FORMULASI DAN EVALUASI SEDIAAN GEL DENGAN KOMBINASI *ECTOINE* DAN *CERAMIDE* SEBAGAI AGEN PELEMBAP KULIT

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ABSTRAK

Latar Belakang: Kerusakan *skin barrier* dapat meningkatkan *transepidermal water loss* (TEWL) sehingga menyebabkan kulit menjadi kering dan rentan mengalami iritasi. *Ectoine* merupakan osmolit alami yang mampu mempertahankan hidrasi kulit, sedangkan *ceramide* merupakan lipid utama stratum korneum yang berperan dalam menjaga kelembapan dan memperbaiki fungsi *skin barrier*. Kombinasi keduanya dalam sediaan gel berpotensi memberikan efek sinergis sebagai agen pelembap kulit.
Tujuan: Mengevaluasi karakteristik fisik, stabilitas fisik, efektivitas pelembap, dan potensi iritasi kulit sediaan gel yang mengandung kombinasi *ectoine* dan *ceramide*.
Metode: Penelitian eksperimental dengan Rancangan Acak Lengkap menggunakan satu kontrol negatif dan lima formula perlakuan (K, F1, F2, F3, F4, dan F5) dengan variasi konsentrasi *ectoine* dan *ceramide*. Evaluasi meliputi uji organoleptis, pH, viskositas, homogenitas, daya sebar, daya lekat, dan stabilitas fisik menggunakan *cycling test* selama 6 siklus. Uji iritasi dan efektivitas pelembap dilakukan pada kelinci New Zealand. Kelembapan kulit diukur menggunakan *Skin Moisture Analyzer* FCM-2. Data dianalisis menggunakan *One-Way* ANOVA, *Paired Samples T-Test*, dan *Two-Way* ANOVA.
Hasil: Seluruh formula memenuhi persyaratan karakteristik fisik sediaan gel, bersifat homogen, stabil selama penyimpanan, dan tidak menimbulkan iritasi kulit (PII = 0). Formula F3 menunjukkan efektivitas pelembap tertinggi dengan peningkatan kelembapan kulit sebesar 83,84–88,81%. Faktor formula dan waktu berpengaruh signifikan terhadap efektivitas pelembap ($p < 0,05$).
Kesimpulan: Sediaan gel kombinasi *ectoine* dan *ceramide* memenuhi persyaratan karakteristik fisik, stabil, aman digunakan, dan efektif meningkatkan kelembapan kulit.

Kata kunci: *Ceramide, Ectoine, Gel, Kelembapan Kulit, TEWL.*

FORMULATION AND EVALUATION OF A GEL PREPARATION CONTAINING A COMBINATION OF ECTOINE AND CERAMIDE AS A SKIN MOISTURIZING AGENT

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ABSTRACT

Background: Impairment of the skin barrier can increase transepidermal water loss (TEWL), resulting in dry and easily irritated skin. Ectoine is a natural osmolyte that helps maintain skin hydration, while ceramide is the major lipid component of the stratum corneum responsible for maintaining skin moisture and restoring skin barrier function. Their combination in a gel formulation may provide a synergistic moisturizing effect.
Aim: To evaluate the physical characteristics, physical stability, moisturizing effectiveness, and skin irritation potential of a gel formulation containing a combination of ectoine and ceramide.
Methods: An experimental study using a Completely Randomized Design was conducted with one negative control and five treatment formulas (K, F1, F2, F3, F4, and F5) containing different concentrations of ectoine and ceramide. Evaluations included organoleptic properties, pH, viscosity, homogeneity, spreadability, adhesiveness, and physical stability using a six-cycle cycling test. Skin irritation and moisturizing effectiveness tests were performed on New Zealand rabbits. Skin moisture was measured using a Skin Moisture Analyzer FCM-2. Data were analyzed using One-Way ANOVA, Paired Samples T-Test, and Two-Way ANOVA.
Results: All formulations met the physical characteristic requirements of topical gels, showed good homogeneity, remained stable during storage, and did not cause skin irritation (PII = 0). Formula F3 demonstrated the highest moisturizing effectiveness, with a skin moisture increase of 83.84–88.81%. Formula composition and observation time significantly affected moisturizing effectiveness ($p < 0.05$).
Conclusion: The gel formulation containing a combination of ectoine and ceramide fulfilled the required physical characteristics, exhibited good physical stability, was safe for use, and effectively increased skin moisture.

Keyword: *Ceramide, Ectoine, Gel, Skin Moisture, TEWL.*