

## Bioaccessibility of Vitamin A Nanoemulsion: Influence of Carrier Oil and Surfactant Concentration

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**Abstract :** Vitamin A deficiency remains to be among the major malnutrition problems in Indonesia. Vitamin A is a fat-soluble vitamin which renders it difficult to be fortified in water-based foods and beverages. Furthermore, its low solubility and stability in aqueous system may limit its bioaccessibility in the gastrointestinal tract. Nanoemulsification of vitamin A may solve these problems. The objective of this study was to investigate bioaccessibility of vitamin A (retinyl palmitate/RP) nanoemulsion as influenced by two types of carrier oil (Virgin Coconut Oil/VCO and corn oil/CO) and surfactant concentrations (polysorbate 20/Tween 20 3% and 6%). Oil in water (o/w) nanoemulsions of vitamin A was produced through a combination of high shear-high pressure homogenization technique. The results showed that RP-VCO nanoemulsions were 121.62 nm (3%) and 115.40 (6%) nm in particle size, whereas RP-CO nanoemulsions were 154.72 nm (3%) and 134.00 nm (6%) in particle size. As for VCO nanoemulsions, the bioaccessibility of vitamin A was shown to be 89.84% and 55.32%, respectively. On the other hand, CO nanoemulsions produced vitamin A bioaccessibility of 53.66% and 44.85%, respectively. In general, VCO nanoemulsions showed better bioaccessibility of vitamin A than CO nanoemulsions. In this study, RP-VCO nanoemulsion with 3% Tween 20 had the highest  $\zeta$ -potential value (-26.5 mV) and produced the highest bioaccessibility of vitamin A (89.84%,  $P < 0.05$ ). Additionally, the vitamin A nanoemulsion was stable even for after a week of freeze and thaw treatment. Following the freeze and thaw treatment, the vitamin A nanoemulsion showed good stability without aggregation and separation. These results would be useful for designing effective vitamin A delivery systems for food and beverage applications.

**Keywords :** bioaccessibility, carrier oil, surfactant, vitamin A nanoemulsion

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