

Contents

Description	Page No.
List of Figures	xi
List of Tables	xv
List of Abbreviations & Symbols	xvii
Preface	xviii
1. Introduction	1-6
2. Literature Review	7-44
2.1. Skin	7
2.1.1 Different layers of skin	7
2.1.2. Functions of the integumentary system	9
2.1.3. Problems associated with skin	9
2.2. Wound	10
2.2.1. Types of wounds	10
2.2.2. Types of clinical wound healing	11
2.2.3. Different phases of wound healing	12
2.2.4. Factor influencing wound healing	17
2.2.5. Reactive oxygen species and its significance in wound healing	17
2.3. Nanofibers	20
2.3.1. Electrospinning	21
2.3.2. Electrospinning setups	24
2.3.3. Parameters affecting the electrospinning process	25
2.3.4. Application of electrospinning technique	30
2.4. Drugs Profile	31
2.4.1. Ciprofloxacin hydrochloride	31
2.4.2. Quercetin	35
2.5. Polymers Profile	39
2.5.1. Poly(ϵ -caprolactone) (PCL)	39
2.5.2. Gelatin	40
2.5.3. Poly (D,L-lactide-co-glycolide) (PLGA)	42
3. Plan of Work	45-48
3.1. Objective	45

3.2. Study Design	45
3.2.1. Pre-formulation Studies	46
3.2.2. Formulation and evaluation of PCL based nanofibers loaded with ciprofloxacin hydrochloride and quercetin	46
3.2.3. Formulation and evaluation of PCL-GE based nanofibers loaded with ciprofloxacin hydrochloride and quercetin	47
3.2.4. Formulation and evaluation of PLGA-GE based nanofibers loaded with ciprofloxacin hydrochloride and quercetin	48
4. Materials and Methods	49-74
4.1. Materials	49
4.2. Experimental sections	51
4.2.1. Pre-formulation studies	51
4.2.2. Formulation development	57
4.2.3. Characterization of nanofiber membrane	62
4.2.4. Statistical analysis	74
5. Results and Discussion	75-137
5.1. Pre-formulation Studies	75
5.1.1. Development of analytical method for the estimation of ciprofloxacin hydrochloride and quercetin by UV-Vis spectroscopy	75
5.1.2. Validation of developed method for the estimation of ciprofloxacin hydrochloride and quercetin by UV-Vis spectroscopy	78
5.1.3. Solubility studies	79
5.2. Fabrication and characterization of PCL based nanofibers loaded with ciprofloxacin hydrochloride and quercetin	80
5.2.1. Morphological study	81
5.2.2. Solid-state characterizations	84
5.2.3. Contact angle of nanofiber membrane	87
5.2.4. Drug entrapment efficiency and <i>in-vitro</i> release study	88
5.2.5. <i>In-vitro</i> antibacterial activity	90
5.2.6. Free-radical scavenging efficiency of nanofibers	91
5.2.7. Biocompatibility study	92
5.2.8. Pilot study- wound healing efficiency of PCL-CH nanofiber membrane in comparison to CIPLOX cream	93
5.2.9. <i>In-vivo</i> wound healing study	95
5.3. Fabrication and Characterization of PCL-GE based Nanofibers Loaded with Ciprofloxacin Hydrochloride and Quercetin	101

5.3.1. Morphology of electrospun nanofibers	102
5.3.2. Solid-state characterizations	104
5.3.3. Contact angle of nanofiber membrane	107
5.3.4. Entrapment efficiency and <i>in-vitro</i> cumulative drug release study	108
5.3.5. <i>In-vitro</i> antibacterial activity	110
5.3.6. Free-radical scavenging efficiency of nanofibers	111
5.3.7. Biocompatibility study	112
5.3.8. <i>In-vivo</i> wound healing study	114
5.4. Fabrication and Characterization of PLGA-GE based Nanofibers Loaded with Ciprofloxacin Hydrochloride and Quercetin	120
5.4.1. Morphology of electrospun nanofibers	121
5.4.2. Solid-state characterizations	123
5.4.3. Entrapment efficiency and <i>in-vitro</i> cumulative drug release study	126
5.4.4. <i>In-vitro</i> antibacterial activity	128
5.4.5. Free-radical scavenging efficiency of nanofibers	129
5.4.6. Biocompatibility study	130
5.4.7. <i>In-vivo</i> wound healing study	132
6. Summary and Conclusions	138- 145
6.1. Summary	138
6.2. Conclusions	145
7. References	146- 157
List of Publications	158
