Ocular Multiparticulate Delivery Systems for Methazolamide

A thesis submitted in the partial fulfillment of the requirements for the Master Degree in Pharmaceutical Sciences (Pharmaceutics)

by

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List of Abbreviations

Analysis of variance	ANOVA
Carbonic anhydrase inhibitors	CAI
Cetostearyl alcohol	CSA
Cetyl alcohol	CA
Crystallinity index	CI
Differential scanning calorimetry	DSC
Distilled water	DW
Dynamic light scattering	DLS
Entrapment efficiency percentages	EE%
Food and drug administration	FDA
Generally regarded as safe	GRAS
Hydrophile lipophile balance	HLB
Intraocular pressure	IOP
Isopropyl myristate	IM
Kilogray	KGy
Labrafac Lipophile® WL 1349	LL
Methazolamide	MZA
Nanostructured lipid carriers	NLCs
Nanostructured lipid matrices	NLMs
Particle size	PS
Phosphate buffered saline	PBS
Polydispersity index	PDI
Primary angle-closure glaucoma	PACG
Primary open-angle glaucoma	POAG
Solid lipid nanoparticles	SLNs
Stearylamine	SA
Transmission electron microscope	TEM
Zeta potential	ZP

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Abstract

Topical administration of methazolamide (MZA) for treatment of glaucoma using lipid nanoparticles as drug delivery carriers will significantly reduce its associated systemic side effects. However solid lipid nanoparticles (SLNs) formulated from one type of lipid (Homolipid) suffer from low drug encapsulation and drug bursting due to crystallization of the lipid into the more ordered β modification leading to decreased drug entrapment and faster drug release. This can be overcome by using mixture of spatially different solid lipids (Heterolipid) to form nanostructured lipid matrices (NLMs) or using mixture of oil and solid lipids to form nanostructured lipid carriers (NLCs). The purpose of this study was to assess the feasibility of using NLMs and NLCs for topical ocular delivery of MZA.

MZA loaded NLMs were successfully prepared adopting heterolipids composed of novel mixtures of Compritol® and cetostearyl alcohol (CSA) and stabilized by Tween 80®. The systems were prepared using the modified high shear homogenization followed by ultrasonication method which avoids the use of organic solvents. A 3^2 full factorial design was constructed to study the influence of two independent variables namely; the ratio of CSA:Compritol® and the concentration of Tween 80® each in three levels. The dependent variables were the