Oral delivery of numerous drugs is hindered owing to their high lipophilicity. Therefore producing suitable formulations is essential to improve the solubility and bioavailability of such drugs. Self-emulsifying systems are a useful means of improving the bioavailability of poorly water soluble drugs. The objectives of the study was to prepare and evaluate self emulsifying drug delivery systems (SEDDS) of poorly water soluble drugs like efavirenz, atorvastatin calcium and rosuvastatin calcium and convert them to solid self emulsifying drug delivery systems.

Based on the solubility study, the oil, surfactants and co surfactants were selected for the preparation of SNEDDS (self nanoemulsifying drug delivery systems). Pseudo ternary phase diagrams were plotted to find the nanoemulsion region. The prepared SNEDDS were evaluated for thermodynamic stability study, dispersion test, effect of pH, robustness to dilution, globule size determination, zeta potential, viscosity, refractive index, percent transmittance, drug content estimation and drug release studies. The optimized liquid SNEDDS was converted to solid form using solid carrier by adsorption technique. The tablets of solid SNEDDS were prepared by applying design of experiments (2^3 factorial design) and evaluated. The optimized formulations were performed with in vivo studies and stability studies.

Following conclusions are drawn from the study.

**Efavirenz**

- Efavirenz, a poorly water soluble drug, is formulated into SNEDDS, which improves the solubility of efavirenz and enhances the drug release.

- The optimized efavirenz SNEDDS were prepared with Labrafac PG (15%), Tween 80 (19%) and PEG 200 (38%) that gives globule size of 142.8nm.
The optimized efavirenz SNEDDS showed drug release of 97.6% whereas pure drug showed 22.4% at 30 min, which indicate improvement in drug release with SNEDDS.

The optimized efavirenz SNEDDS, were loaded into solid carrier by adsorption technique to get free flowing solid SNEDDS (S-SNEDDS).

The tablets of S-SNEDDS were prepared by applying $2^3$ factorial design, which yielded a tablet of hardness 4kg, disintegration time of 78 sec and drug release of 96.1% at 40min.

The *in vivo* studies showed that the Cmax and AUC of efavirenz SNEDDS tablets were improved compared to pure drug.

Hence it can be concluded that solid SNEDDS is a useful technique, to enhance the solubility and bioavailability of efavirenz.

**Atorvastatin calcium**

Atorvastatin calcium, a poorly water soluble drug, is formulated into SNEDDS, which improves the solubility of atorvastatin calcium and enhances the drug release.

The optimized atorvastatin calcium SNEDDS were prepared with Capmul MCM (15%), Tween 20 (14%) and Propylene glycol (28%) that gives globule size of 42.21nm.

The optimized atorvastatin calcium SNEDDS showed drug release of 98.9% whereas pure drug showed 29.54% at 30 min, which indicate improvement of drug release with SNEDDS.
• The optimized atorvastatin calcium SNEDDS, were loaded into solid carrier by adsorption technique to get free flowing solid SNEDDS (S-SNEDDS).

• The tablets of S-SNEDDS were prepared by applying $2^3$ factorial design, which yielded a tablet of hardness 4.5kg, disintegration time of 98 sec and drug release of 97.5% at 40 min.

• The in vivo studies showed that the Cmax and AUC of Atorvastatin calcium SNEDDS tablets were improved compare to pure drug.

• Hence it can be concluded that solid SNEDDS is a useful technique, to enhance the solubility and bioavailability of atorvastatin calcium.

**Rosuvastatin calcium**

• Rosuvastatin calcium, a poorly water soluble drug, is formulated into SNEDDS, which improves the solubility of rosuvastatin calcium and enhances the drug release.

• The optimized rosuvastatin calcium SNEDDS were prepared with Capmul MCM (20%), Tween 20 (20%) and PEG 200 (20%) that gives globule size of 35.27 nm.

• The optimized rosuvastatin calcium SNEDDS showed drug release of 97.6% whereas pure drug showed 22.4% at 30 min, which indicate improvement in drug release with SNEDDS.

• The optimized rosuvastatin calcium SNEDDS, were loaded into solid carrier by adsorption technique to get free flowing solid SNEDDS (S-SNEDDS).
The tablets of S-SNEDDS were prepared by applying $2^3$ factorial design, which yielded a tablet of hardness 4.5 kg, disintegration time of 106 sec and drug release of 97.1% at 40 min.

The *in vivo* studies showed that the Cmax and AUC of rosuvastatin calcium SNEDDS tablets were improved compared to pure drug.

Hence it can be concluded that solid SNEDDS is a useful technique to enhance the solubility and bioavailability of rosuvastatin calcium.

Thus, the specific study objectives envisaged are achieved, namely formulation, evaluation of self-emulsifying formulation containing poorly water soluble drug for improvement of solubility. These dosage forms not only improved the solubility, drug release but also by converting them to solid form, improved the stability and patient compliance. These formulations may further be scaled up for commercial exploitation.