ABSTRACT

Curcumin is one of the compounds contained in the rhizome of Curcuma sp which plays a role in inhibiting the growth of cancer cells. At pH≥6.5 curcumin is very unstable and easily degraded due to the presence of an active methylene group between the two ketone groups in the compound. This can be overcome by encapsulating curcumin in liposomes. The main constituents of liposomes are phospholipids of an amphipathic nature. The double bond and length of the phospholipid acyl chain can affect the permeability and fluidity of the membrane. One of the efforts that can be made to improve the ability of liposomes to encapsulate active ingredients is by modifying the composition of the constituents of the liposome membrane by mixing two types of phospholipids from different sources and the addition of cholesterol. The purpose of this study is to isolate and characterize coconut phospholipids (Cocos nucifera L). Determining the lipophilicity of coconut phospholipids, soybean phospholipids, curcumin, and cholesterol to determine their presence in the liposome-based on the value of their partition coefficient in the octane–water system as well as determining the effect of the composition of a mixture of coconut phospholipids, soybean phospholipids, and cholesterol in liposomes on the encapsulation efficiency of curcumin active ingredients.

This study was carried out in 3 stages, the first stage consists of isolation of coconut phospholipids which incincludesceration, partition extraction, and evaporation. Then the phospholipids from the isolation were characterized using FTIR and GC-MS. The second stage is to determine the lipophilicity of coconut phospholipids, soybean phospholipids, curcumin, and cholesterol based on the value of their partition coefficient in the octane–water system; The third stage is the manufacture of liposomes from coconut phospholipids, soybean phospholipids, and cholesterol using hydration, sonication, and centrifugation methods followed by encapsulation of curcumin in liposomes and measurement of encapsulation efficiency (EE) using a UV-Vis spectrophotometer.

The isolation results obtained 5.746 grams of coconut phospholipids in the form of a gel from 5050 grams of dried coconut flesh (0.114%). Coconut phospholipids and soybean phospholipids are lipophilicity partition coefficient values of 6.92 and 7.59. Cholesterol and curcumin are lipophilic so they are inside the liposome membrane with partition coefficient values of 3.75 and 7.10, respectively, the highest curcumin encapsulation efficiency value was obtained at 85.04% of liposomes made from the composition of coconut phospholipids and soybean phospholipids in a ratio of 1:3 (w/w). The addition of cholesterol can affect the character of liposomes made from the composition of coconut phospholipids and soybean phospholipids thereby reducing the efficiency value of curcumin encapsulation for all types of variations in the composition of liposome constituents. Adding 20% cholesterol provides the best encapsulation efficiency compared to adding 10% cholesterol.

Keywords: Coconut Phospholipid, Soybean Phospholipid, Liposome, Lipophilicity, Encapsulation, Cholesterol, Curcumin