

INDEX

CHAPTER NO.	TITLE	PAGE NO.
1.	Introduction	1 – 14
	Introduction to Breast Cancer	
	Fulvestrant	
	Exemestane	
	Quercetin	
	Role of Nanocarriers in Cancer Therapy	
	Polymer Lipid Hybrid Nanocarriers (PLHNCs)	
	Mesoporous Silica Nanoparticles (MSNs)	
	Aim and Objectives	
	Rationale	
	Hypothesis	
	Envisaged Outcomes	
	Plan of Work	
2.	Literature Review	15 – 84
	Cancer	
	Breast Cancer	
	Fulvestrant Drug Profile	
	Exemestane Drug Profile	
	Nanotechnology in cancer therapy	
	Polymer Lipid Hybrid Nanocarriers	
	Mesoporous Silica Nanoparticles	
	Mesoporous Silica Nanoparticles in cancer delivery	
	Formulation optimization by QbD	
3.	Materials and Protocols	85 - 97
	Materials	
	General procedure for characterization	
	Particle Size	
	Zeta Potential	
	X Ray Diffraction	

	FTIR	
	Morphology Study	
	SEM & TEM	
	Nitrogen Sorption Analysis (BET)	
	In vitro drug release study and drug release kinetics	
4.	Analytical Method Development	98 – 146
	Analysis of Fulvestrant by UV Visible Spectroscopy	
	Analysis of Fulvestrant by HPLC	
	HPLC estimation of Fulvestrant in Rat Plasma	
	Analysis of Exemestane by UV Visible Spectroscopy	
	Analysis of Exemestane by HPLC	
	HPLC estimation of Exemestane in Rat Plasma	
	Estimation of Total Phospholipid content by Stewart Method	
	Analytical Method Validation	
	Results and Discussion	
5.	Formulation Development and Characterization of PLHNCs	147 – 215
	Formulation of Fulvestrant loaded PLHNCs	
	Screening of method of preparation	
	Formulation and Development	
	Quality by Design (QbD)	
	Plackett Burman Screening Design	
	Box Behnken Design	
	Characterization of Fulvestrant PLHNCs	
	Formulation of Exemestane Loaded PLHNCs	
	Method of Preparation	
	Screening of method of preparation	
	Formulation and Development	
	Quality by Design (QbD)	
	Plackett Burman Screening Design	
	Box Behnken Design	
	Characterization of Exemestane PLHNCs	

6.	Formulation Development and Characterization of MSNs	216 – 271
	Formulation of Blank MSNs	
	Synthesis of MCM – 41 types of MSNs	
	Synthesis of SBA – 16 types of MSNs	
	Screening of excipients for MSN synthesis	
	Selection of excipient concentration	
	Selection of process parameters for MSN synthesis	
	Formulation optimization of MSNs by QbD	
	Plackett Burman Screening Design	
	Box Behnken Design	
	Synthesis of amino functionalized MSNs	
	Synthesis of COOH functionalized MSNs	
	Synthesis of folate conjugated MSNs	
	Formulation of Drug loaded MSNs	
	Formulation of Fulvestrant and Quercetin co-loaded MSNs	
	Formulation of Exemestane and Quercetin co-loaded MSNs	
	Characterization of drug loaded MSNs	
	Results and Discussion	
7.	In vitro Cell Line Studies	272 – 313
	Cell line studies for Fulvestrant and Exemestane Loaded PLHNCs	
	In vitro cytotoxicity studies	
	Cell Migration Assay	
	Cellular uptake studies	
	Apoptosis Studies	
	Cell line studies for Fulvestrant and Exemestane Loaded MSNs	
	In vitro cytotoxicity studies	
	Cell Migration Assay	
	Cellular uptake studies	
	Apoptosis Studies	

	Results and Discussion	
8.	In vivo Studies	314 – 334
	Methods	
	Pharmacokinetic Studies	
	Anticancer Studies	
	Measurement of tumor growth and change in body weight	
	Results and Discussion	
	Pharmacokinetics and Biodistribution of FLV PLHNCs	
	Pharmacokinetics and Biodistribution of EXE PLHNCs	
	Pharmacokinetics and Biodistribution of FLV MSNs	
	Pharmacokinetics and Biodistribution of EXE MSNs	
	Body weight change	
	Tumor regression studies	
	Survival Curve (Kaplan Meier plot)	
9.	Stability Studies	335 – 338
10.	Summary and Conclusions	339 - 350