Modifikasi senyawa kurkumin dari ekstrak rimpang kunyit (curcuma longa) melalui reaksi o-etilasi dengan katalis K2CO3/TBAB untuk meningkatkan bioaktivitasnya sebagai antibakteri = Modification of curcumin from turmeric rhizome (curcuma longa) extract through o-etilation with K2CO3/TBAB catalyst to enhance its antibacterial activity

Siti Hamamah Gustiani, author

Abstrak

Kurkumin merupakan senyawa polifenol yang terkandung dalam tanaman rimpang kunyit dan menentukan aktivitas farmakologisnya. Beberapa penelitian telah mengungkap bioaktivitas kurkumin sebagai antioksidan, antibakteri, antifungi, anti-inflammatory, anti tumor, dan anti kanker. Meskipun kurkumin memiliki bioaktivitas yang luas, kurkumin memiliki bioavailabilitas yang rendah terkait dengan kelarutan kurkumin dalam tubuh yang rendah dan cepatnya metabolisme eksresi kurkumin dari dalam tubuh. Modifikasi struktur kurkumin dilakukan untuk meningkatkan lipofilitas senyawa kurkumin sehingga diharapkan dapat meningkatkan bioaktivitasnya. Penelitian ini bertujuan untuk memodifikasi gugus hidroksi pada senyawa kurkumin melalui reaksi O-etilasi dengan dietil karbonat yang ramah lingkungan. Senyawa kurkumin diisolasi dari hasil sokhletasi rimpang kunyit dengan metode kromatografi kolom gravitasi (KKG) berupa silika gel. Isolat kurkumin diperoleh sebesar 20 % kemudian dikarakterisasikan. Isolat kurkumin ini dimodifikasi menjadi dietil kurkumin dengan katalis basa K2CO3 pada kondisi refluks selama 5 jam dengan persen hasil 21 %. Katalis transfer fasa TBAB ditambahkan pada sistem reaksi ini dan terbukti meningkatkan persentase produk sintesis. Produk sintesis telah diperoleh ketika reaksi berlangsung selama 1 jam dan terus mengalami kenaikan sampai waktu optimum selama 4 jam diperoleh persen hasil sebesar 89,15 %. Kurkumin dan senyawa turunannya ini dimurnikan dengan metode KKG dan dikarakterisasi dengan KLT, UV-Vis, FTIR, dan MS. Kemudian dilakukan pengujian antibakteri dengan metode difusi terhadap bakteri Gram positif Staphylococcus aureus dan bakteri Gram negatif Escherichia coli. Dietil kurkumin dan kurkumin dalam penelitian ini memiliki daya hambat terhadap pertumbuhan bakteri Gram negatif Escherichia coli, namun tidak memiliki daya hambat terhadap pertumbuhan bakteri Gram positif Staphylococcus aureus.

<hr>

Curcumin is a polyphenol compound contained in turmeric rhizome plants, and determines its pharmacological activity. Several studies have revealed the bioactivity of curcumin as an antioxidant, antibacterial, antifungal, anti-inflammatory, anti-tumor, and anti-cancer. Although curcumin has extensive bioactivity, curcumin has a low bioavailability associated with rapid metabolism of its excretion from the body. Modification of curcumin structural have been explored to increase the lipofility of the curcumin compound so that it is expected to enhance its bioactivity. This study aims to modify hydroxyl groups in curcumin by O-ethylation with diethyl carbonate that is environmentally friendly. Curcumin was isolated by soxhletation of turmeric rhizome followed by column chromatography (CC) on silica gel. It was resulted in pure curcumin 20 %. Curcumin was modified into diethyl curcumin with a K2CO3 base catalyst under reflux conditions at 130 oC for 5 hours with a yield of 21%. TBAB, as a Phase Transfer Catalyst (PTC), is

added to this reaction system and has been shown to improve the synthesis results. The products have been obtained when the reaction lasts for 1 hour and continues to increase, until the optimum time for 4 hours has obtained percent yield of 89.15%. Diethyl curcumin was also purified by CC method on silica gel. Curcumin and diethyl curcumin were characterized by TLC, UV-Vis, FTIR, and MS. Antibacterial testing was then carried out using the diffusion method against Gram positive Staphylococcus aureus and Gram negative Escherichia coli bacteria. Curcumin and diethyl curcumin had inhibitory zone against E.coli, but did not have inhibitory zone against S.aureus