

ABSTRAK

Hiperpigmentasi merupakan salah satu masalah kulit yang dapat diatasi menggunakan alpha arbutin sebagai agen anti-hiperpigmentasi. Sifat hidrofilik alpha arbutin menyebabkan penetrasi melalui kulit menjadi terbatas sehingga dikembangkan dalam sistem transfersom. Berbagai jenis surfaktan nonionik telah digunakan sebagai *edge activator* pada formulasi transfersom dan menghasilkan nilai efisiensi penyerapan yang berbeda. Penelitian ini bertujuan untuk mengetahui pengaruh jenis surfaktan nonionik terhadap efisiensi penyerapan transfersom alpha arbutin sebagai anti-hiperpigmentasi. Transfersom dibuat menggunakan metode hidrasi lapis tipis dalam 6 formula dengan variasi jenis *edge activator*, yaitu Tween 60, Span 60, dan Span 80. Karakterisasi meliputi uji organoleptik, pH, viskositas (cP), dan efisiensi penyerapan (%) pada seluruh formula, serta pengujian ukuran partikel (nm), indeks polidispersitas, dan zeta potensial (mV) pada formula dengan nilai efisiensi penyerapan tertinggi. Hasil penelitian menunjukkan seluruh formula menghasilkan suspensi transfersom berbentuk cair dan keruh dengan nilai pH 6,45–6,62 serta viskositas 0,695–1,114 cP. Nilai efisiensi penyerapan berada pada rentang 95,390–97,720%, dengan nilai tertinggi diperoleh pada formula F2 sebesar $97,720 \pm 0,011\%$. Analisis statistik menggunakan uji Kruskal–Wallis yang dilanjutkan dengan uji *post hoc* Mann–Whitney menunjukkan bahwa jenis surfaktan nonionik tidak memberikan pengaruh yang signifikan terhadap efisiensi penyerapan transfersom alpha arbutin ($p \geq 0,05$). Formula F2, yang memiliki nilai efisiensi penyerapan tertinggi, dikarakterisasi lebih lanjut dan menghasilkan ukuran partikel $380,4 \pm 14,1$ nm, indeks polidispersitas $0,948 \pm 0,049$, serta zeta potensial $-26,1 \pm 1,4$ mV. Disimpulkan bahwa jenis surfaktan nonionik sebagai *edge activator* tidak berpengaruh signifikan terhadap efisiensi penyerapan transfersom alpha arbutin. Seluruh surfaktan menghasilkan nilai efisiensi penyerapan yang tinggi ($>95\%$), sedangkan formula F2 menunjukkan nilai efisiensi penyerapan tertinggi serta memenuhi karakteristik organoleptik, pH, viskositas, ukuran partikel, dan zeta potensial, meskipun nilai indeks polidispersitasnya belum memenuhi kriteria penelitian.

Kata kunci: Alpha arbutin, efisiensi penyerapan, hiperpigmentasi, surfaktan nonionik, transfersom.

ABSTRACT

Hyperpigmentation is a skin disorder that can be treated using alpha arbutin as an anti-hyperpigmentation agent. The hydrophilic property of alpha arbutin limits its penetration through the skin, leading to the development of transfersomes as a drug delivery system. Various types of nonionic surfactants have been used as edge activators in transfersome formulations and have resulted in different entrapment efficiency values. This study aimed to determine the effect of different types of nonionic surfactants on the entrapment efficiency of alpha arbutin transfersomes as an anti-hyperpigmentation agent. Transfersomes were prepared using the thin-film hydration method in six formulations with different types of edge activators, namely Tween 60, Span 60, and Span 80. Characterization included organoleptic evaluation, pH, viscosity, and entrapment efficiency for all formulations, whereas particle size, polydispersity index, and zeta potential were evaluated in the formulation with the highest entrapment efficiency. The results showed that all formulations produced turbid liquid transfersomal suspensions with pH values ranging from 6.45 to 6.62 and viscosity values ranging from 0.695 to 1.114 cP. The entrapment efficiency ranged from 95.390% to 97.720%, with the highest value obtained for formulation F2 ($97.720 \pm 0.011\%$). Statistical analysis using the Kruskal–Wallis test followed by the Mann–Whitney post hoc test showed that the type of nonionic surfactant did not have a significant effect on the entrapment efficiency of alpha arbutin transfersomes ($p \geq 0.05$). Formulation F2, which exhibited the highest entrapment efficiency, was further characterized and showed a particle size of 380.4 ± 14.1 nm, a polydispersity index of 0.948 ± 0.049 , and a zeta potential of -26.1 ± 1.4 mV. In conclusion, the type of nonionic surfactant used as an edge activator did not significantly affect the entrapment efficiency of alpha arbutin transfersomes. All surfactants produced high entrapment efficiency values ($>95\%$), while formulation F2 exhibited the highest entrapment efficiency and met the criteria for organoleptic properties, pH, viscosity, particle size, and zeta potential, although its polydispersity index did not meet the established criterion.

Keywords: Alpha arbutin, entrapment efficiency, hyperpigmentation, nonionic surfactant, transfersomes.