

FORMULASI DAN EVALUASI SEDIAAN *MICRONEEDLE FILM* NATRIUM DIKLOFENAK MENGGUNAKAN VARIASI KONSENTRASI POLIMER PVA DAN CMC-NA

Talitha Salma Hakim
Program Studi Farmasi

ABSTRAK

Latar Belakang: Natrium diklofenak memiliki keterbatasan pada pemberian oral dan sediaan topikal karena bioavailabilitas yang rendah. Teknologi *microneedle* dapat meningkatkan penetrasi dengan menciptakan saluran mikroskopis pada stratum korneum. Kombinasi polimer PVA dan CMC-Na berpotensi menghasilkan matriks kuat dengan profil pelepasan obat yang baik, namun belum pernah dikaji sebelumnya.

Tujuan: Mengetahui pengaruh variasi konsentrasi PVA dan CMC-Na terhadap sifat fisik, kandungan kadar, daya penetrasi, persen penetrasi *microneedle film* natrium diklofenak.

Metode: Tiga formula *microneedle film*; FI (7:3), FII (8:2), dan FIII (9:1) diuji sifat fisik (organoleptik, pH, keseragaman bobot, ketebalan, kandungan kelembaban, daya tahan lipatan, histologi dan morfologi *needle*), kandungan kadar, serta daya penetrasi dan persen obat terpenetrasi. Data dianalisis menggunakan uji statistik *One Way ANOVA* dan *Post hoc*.

Hasil: Sediaan memenuhi parameter fisik (warna putih, pH $\pm 7,2$, keseragaman bobot CV < 5%, dilipat 250 kali, kelembaban < 10%, tinggi *needle* 210-279 μm , dan mampu menembus hingga dermis atas. Hasil penetapan kadar berada pada rentang 90-110%. Hasil uji daya penetrasi berdasarkan nilai fluks berada pada rentang 602,3 - 643,07 $\mu\text{g}/\text{cm}^2/\text{jam}$ dengan total persen penetrasi obat tertinggi terjadi pada FIII (70,235%).

Kesimpulan: Variasi konsentrasi polimer PVA dan CMC-Na memengaruhi sifat fisik dan kandungan kadar, namun tidak memengaruhi daya penetrasi sediaan.

Kata kunci: natrium diklofenak, *microneedle*, *microneedle film*, PVA, CMC-Na

FORMULATION AND EVALUATION OF DICLOFENAC SODIUM MICRONEEDLE FILMS USING VARIOUS CONCENTRATIONS OF PVA AND SODIUM CMC POLYMERS

Talitha Salma Hakim
Pharmacy Program

ABSTRACT

Background: Diclofenac sodium has limitations in oral and topical administration due to low bioavailability. Microneedle technology can enhance penetration by creating microscopic channels in the stratum corneum. The combination of polyvinyl alcohol (PVA) and sodium carboxymethylcellulose (CMC-Na) polymers potentially produces a strong matrix with a good drug release profile, but has not been previously studied.

Objective: To determine the effect of varying PVA and CMC-Na concentrations on the physical properties, drug content, penetration ability, and penetration percentage of diclofenac sodium microneedle films.

Methods: Three microneedle film formulas, FI (7:3), FII (8:2), and FIII (9:1) were evaluated for physical properties (organoleptic, pH, weight uniformity, thickness, moisture content, folding endurance, needle morphology, and histology), drug content, penetration ability, and drug penetration percentage. Data were analyzed using One-Way ANOVA and *Post hoc* tests.

Results: All preparations met physical parameters: white color, pH \pm 7.2, weight uniformity CV <5%, folding endurance of 250 folds, moisture content <10%, needle height 210-279 μ m, and penetration reaching the upper dermis. Drug content values remain within the 90-110%. Flux values ranged from 602.3 to 643.07 μ g/cm²/hour, with F3 showing the highest cumulative drug penetration at 70.235%.

Conclusion: Variations in PVA and CMC-Sodium polymer concentrations affected physical properties and drug content, but do not significantly affect drug penetration.

Keywords: diclofenac sodium, microneedle, microneedle film, PVA, CMC-Na