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Floating gastro retentive drug delivery system of antacids nanoparticles using hard alginate capsules

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The conventional antacids dosage forms have short duration of action due to the gastric emptying process. Since the healing of gastric ulcers occurs when gastric pH is kept above 3-4, so a gastro retentive dosage form of antacids with prolonged its duration of action is needed to produce to faster the heal of gastric ulcers. The purpose of this study is prolonging the duration action of antacids by preparation floating gastro retentive drug delivery system of antacids using hard alginate capsules. Hard alginate capsules were prepared in our laboratory by using sodium alginate. Then, alginate capsules perforated which 1 hole in body part and 1 hole in cup part, the diameter of hole was 1 mm. Conventional antacids powder were grinded by using Planetary Micro Mill Premium Line (Frittsch) to form antacids nanoparticles. The size of $Mg(OH)_2$ nanoparticles was 186-372 nm and $Al(OH)_3$ was 186-223 nm. $Mg(OH)_2$ and $Al(OH)_3$ nanoparticles were filled into separated alginate capsule, 200 mg each capsule. Buffering action of antacids to 0.1 N HCl solutions was determined on simulated gastric acid secretion. The healing effects of antacids nanoparticles on gastric ulcers were tested using male rats induced by 0.6 N HCl solutions. Examinations of gastric ulcers were observed macroscopically (number of lesions and lesion index) and microscopically (histopathology). The results of this study showed that during the experiment for about 12 hours alginate capsules were floated and did not disintegrate in the 0.1 N HCl solutions, it disintegrated in simulated intestinal fluid. Floating gastro retentive drug delivery system of antacids nanoparticles using perforated hard alginate had buffering action. In simulated gastric fluid secretion experiment, the capsules containing antacid caused the pH raised above 1.2 and maintained the pH of solution at 3.6 for 12 hours. While, perforated alginate capsule containing conventional antacids powder, the pH of medium reached only to 1.3 for 12 hours. On the capsules without perforation containing antacid nanoparticles the pH of medium was almost no changed at pH 1.2-1.3 for 12 hours. The holes of alginate capsules and the nano size of antacids caused the easily reaction between HCl and antacids and neutralized the solution. The healing effect of antacids nanoparticles on gastric ulcers was faster than that of conventional antacids. It is concluded that hard alginate capsules is potential to be used as new gastro retentive drug delivery system of antacids.

Biography

Hakim Bangun has obtained his PhD degree from Faculty of Pharmaceutical Sciences, The University of Tokushima, Japan in 1990. Since 1980 he has been working as an Academic Staff at Faculty of Pharmacy, University of Sumatera Utara. He became Professor of Pharmaceutical Technology/Physical Pharmacy on 1999. His research interest is about the application of alginate in pharmaceutical preparation, such as enteric capsules, gastro retentive drug delivery system, drug encapsulation, gastric delivery system, sustained release, nano capsules, nanoparticles, transdermal preparation, peridental gel and the biological activity of alginate. He has published about 25 papers in reputed journals.

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