

Poster

Enhanced curcumin solubility and dissolution by complexation with hydroxypropyl beta-cyclodextrin

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Introduction. Curcumin is the main constituent extracted from the spice turmeric. It has a number of pharmacological effects. It is incompletely absorbed from gastrointestinal tract. This effect is probably due to the limited solubility and slow dissolution.

Objectives. To increase curcumin solubility and dissolution by inclusion complex formation with hydroxypropyl beta-cyclodextrin (HPBCD) and to characterize the physicochemical properties of the inclusion complexes.

Methods. The solubilities of curcumin in HPBCD were studied. Inclusion complexes of curcumin-HPBCD in 1:1 molar ratio were prepared by kneading method, coevaporation method and freeze-drying method. The solubility, dissolution and the physicochemical properties of inclusion complexes were evaluated.

Results. The solubility of curcumin increased linearly as a function of the HPBCD concentrations, showing that the soluble complexes were formed. The melting endotherms of curcumin in coevaporated and freeze-dried samples disappeared. This phenomenon, generally considered as indicative of both inclusion complex formation and/or drug amorphilisation, is attributed to a strong interaction in the solid state between curcumin and HPBCD. The FTIR spectra of coevaporated and freeze-dried samples showed the formation of hydrogen bonding of monomeric curcumin with HPBCD, which could result in the inclusion complex formation of curcumin into the cavity of HPBCD. From X-ray diffraction studies, the absence of crystalline peaks of curcumin was obtained in coevaporated and freeze-dried samples. This result can be interpreted on the basis of the formation of amorphous phase, possibly an amorphous inclusion complex which confirmed by differential scanning calorimetry and FTIR. All inclusion complexes exhibited markedly higher solubility and dissolution than pure curcumin. Storage of curcumin-HPBCD coevaporated system at ambient temperature and 45°C for 6 months did not appear to have any marked effect on curcumin dissolution and curcumin still in the amorphous form.

Conclusion. The curcumin-HPBCD inclusion complexes prepared by coevaporation method and freeze-drying method exhibited the most efficacious to obtain complex formation and curcumin amorphization. All inclusion complexes show the remarkable improvement in curcumin solubility and dissolution.

Keywords: curcumin, dissolution, hydroxypropyl beta-cyclodextrin, inclusion complex, physicochemical

Selected References

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