

liposomes delivered by the inhalation route in mice caused significantly reduction in plasma glucose levels (Huang & Wang, 2006).

Taking all of this account oral insulin delivery is considered to be the most safest and convenient which delivers the insulin directly into the liver through portal circulation, where it inhibits hepatic glucose production. Hence, by oral delivery largely the natural physiological route of insulin can be mimicked (Figure 1.3). Insulin being a protein, difficulties encountered in oral delivery includes denaturation and degradation by low pH of the stomach and different digestive enzymes in the stomach and small intestine; and the major barrier for absorption is the intestinal epithelium. All these lead to low bioavailability. Different formulations of polymers for insulin delivery such as liposomes, microspheres, microemulsion and nanoparticles (NPs) have been investigated to circumvent these GI barriers (Carino & Mathiowitz, 1999; Chandra et al., 2014).