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Investigation of Drug Delivery of Curcumin Extracted from Turmeric Plants, Using Modified Nanoporous MCM-48

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Abstract

In today's world, drug delivery is mostly done via smart systems and with more effective control as compared to traditional drug delivery methods. In this regard, the slow and intermittent release of the drug is widely done via porous silica nanoparticles. On the other hand, medical herbs have unique properties that make them ideal candidates for the replacement of chemical drugs. Curcumin extracted from turmeric has anti-pain and anti-inflammatory properties. In this study, MCM-48 and its modified form as a drug carrier were studied to deliver the Curcumin extracted from turmeric plant. To this end, the MCM-48 was first synthesized and then modified with 3-Aminopropyl Triethoxysilane to produce APTES/MCM-48 mesopore. The XRD, BET, FT-IR, SEM, and TEM analysis showed that the MCM-48 was well synthesized and its surface was successfully modified. In order to evaluate the delivery of Curcumin using MCM-48 and APTES/MCM-48 mesopores, the turmeric extract was first produced using maceration method. HPLC analysis showed that turmeric extract contained 1.19 % of Curcumin, which is in agreement with the literatures. Subsequently, the MCM-48 and APTES/MCM-48 mesopores were loaded with Curcumin in Turmeric extract. Eventually, the release of Curcumin was investigated in SBF buffer by UV-Vis study at 425 nm. This study showed that, the modification of the surface of MCM-48 mesopore results in the smart control of Curcumin release. Accordingly, APTES/MCM-48 mesopore is a good candidate for the smart delivery of Curcumin in turmeric extract.

keywords: Mesopore, Modified, MCM-48, Drug Delivery, Curcumin, Turmeric Extract