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Colon Specific Delivery of Insulin loaded Colloidosomes based on pH-dependent polymer

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Objectives: Protein/peptide drugs are generally administered parenterally, but needle phobia and stress of multiple daily injection and other associated disadvantages lead to development of new and significant approaches for their delivery. In the present work Insulin loaded colloidosomes were formulated, characterized and its drug delivery potential was investigated. Colloidosomes are novel drug delivery carrier which consists of closed packed layer of colloid particles which are linked together to form a hollow, elastic microcapsules having interstices or pores between particles which are responsible for drug release. Colloidosomes bearing aqueous gel-core containing insulin encapsulated by colloidal particles of PMMA(polymethyl methacrylate) with penetration enhancers were filled in gelatin capsule coated with polyacrylic polymer(eudragit) having pH-dependent properties.

Methods: Colloidosomes were prepared in two-steps ie preparation of nanoparticles(NPs) by reprecipitation method and then integration of colloidosomal assembly. The NP's were characterized for *In-vitro* drug release, size distribution and zeta potential, Transmission electron microscope(TEM) was used as a visualizing aid for particle morphology, shape and surface morphology using SEM. *In-vivo* antidiabetic study was carried by estimating plasma glucose level using glucose-oxidase method (Glucose GOD-PAD kit, Bayers diagnostics).

Results: Colloidosomes were spherical with smooth surfaces and showed a release profile suitable for oral delivery system. Insulin release in caecal and colonic contents was significantly higher than that in stomach and small intestine. It was observed that insulin loaded colloidosomes showed better protective effects against proteolytic enzymes as compared to plain insulin solution. Colloidosomes bearing insulin exhibited better therapeutic effects in decreasing plasma glucose level as compared to plain insulin solution and subcutaneous injection of insulin.

Conclusions: Colloidosomes showed a matrix diffusion controlled first order release. A significantly prolonged decline of the plasma glucose level was obtained over 10 h after administration of the insulin-loaded colloidosomes. In conclusion, colloidosomes can be used as an efficient carrier for the colon-specific delivery of insulin.