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# Development and optimization of Sirolimus self nanoemulsifying drug delivery systems containing bioavailability enhancers

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**Background and Aims:** The aim of the present study was to develop Self-nanoemulsifying drug delivery systems of Sirolimus under Quality by Design approach for improvement of dissolution and oral absorption using different excipients known to enhance oral bioavailability.
**Methods:** Preliminary screening was carried out to select proper components combination. Response surface experimental design was applied to optimize a self nanoemulsifying drug delivery system (SNEDDS) that contains minimum amount of surfactant, maximum amount of lipid, and possesses enhanced emulsification and dissolution rates. Box-Behnken experimental design was employed as statistical tool to optimize the formulation variables, X1 (oil phase), X2 (surfactant), and X3 (co-surfactant). Prepared SNEDDSs were further evaluated for their visual characteristics, emulsification efficacy, percentage transmittance, emulsification time, phase separation, dilution, droplet size, polydispersity index, zeta potential and drug release.
**Results:** There was a good correlation between percent transmitted and droplet size of diluted SNEDDS. Transmission electron microscopy demonstrated spherical droplet morphology. The optimized formulation of sirolimus-loaded SNEDDS exhibited a significant increase in In vitro drug release compared with the plain drug, which had a limited dissolution rate.
**Conclusions:** The results of our study suggest the potential use of the optimized SNEDDS formulation, containing bioenhancing surfactants as a promising tool improve dissolution and oral absorption of sirolimus.

**Keywords:** Self nanoemulsifying; Optimization; Bioavailability enhancer