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Encapsulation of β -carotene fortified virgin coconut oil to form soft gel capsules

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Production of soft gel capsules using a non-gelatin shell material is a new trend as the animal source of gelatin can be a problem for certain consumers. In this study, encapsulation of β -carotene fortified virgin coconut oil to form soft gel capsules was studied by using calcium alginate as the shell material as it is versatile and accommodates a wide variety of compounds. β -Carotene was extracted into virgin coconut oil from carrots. Soft gel capsules were prepared according to the selected formulation with 4% alginate solution and 75 mg of CaCl_2 content in the virgin coconut oil emulsion. As physical parameters, the average diameter of soft gel capsules was 8.132 ± 0.349 mm, and the average weight was 0.469 ± 0.058 g with a weight loss of 23.5% during drying due to moisture and alginate loss. The capsule coating thickness was 0.340 ± 0.049 mm and coating weight was 0.123 ± 0.018 g. Hardness and hardness work determined by the texture analyser were 321.5 ± 22.5 g and 6.190 ± 0.794 mJ, respectively. Encapsulation Efficiency (EE) and Loading Capacity (LC) of β carotene fortified virgin coconut oil were calculated to study the amount of core material entrapped within the shell. EE was $68.237 \pm 0.031\%$ while LC was $75.83 \pm 1.81\%$. As chemical parameters, β -carotene content was quantified by High Performance Liquid Chromatography (HPLC) and UV-visible spectroscopic methods to determine the amount of β -Carotene in soft gel capsules, and they were 15.20 ppm and 18.96 ± 0.85 ppm respectively. The ash content of capsules was $1.34 \pm 0.05\%$ which has a contribution of $66.46 \pm 2.72\%$ of Calcium. The moisture content was increased from $7.42 \pm 0.34\%$ to $9.63 \pm 0.51\%$ within a month due to the hygroscopic nature of the glycerol in outer layer of capsules, as glycerol was added as a plasticizer. It can be concluded that soft gel capsules with β -carotene fortified virgin coconut oil can be prepared according to the selected formulation under properly and carefully maintained processing conditions since the gelling process of calcium alginate takes place under mild conditions.

Key words: Encapsulation, Calcium alginate, Soft gel capsules, β Carotene

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