

ABSTRACT

FORMULATION AND ANTIFUNGAL ACTIVITY TEST PREPARATION OF NANOPATCH MUCOADHESIVE KAFFIR LIME (*Citrus hystrix*) AGAINST *Candida albicans* FUNGUS THAT CAUSES THRUSH

By

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Background: Thrush is an opportunistic infectious condition of the oral mucosa characterized by the appearance of ulcers and is known as pseudomembranous candidiasis (Thrush). Kaffir lime leaves (*Citrus hystrix*) contain secondary metabolites that exhibit antifungal activity against *Candida albicans*. Mucoadhesive *patches* offer a targeted treatment solution for thrush, but the compounds in kaffir lime leaf extract are impermeable. Therefore, a spontaneous nanoemulsion delivery system is necessary to optimize the active substances in the *patch* preparation. The aim of this research was to determine the optimum concentration of kaffir lime leaf extract for inhibiting *Candida albicans* fungus, characterize the *nanopatch* preparation, and evaluate the antifungal activity of the *nanopatch* against *Candida albicans*.

Methods: The study design was experimental, focusing on determining the optimum concentration of kaffir lime leaf extract for inhibiting *Candida albicans*, characterizing the *nanopatch* preparation, and conducting antifungal activity tests against *Candida albicans*.

Results: The results revealed that the optimum concentration of kaffir lime leaf extract was found to be 10%, showing an inhibition zone diameter of 17.26 mm categorized as strong inhibition. The 10% concentration of kaffir lime leaf extract was successfully formulated into a nanoemulsion with good clarity, having an average particle size of 295.2 nm, polydispersity of 0.34, zeta potential of -11.13 mV, and a morphology indicating the phase (m/a). The nanoemulsion of kaffir lime leaves was used to formulate *patches* with organoleptic characteristics of elastic citrus-scented edible film, fold resistance exceeding 500 times, pH of 5, average thickness of 0.503 mm, mucoadhesive ability lasting for 240 minutes, and exhibiting antifungal activity against *Candida albicans* with an inhibition zone of 24 mm, classified as strong inhibition.

Conclusion: Kaffir lime leaf extract at a concentration of 10% was found to be optimal for inhibiting *Candida albicans* and can be effectively formulated into a *nanopatch* preparation with potent antifungal properties against *Candida albicans*.

Keywords: antifungal, *Candida albicans*, kaffir lime leaf, nanoemulsion, mucoadhesive patches

ABSTRAK

FORMULASI DAN UJI AKTIVITAS ANTIFUNGI SEDIAAN NANOPATCH MUKOADHESIF EKSTRAK DAUN JERUK PURUT (*Citrus hystrix*) TERHADAP JAMUR *Candida albicans* PENYEBAB SARIAWAN

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Latar Belakang: Sariawan adalah kondisi infeksi oportunistik pada mukosa mulut yang ditandai dengan munculnya ulkus dan dikenal dengan istilah *pseudomembranous candidiasis* (*Thrush*). Daun jeruk purut (*Citrus hystrix*) mengandung metabolit sekunder yang memiliki aktivitas antifungi terhadap jamur *Candida albicans*. Patch mukoadhesif menjadi solusi dalam pengobatan sariawan yang tertarget namun senyawa dalam ekstrak daun jeruk purut bersifat impermeabilitas, sehingga diperlukan sistem penghantaran nanoemulsi spontan untuk mengoptimalkan zat aktif dalam sediaan *patch*. Penelitian ini bertujuan untuk mengetahui konsentrasi optimum ekstrak daun jeruk purut dalam menghambat jamur *Candida albicans*, karakteristik sediaan *nanopatch* dan uji aktivitas antifungi sediaan *nanopatch* terhadap jamur *Candida albicans*.

Metode: Penelitian ini adalah penelitian eksperimental untuk mengetahui konsentrasi optimum ekstrak daun jeruk purut dalam menghambat jamur *Candida albicans*, karakteristik sediaan *nanopatch* dan uji aktivitas antifungi sediaan *nanopatch* terhadap jamur *Candida albicans*.

Hasil: Berdasarkan hasil penelitian, konsentrasi optimum ekstrak daun jeruk purut yaitu 10% dengan diameter zona hambat 17,26 mm termasuk kategori kuat. Ekstrak daun jeruk purut konsentrasi 10% dapat diformulasikan menjadi nanoemulsi dengan kejernihan yang baik yang mempunyai rerata ukuran partikel 295,2 nm; polidispersitas 0,34; potensial zeta -11,13 mV dan morfologi yang menunjukkan fase (m/a). Nanoemulsi daun jeruk purut diformulasikan *patch* dengan karakteristik organoleptik *edible film* beraroma citrus yang elastis; dengan ketahanan lipatan >500 kali; pH 5; rerata ketebalan 0,503 mm; kemampuan mukoadhesif 240 menit; dan menghambat aktivitas antifungi *Candida albicans* sebesar 24 mm dengan kategori kuat.

Kesimpulan: Daun jeruk purut (*Citrus hystrix*) optimal pada konsentrasi 10% dalam menghambat jamur *Candida albicans* dan dapat diformulasikan menjadi sediaan *nanopatch* yang mampu menghambat menghambat jamur *Candida albicans*.

Kata Kunci : antifungi, *Candida albicans*, daun jeruk purut, nanoemulsi, *patch* mukoadhesif