

Formulation of a Healthy Ingredient using Papaya Carotenoid Enriched Vegetable Oils: A Preliminary Study to Improve Carotenoids Stability and Bioaccessibility with O/W Emulsions

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The aim of the present work was to improve stability and bioaccessibility of carotenoids from papaya Sweet Mary tissues using carotenoid-enriched vegetable oils (soybean oil, sunflower oil and MCT) to formulate oil-in-water (O/W) emulsions. The use of different concentrations of pectin (1%, 2% and 3%) and homogenization conditions (time: 2, 3, 4 and 5 min; rpm: 9500, 12000, 14000 and 16000 rpm) and high pressure homogenization (HPH) at 100 MPa for 5 cycles, were evaluated to determine the optimal condition to formulate such emulsions. The standardized in vitro digestion INFOGEST methodology was used to evaluate the bioaccessibility of papaya carotenoids encapsulated by O/W emulsions. Microstructural studies (confocal and optical microscopy) of the obtained emulsions and during their in vitro digestion phases were carried out. Sunflower O/W microemulsions showed smaller mean particle size, higher negative ζ -potential and higher viscosity, than soybean O/W microemulsions. Particle size reduction in sunflower microemulsions favoured the bioaccessibility of papaya carotenoids, being lycopene the carotenoid with the higher bioaccessibility (71.4%), followed by β -carotene (18.4%), β -cryptoxanthin (15.0%) and β -cryptoxanthin laurate (7.2%). Similar bioaccessibility was obtained for β -cryptoxanthin (15.41%), β -cryptoxanthin laurate (3.54%), β -carotene (17.89%) and lycopene (64.09%) in soybean emulsions. These results highlight the potential of using carotenoid-enriched vegetable oils to formulate O/W emulsions to enhance carotenoids bioactivity by efficiently preventing their degradation and increasing in vitro bioaccessibility.

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