

INTISARI

Patch luka berbasis *hydrogel* merupakan salah satu bentuk sediaan *transdermal* modern yang banyak digunakan dalam penatalaksanaan luka karena mampu menyediakan lingkungan lembap, menjaga hidrasi jaringan, serta memberikan perlindungan fisik dari kontaminasi eksternal. *Hydrogel* berfungsi sebagai sistem penghantaran bahan bioaktif yang dapat mempercepat proses penyembuhan luka. Penelitian ini, *patch* disusun menggunakan kombinasi gelatin dan nanokitosan sebagai matriks utama, kemudian diperkaya dengan kalsium karbonat (CaCO_3), *Freeze-Dried Platelet-Rich Plasma* (FD-PRP), serta *cinnamaldehyde*. Setiap bahan memiliki peran penting: CaCO_3 berkontribusi pada pelepasan ion kalsium yang mendukung regenerasi jaringan, FD-PRP menyediakan *growth factor* yang membantu proliferasi sel, sedangkan *cinnamaldehyde* memberikan efek antibakteri dan antiinflamasi. Salah satu parameter yang digunakan untuk menilai kualitas *patch* adalah kekasaran permukaan (*surface roughness*), karena karakteristik ini mempengaruhi adhesi bakteri, kemampuan *patch* menempel pada kulit, serta efektivitas pelepasan bahan aktif. Penelitian dilakukan secara eksperimental laboratoris *in vitro* dengan dua kelompok perlakuan yaitu *patch hydrogel* nanokitosan dengan penambahan kalsium karbonat *Freeze Dried Platelet-Rich Plasma Cinnamaldehyde* dan *patch* luka *hydrogel* nanokitosan saja. *Patch* yang telah dibuat diuji menggunakan *surface roughness tester* dan dianalisis dengan uji normalitas Shapiro-Wilk dan uji homogenitas menggunakan *Levene's*. Dilanjutkan menggunakan uji *Independent Samples T-test*.

Hasil penelitian menunjukkan perbedaan signifikan antar kelompok ($p < 0,05$). Kelompok perlakuan menunjukkan nilai kekasaran tertinggi dibandingkan dengan kelompok kontrol, diduga kemungkinan disebabkan oleh agregasi protein dan platelet dari FD-PRP selama proses *freeze-drying*. Dengan demikian, kombinasi nanokitosan- CaCO_3 -FD-PRP-*cinnamaldehyde* terbukti memengaruhi karakteristik *surface roughness patch*.

Kata kunci: Membran luka, nanokitosan, FD-PRP, *cinnamaldehyde*, kekasaran permukaan.

ABSTRACT

Hydrogel-based wound patches are a modern form of transdermal dosage widely used in wound management due to their ability to provide a moist environment, maintain tissue hydration, and offer physical protection against external contamination. Hydrogels function as delivery systems for bioactive substances that can accelerate the wound healing process. In this study, the patch was formulated using a combination of gelatin and nanochitosan as the main matrix, enriched with calcium carbonate (CaCO_3), freeze-dried platelet-rich plasma (FD-PRP), and cinnamaldehyde. Each component plays an important role: CaCO_3 contributes to the release of calcium ions that support tissue regeneration, FD-PRP provides growth factors that promote cell proliferation, and cinnamaldehyde exhibits antibacterial and anti-inflammatory effects. One of the parameters used to evaluate patch quality was surface roughness, as this characteristic influences bacterial adhesion, patch adherence to the skin, and the effectiveness of bioactive agent release. The study was conducted as an in vitro laboratory experimental study with two treatment groups: nanokitosan hydrogel wound patches supplemented with calcium carbonate freeze-dried platelet-rich plasma cinnamaldehyde and nanokitosan hydrogel wound patches without additional active components. The prepared patches were evaluated using a surface roughness tester. Data were analyzed using the Shapiro–Wilk test for normality and Levene’s test for homogeneity of variances, followed by an Independent Samples T-test.

The results demonstrated a significant difference between the groups ($p < 0.05$). The treatment group exhibited higher surface roughness values compared to the control group, which was presumably caused by protein and platelet aggregation from FD-PRP during the freeze-drying process. In conclusion, the combination of nanochitosan– CaCO_3 –FD-PRP–cinnamaldehyde significantly affected the surface roughness characteristics of the hydrogel wound patch.

Keywords: wound patch, nanochitosan, FD-PRP, cinnamaldehyde, surface roughness.