OP-23

DOI: 10.14232/syrptbrs.2024.44

Evaluation of different β-cyclodextrins- and polymer-containing nasal powders

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Nasal administration of active pharmaceutical ingredients (APIs) may be a good alternative to parenteral or oral administration. Although the selective permeability of the nasal mucosa and the mucociliary clearance make the drug absorption difficult, the use of various permeation-enhancing and viscosity-increasing excipients can reduce their hindering effect [1].

In our work, meloxicam-potassium-containing (MXP) nasal powders were produced. Differently charged – neutral (BCD), cationic (QABCD) or anionic (SBECD) – β-cyclodextrins were applied as permeation-enhancers, and (polyvinyl)alcohol (PVA) was used as a viscosity-increasing excipient. Polymer-containing and polymer-free samples were prepared by nano spray drying. The particle size distribution, morphology, crystallinity of the formulations, interactions between the materials, *in vitro* mucoadhesion, dissolution and permeation of the drug were examined.

As a result of spray drying, spherical, amorphous particles were obtained, with an average particle size under 2.2 µm, secondary interactions between the materials were detected. The charged cyclodextrin-containing formulations had higher *in vitro* mucoadhesion than BCD-containing formulations, the dissolution of MXP was fast from all samples. The permeation of the drug was the highest in the case of powders containing QABCD. Comparing the samples based on their polymer content, the diffusion of MXP improved in all cases in the presence of PVA.

Based on our results, the formulation containing both QABCD and PVA seemed to be the most promising. Hopefully, after further tests, the work can contribute in the future to the production of a nasal systemic pain-relieving product.

Acknowledgement: Supported by the ÚNKP-23-3 - SZTE-196 new national excellence program of the Ministry for Culture and Innovation from the source of the National Research, Developement and Innovation Fund.

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