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TITLE

MESOPOROUS SILICA CARRIER-BASED COMPOSITES FOR TASTE MASKING OF PRAZIQUANTEL

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ABSTRACT

Praziquantel (PZQ) is the standard treatment for schistosomiasis, a neglected tropical disease that affects over 123 million children worldwide. However, PZQ's bitter taste and low aqueous solubility hinder the development of conventional dosage forms. Therefore, alternatives are crucial for enhancing the physicochemical and biopharmaceutical properties of PZQ. Recently, mesoporous silica has emerged as a feasible material for taste masking and to enhance aqueous apparent solubility of drugs. This study aimed to develop and characterize PZQ-loaded mesoporous silica (MCM-41 type) as a prototype taste masking composite. MCM-41 was synthesized via the sol-gel method with hydrothermal treatment using a surfactant as a pore template, followed by calcination for template removal. PZQ was incorporated into MCM-41 by the incipient wetness impregnation method (MCM-41@PZQ). The MCM-41 and MCM-41@PZQ were characterized by nitrogen adsorption-desorption method, X-ray diffraction (XRD), and differential scanning calorimetry (DSC), while drug release was assessed by the dialysis bag method under sink conditions and apparent aqueous solubility analysis. A high drug load of PZQ (38.25% w/w) was achieved. Morphological analysis showed a reduced surface area and pore volume of MCM-41@PZQ (535 m^2/g and 0.37 cm^3/g) compared to pristine MCM-41 (808 m^2/g and 0.83 cm^3/g), which is explained by the incorporation of the PZQ in the inner mesopores of MCM-41. PZQ incorporated into MCM-41 exhibited no crystallinity in XRD analysis and no melting point in DSC, which indicate drug amorphization within MCM-41 composites. MCM-41@PZQ showed a slower drug release behavior than pristine PZQ, with 50% and 66% of PZQ released after 10 h, respectively. Furthermore, the incorporation of PZQ into MCM-41 mesopores enhanced apparent aqueous solubility of PZQ due amorphization by 1.3x compared to pristine drug. The results indicate that MCM-41 is a feasible material as a PZQ composite by the drug amorphisation and controlled release. Further studies will be carried out to evaluate the taste masking properties of MCM-41@PZQ.

KEYWORDS

Praziquantel; Mesoporous Silica; Composite; Taste Masking; Palatability

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