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Rajnibhai V. Patel
PharmInnova Award
Best M. Pharm Thesis

RUNNER-UP

Runner-Up

Ms. Neelam A Suthar

Research Guide

Dr. Srinivas Mutalik

Subject:
Pharmaceutics & Pharmaceutical Technology

Thesis Title :
Curcumin Loaded nanoparticulate drug delivery system for the treatment of inflammatory bowel disease

College:
Manipal College of Pharmaceutical Sciences, Manipal

Colon targeted delivery of Curcumin (Haldi) for treatment of Irritable Bowel Syndrome (IBS)

Outcome of Research:

Presently used drugs in the treatment of inflammatory bowel disease (IBD) (e.g. sulfasalazine, mesalamine) are expensive and have many side-effects. Curcumin, an active constituent of the turmeric (haldi) powder, is recommended as a safe and economical option for IBD. This study formulated Curcumin in a unique delivery system using nanoparticles and a polymer (PAAm-g-Xanthan gum) which provides site specific action with improved solubility, stability and bioavailability of curcumin demonstrated by *in vitro and preclinical studies*. This newly formulated delivery system provides better therapeutic action than that of plain curcumin and sulphasalzine in precisely targeting the colon in the treatment of IBD.

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Curcumin Loaded nanoparticulate drug delivery system for the treatment of inflammatory bowel disease

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ABSTRACT

Inflammatory bowel disease (IBD), a chronic immune disorder that involves an overactive immune component in the intestinal mucosa, encompasses chronic inflammatory conditions which are manifested asCrohn's Disease and Ulcerative colitis. Curcumin is one of the plant based cost effective polyphenolic drugs and has been shown to successfully and effectively alleviate chronic inflammation in experimental model of IBD. On the contrary, curcumin has many disadvantages like poor aqueous solubility, dissolution rate, absorption and finally very low bioavailability, which pose the greatest obstacle to its routine clinical application. In the present work, nanoparticles loaded with curcumin were prepared using a novel grafted polymer (polyacrylamide grafted xanthan gum copolymer; PAAm-g-XG). This polymer has high specificity for colon targeting due to the precise colon pH dependent solubility (because of polyacrylamide part in polymer) and micro flora activated property (because of xanthan gum part, which makes the polymer to release the loaded drug in caecum content). Hydrolyzed PAAm-g-XG polymer nanoparticles loaded with curcumin were formulated and optimized by taking several variables into consideration. Particle size, drug content, drug entrapment and invitro drug release studies showed that formulation CN 20 was a free flowing fluffy powder having the particle size of about 400 nm, zeta potential of about -31 mV and entrapment efficiency of 17.49%. This formulation exhibited very low drug release in pH 1.2 (for 2 h) and complete release at pH 7.4 (within 3 h) indicating precise pH dependant solubility of the polymer. The preclinical pharmacokinetic studies also suggested targeted drug delivery to colon as indicated by considerably increased Tmax. The degree of colitis caused by administration of acetic acid was significantly attenuated by colonic delivery of nanoparticles of curcumin. The results of present study demonstrate that natural dietary component curcumin could be useful in the therapeutic strategy for inflammatory bowel disease suffering patients.