FORMULASI DAN EVALUASI SEDIAAN TOPIKAL NANOGEL MENGANDUNG ZINK OXIDE NANOPARTIKEL EKSTRAK AIR KULIT JENGKOL (*Pithecellobium lobatum* Benth) DAN AKTIVITAS SEBAGAI ANTIMIKROBA

ABSTRAK

Pendahuluan: Penyakit infeksi pada ulkus diabetikum dapat disebabkan oleh mikroorganisme seperti Staphylococcus aureus dan Candida albicans. Penggunaan antimikroba dari bahan alam menjadi salah satu alternatif yang dapat dikembangkan untuk mengurangi risiko resistensi dan efek samping penggunaan obat sintetik. Kulit jengkol (Pithecellobium lobatum Benth) diketahui mengandung metabolit sekunder seperti flavonoid, tanin, saponin, alkaloid, dan glikosida yang berpotensi sebagai antimikroba. **Tujuan:** Memformulasikan dan mengevaluasi sediaan topikal nanogel yang mengandung nanopartikel zink oksida ekstrak air kulit jengkol serta menguji aktivitas antimikrobanya terhadap Staphylococcus aureus dan Candida albicans. **Metode**: Pembuatan simplisia, ekstraksi dengan metode infudasi, sintesis nanopartikel ZnO, formulasi nanogel dengan konsentrasi F1 2,5%, F2 5%, dan F3 10%, serta evaluasi sediaan meliputi uji organoleptis, homogenitas, daya sebar, viskositas, stabilitas, ukuran partikel, pH, iritasi, dan aktivitas antimikroba dengan metode difusi sumuran. **Hasil:** Seluruh formula berbentuk gel homogen, stabil selama penyimpanan, memiliki daya sebar 5,3–6,9 cm, viskositas 5817–8820 cPs, pH 5,31–5,56, ukuran partikel 38,80–43,10 nm, serta tidak menimbulkan iritasi pada sukarelawan. Aktivitas antibakteri terhadap Staphylococcus aureus menunjukkan diameter zona hambat tertinggi pada F3 sebesar 13,0 mm, sedangkan aktivitas antijamur terhadap Candida albicans menunjukkan diameter zona hambat tertinggi pada F3 sebesar 11,76 mm. **Kesimpulan:** Nanogel nanopartikel ZnO ekstrak air kulit jengkol memenuhi persyaratan evaluasi fisik dan kimia sediaan topikal, tidak menimbulkan iritasi, serta memiliki aktivitas antimikroba terhadap Staphylococcus aureus dan Candida albicans, dengan aktivitas terbaik ditunjukkan oleh formula F3 konsentrasi 10%.

Kata Kunci: Nanogel, Nanopartikel ZnO, Kulit jengkol, antimikroba.

FORMULATION AND EVALUATION OF TOPICAL NANOGEL CONTAINING ZINC OXIDE NANOPARTICLES OF JENGKOL PEEL AQUEOUS EXTRACT (*Pithecellobium lobatum* Benth.) AND ITS ANTIMICROBIAL ACTIVITY

ABSTRACT

Introduction: Infectious diseases in diabetic ulcers can be caused by microorganisms such as Staphylococcus aureus and Candida albicans. The use of antimicrobial agents derived from natural materials is an alternative that can be developed to reduce the risk of resistance and side effects associated with synthetic drugs. Jengkol peel (Pithecellobium lobatum Benth.) is known to contain secondary metabolites such as flavonoids, tannins, saponins, alkaloids, and glycosides, which have potential antimicrobial activity. **Objective**: This study aimed to formulate and evaluate a topical nanogel containing zinc oxide nanoparticles synthesized using aqueous extract of jengkol peel and to determine its antimicrobial activity against Staphylococcus aureus and Candida albicans. **Methods:** The study included the preparation of simplicia, extraction using the infusion method, synthesis of ZnO nanoparticles, and formulation of nanogel with concentrations of 2.5% for F1, 5% for F2, and 10% for F3. The nanogel preparations were evaluated for organoleptic properties, homogeneity, spreadability, viscosity, stability, particle size, pH, irritation, and antimicrobial activity using the well diffusion method. **Results:** All formulas were homogeneous gels and remained stable during storage. The preparations had a spreadability of 5.3–6.9 cm, viscosity of 5817–8820 cPs, pH of 5.31–5.56, and particle size of 38.80–43.10 nm. The nanogels also did not cause irritation in volunteers. The antibacterial activity against Staphylococcus aureus showed the highest inhibition zone diameter in F3, with a value of 13.0 mm. Meanwhile, the antifungal activity against Candida albicans showed the highest inhibition zone diameter in F3, with a value of 11.76 mm. **Conclusion:** The nanogel containing ZnO nanoparticles synthesized using aqueous extract of jengkol peel met the physical and chemical evaluation requirements for topical preparations, did not cause irritation, and showed antimicrobial activity against Staphylococcus aureus and Candida albicans. The best activity was demonstrated by formula F3 at a concentration of 10%.

Keywords: *Nanogel, ZnO nanoparticles, jengkol peel, antimicrobial.*