric Nanoparticles

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Extended Abstract

Sertraline hydrochloride, is selective serotonin reuptake inhibitor (SSRI) recommended as a first-line treatment of depression including obsessive compulsive disorder, panic disorder and post-traumatic stress disorder [1]. Sertraline hydrochloride belongs to biopharmaceutical classification system (BCS) class II having low aqueous solubility and high permeability [2]. The oral bioavailability of sertraline hydrochloride is poor ($< 40\%$) due to extensive first pass metabolism in intestinal gut and liver [3]. It has also been reported that SRT after coming in contact with gastro-intestinal fluid coverts into its original base form i.e. sertraline leading to aggregation and thus slow/poor absorption [4]. Several strategies are being explored to enhance bioavailability of SRT by enhancing its solubility. Formulation of inclusion complexes of SRT with β-cyclodextrin resulted in higher dissolution in different biomimetic fluids in comparison to free drug [5]. Orally disintegrating tablets prepared with different types and percentages of super disintegrants showed faster release of drug in comparison to marketed conventional tablets [5]. Self-nanoemulsifying drug delivery system [6], crystal modification [7], nanosuspension [8] have also been formulated for enhancement of solubility of SRT. The main objective of this research is to study the encapsulation and release of SER using different nanoparticle platforms. Polylactic glycoloc acid (PLGA) and liposomes composed from two phospholipids, and cholesterol will be formulated and studied. The evaluation will be based on the particle size, zeta potential, encapsulation efficiency, surface morphology, and *in vitro* release studies. Additionally, differential scanning calamity, Fourier transferred infrared, X-ray diffraction will be evaluated. Suitable high performance liquid chromatography technique will be modified, to measure the drug content, drug loaded as well as *in vitro* release, *in vivo*, *ex vivo* measurement. SER-PLGA -liposome nanoparticles will be further evaluated based on the *ex-vivo*, pharmacokinetics, and brain distribution. The SER-PLGA-liposome is expected to have a sustained *in vitro* release, *ex vivo* permeation, and better *in vivo* brain delivery than free SER. Oral delivery of SER may offer a direct drug targeting with higher bioavailability.

Acknowledgment

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