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Formulation and evaluation of extra virgin Olive Oil Nano-Emulsion as Anti-Aging

Anyanti Arianto, Nurul Anisha Hakim and Hakim Bangun

University of Sumatera Utara, Indonesia

Extra virgin olive oil contains many antioxidants and vitamin E. Therefore, it is thought to have anti-aging effects. The purpose of this study was formulated and evaluated the physical properties and the anti-aging effects of extra virgin olive oil nanoemulsion. Nano-emulsion was prepared by using 5% extra virgin olive oil and various concentrations of Tween 80 (24, 25 and 26%) as surfactant and sorbitol (36, 35 and 34%) as co-surfactant. Extra virgin oil nano-emulsion was prepared by spontaneous emulsification technique by the addition drop-wise of oil phase to water phase with stirring at 4000 rpm and the result was continued stirring for 6 hours and sonification for 30 minutes to obtain nano-emulsion. Extra virgin olive oil nano-emulsion was evaluated for particle size, thermodynamic stability, transmission electron microscopy, surface tension, viscosity and anti-aging effect in six volunteers. The results of this study showed that the average particle size of extra virgin oil nano-emulsion using the combination of 25% Tween 80 and 35% sorbitol was 189.82 nm with the range particle size was 67.63-338.93 nm, pH was 6.2, viscosity was 113 cP, surface tension was 46.67 dyne/cm, and no creaming after centrifugation at 3750 rpm for 5 hours. The application of extra virgin olive oil nano-emulsion two times a day on the cheek region of volunteers caused no irritation and increase of skin hydration, the smaller of skin pores, decrease of spots and wrinkles. It is concluded that extra virgin olive oil can be formulated as nano-emulsion dosage form and potentially used as anti-aging. Vitamin E (alpha-tocopherol) has an anti-aging role and can protect the biologic membrane damage from free radicals. Vitamin E is highly lipophilic and has low stability, therefore to improve its effectiveness it is necessary to select appropriate carriers. Nanoemulsion is a drug delivery system in the form of aqueous oil dispersion stabilized by a combination of surfactants and co-surfactants that having droplet size 20-600 nm. Objective: This research aimed to prepare and to evaluate the physical characteristics of vitamin E nanoemulsion. Preparation of vitamin E nanoemulsion using phase oil of VCO (Virgin Coconut Oil) and Olive Oil. Method: The preparation of vitamin E nanoemulsion was performed by a combination of a low energy emulsification method with a magnetic stirrer and a method with high energy emulsification with a sonicator. The parameters of the nanoemulsion formula include organoleptic, pH, nanoemulsion type, percent transmittance, as well as the size and distribution of droplets. Results: The results showed that the composition of the optimum formula of nanoemulsion vitamin E using VCO as oil phase consists of 2% VCO, 24% tween 80 and 6% PEG 400. The optimum formula was transparent, homogeneous, pH 6.19, nanoemulsion type of oil in water, transmittance percentage 98.7%, droplet size 11.9 nm, polydispersity index 0.023. The composition of the optimum formula of nanoemulsion vitamin E using olive as oil phase consists of 2% olive oil, 18-24% tween 80 and 6% PEG 400.The optimum formula was transparent, homogeneous, pH 6.46 and 6.29, nanoemulsion type of oil in water, transmittance percentage 100%, droplet size 13.2 nm and 10.4 nm, polydispersity index 0.004 and 0.034. Nanoemulsions are considered an innovative approach for industrial food applications. The present study explored the potential use of olive-pomace oil (OPO) for oil-in-water (o/w) nanoemulsion preparations and compared the effectiveness of extra virgin olive oil (EVOO) and OPO at nanoemulsion formulations. The ternary-phase diagrams were constructed and the o/w nanoemulsions properties were evaluated in relation to their composition. The results showed that it is possible to form OPO nanoemulsions using Polysorbate 20 or Polysorbate 40. Nanoemulsions with EVOO and OPO presented desirable properties, in terms of kinetic stability (emulsion stability index % [ESI%]), mean droplet diameter (MDD), polydispersity index (PDI), ζ-potential, viscosity, and turbidity. EVOO exhibited lower surface and interfacial tension forming nanoemulsions with a high ESI% and a low MDD. However, OPO led to nanoemulsions with a high ESI% but with a higher MDD. It was observed that by increasing the emulsifier concentration the MDD decreased, while increasing the dispersed phase concentration led to a higher MDD and a lower ESI%. Finally, nanoemulsions with the smallest MDD (99.26 ± 4.20 nm) and PDI (0.236 ± 0.010) were formed using Polysorbate 40, which presented lower surface and interfacial tension. Specifically, the nanoemulsion with 6 wt% EVOO and 6 wt% Polysorbate 40 demonstrated an interfacial tension of 51.014 ± 0.919 mN m−1 and an MDD of 99.26 ± 4.20 nm. However, the nanoemulsion with 6 wt% OPO and 8 wt% Polysorbate 20 presented an interfacial tension of 54.308 ± 0.089 mN m−1 and an MDD of 340.5 ± 7.1 nm.