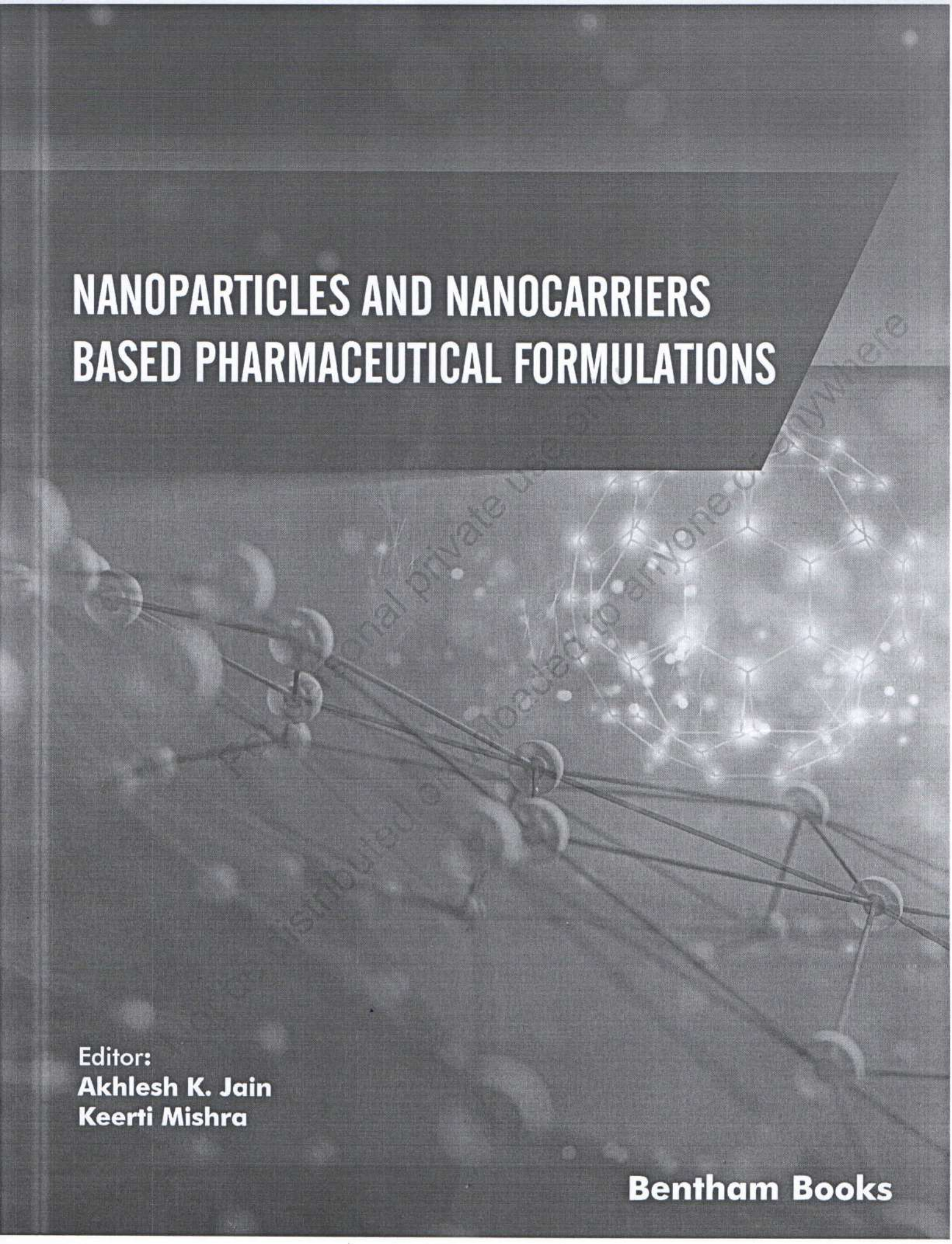
NANOPARTICLES AND NANOCARRIERS BASED PHARMACEUTICAL FORMULATIONS



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CHAPTER 6

Targeting Potential of Nanocarriers for Efficient Treatment of *H. Pylori* Infection

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Abstract: *Helicobacter pylori* (*H. pylori*), a prevalent human-specific pathogen, plays a key role in the development of peptic ulcer disease, gastric carcinoma, and gastric mucosa associated lymphoid tissue lymphoma. Once infected, those bacteria reside below the gastric mucosa adherent to the gastric epithelium, and entry of drugs to this target site is very difficult. The bacteria can also acquire resistance to commonly used antimicrobial drugs. Thus, an effective antimicrobial concentration cannot be achieved in the gastric mucous layer or on the epithelial cell surfaces where *H. pylori* exist and caused inefficient treatment. Such challenges have encouraged researchers into developing some therapies based on nanotechnology.

