

FORMULASI DAN UJI AKTIVITAS ANTIOKSIDAN SEDIAAN SERUM NANOPARTIKEL EMAS (AuNPs) MENGGUNAKAN BIOREDUKTOR KUERSETIN

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ABSTRAK

Latar Belakang: Paparan sinar ultraviolet (UV) yang tinggi dapat meningkatkan pembentukan radikal bebas dan menyebabkan stres oksidatif pada kulit. Nanopartikel emas (AuNPs) yang disintesis menggunakan kuersetin sebagai bioreduktor alami berpotensi dikembangkan sebagai antioksidan topikal.

Tujuan: Penelitian ini bertujuan untuk mengetahui pengaruh variasi konsentrasi kuersetin terhadap karakteristik AuNPs serta mengevaluasi sifat fisik, stabilitas, dan aktivitas antioksidan sediaan serum AuNPs.

Metode: AuNPs disintesis menggunakan kuersetin dengan variasi volume 100 μL , 200 μL , dan 300 μL . Formula nanopartikel terbaik kemudian diformulasikan menjadi sediaan serum dengan variasi konsentrasi HPMC 0,5%; 0,75%; dan 1,0%. Evaluasi meliputi ukuran partikel, indeks polidispersitas (PDI), zeta potensial, karakteristik fisik, uji stabilitas dipercepat selama 21 hari, dan aktivitas antioksidan menggunakan metode DPPH.

Hasil: AuNPs dengan kuersetin 100 μL menunjukkan karakteristik terbaik dengan ukuran partikel 61,58 nm, PDI 0,6123, dan zeta potensial $-16,03$ mV. Seluruh formula serum memiliki karakteristik fisik yang baik. Aktivitas antioksidan serum F1, F2, dan F3 berturut-turut sebesar 72,32%; 71,52%; dan 67,84%, lebih tinggi dibandingkan kuersetin dan AuNPs tanpa formulasi. Seluruh formula tetap homogen dan memenuhi persyaratan sediaan topikal selama penyimpanan.

Kesimpulan: Variasi konsentrasi kuersetin memengaruhi ukuran partikel dan zeta potensial AuNPs. Formula F2 dengan HPMC 0,75% merupakan formula serum terbaik berdasarkan karakteristik fisik, stabilitas, dan aktivitas antioksidan.

Kata kunci: *nanopartikel emas (AuNPs), kuersetin, serum, aktivitas antioksidan.*

FORMULATION AND ANTIOXIDANT ACTIVITY EVALUATION OF GOLD NANOPARTICLE (AuNPs) SERUM USING QUERCETIN AS A BIOREDUCTOR

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ABSTRACT

Background: Ultraviolet (UV) radiation can increase free radical formation and induce oxidative stress in the skin. Gold nanoparticles (AuNPs) synthesized using quercetin as a natural bioreductor have potential as topical antioxidants.

Objective: This study aimed to determine the effect of quercetin concentration on the characteristics of AuNPs and to evaluate the physical properties, stability, and antioxidant activity of AuNPs serum formulations.

Methods: AuNPs were synthesized using quercetin at concentrations of 100 μ L, 200 μ L, and 300 μ L. The best nanoparticle formula was formulated into serum preparations containing HPMC at concentrations of 0.5%, 0.75%, and 1.0%. Evaluations included particle size, polydispersity index (PDI), zeta potential, physical characteristics, accelerated stability testing for 21 days, and antioxidant activity using the DPPH method.

Results: AuNPs synthesized with 100 μ L quercetin showed the best characteristics, with a particle size of 61.58 nm, PDI of 0.6123, and zeta potential of -16.03 mV. All serum formulations exhibited good physical characteristics and homogeneity. The antioxidant activities of F1, F2, and F3 were 72.32%, 71.52%, and 67.84%, respectively, which were higher than those of quercetin and AuNPs alone. All formulations remained homogeneous and met topical preparation requirements during storage.

Conclusion: Quercetin concentration affected the particle size and zeta potential of AuNPs. Formula F2 containing 0.75% HPMC was identified as the best serum formulation based on its physical characteristics, stability, and antioxidant activity.

Keywords: *gold nanoparticles (AuNPs), quercetin, serum, antioxidant activity.*