ABSTRACT

Title: Studies on the antidiabetic activity of co-encapsulated andrographolide and curcumin in nanostructured lipid carrier system

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While the far-reaching remedial activities of andrographolide (AG) and curcumin (CMN) have been well established , its notable delivery to comprehend its true therapeutic potentials confront a major challenge due to their poor oral bioavailability and short plasma half life. Co-administration of natural therapeutics offers synergistic efficacy while minimizing the dose level. The major drawback of nano-encapsulations is the low drug loading consequently leading to low therapeutic efficacy. We represent here a bioavailability enhancement strategy for both curcumin and andrographolide in the form of amphiphilic curcumin-chitosan (CCN) ion–pairing complex co-loaded with andrographolide (AG-CMN) in core–shell- type lipid-polymer hybrid nanoparticle and then evaluated its therapeutic effect in experimental diabetes model.Curcumin-chitosan amphiphilic complex and andrographolide was incorporated into the lipid phase by hot melting followed by homogenization in aqueous phase containing lecithin which leads to nanoprecipitation. We have also develop a validated RP-HPLC method to quantify andrographolide (AG) and curcumin (CMN) simultaneously for drug loading, *in vitro* drug release study and *in vivo* pharmacokinetic study of novel NLC formulation. The results indicate that the formulated AG-CMN nanoparticle had nano size range 145.6 ± 4.1 nm and zeta potential (+)18.3 with high drug loading of 19.21% and 18.12% for andrographolide and curcumin, respectively. Appearance of curcumin in the blood was 9.08 fold higher and 4.8 fold higher for andrographolide in comparison to unformulated CMN and AG, respectively. AG-CMN NLC showed 98% hypoglycaemic effect compared to glibenclamide at 1 mg/kg dose.

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Asit Kumar De

Signature of the candidate

Tanmoy Bera, M. Pharm., Ph.D.
Professor
Division of Medicinal Biochemistry
Department of Pharmaceutical Tech.
Jadavpur University, Kolkata-700 032

Signature of the Supervisor(s) date with official seal