

EFFECT OF COMPARISON OF SURFACTANT AND COSURFACTANT W/O MICROEMULSION OVALBUMIN WITH SOYBEAN OIL TO PHYSICOCHEMICAL CHARACTERIZATION

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(w/o Microemulsion with Surfactant Span 80- Tween 80 : Cosurfactant Ethanol 96% = 5:1; 6:1 and 7:1)

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INTRODUCTION

Microemulsions are macroscopically isotropic mixtures of at least a hydrophilic, a hydrophobic and an amphiphilic component. Their thermodynamic stability and their nanostructure are two important characteristics that distinguish them from ordinary emulsions which are thermodynamically unstable¹). Microemulsions can protect drug from degradation²). Ovalbumin is protein carrier that used as adjuvant for vaccine. Mean while, many topical vaccines developed to induced immune function response³). Microemulsion expected to protect ovalbumin from degradation. In this study, microemulsions made from ovalbumin, aquabidestillata Span 80, Tween 80 as surfactant and ethanol as cosurfactant (surfactant : cosurfactant = 5:1; 6:1 and 7:1). The aim of this study was to know the influence of surfactant and cosurfactant comparison to microemulsion characteristics. Evaluation of this study included organoleptic, pH, surface tension, particle size distribution and drug entrapment.

MATERIALS AND METHODS

Material used in this study are ovalbumin pharmaceutical grade (Sigma-Aldrich), soy bean oil food grade (Moi Foods), Span 80 cosmetic grade (Croda), Tween 80 cosmetic grade (Croda), ethanol pro analysis (MERCK) dan aquabidestilata (PT. Widatra Bakti), Coomassie Brilliant Blue (Sigma-Aldrich).
 Microemulsion Preparation

Soy bean oil, Span 80, Tween 80 and ethanol 96% mixed in beaker glass with magnetic stirrer at 1000 rpm for 15 minutes then aquabidestilata added and stired at 1500 rpm for 15 minutes. Ovalbumin dissolved in microemulsion and stired at 1500 rpm for 60 minutes.

Evaluation of Microemulsion

Organoleptic

Organoleptic evaluation determined visually including color, odor, and consistension.

pH

pH evaluation determined by Eutech Instrument pH700 pH/ mV/ °C/ °F meter. All measurements were carried out in triplicate

Table 5. Formula of the microemulsion.

Material	Concentration (% b/b)		
	Formula I	Formula II	Formula III
Ovalbumin	1	1	1
Soy bean oil	31	31	31
Span 80	37.38	38.45	39.25
Tween 80	12.62	12.98	13.25
Ethanol 96%	10	8.57	7.5
Aquabidestilata	8	8	8



Surface Tension

Surface tension evaluation determined by Du Noüy tensiometer.

Droplet Size Distribution

Droplet size distribution evaluation determined by Delsa™ Nano Submicron Particle size and Zeta Potential Dynamic Light Scattering. Sample observed in 165° angle and temperature 25°C.

Drug Entrapment

The loaded microemulsion centrifuged in 2500 rpm for 15 minutes. 50 µl filtrate added with aquabidestillata up to 50,0 ml in volumetric flask. 50 µl aliquotes added with 2,5 ml Coomassie Brilliant Blue. Absorbance checked in wave length 620 nm. Ovalbumin absorbance was absorbance difference between loaded microemulsion and unloaded microemulsion.

Statistics

All the results were analyzed by statistic using one way analysis of variance with degree of believed 95% ($\alpha = 0,05$) and followed by HSD (Honestly Significant Difference). Independent sample t-test used to know the difference between loaded and unloaded microemulsion.

RESULTS AND DISCUSSION

The results of organoleptics evaluation showed that microemulsions have transparent yellow colour and high fluidity for all formulas.

The data showed the mean of pH for unloaded and loaded of formula I were $6.89 \pm 5.77 \times 10^{-3}$ and 6.95 ± 0.036 , formula II were 6.87 ± 0.010 and $6.90 \pm 5.77 \times 10^{-3}$ and formula III were 6.76 ± 0.026 and $6,89 \pm 5.77 \times 10^{-3}$. This showed there was no significant difference between formulas but there is difference between loaded and unloaded microemulsions.

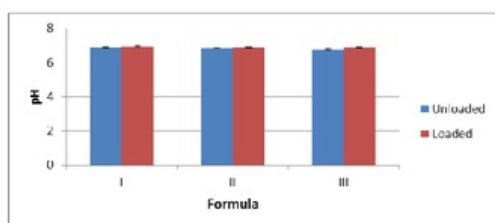


Figure 1. Histogram of microemulsions pH

The results of surface tension studies showed that the mean for unloaded and loaded of formula I were 0.3705 ± 0.0000 and 0.3297 ± 0.0051 Nm⁻², formula II were 0.3562 ± 0.0045 and 0.3397 ± 0.0015 Nm⁻² and formula III were $0,3900 \pm 0,0000$ and 0.3377 ± 0.00351 Nm⁻². This result showed there is difference between formulas for loaded and unloaded microemulsion. Surface tension value decreased after microemulsion loaded with ovalbumin this can be caused ovalbumin had a function as emulsifying agent at the interface of the microemulsion4).

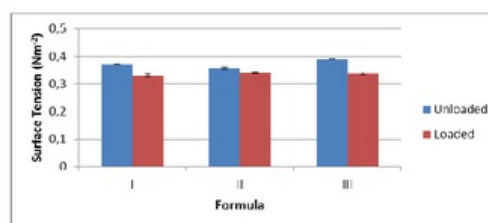


Figure 2. Histogram of microemulsion surface tension

The droplet size distribution for unloaded and loaded of formula I were 30.7 ± 4.01 and 0.26 ± 0.10 nm, formula II were 27.6 ± 2.97 and $23.8 \pm 0,26$ nm and formula III were 27.1 ± 1.70 and 25.0 ± 1.14 nm. This result showed that there was no significant difference between unloaded microemulsion and there was difference between loaded microemulsion. The loaded and unloaded microemulsion had no significant difference result.

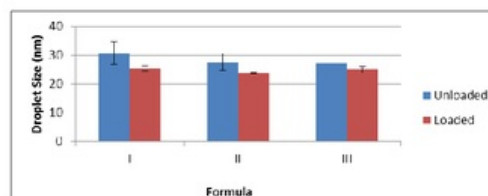


Figure 3. Histogram of microemulsion droplet size



Drug entrapment study showed the mean value of formula I was 25.77 ± 10.12 %, formula II was 46.01 ± 10.12 % and formula III was 29.14 ± 5.84 %. This result showed there was no significant difference between formulas made.

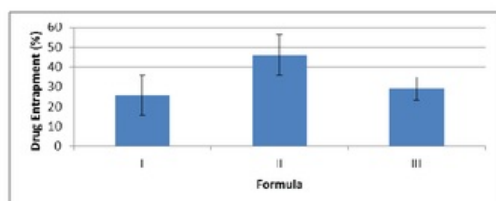


Figure 4 Histogram of microemulsion drug entrapment

CONCLUSION

The best formula can not define because in comparison of surfactant and cosurfactant in microemulsion showed no significant difference in physicochemical characteristic of microemulsion.

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