INTISARI

PENGARUH KOMPLEKS INTERPOLIMER KOLLIDON SR DAN EUDRAGIT TERHADAP KINETIKA DAN MEKANISME PELEPASAN OBAT PADA TABLET *SWELLABLE GASTRO-FLOATING*

Kompleks interpolimer (KIP) antara Kollidon SR (KSR) dan Eudragit (Eud) mampu mengubah karakteristik fisika-kimia dan fisika-mekanik polimer tersebut. Penelitian ini bertujuan untuk mengetahui pengaruh KIP Kollidon SR dan Eudragit serta interaksinya pada matriks berbasis polimer hidroksipropil metil selulosa (HPMC) (Methocel K100M DC2) terhadap mekanisme pelepasan obat pada tablet *swellable gastro-floating* menggunakan metformin HCl sebagai model obat yang sangat mudah larut.

Preparasi KIP KSR-Eud RS, KSR-Eud L, KSR-Eud E dan Eud E-Eud L dilakukan dengan metode *spray drying*, *anti-solvent* diikuti dengan liofilisasi atau penguapan pelarut. Hasil KIP dan campuran antara KIP-HPMC dikarakterisasi dengan spektrofotometer *Fourier transform infrared* (FTIR), *differential scanning calorimetry* (DSC), *powder* X-*ray diffraction*, *scanning electron microscopy*, dan pelepasan obat. KIP KSR/Eud terpilih dikaji pengaruhnya terhadap pelepasan obat pada rentang konsentrasi *threshold* HPMC dan ketahanan mekaniknya pada proses disolusi. Pengaruh dan interaksi campuran KIP KSR-Eud RS, HPMC, dan komponen *effervescent* dinilai dengan model *D-optimal design* terhadap kemampuan mengapung, *swelling*, dan pelepasan obatnya.

Interaksi KIP Kollidon SR dan Eudragit melalui ikatan hidrogen dan *van der Waals* mengubah kemampuannya dalam mengendalikan pelepasan obat. Hasil evaluasi dengan FTIR, DSC, pelepasan obat, dan karakteristik fisika-mekanik, KIP Eud RS-KSR paling potensial untuk diinkorporasikan dalam sediaan *swellable gastro-floating*. KIP Eud RS-KSR dapat meningkatkan kemampuan HPMC dalam mengendalikan pelepasan obat dan ketahanan mekanik terhadap agitasi serta pengaruh *curing* di bawah konsentrasi *threshold* HPMC. Peningkatan konsentrasi KIP pada matriks berbasis HPMC memberikan kontribusi terhadap penurunan *floating lag time*, peningkatan *swelling*, dan menurunkan *efek burst release* dengan meningkatkan resistensi terhadap erosi.

Kata Kunci: HPMC, Eudragit, Kollidon SR, kompleks interpolimer, tablet *swellable gastro-floating*

ABSTRACT

THE EFFECT OF INTERPOLYMER COMPLEX OF KOLLIDON SR AND EUDRAGIT TYPES ON THE DRUG RELEASE KINETICS AND MECHANISM OF A SWELLABLE GASTRO-FLOATING TABLET

Interpolymer complexes (IPCs) between Kollidon SR (KSR) and Eudragits (Euds) promote alterations of physicomechanical and physicochemical properties of polymers. This research was aimed to determine the effect of IPC of Euds and KSR and their interaction with hydroxyl propyl methyl cellulose (HPMC)-based matrix (Methocel K100M DC2) on the drug release of a swellable gastro-floating tablet using metformin HCl as a freely water-soluble drug model.

Preparation of IPC of KSR-Eud RS, KSR-Eud L, KSR-Eud E and Eud E-Eud L was performed by spray drying and anti-solvent followed by either lyophilization or solvent evaporation. The IPC of KSR and Euds and the interaction of selected IPC and HPMC were characterized by Fourier transform infrared (FTIR) spectrophotometer, differential scanning calorimetry (DSC), powder X-ray diffraction, scanning electron microscopy, and drug release. The effect of the selected IPC of Euds and KSR was studied on the drug release under the range of HPMC threshold concentration. The effect and interaction of IPC KSR-Eud RS, HPMC, and component effervescent were assessed using D-optimal design on floating behavior, swelling and the drug release.

Interaction of IPC between KSR and Euds through hydrogen bonding and van der Waals interaction altered the ability to control the drug release. Depending on FTIR, DSC, drug release, and physicomecanical properties, KSR-Eud RS IPC was the most potential to be incorporated into the swellable gastro-floating tablet. KSR-Eud RS IPC increased the ability of polymer to control the drug release and mechanical robustness according to the agitation and curing effect below threshold concentration of HPMC. Increasing the IPC concentration on the HPMC matrix based incorporated into the swellable gastro-floating formulation contributed to reduce the floating lag time, increase swellability, and reduce the burst release effect owing to increasing the tablet integrity toward matrix erosion.

Keywords: HPMC, Eudragit, Kollidon SR, interpolymer complex, swellable gastro-floating tablet