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FORMULATION, CHARACTERIZATION AND STABILITY EVALUATION OF A VIRGIN COCONUT OIL BASED EMULSION

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An emulsion is defined as a heterogeneous system, consisting of at least two immiscible liquids or phases, one of which is dispersed as droplets in the other liquid. Virgin coconut oil (VCO) is gaining wide popularity in the scientific field and among the public, due to its various health benefits and special characteristics.

The main objectives of this study were to formulate an emulsion containing VCO as the oil phase and Tween 20[®] as the surfactant and to optimize the emulsion with appropriate ratio of oil: water: surfactant. The effects of high shear on the optimized formulae and their characterizations were also studied in this project.

VCO and Tween 20[®] were left for 20 minutes under magnetic stirring at 600 rpm at 25^oC. To the resultant mixture water was added drop by drop in the method 1. In the method 2, high shear homogenization was applied for 5 minutes at 10000 rpm at 25^oC to the formulations resulting from method 1. Based on the visual observations of stability studies, proper ratios of oil, water and surfactant were selected. A centrifugation test was also done to determine the stability of the formulations. The optimized formulae were further studied for its characterization such as droplet size measurement, pH value, creaming index, viscosity measurements and microscopic studies.

According to the results the most stable formulation from both methods consisted of oil 32% (w/w), surfactant 32% (w/w) and water 36% (w/w). Particle size of the best formulae from method 1 and 2 were 653.8 nm and 484 nm respectively. Method 1 produced a micro-emulsion and method 2 produced a nano-emulsion which is below 500 nm. Creaming indexes were zero. Method 1 and method 2 produced different pH values and viscosities for the same formulation. Those pH values were suitable for topical application and zero value of creaming index was a good indicator of a stable emulsion. Microscopic studies indicated that the resulting best formulae were oil-in-water type (o/w) emulsion.

In conclusion VCO is suitable for preparation of nano-emulsion and it gives an o/w emulsion. The best formulae consisted of oil 32% (w/w), surfactant 32% (w/w) and water 36% (w/w). High shear homogenization leads to substantial reduction of the particle size and increases the stability of the formulation compared to the conventional emulsion preparation method.

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