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DEVELOPMENT, CHARACTERISATION AND RELEASE STUDY OF ENCAPSULATED CURCUMIN MICROPARTICLES

Hesham Abdul Aziz*, Kok Khiang Peh, Yvonne Tze Fung Tan[1]
School of Pharmaceutical Sciences, University of Science Malaysia, Penang, Malaysia
[1]*Email: yvonne@usm.my*

Curcumin, the major yellow pigment of *Curcuma longa* L., has been traditionally used to treat inflammation, skin wounds and tumors. The major disadvantage of curcumin is its high colour intensity, which stains fabrics when in contact with the treated skin. The objective of this study was to characterize encapsulated curcumin microparticles prepared by a simple coacervation-phase separation method. The curcumin microparticles were produced by adding curcumin ethanolic solution to gelatin solution using a syringe pump. Formaldehyde solution was used to rigidize the gelatin coat before the microparticles were washed with ethanol followed by freeze-drying. The entrapment efficiency (EE), morphology, particle size, and release property of the encapsulated curcumin microparticles were examined. The curcumin EE was quantified using a simple yet specific high performance liquid chromatography method. The mean EE value of curcumin was approxiamtely 49%. When examined microscopically, the shape of the microparticles remained spherical with changes in concentration of gelatin solution and volume of ethanol. The mean particle size of curcumin microparticles was approximately 200 μm measured using Mastersizer. The *in-vitro* release of curcumin was evaluated using Franz cells. The *in-vitro* release results showed that the release profiles of curcumin powder and encapsulated curcumin microparticles were closely similar and not significantly different statistically. Furthermore, the staining effect of encapsulated curcumin microparticles was considerably less than that of curcumin powder. In conclusion, encapsulated curcumin microparticles were successfully formulated. The microencapsulation process produced spherical microparticles and did not affect the curcumin release.

Keywords: curcumin, gelatin, microencapsulation, entrapment efficiency

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HIGH PERFORMANCE LIQUID CHROMATOGRAPHY METHOD FOR DETERMINATION OF CURCUMIN IN TURMERIC EXTRACTS

Hesham Abdul Aziz, Kok Khiang Peh* & Yvonne T. F. Tan

School of Pharmaceutical Sciences, University of Science Malaysia,
11800 Penang, Malaysia.
E-mail: kkpeh@usm.my

The purpose of the study was to develop a simple, sensitive and specific high performance liquid chromatography (HPLC) method for the determination of three curcuminoid compounds, namely, Curcumin (CUR 1), Mono-demethoxycurcumin (CUR 2) and Bis-demethoxycurcumin (CUR 3) in ethanolic extract of turmeric rhizomes. Prior to HPLC analysis, the curcuminoids were identified using thin layer chromatography method. The R_f value of the turmeric extract sample was compared with that of curcumin standard. The HPLC system was comprised of a pump (Model 307, Gilson), a 6-valve injection port (Rheodyne, USA), a UV detector (Model 115, Gilson, France) and an integrator (D-2500 Chromato-Integrator, Hitachi, Japan). The detector was operated at a detection wavelength of 375 nm. A reversed phase Phenomenex® column (Luna C18 (2), 5 μm, 150 × 4.5 mm ID) fitted with a refillable guard column was used for chromatographic separation. The mobile phase consisted of acetonitrile, methanol and water at ratio of 35:10:55 (v/v) and adjusted to pH 3.0 with glacial acetic acid. The analysis was run at a flow-rate of 1.3 ml/min. The standard calibration curves were linear with mean correlation coefficient values of 0.9998 for CUR 1, 0.9993 for CUR 2, and 0.9990 for CUR 3. The within-day and between-day precision and accuracy values of the assay method for the three compounds were all less than 10%. The limit of quantification was 6.25 μg/ml and the limit of detection was approximately 3.0 μg/ml.

Key words: High performance liquid chromatography (HPLC), curcumin, *Curcuma domestica*, Zingiberaceae, turmeric