

# **PENGUJIAN DAN EVALUASI SEDIAAN NANO EMULGEL DARI KOMBINASI MINYAK KELAPA SAWIT DAN MINYAK ALPUKAT SEBAGAI ANTI ANGIOGENIK**

## **ABSTRAK**

Penelitian ini bertujuan untuk mengembangkan dan mengevaluasi sediaan nano emulgel berbasis kombinasi minyak kelapa sawit dan minyak alpukat sebagai kandidat agen antiangiogenik. Formulasi nano emulgel dibuat dalam lima variasi formula (F1–F5) dan diuji melalui serangkaian pengujian fisik, stabilitas, dan aktivitas biologis. Pengujian organoleptik, pH, daya sebar, viskositas, serta uji stabilitas menunjukkan adanya variasi karakteristik antar formula. Hasil uji ukuran partikel, indeks polidispersitas, dan zeta potensial mengindikasikan bahwa F5 memiliki karakter nano paling stabil dengan distribusi partikel seragam. Evaluasi daya sebar dan viskositas menunjukkan bahwa F1 memiliki penyebaran paling luas, sedangkan F4 memiliki viskositas tertinggi. Uji antiangiogenik menggunakan model *in vivo* memperlihatkan bahwa formula F5 menunjukkan aktivitas penghambatan pembentukan pembuluh darah yang paling mendekati kontrol positif. Analisis statistik melalui ANOVA satu arah mengonfirmasi bahwa perbedaan antar formula signifikan ( $p < 0,05$ ), dan F5 tidak berbeda nyata dengan kontrol positif. Secara keseluruhan, nano emulgel kombinasi minyak kelapa sawit–minyak alpukat berpotensi sebagai agen antiangiogenik yang stabil, aman, dan efektif, dengan F5 sebagai formula terbaik berdasarkan seluruh parameter pengujian.

**Kata kunci:** Nano emulgel, antiangiogenik, stabilitas, viskositas, minyak nabati

**TESTING AND EVALUATION OF NANO EMULGEL FORMULATIONS  
CONTAINING A COMBINATION OF PALM OIL AND AVOCADO OIL AS AN  
ANTI-ANGIOGENIC AGENT**

**ABSTRACT**

*study aims to develop and evaluate a nano emulgel formulation containing a combination of palm oil and avocado oil as a potential anti-angiogenic agent. The nano emulgel was prepared in five different formulations (F1–F5) and assessed through a series of physical, stability, and biological activity tests. Organoleptic evaluation, pH measurement, spreadability, viscosity, and stability tests revealed noticeable variations among the formulations. Particle size analysis, polydispersity index, and zeta potential measurements indicated that F5 exhibited the most stable nanoscale characteristics with uniform particle distribution. Spreadability and viscosity assessments showed that F1 had the widest spreading diameter, whereas F4 demonstrated the highest viscosity. Anti-angiogenic activity using the CAM (Chorioallantoic Membrane) model showed that F5 achieved the strongest inhibition of blood vessel formation, closely approaching the effect of the positive control. Statistical analysis using one-way ANOVA confirmed significant differences among the formulations ( $p < 0.05$ ), with F5 not significantly different from the positive control. Overall, the nano emulgel containing palm and avocado oils demonstrates strong potential as a stable, safe, and effective anti-angiogenic topical agent, with F5 identified as the most optimal formulation based on all evaluation parameters.*

**Keywords:** *Nano emulgel, angiogenesis inhibition, stability, viscosity, vegetable oils*