344. IN VITRO KINETICS STUDY OF VANCOMYCIN RELEASE FROM W/O/W EMULSIONS AND W/O/W/CHITOSAN HYDROGEL FOR TOPICAL DELIVERY

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Introduction. Vancomycin (VANCO) is a glycopeptide antibiotic active against Gram-positive bacteria. VANCO is usualy distributed on parenteral route in the treatement of staphylococcal infection. Unfortunately, the VANCO administrated by intravenous route cause some undesirable effects such as ototoxicity and nephrotoxicity. Therefore, in recent years, the innovative VANCO topical delivery systems (liposomes, multiple emulsions, polymer nanoparticles, solid lipid nanoparticles) were investigated, and used in the treatment of diseases, such as: local infection, osteomyelitis, skin wound, burns etc [1, 2, 3].

The aim of the present work was the preparation of two topical delivery systems based on the W/O/W emulsions loaded with VANCO. We also studied the kinetics release mechanism of VANCO from W/O/W emulsions and W/O/W/chitosan hydrogels and permeation of VANCO through the skin.

Materials and Methods: Vancomycin hydrochloride (Mylan S.A.S), chitosan with Mw=180 Da (Sigma Aldrich); soybean oil (Fluka), Span 80 and Tween 80 (Sigma Aldrich), cellulose membrane 0.45 μm (Millipore Corporation, Bedford, USA), deionized water. All reagents used, were of pharmaceutical purity. In vitro kinetics study of VANCO release from the W/O/W emulsion and W/O/W chitosan hydrogel. In vitro experiments concerning VANCO release from the W/O/W and W/O/W chitosan hydrogel were made using a vertical diffusion cell in steady state, and the cellulose membrane as barrier diffusion was used. In vitro skin permeation studies. In order to investigate the VANCO skin permeation, the porcine ear skin was used as penetration barrier. The ear skin was hair depilated, rinsed with physiological saline and washed with BPS.

Discussion and results.VANCO-W/O/W emulsion preparation and stability Water-in-oil-in-water (w/o/w) emulsions are systems in which a W/O primary emulsion is dispersed into external aqueous phase. The W/O/W emulsions were recently used to encapsulate hydrophilic compounds in food, cosmetics, and pharmaceuticals. Our results show that the release of VANCO from the emulsion is achieved by diffusion controlled release mechanism, facilitated by the presence of reverse micelles formed into the oil phase. The release and permeation profiles of VANCO followed zero order kinetics. The permeation ability of VANCO-W/O/W emulsions and VANCO-W/O/W/chitosan hydrogel was evaluated using the ear skin as barrier. The control sample was a 0.001M VANCO PBS solution (pH 7.4).

Conclusions. The obtained results showed that the release of VANCO from the emulsion is achieved by diffusion controlled release mechanism, facilitated by the presence of reverse micelles formed into the oil phase. The release and permeation profiles of VANCO followed zero order kinetics

Key words: vancomycin, multiple emulsions, chitosan hydrogel.