Chapter-3

Plan of Study

This research was proposed to develop, characterize and evaluate ATR loaded following polymeric nanoparticles:

(A) ATR encapsulated eudragit RSPO nanoparticles (AERSNs)
(B) ATR loaded PLGA nanoparticles (APLNs)
(C) ATR loaded PCL nanoparticle (ALPNs)

Objective of the study was:

- To develop, optimize and investigate the potential of these polymeric nanoparticles to enhance bioavailability, efficacy and safety profile of loaded ATR.

The study was planned as delineated below:

A) Preformulation studies of ATR

- Analytical method development of ATR by UV-visible spectroscopy and HPLC method
- Solubility studies of ATR with different surfactant in various buffers using shake flask method

B) Formulation of polymeric nanoparticles of ATR

- Preparation of polymeric nanoparticles AERSNs, APLNs and ALPNs using emulsification/nano-precipitation solvent evaporation method.
- Optimization of formulations using central composite design (CCD) as response surface methodology (RSM) for the parameters, such as hydrodynamic mean particle size and entrapment efficiency.
- Lyophilization of optimized batch of formulations
- Solid state characterization of optimized formulation using FT-IR, DSC and PXRD

- Morphological study of the prepared nanoparticles using transmission electron microscope (TEM) and atomic force microscopy (AFM)
- *In vitro* release study of drug from the optimized formulations in phosphate buffer medium pH 7.4 using dialysis membrane method
- Assessment of stability of the optimized formulation under accelerated storage conditions, normal condition and refrigerated condition
- Assessment of residual organic solvents (acetone/chloroform) in optimized formulations using gas chromatography equipped with FID detector and capillary column.
- Pharmacokinetic study of optimized formulations in male Charles foster rats and estimation of pharmacokinetic parameters.
- Efficacy study of optimized formulations by estimation of biochemical parameter like lipid profile (total cholesterol, triglyceride, low density lipoprotein and high density lipoprotein) and glucose level of rat plasma.
- Safety studies assessment of optimized formulations by estimation of biochemical parameters (creatinine, blood urea nitrogen, creatinine kinase, lactate dehydrogenase and aspartate amino transferase) in rat plasma.
- Histology of liver tissue of experimental rats.