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Physicochemical Characterization, Molecular Modeling, and Stability of the Resveratrol-Cyclodextrin Inclusion Complexes

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***SUMMARY*. Resveratrol exhibits wide pharmacological activities, such as, anti-oxidant, anti-inflammatory, analgesic, cardio-protective, neuro-protective, chemo-preventive, chemo-therapeutic, and anti-aging. However, its aqueous solubility is very low. This poor aqueous solubility creates huge problems for its delivery. This study aimed to increase aqueous solubility of resveratrol by forming inclusion complexes with cyclodextrin (CD) derivatives, hydroxypropyl-β-cyclodextrin (HP-β-CD) and randomly methylated-β-cyclodextrin (RM-β-CD). The physicochemical properties of the inclusion complexes (resveratrol-HP-β-CD and resveratrol-RM-β-CD) were investigated by UV scan, Fourier transform infrared spectrophotometry, differential scanning calorimetry, and X-ray diffractometry to confirm the complex formation. Stability of the inclusion complexes were determined in different storage conditions. Molecular modeling served as a supplementary tool to understand the inclusion behavior of the CDs by predicting the inclusion modes and the stoichiometry of the complexes. Although solubility of resveratrol in the simulated physiological fluids were very low, solubility was increased by CDs. RM-β-CD was superior to HP-β-CD for solubility enhancement. The combined use of different characterization techniques suggested inclusion complex formation between resveratrol and CDs. Molecular modeling further supported the inclusion complex formation. Stable solution formulations of resveratrol were prepared in this study.**

KEYWORDS: Physicochemical characterization, Cyclodextrin, Inclusion complex, Resveratrol, solubility.

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