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PHARMACEUTICAL PROPERTIES AND IN-VITRO EVALUATION OF IBUPROFEN-LOADED PLGA NANOPARTICLES BY NANOPRECIPITATION

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ABSTRACT

The main objective of this study was to develop a polymeric drug delivery system for ibuprofen with final goal of improving the delivery of poor water soluble drugs. In order to achieve this goal, ibuprofen-loaded PLGA nanoparticles were prepared by the nanoprecipitation method. The following characteristics of nanoparticles formulate were determined; particle sizes, zeta potential, drug content, drug entrapment and drug release profile. Our result demonstrate that the methodology of preparation allowed the formation of nanometric (<200 nm), a narrow size distribution (polydispersity index< 0.2) and a negative surface charge (zeta potential values ranging from -27.4 to -31.3 mV). The release behaviour of ibuprofen from the developed nanoparticles exhibited a biphasic pattern characteristic by an initial fast release during the first 7 hours, followed by a slower and continues release. The formulation was optimised by 30% of theoretical drug loading with highest percentage of drug entrapment of 74.63% and drug content of 58.09%. The study has demonstrated that incorporation of ibuprofen in PLGA can improve drug release profile.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Polymeric nanoparticles have received increasing scientific and industrial interests because of their potential site-specific drug delivery to optimize drug therapy (Kreuter, 1994). Polymeric nanoparticles have been considered as promising carriers for poorly water-soluble drugs. Besides, directing nanosize of drugs may also provide excellent result in drug solubility as well as drug delivery (Merisko-Liversidge *et al.*, 2003). Other important advantages associated with the use of nanoparticle include the ease of their preparation with well-defined biodegradable polymer and their high stability in biological fluids and during storage (Fonseca *et al.*, 2002). Several review articles have highlighted the ability of such nanoparticles to reduce associated adverse effects of various drugs (Govender *et al.*, 1999).

Various polymers have been used in drug delivery research that can effectively deliver the drug to a target site and increase the therapeutic effect. There have been significant interests in developing biodegradable nanoparticles as effective drug delivery carriers. Polylactide-co-glycolic acid (PLGA), a copolymer of poly (lactic acid) and poly (glycolic acid), has been studied extensively as a polymeric carrier for