Keywords: Antibiotics, Gastro-retentive delivery system, *H. pylori*, Nanoparticles, pH responsive nanoparticles, Herbal approach, Liposomes, Lectins, Nanogels, Nanoparticulate vaccine, Mucoadhesion, Nanocarriers, Nanolipobeads, Polymeric nano-micelles, Receptor mediated targeting.

INTRODUCTION

The incidence of Helicobacter pylori (*H. pylori*) is found to be between 85 to 95% in developing countries such as India, Malaysia, *etc* and 30 to 50% in developed countries such as the USA, Australia, UK, *etc*. The epidemiology of *H. pylori* infection has been changed with improved sanitation and methods of eradication.

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CHAPTER 9

Nanoemulsion: A Potential Carrier for Topical Drug Delivery

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Abstract: Nanoemulsions (NEs) are stable nanocarrier systems consisting mainly of oil and water, which are stabilized by surfactant with cosurfactant. Due to their typical size, nano-emulsions are transparent or translucent, and minute droplet size makes them stable against sedimentation or creaming. The nanoemulsion system may be in the form of oil-in-water (O/W) or water-in-oil (W/O). The recent literature revealed that NEs as a colloidal carrier system has been confirmed to be a valuable strategy to improve the bioavailability of topically applied drugs. NE has been proposed as a viable alternative to conventional topical dosage forms due to the ability to overcome the skin/ocular barriers faced after administration. Better permeation rate, improved therapeutic efficacy and reduction of dose, non–specific toxicity, and targeted drug delivery system can improve drug effectiveness when drugs are incorporated into NEs. In recent years, research studies have focused more on ion nanoemulsion systems using a mixture of surfactants to solve critical factors, such as solubility, stability, and drug delivery applications. This chapter outlines the recent development in nanoemulsion as a delivery system to study topical drug delivery.

Keywords: Nanocarrier, Nanoemulsion, Ocular, Skin, Topical drug delivery.

INTRODUCTION

Oil and water are immiscible liquids for blending two phases; the phases are miscible with the addition of the third substance like an emulsifier [1]. Uniting the combination of these phases requires energy contribution to make up dissimilar contacts with in water-oil systems that can restore similar phase

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CHAPTER 14

Gene Therapy: A New Avenue for the Management of Ophthalmic Diseases

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Abstract: Gene therapy aims at intercellular delivery of functional genetic material to the affected area to restore its function or block a dysfunctional gene using viral vectors (Adeno-associated virus) or non-viral vectors (liposomes, SLNs). Gene therapy for the management of ocular diseases is emerging with improved and encouraging results. The Eye has well-defined anatomy, tight ocular barriers, and immune-privileged. It is a perfect target for gene therapy. Recently, many clinical trials are underway or have been completed. The success of these clinical trials promotes the treatment of several ocular diseases (Age-related macular degeneration, glaucoma, retinitis pigmentosa, and choroideremia). Gene therapy should possess an efficient targeting capacity and longstanding gene expression. Viral vectors are mainly used for gene therapy, but due to the risk associated with immunogenicity and mutagenesis, non-viral vectors are widely utilized. This chapter summarizes the recent development of therapeutic gene delivery approaches for the effective management of ocular diseases and their use in ophthalmology.

Keywords: Gene therapy, Non-viral, Ocular delivery, Ocular gene therapy, Viral.

INTRODUCTION

The human eye is an inaccessible, unique, and highly complex organ specified for photoreception. Its complex anatomy and physiology make it a vastly protected organ [1]. The eye ball consists of three primary layers, i) sclera and cornea (on the outside), ii) the retina (on the inside), and iii) in between is the uvea layer.

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