Formulasi dan uji aktivitas antioksidan serum nanoemulsi minyak biji kelor (Moringa oleifera Lam.) = Formulation and antioxidant activity test of moringa seed oil (Moringa oleifera Lam.) nanoemulsion serum

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Abstrak

Minyak biji kelor mengandung berbagai senyawa antioksidan dapat menangkal radikal bebas, namun aplikasinya secara topikal menyebabkan terjadinya iritasi kulit dan ketidaknyamanan akibat efek berminyak. Minyak biji kelor bersifat hidrofobik sehingga diformulasikan dalam sistem pembawa nanoemulsi. Serum mengandung agen farmasetik dalam jumlah tinggi dan efek hidrasi yang baik. Penelitian ini bertujuan untuk mengkarakterisasi dan mengetahui sifat antioksidan dari minyak biji kelor kemudian memformulasikanya menjadi serum nanoemulsi, melakukan uji stabilitas dan aktivitas antioksidan dari sediaan. Komponen kimia minyak dianalisis dengan kromatografi gas. Aktivitas antioksidan minyak dan sediaan diukur dengan metode peredaman DPPH (2,2-difenil-1-pikrilhidrazil). Area optimum nanoemulsi pada diagram fase pseudo-ternary diperoleh berdasarkan hasil optimasi formula yang disusun terdiri campuran minyak dan smix mulai 1:9 hingga 9:1 dan dianalisis menggunakan software chemix 7.0. Formula optimum dimasukkan ke dalam formula serum dalam konsentrasi 10%, 20% dan 30%, formula terbaik dipilih berdasarkan hasil pengamatan stabilitas selama 1 minggu untuk selanjutnya diuji stabilitas selama 12 minggu dan uji aktivitas antioksidan. Minyak memiliki kandungan total asam lemak 65% b/b dengan kandungan asam oleat yang dominan hingga 72,341%. Minyak memiliki aktivitas antioksidan sedang dengan IC50 147,0277 µg/mL. Formula nanoemulsi memiliki ukuran partikel Dv90 241 nm, PDI 0,474 dan zeta potensial -35,4 mV, nilai efisiensi penjerapan 58,59%. Uji stabilitas dilakukan terhadap sediaan serum dengan 10% kandungan nanoemulsi. Serum nanoemulsi stabil pada pengujian cycling test, uji mekanik dan penyimpanan pada berbagai suhu, namun terjadi peningkatan viskositas dan ukuran partikel. Aktivitas antioksidan serum sangat lemah dengan nilai IC50 14601,76 µg/mL dan mengalami penurunan menjadi 61642 µg/mL setelah penyimpanan selama 12 minggu.

.....Moringa seed oil contains various antioxidant compounds that can counteract free radicals, but its topical application causes skin irritation and discomfort due to the oily effect. Moringa seed oil is hydrophobic so it is formulated in a nanoemulsion carrier system. The serum contains a high amount of pharmaceutical agents and a good hydrating effect. The objective of this study was to characterize and determine the antioxidant properties of Moringa seed oil and then formulate it into a nanoemulsion serum, and test its stability and antioxidant activity. The chemical components of the oil were analyzed by gas chromatography. The antioxidant activity of was measured by the DPPH reduction method (2,2-diphenyl-1-picrylhydrazyl). The optimum area of nanoemulsion on the pseudo-ternary phase diagram was obtained based on the results of the optimization of the formula which was composed of a mixture of oil and smix from 1:9 to 9:1 and analyzed using chemix 7.0 software. The optimum formula was put into the serum formula in concentrations of 10%, 20%, and 30%, the best formula was selected based on the observation of stability for 1 week to be further tested for stability for 12 weeks and antioxidant activity test. The oil has a total fatty acid content of 65% w/w with a dominant oleic acid content of up to 72.341%. The oil has moderate antioxidant activity with an IC50 of 147.0277 g/mL. The nanoemulsion formula had a particle size of 241 nm, PDI 0.474, and

zeta potential -35.4 mV, the adsorption efficiency value is 58.59%. A stability test was carried out on serum formula with 10% nanoemulsion content. Serum nanoemulsion was stable in the cycling test, mechanical test, and storage at various temperatures, but there was an increase in viscosity and particle size. Serum antioxidant activity was very weak with an IC50 value of 14601.76 g/mL and decreased to 61642 g/mL after 12 weeks of storage.