Asetilasi kurkumin dari rimpang kunyit (Curcuma longa) dengan katalis Ni/SiO2 dan piridin serta uji aktivitas antibakterinya = Acetylation of curcumin from turmeric rhizome (Curcuma longa) with Ni/SiO2 and pyridine catalysts and its antibacterial activity

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Abstrak

Infeksi bakteri merupakan penyebab utama penyakit di Indonesia. Salah satu cara untuk mengatasi infeksi ini adalah dengan menggunakan antibiotik. Namun, karena adanya efek samping dan resistensi bakteri, diperlukan pengembangan antibakteri yang lebih efektif dan aman. Kunyit (Curcuma longa) telah dikenal memiliki aktivitas antibakteri karena mengandung kurkumin aktif. Aktivitas antibakteri dapat ditingkatkan dengan menurunkan polaritasnya, salah satunya adalah dengan cara memodifikasi -OH pada gugus fenolik kurkumin menjadi gugus asetoksi dengan asetilasi. Senyawa kurkuminoid diekstraksi dan kurkumin dipisahkan dengan kromatografi kolom. Kurkumin dimodifikasi oleh asetilasi dengan Ni/SiO2 dan katalis piridin. Produk kemudian dipisahkan dengan kromatografi kolom dan semua senyawa dikarakterisasi menggunakan kromatografi lapis tipis (KLT), FTIR, dan UV-Vis. Semua senyawa diuji terhadap bakteri Eschericia coli dan Bacillus subtilus. Hasil penelitian menunjukkan bahwa asetilasi kurkumin dengan piridin lebih efektif dengan konversi 94% di-O-asetilkurkumin dibandingkan dengan katalis Ni/SiO2 dengan konversi 90% campuran di-O-asetilkurkumin, mono-O-asetilkumin dan sisa kurkumin tak bereaksi. Di-O-acetylcurcumin menunjukkan aktivitas antibakteri tertinggi terhadap Eschericia coli dengan diameter zona hambat 2 mm sedangkan mono-O-acethylcurcumin menunjukkan aktivitas antibakteri tertinggi terhadap Bacillus subtilis dengan diameter zona hambat 3 mm.

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Bacterial infection is a major cause of diseases in Indonesia. One way to overcome this infection is by using antibiotics. However, due to side effects and bacterial resistance, more effective and safer antibacterial development is needed. Turmeric (Curcuma longa) has been known for its antibacterial activity because it contains active curcumin. Antibacterial activity can be amplified by reducing its polarity, one way is by modifying -OH on phenolic group of curcumin to an acetoxy group by acetylation. The curcuminoid compound was extracted and curcumin was separated by coloumn chromatography. Curcumin was modified by acetylation with Ni/SiO2 and pyridine catalyst. The products were then separated by coloumn chromatography and all compounds were characterized using thin layer chromatography (TLC), FTIR, and UV-Vis. All compounds were tested on Eschericia coli and Bacillus subtilus bacteria. The results showed that acetylation curcumin with pyridine was more effective at 94% conversion of di-O-acetylcurcumin compared to Ni/SiO2 catalyst which has 90% conversion but still in a mixture of di-O-acetylcurcumin, mono-O-acetylcumin and curcumin residual. Di-O-acetylcurcumin showed the highest antibacterial activity against Eschericia coli with inhibitory zone diameters at 2 mm while the mono-O-acethylcurcumin showed the highest antibacterial activity against Bacillus subtilis with inhibitory zone diameters at 3 mm.