

Esterifikasi Enzimatis Ester Asam Lemak-Sakarida Menggunakan Asam Oleat dengan D-Fruktosa, D-Manosa, dan Manitol Sebagai Kandidat Senyawa Antikanker = Enzymatic Esterification of Saccharide-Fatty Acid Esters Using Oleic Acid with D-Fructose, D-Mannose, and Mannitol as Candidates for Anticancer Compounds

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Abstrak

Asam lemak merupakan sumber daya alam yang banyak ditemukan pada minyak sawit. Salah satu komponen asam lemak yang paling banyak ditemukan adalah asam oleat. Asam oleat merupakan asam lemak tidak jenuh karena memiliki ikatan rangkap pada rantai karbonnya. Asam lemak memiliki berbagai senyawa turunan dengan beragam manfaat. Salah satu senyawa turunan asam lemak adalah ester asam lemak-sakarida atau ester sakarida. Senyawa ini dapat diperoleh melalui reaksi esterifikasi asam lemak dengan sakarida atau sakarida-alkohol. Ester asam lemak-sakarida memiliki berbagai manfaat di antaranya sebagai agen pengemulsi dan kandidat senyawa antikanker. Pada penelitian ini, akan dilakukan reaksi esterifikasi asam oleat dengan D-fruktosa, D-manosa, dan manitol menggunakan enzim lipase Novozyme Eversa® Transform 2.0 FG. Produk berupa ester asam oleat-fruktosa, ester asam oleat-manosa, ester asam oleat-manitol kemudian diidentifikasi menggunakan KLT (kromatografi lapis tipis) dan instrumentasi FTIR (Fourier transform-infrared). Hasil uji MTT menunjukkan nilai IC₅₀ asam oleat, ester oleat-fruktosa, dan ester oleat-manitol masing-masing sebesar 49,10 ppm ($\mu\text{g/mL}$) (173,82 μM), 84,10 ppm ($\mu\text{g/mL}$) (189,15 μM), dan 89,74 ppm ($\mu\text{g/mL}$) (126,20 μM). Ester oleat-manosa memiliki persen inhibisi sebesar 42,02% pada konsentrasi 200 ppm ($\mu\text{g/mL}$). Nilai persen konversi asam oleat untuk produk ester oleat-fruktosa sebesar 20,67%, ester oleat-manitol sebesar 39,73%, dan ester oleat-manosa sebesar 19,11%. Uji kestabilan menunjukkan bahwa ester oleat-manosa memiliki potensi sebagai agen pengemulsi.

.....Fatty acids are natural resources that are mostly found in palm oil. One of the most abundant components of fatty acids is oleic acid. Oleic acid is an unsaturated fatty acid since it has double bonds in its carbon chain. Fatty acids have various derived compounds with various benefits. One of the fatty acid derivatives is the saccharide-fatty acid esters or saccharide esters. This compound can be obtained through the esterification reaction of fatty acids with saccharides or saccharide-alcohols. Fatty acid-saccharide esters have various benefits, including as emulsifier and candidates for anticancer compounds. In this study, the esterification reaction of oleic acid with D-fructose, D-mannose, and mannitol was conducted by using the lipase enzyme Novozyme Eversa® Transform 2.0 FG. The products obtained were fructose-oleic esters, mannose-oleic esters, and mannitol-oleic ester. Products were identified by using TLC (thin layer chromatography) and characterized by using FTIR (Fourier transform-infrared) instrumentation. Furthermore, the MTT test results show that the IC₅₀ value of oleic acid, fructose-oleic ester, and mannitol-oleic ester, and is 49.10 ppm ($\mu\text{g/mL}$) (173.82 μM), 84.10 ppm ($\mu\text{g/mL}$) (189.15 μM), dan 89.74 ppm ($\mu\text{g/mL}$) (126.20 μM). respectively. As for mannose-oleic esters, it shows inhibition percentage of 42.02% at 200 ppm ($\mu\text{g/mL}$). The percentage conversion value of oleic acid for fructose-oleic esters is 20.67%, mannitol-oleic ester is 39.73%, and mannose-oleic ester is 19.11%. In addition, emulsion stability test shows that mannitol oleic ester has potential as an emulsifier.