INTISARI

Simvastatin merupakan obat yang termasuk *biopharmaceutics classification system* kelas II yang memiliki kelarutan rendah dan dapat ditingkatkan dengan sistem pembawa misellar polimer. Penelitian ini bertujuan untuk mengetahui pengaruh komponen penyusun *triblock co-polymer* terhadap karakteristik *poly(lactid-co-glycolide acid)* (PLGA)-polietilen glikol (PEG)-PLGA *triblock co-polymer* dengan model obat simvastatin.

Pembuatan PLGA-PEG-PLGA *triblock co-polymer* dilakukan dengan metode peleburan. PEG 1000, *D,L-lactide acid* (LA), dan *glycolide acid* (GA) sebagai komponen penyusun dan *stannous 2-ethylhexanoate* sebagai katalis. Hasil *triblock co-polymer* dikarakterisasi dengan *spektrofotometer Fourier transform infrared* (FTIR) dan *differential scanning calorimetry*. Simvastatin sebagai model obat hidrofobik diinkorporasikan ke dalam sistem misel polimerik PLGA-PEG-PLGA *triblock co-polymer*. Metode 2^2 *full factorial design* dengan penambahan *curvature* pada titik tengah diaplikasikan untuk menilai pengaruh rasio LA/GA dan konsentrasi PEG 1000. Karakterisasi simvastatin-*polymeric micelle* dilakukan dengan pengujian: kelarutan jenuh, *entrapment efficiency*, ukuran dan distribusi ukuran partikel, dan potensial zeta.

Hasil penelitian menunjukkan bahwa rasio LA/GA dan konsentrasi PEG 1000 memberikan pengaruh terhadap pembentukan sistem polimer. Hasil karakterisasi FTIR menunjukkan bahwa rasio LA/GA dan konsentrasi PEG 1000 tidak memberikan pengaruh terhadap perubahan gugus fungsi, akan tetapi memberikan pengaruh terhadap panjang rantai polimer yang terbentuk dikarakterisasi dengan perubahan suhu *glass transition*. Peningkatan rasio LA/GA dan penurunan konsentrasi PEG 1000 meningkatkan kelarutan simvastatin dan *entrapment efficiency* (p<0,05). Rasio LA/GA memberikan pengaruh yang lebih dominan terhadap perubahan ukuran dan distribusi ukuran partikel dibandingkan dengan PEG 1000 (p<0,05). PLGA-PEG-PLGA *triblock co-polymer* optimum diperoleh pada rasio LA/GA10:1 dan PEG 1000 sebesar 35,9%.

Kata kunci: simvastatin, misel, PLGA-PEG-PLGA, *triblock co-polymer*

ABSTRACT

Simvastatin belongs to the class II of the biopharmaceutical classification system which has low solubility and this issue can be addressed by a polymeric micellar carrier system. The purpose of this study was to find out the effect of constituent components in the triblock co-polymer on the characteristics of poly(lactid-co-glycolide acid) (PLGA)-polyethylene glycol (PEG)-PLGA using simvastatin as a drug model.

The preparation of PLGA-PEG-PLGA triblock co-polymer was performed using a fusion method. PEG 1000, D,L-lactide acid (LA), and glycolide acid (GA) were used as constituent components and stannous 2-ethylhexanoate was added as a catalyst. Triblock co-polymer was characterized using Fourier transform infrared spectrophotometer (FTIR) and differential scanning calorimetry. Simvastatin as a hydrophobic drug model was incorporated into the polymeric micelle system of PLGA-PEG-PLGA triblock co-polymer. A 2^2 full factorial design with an addition in the middle point as a curvature was applied to assess the effect of LA to GA ratio and PEG 1000 concentration. The simvastatin-polymeric micelle was characterized by saturated solubility, entrapment efficiency, particle size and distribution, and zeta potential.

The results showed that the LA to GA ratio and PEG 1000 concentration affected on the formation of polymer system. The FTIR characterization result showed that LA to GA ratio and PEG 1000 concentration did not affect on the alteration of functional groups. Although, the effect on the polymer chain length was characterized by the alteration of glass transition temperature. Increasing the LA to GA ratio and decreasing the PEG 1000 concentration increased simvastatin saturated solubility and entrapment efficiency ($p<0.05$). The LA to GA ratio had more dominant effect on the alteration of particle size and distribution than the PEG concentration 1000 ($p<0.05$). The optimum of PLGA-PEG-PLGA triblock co-polymer was obtained at LA to GA ratio of 10:1 and 35.9% PEG 1000.

Keywords: simvastatin, micelle, PLGA-PEG-PLGA, triblock co-polymer