

ABSTRAK

Paparan sinar ultraviolet (UV) pada bibir dapat menyebabkan berbagai masalah, seperti kekeringan, iritasi, hiperpigmentasi, hingga kerusakan jaringan. Oleh karena itu, diperlukan sediaan *Lip Balm* yang tidak hanya berfungsi sebagai pelembap, tetapi juga mampu memberikan perlindungan terhadap sinar UV. Penelitian ini bertujuan untuk mengoptimasi formulasi sediaan *Lip Balm* kombinasi minyak biji anggur (*Vitis vinifera* L.), *jojoba oil*, dan minyak biji alpukat (*Persea americana*) sebagai sun protector menggunakan metode Box-Behnken Design (BBD). Penelitian ini merupakan penelitian eksperimental laboratorium dengan tiga faktor, yaitu konsentrasi minyak biji anggur (5–15%), *jojoba oil* (1–10%), dan minyak biji alpukat (5–10%). Formulasi dilakukan menggunakan metode peleburan (*fusion method*) dan menghasilkan 17 formula berdasarkan rancangan Box-Behnken Design. Evaluasi sediaan meliputi uji organoleptik, homogenitas, pH, titik leleh, daya sebar, dan nilai Sun Protection Factor (SPF). Analisis optimasi dilakukan menggunakan perangkat lunak Design Expert.

Hasil penelitian menunjukkan bahwa seluruh formula menghasilkan sediaan *Lip Balm* yang homogen, berwarna hijau muda, beraroma anggur, dan memiliki bentuk semi padat. Nilai pH yang diperoleh berada pada rentang 4,61–7,00, daya sebar 1,51–2,77 cm, dan nilai SPF 9,58–16,80. Hasil analisis menunjukkan bahwa model kuadratik (*quadratic model*) merupakan model terbaik dalam menjelaskan hubungan antara faktor dan respon. Konsentrasi minyak biji anggur, *jojoba oil*, dan minyak biji alpukat berpengaruh terhadap karakteristik fisik serta nilai SPF sediaan. Formula optimum yang diperoleh mampu menghasilkan sediaan dengan karakteristik fisik yang memenuhi persyaratan dan memiliki aktivitas proteksi terhadap sinar ultraviolet yang baik.

Berdasarkan Hasil metode *Box-Behnken Design*, diperoleh formula optimum dengan komposisi MBA 7,616%, JO 5,210% dan MBAL 9,426%. Formula optimum tersebut memiliki nilai *desirability* tertinggi, sehingga dipilih sebagai formula terbaik karena mampu memberikan karakteristik sediaan yang paling mendekati target yang diharapkan.

Kata kunci: *Lip Balm* , minyak biji anggur, *jojoba oil*, minyak biji alpukat, SPF, *Box-Behnken Design*.

ABSTRACT

Ultraviolet (UV) radiation exposure to the lips can cause various problems, such as dryness, irritation, hyperpigmentation, and tissue damage. Therefore, a Lip Balm preparation is needed not only to function as a moisturizer but also to provide protection against UV radiation. This study aimed to optimize a Lip Balm formulation containing a combination of grape seed oil (*Vitis vinifera* L.), jojoba oil, and avocado oil (*Persea americana*.) as a sun protector using the Box-Behnken Design (BBD) method.

This study was an experimental laboratory research involving three factors, namely grape seed oil concentration (5–15%), jojoba oil concentration (1–10%), and avocado oil concentration (5–10%). The formulation was prepared using the fusion method and resulted in 17 formulations based on the Box-Behnken Design. The evaluations included organoleptic testing, homogeneity testing, pH measurement, melting point determination, spreadability testing, and Sun Protection Factor (SPF) assessment. Optimization analysis was performed using Design Expert software. The results showed that all formulations produced homogeneous Lip Balm preparations with a light green color, grape aroma, and semi-solid consistency. The pH values ranged from 4.61 to 7.00, spreadability ranged from 1.51 to 2.77 cm, and SPF values ranged from 9.58 to 16.80. The analysis indicated that the quadratic model was the best model for describing the relationship between factors and responses. The concentrations of grape seed oil, jojoba oil, and avocado oil influenced the physical characteristics and SPF values of the preparations. The optimum formulation was able to produce a Lip Balm preparation that met the required physical characteristics and exhibited good ultraviolet protection activity. Based on the Box–Behnken Design results, the optimum formulation was obtained with a composition of 7.616% MBA, 5.210% JO, and 9.426% MBAL. The optimum formulation exhibited the highest desirability value and was therefore selected as the best formulation, as it was able to provide product characteristics that were closest to the predetermined target criteria.

Keywords: Lip Balm, grape seed oil, jojoba oil, avocado oil, SPF, Box-Behnken Design.