P-117

Effect of lubricant content and drug type on spray-dried chitosan-clay composite tablets

Rapee Khlibsuwan*, Thaned Pongjanyakul*

Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen 40002, Thailand.

*E-mail: rapee_k@kkumail.com

Chitosan (CS), a cationic polysaccharide, was modified to spray-dried powder for using as a binder or filler of tablets. Spray-dried CS could be used as a matrix-forming agent, but it could not provide sustained-release of drug because CS could rapidly swell and erode in acid medium [1]. Addition of magnesium aluminum silicate (MAS), an anionic clay, could retard swelling property of CS in acidic medium [2]. Thus, spray-dried CS-MAS composites were prepared and evaluated. The spray-dried CS-MAS composite at the ratio of 1:0.6 showed the slowest release of drug when preparing by direct compression method [3]. In this study, effect of lubricant content and drug type on physical properties and drug release pattern of spray-dried CS-MAS tablets was investigated.

CS-MAS dispersion at the ratio of 1:0.6 by weight was prepared and dried by using spray-drying technique. For effect of lubricant, magnesium stearate (MgSt) in the contents of 1, 2 or 3 %w/w was used. Three types of drug, such as diclofenac sodium (DCF), a negatively charged drug, propranolol HCl (PPN), a positively charged drug, or hydrochlorothiazide (HCTZ), a poorly soluble drug, were used as model drugs. The tablets were compressed by using a hydraulic press. Tablet properties, such as hardness, %friability, and drug release profile, were investigated. Drug release was characterized by using a USP dissolution apparatus I. The results showed that tablet hardness obviously decreased with increasing MgSt content, whereas %friability of tablets increased because increasing of MgSt could disturb cold welding at the contact area of spray-dried CS-MAS composites. However, drug release pattern did not obviously change because swelling properties of spray-dried CS-MAS composite in acidic medium still retarded drug release. For effect of drug type on drug release in distilled water, the PPN tablets showed faster release than DCF and HCTZ tablets (Fig. 1) because of higher water solubility of PPN. The slowest drug

release was found in DCF tablets although DCF had higher water solubility than HCTZ. It is possible to describe that soluble DCF could possibly interact with CS via electrostatic interaction, leading to slower diffusivity of DCF in swollen matrix. In conclusion, lubricant content added can affect physical properties and drug release of spray-dried CS-MAS composite tablets. Interaction of drug with CS or MAS should be considered for using the spray-dried CS-MAS composite in tablet formulations.

Keywords: Chitosan; Magnesium aluminum silicate; Spray-drying; Tablets; Lubricant; Drug release

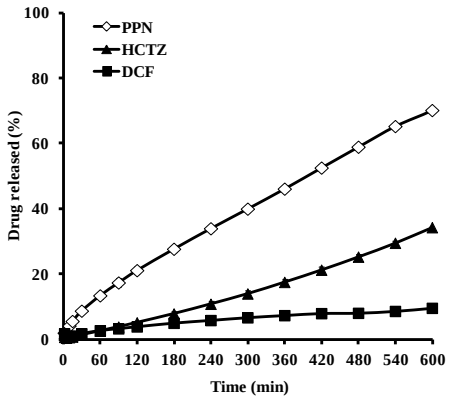

Fig. 1. Effect of drug type on drug release of spray-dried CS-MAS tablets in distilled water.

Acknowledgements

The authors acknowledged the financial support from the Thailand Research Fund through the Royal Golden Jubilee Ph.D. Program (Grant No. PHD/0071/2553).

References

[1] Rege P, Garmise R, Block L. Spray-dried chitinosans: Part II: In vitro drug release from tablets made from spray-dried chitinosans. Int. J. Pharm. 2003;252:53–59.

[2] Khunawattanakul W, Puttipipatkhachorn S, Rades T, Pongjanyakul T. Novel chitosan−magnesium aluminum silicate nanocomposite film coatings for modified-release tablets. Int. J. Pharm. 2011;407:132-141.

[3] Khlibsuwan R, Pongjanyakul T. Spray-dried chitosan-magnesium aluminum silicate composites for use in tablets. Proceeding of the 9th World Meeting on Pharmaceutics, Biopharmaceutics and Pharmaceutical Technology, Lisbon, 2014.