SINTESIS SENYAWA ESTER TURUNAN DARI *p*-METOKSI SINAMAT DAN UJI AKTIVITASNYA SEBAGAI ANTIBAKTERI

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INTISARI

Senyawa turunan *p*-metoksi sinamat diketahui memiliki aktivitas anti bakteri, oleh karena itu pada penelitian ini dilakukan sintesis empat senyawa ester turunan dari *p*-metoksi sinamat dan uji aktivitas antibakterinya. Senyawa ester yang disintesis adalah metil *p*-metoksi sinamat (MPMC), propil *p*-metoksi sinamat (PPMC), heksil *p*-metoksi sinamat (HPMC), dan *cis* 3-heksenil *p*-metoksi sinamat (CsPMC). Sintesis dilakukan melalui reaksi transesterifikasi dengan katalis NaOH menggunakan bahan dasar *octyl p*-metoksi sinamat (OMC) dan alkohol (metanol, 1-propanol, 1-heksanol, dan *cis* 3-heksenol). Elusidasi struktur produk reaksi dilakukan menggunakan GC-MS, ^{1}H NMR, ^{13}C NMR, dan FT-IR. Uji aktivitas antibakteri senyawa ester hasil sintesis dan OMC dilakukan terhadap bakteri *E. coli* ATCC 25922 dan *S. aureus* ATCC 25923. Uji zona hambat digunakan sebagai analisis kualitatif aktivitas antibakteri, sementara uji mikrodilusi digunakan untuk penentuan *minimum inhibitory concentration* (MIC). *Minimum bactericidal concentration* (MBC) ditentukan melalui metode *spread plate*.

Hasil penelitian menunjukkan bahwa MPMC, PPMC, dan CsPMC dapat disintesis melalui reaksi transesterifikasi terkatalisis NaOH pada temperatur reaksi 60 ^{o}C. Adapun HPMC dapat disintesis pada temperatur reaksi 50 ^{o}C. Rendemen reaksi MPMC, PPMC, HPMC, dan CsPMC berturut-turut adalah 91,06%; 16,92%; 9,45%; dan 9,35%. Hasil uji zona hambat MPMC, PPMC, HPMC, CsPMC, dan OMC menunjukkan seluruhnya aktif terhadap *E. coli* namun hanya HPMC yang juga aktif terhadap *S. aureus*. Nilai MIC dan MBC masing-masing senyawa uji terhadap *E. coli* adalah 2,5 μg/mL.

Kata kunci: *p*-metoksi sinamat, transesterifikasi, katalis basa, antibakteri, *E. coli*, *S. aureus*

SYNTHESIS OF ESTER p-METHOXY CINNAMATE DERIVATIVES AND ITS ACTIVITIES TEST AS ANTIBACTERIAL AGENT

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ABSTRACT

p-Methoxy cinnamate derivatives have been reported to exhibit antibacterial activity. This study aimed to synthesize four ester derivatives of *p*-methoxy cinnamate and evaluate their antibacterial activity. The esters synthesized were methyl *p*-methoxy cinnamate (MPMC), propyl *p*-methoxy cinnamate (PPMC), hexyl *p*-methoxy cinnamate (HPMC), and *cis* 3-hexenyl *p*-methoxy cinnamate (CsPMC). The synthesis of these four esters was performed through the transesterification of octyl *p*-methoxy cinnamate (OMC) with various alcohols (methanol, 1-propanol, 1-hexanol, and *cis* 3-hexenol) catalyzed by NaOH. GC-MS, ^{1}H NMR, ^{13}C NMR, and FT-IR analyses were employed to confirm the structure of the synthesized products. The antibacterial activity of the synthesized esters was tested against *E. coli* ATCC 25922 and *S. aureus* ATCC 25923. The disk agar diffusion test was conducted as a qualitative analysis of their antibacterial activity. Broth microdilution was used to determine the minimum inhibitory concentration (MIC), and the spread plate method was used to evaluate the compounds' minimum bactericidal concentration (MBC).

The experiment showed that the synthesis of MPMC, PPMC, and CsPMC could be conducted at 60 °C, while HPMC was obtained at 50 °C. The yields of MPMC, PPMC, HPMC, and CsPMC were 91.06%, 16.92%, 9.45%, and 9.35%, respectively. The disk diffusion test revealed that all esters exhibited antibacterial activity against *E. coli*, although only HPMC was active against *S. aureus*. The MIC and MBC values of the esters were each 2.5 μg/mL against *E. coli*.

Keywords: *p*-methoxy cinnamate, transesterification, base catalyse, antibacterial test, *E. coli*, *S. aureus*