Sintesis dan Uji Aktivitas Antibakteri Senyawaan Alkanolamida dari Reaksi Amidasi Langsung Asam Palmitat dan Asam Stearat dengan Dietanolamina = Synthesis and Antibacterial Tests of Alkanolamide Compounds from the Direct Amidation Reaction of Palmitic Acid and Stearic Acid with Diethanolamine

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Abstrak

Penyakit infeksi disebabkan oleh berbagai mikroorganisme seperti bakteri, virus, riketsia, jamur, dan protozoa. Asam palmitat dan asam stearat merupakan asam lemak jenuh yang memiliki potensi sebagai agen antibakteri. Modifikasi asam lemak jenuh dikembangkan dengan mengubah gugus karboksilat menjadi gugus amida. Antibiotik yang mengandung gugus amida telah banyak digunakan, seperti beta-laktam, turunan penisilin, sefalosporin, dan carbapenem. Oleh karena itu, penelitian ini dilakukan untuk menyintesis senyawaan alkanolamida melalui reaksi amidasi langsung dengan satu tahap reaksi pada asam palmitat dan asam stearat dengan dietanolamina dan gel silika sebagai katalis serta uji aktivitas antibakterinya. Produk yang terbentuk diidentifikasi keberadaannya dengan kromatografi lapis tipis (KLT) lalu dimurnikan dengan kromatografi kolom. Produk dikarakterisasi menggunakan FTIR (Fourier transform-infrared) dan 1H-NMR (nuclear magnetic resonance). Hasil karakterisasi menggunakan FTIR menunjukkan terbentuknya produk alkanolamida. Produk alkanolamida stearat-dietanolamina berhasil diidentifikasi strukturnya dengan karakterisasi 1H-NMR. Rendemen yang dihasilkan alkanolamida palmitat-dietanolamina sebesar 2,73% dan alkanolamida stearat-dietanolamina sebesar 6,99%. Selanjutnya dilakukan uji aktivitas antibakteri terhadap bakteri Escherichia coli dan Staphylococcus aureus. Pada pengujian aktivitas antibakteri, alkanolamida palmitat-dietanolamina dan alkanolamida stearat-dietanolamina tidak menunjukkan aktivitas antibakteri terhadap bakteri uji Escherichia coli dan Staphylococcus aureus.
.....Infectious diseases are caused by various microorganisms such as bacteria, viruses, rickettsia, fungi, and protozoa. Palmitic acid and stearic acid are saturated fatty acids that have potential as antibacterial agents. Modification of saturated fatty acids is developed by changing the carboxylic group into an amide group. Antibiotics containing amide groups have been widely used, such as beta-lactams, penicillin derivatives, cephalosporins, and carbapenems. In this research, synthesis alkanolamide compounds was carried out through direct amidation reactions with a one-step reaction on palmitic acid and stearic acid with diethanolamine and silica gel as catalysts for antibacterial activity test. The formed products were identified by thin layer chromatography (TLC) and then purified by column chromatography. The products were characterized using FTIR (Fourier transform-infrared) and 1H-NMR (nuclear magnetic resonance). The FTIR characterization results indicated the formation of alkanolamide products. The structure of stearic-diethanolamine alkanolamide product was successfully identified by 1H-NMR characterization. The yield of palmitate-diethanolamine alkanolamide was 2,73% and stearate-diethanolamine alkanolamide was 6,99%. The antibacterial activity was tested against Escherichia coli and Staphylococcus aureus bacteria. On antibacterial activity test, palmitate-diethanolamine alkanolamide and stearate-diethanolamine alkanolamide did not show antibacterial activity against the tested bacteria, Escherichia coli and Staphylococcus aureus.