ABSTRAK

Minyak atsiri sereh wangi (*Cymbopogon nardus* L. Rendle) mengandung metabolit sekunder yang bermanfaat. Senyawa yang terdapat dalam minyak sereh tersebut merupakan zat aktif yang berpotensi sebagai antimikroba. Tujuan dari penelitian ini yaitu membuat formulasi nanoemulsi minyak sereh wangi, menentukan karakteristik nanoemulsi minyak sereh wangi, dan menentukan aktivitas antimikroba nanoemulsi minyak sereh wangi dengan metode sumuran. Pembuatan formulasi nanoemulsi dilakukan dengan metode energi rendah. Formulasi nanoemulsi dibuat dengan 3 variasi konsentrasi minyak yaitu F1 (2%), F2 (4%), dan F3 (6%), selain itu dibuat juga formulasi emulsi dan minyak sereh wangi yang diencerkan dengan konsentrasi yang serupa dengan nanoemulsi. Surfaktan dan kosurfaktan yang digunakan untuk membuat nanoemulsi yaitu tween 80 dan propilen glikol dengan perbandingan 20:15. Karakterisasi sediaan nanoemulsi meliputi pengukuran distribusi partikel, uji organoleptis, pengukuran persen transmittan, pengukuran viskositas, pengukuran pH, pemeriksaan tipe nanoemulsi, uji *freeze-thaw cycle*, dan uji sentrifugasi. Ukuran partikel semua formulasi nanoemulsi minyak sereh wangi konsentrasi 2% sebesar 17,21 nm(100%) 4% sebesar 22,89 nm(100%), dan 6% sebesar 77,60 nm(15,5%) dan 16,43 nm(84,5%). Hasil karakterisasi uji organoleptis sediaan nanoemulsi menunjukkan semakin besar konsentrasi minyak, warna akan semakin kuning, bau semakin wangi, dan kejernihan berkurang. Nilai persen transmitan nanoemulsi minyak sereh wangi konsentrasi 2, 4, dan 6% berturut-turut yaitu 99,230±0,058; 98,030±0,058; dan 97,500±0,000% sedangkan emulsi dengan konsentrasi serupa yaitu 99,100±0,000; 71,300±0,000; dan 54,530±0,058%. Nilai viskositas nanoemulsi minyak sereh wangi konsentrasi 2, 4, dan 6% berturut-turut 6,0924; 11,3418; dan 16,1668 cP. Tipe nanoemulsi yang dihasilkan adalah tipe O/W. Nilai pH nanoemulsi minyak sereh wangi konsentrasi 2, 4, dan 6% berturut-turut yaitu 5,913±0,011; 5,906±0,006; dan 5,873±0,012. Hasil uji sentrifugasi dan *freeze-thaw cycle* nanoemulsi minyak sereh wangi menunjukkan tingkat kestabilan fisik yang baik, Secara umum karakteristik dan kestabilan nanoemulsi lebih baik dibandingkan dengan emulsi. Hasil uji sentrifugasi emulsi dan nanoemulsi minyak sereh wangi tidak menunjukkan pengendapan ataupun pemisahan fasa. Zona hambat antibakteri *P. acne* nanoemulsi 2, 4, 6% berturut-turut yaitu 1,530±0,742; 2,500±0,354; dan 6,180±1,450 mm. Zona hambat antijamur *C. albicans* nanoemulsi 2, 4, 6% berturut-turut yaitu 0,000±0,000; 2,750±0,354; dan 6,050±0,071 mm.

Kata Kunci: Antibakteri, antijamur, emulsi, nanoemulsi, minyak atsiri sereh wangi (*Cymbopogon nardus* L. Rendle).

ABSTRACT

Citronella (*Cymbopogon nardus* L. Rendle) essential oil contains beneficial secondary metabolites. The compounds contained in citronella oil are active substances that have potential as antimicrobials. The aims of this study were to formulate a citronella oil nanoemulsion, to determine the characteristics of a citronella oil nanoemulsion, and to determine the antimicrobial activity of a citronella oil nanoemulsion using the well method. The nanoemulsion formulation was made using a low energy method. The nanoemulsion formulation was made with 3 variations of oil concentration, namely F1 (2%), F2 (4%), and F3 (6%), in addition, an emulsion formulation and diluted citronella oil were also made with a concentration similar to that of the nanoemulsion. Surfactants and cosurfactants used to make nanoemulsions were tween 80 and propylene glycol in a ratio of 20:15. The characterization of nanoemulsion preparations included measurement of particle distribution, organoleptic test, measurement of percent transmittance, measurement of viscosity, measurement of pH, examination of nanoemulsion type, freeze-thaw cycle test, and centrifugation test. The particle size of all nanoemulsion formulations of citronella oil with a concentration of 2% of 17.21nm(100%) 4% of 22.89 nm(100%), and 6% of 77.60 nm(15.5%) and 16.43 nm (84.5%). The results of the organoleptic test characterization of nanoemulsion preparations showed the greater the concentration of oil, the more yellow the color, the more fragrant the smell, and the reduced clarity. The percent transmittance values of citronella oil nanoemulsion at concentrations of 2, 4, and 6%, respectively, were 99.230±0.058; 98.030±0.058; and 97.500±0.000% while the emulsion with a similar concentration was 99.100±0.000; 71,300±0.000; and 54.530±0.058%. The viscosity value of citronella oil nanoemulsion at concentrations of 2, 4, and 6%, respectively, was 6.0924; 11.3418; and 16.1668 cP. The type of nanoemulsion produced is the O/W type. The pH values of the citronella oil nanoemulsion with concentrations of 2, 4, and 6%, respectively, were 5.913±0.011; 5.906±0.006; and 5.873±0.012. The results of the centrifugation and *freeze-thaw* cycle test of citronella oil nanoemulsion showed a good level of physical stability. In general, the characteristics and stability of the nanoemulsion were better than the emulsion. The results of the centrifugation test of citronella oil emulsion and nanoemulsion did not show precipitation or phase separation. The antibacterial inhibition zone of P. *acne* nanoemulsion was 2, 4, 6%, respectively, namely 1,530±0.742; 2,500±0.354; and 6.180±1,450 mm. The antifungal inhibition zones of C. *albicans* nanoemulsion were 2, 4, 6%, respectively, namely 0.000±0.000; 2.750±0.354; and 6.050±0.071 mm.

Keywords: Antibacterial, antifungal, citronella essential oil (*Cymbopogon nardus* L. Rendle), emulsion, nanoemulsion.