UNIVERSITAS
GADJAH MADA
**Pengembangan Formula Serum Mikroemulsi dari Ekstrak Terpurifikasi Daun Congkok (Curculigo Latifolia)
Sebagai Antioksidan dan Anti-Elastase Secara In Vitro**
Fajar Hasmoro Carsita, Prof. Dr. apt. Abdul Karim Zulkarnain, M.Si.; Prof. Dr.rer.nat. apt. Endang Lukitaningsih, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

Ekstrak daun congkok (*Curculigo latifolia*) dilaporkan memiliki aktivitas antioksidan yang berpotensi melindungi kulit dari paparan radikal bebas penyebab penuaan kulit. Mikroemulsi sebagai sistem penghantaran berbasis nano memiliki keunggulan dalam menghantarkan senyawa aktif hidrofilik maupun lipofilik melalui peningkatan penetrasi melewati *stratum corneum*. Penelitian ini bertujuan memperoleh formula optimum serum mikroemulsi yang memenuhi persyaratan karakteristik fisik dan stabilitas sediaan serta memiliki aktivitas antioksidan dan anti-elastase secara *in vitro*. Metode penelitian meliputi penapisan dan profiling fitokimia menggunakan KLT, penetapan kadar total flavonoid ekstrak, pengujian aktivitas antioksidan ekstrak dengan metode DPPH dan ABTS, optimasi formula mikroemulsi dan pembuatan sediaan serum, penentuan stabilitas, serta pengujian efektivitas serum mikroemulsi yang mengandung ekstrak terpurifikasi daun *Curculigo latifolia*. Optimasi formula dilakukan menggunakan *software Design Expert* versi 13 dengan metode *D-optimal Mixture Design*. Sebanyak 16 formula dibuat dan dievaluasi berdasarkan respon ukuran droplet, indeks polidispersitas (PDI), dan % transmitan. Hasil penelitian menunjukkan bahwa ekstrak terpurifikasi daun *Curculigo latifolia* memiliki aktivitas antioksidan dengan nilai IC_{50} DPPH sebesar 195,46 µg/mL dan IC_{50} ABTS sebesar 67,60 µg/mL, serta kadar total flavonoid sebesar 6,75 mg QE/g ekstrak. Formula optimum diperoleh pada komposisi *caprylic/capric triglyceride* 5%, PEG-40 *hydrogenated castor oil* 29%, dan PEG 400 10%. Formula optimum diperoleh ukuran droplet sebesar 22,34 nm, nilai PDI 0,067, dan persen transmitan 88,80%. Serum mikroemulsi yang dibuat memenuhi karakteristik fisik sediaan serum, stabil selama penyimpanan serta menunjukkan aktivitas penangkapan radikal ABTS sebesar 90,49% dan aktivitas penghambatan enzim elastase sebesar 68,28%. Berdasarkan hasil penelitian, serum mikroemulsi ekstrak terpurifikasi daun *Curculigo latifolia* berpotensi untuk dikembangkan sebagai kosmetik *anti-aging* dengan mekanisme *dual action* sebagai antioksidan dan anti elastase.

Kata kunci: aktivitas antioksidan, anti-elastase, *D-optimal mixture design*, Ekstrak daun *Curculigo latifolia*, serum mikroemulsi, total flavonoid.

UNIVERSITAS
GADJAH MADA
**Pengembangan Formula Serum Mikroemulsi dari Ekstrak Terpurifikasi Daun Congkok (Curculigo Latifolia)
Sebagai Antioksidan dan Anti-Elastase Secara In Vitro**
Fajar Hasmoro Carsita, Prof. Dr. apt. Abdul Karim Zulkarnain, M.Si.; Prof. Dr.rer.nat. apt. Endang Lukitaningsih, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

ABSTRACT

Congkok leaf extract (*Curculigo latifolia*) is reported to have antioxidant activity that has the potential to protect the skin from exposure to free radicals that cause skin aging. Microemulsion as a nano-based delivery system has the advantage of delivering hydrophilic and lipophilic active compounds through increased penetration through the stratum corneum. This study aims to obtain an optimal formula of facial serum microemulsion that meets the requirements of physical characteristics and stability of the preparation and has antioxidant and anti-elastase activity *in vitro*. The research methods include phytochemical screening and profiling using TLC, determination of total flavonoid content of extract, testing of antioxidant activity of extracts using DPPH and ABTS methods, optimization of microemulsion formulas and the production of facial serum preparations, determination of stability, and testing of the effectiveness of serum microemulsions containing purified extracts of *Curculigo latifolia* leaves. Formula optimization is carried out using *Design Expert* software version 13 with the D-optimal mixture design method. A total of 16 formulas were created and evaluated based on particle size, polydispersibility index (PDI), and % transmittan. The results showed that the purified extract of *Curculigo latifolia* leaves had antioxidant activity with an IC_{50} DPPH value of 195.46 µg/mL and IC_{50} ABTS of 67.60 µg/mL, as well as a total flavonoid content of 6.75 mg QE/g extract. The optimum formula was obtained in the composition of caprylic/capric triglyceride 5%, PEG-40 hydrogenated castor oil 29%, and PEG 400 10%. The optimum formula was obtained with a particle size of 22.34 nm, a PDI value of 0.067, and a transmittan percentage of 88.80%. The microemulsion facial serum meets the physical characteristics of serum preparations, stable during storage and shows ABTS free radical inhibition of 90.49% and elastase enzyme inhibition of 68.28%. Based on the results of the study, the serum microemulsion containing purified extract of *Curculigo latifolia* leaves has the potential to be developed as an anti-aging cosmetic with a dual action mechanism as an antioxidant and anti-elastase.

Keywords: antioxidant activity, anti-elastase, D-optimal mixture design, *Curculigo latifolia* leaf extract, microemulsion facial serum, total flavonoid content.