3. AIM AND OBJECTIVES OF WORK

A large number of drug delivery systems are presently available to treat diabetes. However, therapeutic efficacy of the drug is frequently effective by parental use that is not suitable for daily injection due to painful.\textsuperscript{151}

The present research work was aimed to overcome this problem. Microsphere based colon specific drug delivery system(s) was expected to effectively target bioactive compounds and increase residence time as well.\textsuperscript{152}

Insulin is degraded very quickly by the stomach's acidic environment and proteolytic enzymes. The dream of an "Insulin tablet" has also not become a reality, the main problem being digestion and a lack of a specific peptide carrier system in the gut.\textsuperscript{153}

Researchers are currently examining whether insulin absorbed into a microsphere can bypass these enzymes and pass through the wall of the intestine. But this research is still in its early phases. Provalis is trying to develop an insulin based oral pill. The technology uses a water-in-oil microemulsion in which aqueous phase contains insulin and the oil phase contains cholesterol, lecithin and non-esterified fatty acids. Nobex oral insulin is based on a technology of covalent attachment of low molecular weight polymers to insulin creating drug polymer conjugate. This is now in phase II trial in USA. Chemical engineers at Purdue University, USA recently claimed that they have developed a polymer, to shepherd insulin past the stomach. The polymer in acid collapses into a tight ball that traps the insulin. In about 30 minutes, the pill reaches the non-acidic intestine, where the polymer expands to release the insulin. The pill has worked in rats and dogs, but so far it has been hard to predict how much insulin will be absorbed and how fast. Also, at least 85 percent gets wasted.\textsuperscript{154}

This study encompasses preparation and evaluation of microspheres based colon specific tablet formulations. Initially, microspheres of Insulin was prepared by quasi-emulsion solvent diffusion method using Eudragit RL 100 and Eudragit L-100. The reason for preparing Microsphere due to the fact that, drug carrier systems less than 200 μm may efficiently be taken up by the macrophages present in colon
tissue, thus exhibit effective localized drug action at the desired site.\textsuperscript{155} A subsequent increase of residence time that may be postulated for microspheres as compared to existing drug delivery systems may allow dose reduction and enhance therapeutic effect. Another reason for preparing microspheres was their matrix like texture that can easily be compressed by direct compression for producing mechanically strong tablets.\textsuperscript{157}

Then core tablets of microspheres were prepared by direct compression method and were compression coated with pectin:HPMC mixture.\textsuperscript{158} The reason for selecting pectin was its biodegradation in the colon by colonic flora.\textsuperscript{159} HPMC is reported to increase the mechanical strength of the tablet coat\textsuperscript{160} and helped in maintaining its integrity during its jejunum in the gastro-intestinal tract.\textsuperscript{161}

3.1 Aim of the Present Research Work

The present study was aimed at developing and characterizing Microsphere based novel colon specific drug delivery systems containing Insulin for the treatment of diabetes to achieve following objects:

To potential enhancing maximum therapeutic effectiveness of Insulin by oral drug delivery system. To develop superior formulation with pronounced targeting potential of drugs to colon as compared to conventional delivery systems.
3.2 Plan of Work

Exhaustive Literature survey through journals and E-journal

Procurement of Drug(s), and Excipient(s) Preformulation studies

Preparation and optimization of microspheres

Development of colon specific formulation(s)

*In vitro* and stability studies of promising formulations