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Characterization and Optimization of Natural Maltodextrin-based Niosome

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ABSTRACT

Natural maltodextrin, due to their outstanding merits, have received more and more attention in the field of drug delivery systems. In particular, maltodextrin seem to be the most promising materials in the preparation of niosome carriers. This study aimed to optimize and characterize the formulation of natural maltodextrin-based niosome. The natural maltodextrin was made from cilembu sweet potato starch which used partial starch hydrolysis method by α-amylase enzyme. Proniosome and niosome formulations used three various concentration of surfactant (sorbitan monostearat) which about 5 mmol, 7.5 mmol, and 10 mmol for formula 1 (F1), formula 2 (F2), and Formula 3 (F3) respectively. In addition, physical and chemical characterizations had been done to characterize maltodextrin, proniosome, and niosome. The Dextrose Equivalent (DE) value of natural maltodextrin was 7.99±0.11. Furthermore, the vesicle size of proniosome was in the range of 5μ to 13μ. The entrapment percentages of piroxicam in niosome formulations were 72.5±1.1%,, 76+1.7 %, and 77.5+1.9 % for FI, F2 and F3 respectively. It can be concluded that the result provided an indication of natural maltodextrin from Cilembu sweet potato starch are potentialy carrier in the proniosome preparation which can be used for producing niosomes.

INTRODUCTION

Piroxicam, one of the non-steroid anti-inflammatory drug (NSAID) as a model in this study, have been formulated into topical delivery to avoid its side effect (Wathoni, 2012). However, the passive transport of piroxicam across mammalian skin is relatively low (Doliwa, 2012). On other hand, niosome formulation can be used to improve the rate of penetration of active substance by transdermal drug delivery (Blazek-Welsh *et al*, 2001). Niosomes are non-ionic surfactant vesicles and obtained on hydration of synthetic nonionic surfactants, with or with out incorporation of cholesterol or other lipids (Tangri and Khurana, 2011). The study of erythromycin with using niosome formulations proved that it can improve diffusion rate of erythromycin in transdermal drug delivery (Jayraman, 1996). Other studies reported that the formulation and evaluation of Indomethacin loaded niosomes showed therapeutic effectiveness increased and simultaneously toxic side effect reduced as compared with free Indomethacin in paw-oedema bearing rats (Namdeo *et al*, 1999). The methods of manufacturing niosome has some draw backs nowadays, such as need a complex preparation, long time and special equipments. This problem can be solved with the establishment of proniosome (Lian, 2001). Blazek-Walsh et al., have reported the formulation of niosomes from maltodextrin based proniosomes. This provides rapid reconstitution of niosomes with minimal residual carrier. Slurry of maltodextrin and surfactant was dried to form a free-flowing powder, which could be rehydrated by addition of warm water (Blazek-Welsh *et al*, 2001).

Jufri study also showed that maltodextrin, Dextrose Equivalent 5-10 and was derived from cassava starch, can be used as a base material of niosome (Jufri, 2004). In this study maltodextrin derived from Cilembu sweet potato starch (Ipomoea batatas sp.) which has a high starch content (Arifin, 2002).

MATERIAL AND METHODS

Cilembu sweet potato starch (*Ipomoea batatas sp.*) were obtained from Sumedang (West Java Province-Indonesia), α-amilase enzyme (sigma aldrich), all other reagents used were of analytical grade.

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