Preface

Atherosclerotic complications lead to a number of cardiovascular disease and it is a leading cause of death worldwide. It is no more a disease of affluent country and afflicting developing country population very rapidly. In broad outline, atherosclerosis can be considered to be a form of chronic inflammation resulting from interaction between modified lipoproteins, monocyte-derived macrophages, T- cells, and the normal cellular elements of the arterial wall. Elevated levels of serum cholesterol and triglycerides are sufficient to drive the development of atherosclerosis in human even in the absence of other known risk factors.

Atorvastatin calcium (ATR) is highly prescribed second generation statin drug for atherosclerosis, hyperlipidemia and cardiovascular disease; on account of its greater potency, efficacy, antioxidant, anti-inflammatory and other beneficial properties. In spite of being blockbuster drug its oral bioavailability is low (12%) due to poor aqueous solubility, presystemic elimination by gut wall efflux pump and cytochrome P-450 enzymes along with high hepatic first-pass metabolism. Muscle toxicity like mild myositis to severe rhabdomyolysis is common adverse effect after chronic use of statin for longer period.

The idea of the research carried out in present thesis was conceived on aforementioned problems of ATR therapy and was designed with an objective to develop nanoparticulate drug delivery systems to enhance drug bioavailability, efficacy and safety profile. In this context, rigorous literature survey was accomplished with special emphasis on polymeric nanoparticulate drug delivery systems. Additional efforts was attempted to collect details of drug, polymers, surfactants and other excipients.

The entire research work has been carried out systematically in three steps. First; ATR encapsulated eudragit RSPO nanoparticles (AERSNs), second; ATR loaded poly (dl lactide-co-glycolic acid) nanoparticles (APLNs) and lastly; ATR loaded poly (ϵ-caprolactone) nanoparticles (ALPNs) were prepared and optimized by using central composite design tool. Moreover, the optimized formulations were extensively evaluated for solid state characterization, *in vitro* and *in vivo* evaluation, and the results were discussed profoundly.

The purpose of this research adds up an avenue in the utilization of biodegradable and non-biodegradable polymer as potential carrier to improve oral bioavailability, efficacy and safety of incorporated drugs.