STUDI IN-VITRO PELEPASAN KURKUMIN DARI MEMBRAN MAKROPORI KITOSAN-PEKTIN MENGGUNAKAN SILIKA SEBAGAI POROGEN

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INTISARI

Telah dilakukan penelitian mengenai laju pelepasan kurkumin dari membran makropori kitosan-pektin. Penelitian ini bertujuan untuk mengetahui efektifitas membran makropori dalam pelepasan kurkumin di dalam larutan buffer:etanol (v/v). Dalam penelitian ini telah dipelajari pengaruh komposisi kitosan dan pektin, komposisi silika, komposisi asam sterat dan variasi pH medium pelepasan terhadap laju pelepasan kurkumin.

Membran makropori kitosan-pektin dibuat dengan menambahkan gluterldehid sebagai agen penaut silang, asam sterat sebagai pengemulsi dan silika sebagai porogen. Membran makropori direndam dalam larutan kurkumin 500 ppm untuk mendapatkan membran makropori termuat kurkumin. Membran makropori dikarakterisasi menggunakan FTIR dan SEM. Kinetika pelepasan kurkumin dikaji dengan persamaan orde nol, orde satu, model Higuchi dan model Korsmeyer-Peppas.

Karakterisasi membran makropori kitosan-pektin sebelum pelepasan silika dengan FTIR menunjukkan bilangan gelombang spesifik pada 1095 cm^{-1} dan 795 cm^{-1} yang merupakan vibrasi regangan simetri dan asimetri dari Si-O-Si, serta pada 462 cm^{-1} menunjukaan vibrasi tekuk dari Si-O-Si. Karakterisasi dengan SEM menunjukkan bahwa membran makropori memiliki diameter ukuran pori sekitar 29,53-39,15 μm. Hasil penelitian menunjukkan bahwa pelepasan kurkumin dipengaruhi oleh komposisi silika. Laju pelepasan kurkumin selama 6 jam semakin cepat dengan peningkatan komposisi silika. Membran tanpa porogen melepaskan 4,71% kurkumin sedangkan membran dengan penambahan 150% silika dapat melepaskan 9,17% kurkumin selama 6 jam. Model farmakokinetika menunjukkan bahwa pelepasan kurkumin dari membran mengikuti persamaan Korsmeyer-Peppas dengan konstanta laju (k) sebesar 1,3715 $menit^{-0,3256}$ dan mekanisme pelepasan kurkumin didominasi oleh difusi Fickian.

Kata kunci: membran makropori, pektin, kitosan, pelepasan kurkumin

IN VITRO CONTROLLED RELEASE STUDY OF CURCUMIN FROM PECTIN-CHITOSAN MACROPOROUS MEMBRANE USING SILICA AS A POROGEN

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ABSTRACT

The controlled release of curcumin from pectin-chitosan macroporous membrane had been studied. The aim of this research was identification the effectiveness of curcumin release in a buffer:etanol solution (v/v) from the macroporous membrane. The research had studied the effect of the amount of chitosan and pectin, the amount of silica, the amount of stearic acid and the variation of the medium pH toward the release rate of curcumin.

Pectin-chitosan macroporous membrane was prepared by adding gluteraldehyde as crosslinker, stearic acid as emulsifier and silica as porogen. Macroporous membrane was carried into 500 ppm of curcumin solution to obtained curcumin-loaded macroporous membrane. Macroporous membrane was characterized by using SEM and FTIR spectrometer. The kinetics of releasing curcumin were analyzed by pharmacokinetics models such as zeroth order, first order, Higuchi and Korsmeyer-Peppas models.

IR spectrometric characterization of pectin-chitosan macroporous membrane which before release of silica showed absorbtion bands at 1095 cm^{-1} and 795 cm^{-1} as symmetri and asymmetri stretching bands of Si-O-Si and at 463 cm^{-1} as bending bands of Si-O-Si. The result of characterization by SEM showed that macroporous membrane has diameter size of pores about 29.53-39.15 μm. The result of this study showed that the released of curcumin was influenced by the amount of silica. The rate of releasing curcumin during 6 h showed that the increasing of silica addition increases the rate of releasing curcumin. For example, membrane without porogen releases 4.71% curcumin whereas the membrane added 150% of porogen could releases 9.17% during 6 h. The pharmacokinetic model shows that the curcumin release from the membrane followed a Korsmeyer-Peppas model with rate constant (k) of 1.3715 $minute^{-0.3256}$ and the release mechanism was mainly dominated by Fickian difussion process.

Key words: macroporous membrane, pectin, chitosan, curcumin release