

Optimalisasi formula transfersom luteolin serta uji penetrasi in vitro dan in vivo gel transfersom luteolin = Optimization of luteolin transfersome formula and in vitro and in vivo penetration study of luteolin transfersome gel / Damai Ria Setyawati

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Abstrak

ABSTRAK

Luteolin merupakan kandidat yang poten sebagai alternatif pengobatan penyakit asam urat karena aktivitas antiinflamasi dan penghambatan xantin oksidase. Akan tetapi, kelarutan dan permeabilitas luteolin yang kurang baik merupakan masalah dalam pengembangan formula. Penelitian ini bertujuan untuk meningkatkan penetrasi luteolin ke dalam kulit melalui formulasi transfersom luteolin. Luteolin diformulasikan dalam transfersom dan beberapa variasi formula meliputi konsentrasi total lipid (fosfolipid-Tween 80) dan luteolin dioptimalisasi menggunakan response surface methodology. Respon optimalisasi yang diukur adalah ukuran partikel, indeks polidispersitas, potensial zeta dan efisiensi penjerapan. Uji penetrasi in vitro dan in vivo dilakukan menggunakan tikus putih jantan galur Sprague Dawley. Hasil optimalisasi transfersom luteolin mengindikasikan bahwa konsentrasi total lipid 4,88% dan luteolin 0,5% merupakan formula optimal. Gambaran vesikel menggunakan transmission electron microscope (TEM) memperlihatkan partikel sferis dengan beberapa partikel yang beragregasi. Transfersom luteolin formula optimal mempunyai ukuran partikel $257,18 \pm 15,20$ nm, indeks polidispersitas $0,480 \pm 0,013$, potensial zeta $-18,67 \pm 0,379$ mV dan efisiensi penjerapan $94,97 \pm 0,28\%$. Penetrasi luteolin secara in vitro pada gel transfersom luteolin sebesar 16,49% dengan nilai fluks $126,80 \pm 5,09$ μg/cm²/jam. Hasil tersebut lebih tinggi dibandingkan dengan gel luteolin yaitu 6,27% dan fluks $24,03 \pm 2,32$ μg/cm²/jam. Penetrasi in vivo memberikan nilai C_{maks} dan AUC₀₋₈₇₃₄ sebesar 9982,29 ng/mL dan 25329,94 ng.jam/mL pada gel transfersom luteolin dan 2908,34 ng/mL dan 7965,88 ng.jam/mL pada gel luteolin. Dari hasil penelitian dapat disimpulkan bahwa transfersom luteolin mampu meningkatkan penetrasi melalui kulit, baik secara in vitro maupun in vivo.

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ABSTRACT

Luteolin is a potent candidate as an alternative treatment for gout due to its xanthine oxidase inhibition and anti-inflammatory activities. However, its poor solubility and permeability are hampering its formulation and development process. This study aimed to improve skin penetration of luteolin by luteolin transfersome formulation. Luteolin transfersome firstly was prepared, and various formulation variables including total lipid (phospholipid-Tween 80) and luteolin concentration were optimized using response surface methodology. Measured responses of optimization were particle size, polydispersity index, zeta potential and entrapment efficiency. In vitro and in vivo penetration studies were carried out using Sprague Dawley male rats. The results of optimization indicate that 4.88% total lipid and 0.5% luteolin concentration is the optimum formulation. Vesicle image using transmission electron microscope (TEM) revealed spherical particles and occurrence of particle aggregation. The optimum luteolin transfersome had particle size of 257.18 ± 15.20 nm, polydispersity index of 0.480 ± 0.013 , zeta potential of -18.67 ± 0.379 mV and entrapment efficiency of $94.97 \pm 0.28\%$. In vitro penetration experiment of luteolin transfersome gel showed that 16.49%

of luteolin was penetrated with flux parameter was of $126.80 \pm 5.09 \text{ } \mu\text{g/cm}^2/\text{h}$. It was significantly higher compared to luteolin gel which only 6.27% of luteolin was penetrated and flux of $24.03 \pm 2.32 \text{ } \mu\text{g/cm}^2/\text{h}$. Moreover, in vivo penetration study showed that C_{max} and AUC_{0-24} of luteolin transfersome gel were 9982.29 ng/mL and 25329.94 ng.h/mL, respectively, which was higher than those of luteolin gel (2908.34 ng/mL and 7965.88 ng.h/mL). It was concluded that luteolin transfersome enhanced in vitro and in vivo penetration of luteolin.