

INTISARI

Paparan radikal bebas dari sinar ultraviolet dan polusi lingkungan dapat memicu stres oksidatif pada kulit yang berkontribusi terhadap proses penuaan dini. Tetrahidropentagamavunon-5 (THPGV-5) merupakan turunan sintesis kurkumin dengan aktivitas antioksidan tinggi yang berpotensi dikembangkan dalam bentuk sediaan serum. Penelitian ini bertujuan untuk memperoleh formula optimum serum THPGV-5 menggunakan kombinasi gelling agent karbomer dan CMC-Na, mengevaluasi stabilitas fisik sediaan, serta menentukan aktivitas antioksidannya.

Optimasi formula dilakukan menggunakan metode Simplex Lattice Design (SLD) dengan perangkat lunak Design-Expert versi 13. Konsentrasi karbomer dan CMC-Na digunakan sebagai variabel independen, sedangkan pH, viskositas, dan diameter sebar sebagai respon optimasi. Formula optimum selanjutnya diformulasikan dengan penambahan THPGV-5 dan dievaluasi meliputi organoleptis, homogenitas, pH, viskositas, diameter sebar, dan daya lekat. Stabilitas fisik diuji menggunakan cycling test selama tiga siklus. Aktivitas antioksidan diuji menggunakan metode DPPH dan dinyatakan sebagai nilai IC_{50} .

Formula optimum diperoleh pada kombinasi karbomer 0,100% dan CMC-Na 0,200% dengan nilai desirability 0,75. Formula tersebut memenuhi kriteria sediaan serum yang baik pada parameter pH, viskositas, diameter sebar, dan daya lekat. Hasil uji stabilitas menunjukkan sediaan relatif stabil selama tiga siklus *cycling test* tanpa perbedaan signifikan pada seluruh parameter fisik yang diuji. Namun demikian, homogenitas sediaan belum sepenuhnya terpenuhi yang diduga disebabkan oleh kelarutan THPGV-5 yang belum optimal dalam sistem formula. Serum THPGV-5 menunjukkan aktivitas antioksidan sangat kuat dengan nilai IC_{50} sebesar 2,65 ppm (6,37 μ M).

Kata kunci: THPGV-5, serum, antioksidan, Simplex Lattice Design

ABSTRACT

Free radical exposure from ultraviolet radiation and environmental pollution can induce oxidative stress in the skin, contributing to premature aging. Tetrahidropentagamavunon-5 (THPGV-5), a synthetic derivative of curcumin, exhibits high antioxidant activity and has potential to be developed into a serum formulation. This study aimed to obtain the optimum formulation of THPGV-5 serum using a combination of carbomer and CMC-Na as gelling agents, evaluate its physical stability, and determine its antioxidant activity.

The formulation was optimized using the Simplex Lattice Design (SLD) method with Design-Expert software version 13. The concentrations of carbomer and CMC-Na were used as independent variables, while pH, viscosity, and spreadability were selected as responses. The optimum formula was then prepared with the addition of THPGV-5 and evaluated for organoleptic properties, homogeneity, pH, viscosity, spreadability, and adhesiveness. Physical stability was assessed using a cycling test for three cycles. Antioxidant activity was determined using the DPPH method and expressed as IC_{50} value.

The optimum formula was obtained at a combination of 0.100% carbomer and 0.200% CMC-Na with a desirability value of 0.75. The formulation met the criteria for a good serum based on pH, viscosity, spreadability, and adhesiveness. Stability testing indicated that the formulation remained relatively stable after three cycles without significant changes in physical parameters. However, the homogeneity was not fully achieved, likely due to the limited solubility of THPGV-5 in the formulation system. The THPGV-5 serum exhibited very strong antioxidant activity with an IC_{50} value of 2.65 ppm (6.37 μ M).

Keywords: THPGV-5, serum, antioxidant, carbomer, Simplex Lattice Design