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The effect of B-cyclodextrine on penetration of oxybenzone (eusolex 4360) sunscreen agent through rat skin

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Background and Aims: The aim of this study was evaluation of the effect of complexation of with B-cyclodextrine (CDX) on transdermal absorption of oxybenzone and formulation of a sunscreen product with low transdermal absorption using this technique.
Methods: In the first step, we designed a base for our formulation with suitable features in the case of appearance, viscosity and stability (including physical and chemical stability). Sunscreen-CDX complexs were prepared by different methods including: Kneading, cogrinding and solvent evaporation. The performance of complexation process was assessed by DSC and FTIR spectra and coevaporetion method was selected as the best complexation technique. Transdermal absorption studies were carried out on the base formulation with sunscreen,sunscreen plus CDX as simple physical mixture and sunscreen-CDX complexes. Transdermal studies were done using full thickness skin of wistar rats and Standard Franz diffusion cell wquipment. Sunscreen in the samples taken from receptor phase of diffusion cells were analyzed by HPLC method.
Results: Results showed that complexation with CDX can significantly decrese flux of sunscreen agent (14.5 fold lower than formulation without CDX) whereas formulation containing sunscreen-CDX physical mixture did not showed significant decrease in flux compare with CDX free formulation. (0.4477 and 0.3575µg/cm²/h for sunscreen-CDX simple physical mixture and CDX free formulation respectively). Lag time of skin penetration also significantly increased with CDX in formulation containing sunscreen-CDX complex (2.53 and 1.88h for formulation containing sunacreen-CDX complex and CDX free formulation respectively).
Conclusions: These results demonstrated the complexation with CDX can improve characteristics of sunscreen formulation prepared with Eusolex 4360 active ingredient significantly.

Keywords: Formulation; Sunscreen; Skin absorption; B-Cyclodextrine; Oxybenzone; Complexation