

ABSTRAK

Aktivitas antioksidan, antibakteri dan antiinflamasi pada kuersetin berpotensi mempercepat penyembuhan luka bakar tipe IIA. Kuersetin merupakan senyawa obat golongan BCS kelas II dengan permeabilitas yang baik namun memiliki kelarutan dalam air yang buruk, sehingga *micellar hydrogel* dapat menjadi bentuk sediaan alternatif yang dapat memberikan solubilisasi kuersetin, memberikan *cooling effect*, dan melindungi luka terbuka. Variasi konsentrasi tween-80 dan natrium alginat dapat memengaruhi sifat fisik dan stabilitas fisik sediaan. Tujuan penelitian ini, yaitu optimasi formula serta mengetahui pengaruh serta tween 80, natrium alginat, dan kemungkinan interaksi terhadap stabilitas fisik dan sifat fisik sediaan *micellar hydrogel* berbahan aktif kuersetin.

Penelitian ini dirancang menggunakan desain faktorial 2x2. *Micellar hydrogel* kuersetin terbentuk dari enkapsulasi kuersetin oleh misel tween 80 yang diintegrasikan bersama natrium alginat. Faktor yang diamati, yaitu tween 80 level 11 gram dan 12 gram serta natrium alginat level 1,5 gram dan 2,5 gram. Respon yang diamati adalah viskositas, daya sebar, dan %pergeseran viskositas. Hasil data dianalisis dengan statistik *two way* ANOVA dengan bantuan *software Design Expert® Stat-Ease 360 Trial* dengan tingkat kepercayaan 95%. Optimasi formula dilakukan dengan menggabungkan *contour plot* beberapa respon model yang signifikan, sehingga menghasilkan *superimposed contour plot* sebagai area respon optimum.

Hasil penelitian menunjukkan bahwa tween 80 memengaruhi viskositas, daya sebar, dan %pergeseran viskositas dengan kontribusi kecil, yaitu 0,458%; 0,974%; dan 0,661%. Natrium alginat secara dominan berkontribusi terhadap viskositas, respon daya sebar, dan %pergeseran viskositas dengan kontribusi sebesar 99,233%; 97,962%; dan 89,814%. Area optimum dapat ditemukan dari hasil *superimposed contour plot* dan menunjukkan hasil yang valid.

Kata kunci: kuersetin, *micellar hydrogel*, tween 80, natrium alginate, faktorial.

ABSTRACT

Quercetin shows antioxidant, antibacterial, and anti-inflammatory activities that potentially accelerate the healing of type IIA burns. Quercetin is a BCS class II drug compound with high permeability but poor water solubility. Therefore, micellar hydrogel could serve as an alternative formulation to solubilize the quercetin, providing a cooling effect and protecting open wounds. Variations in tween-80 and sodium alginate concentrations may influence the physical properties and stability of the formulation. The aim of this study was to optimize the formula and investigate the effects of how tween-80, sodium alginate, and their potential interactions affect the physical stability and characteristics of micellar hydrogel formulations containing quercetin.

This research employed a 2x2 factorial design. The micellar hydrogel containing quercetin was formed through the encapsulation of quercetin by tween-80 micelles which was then integrated with sodium alginate. The factors observed were tween-80 levels of 11 grams and 12 grams, and sodium alginate levels of 1.5 grams and 2.5 grams. The responses measured included viscosity, spreadability, and percentage of viscosity alteration. The data were analyzed using two-way ANOVA statistics via Design Expert ® Stat-Ease 360 Trial software with a 95% confidence level. Formula optimization was conducted by combining contour plots of significant response models, resulting in superimposed contour plots to identify the optimal response area.

The results indicate that tween-80 affected viscosity, spreadability, and percentage of viscosity alteration with minor contributions of 0.458%, 0.974%, and 0.661%, respectively. Sodium alginate predominantly contributed to viscosity, spreadability response, and percentage of viscosity alteration with contributions of 99.233%, 97.962%, and 89.814%, respectively. The optimal area could be drawn from the superimposed contour plots, demonstrating valid results on the level studied.

Keywords: quercetin, micellar hydrogel, tween-80, sodium alginate, factorial.