ADVANCED BIO-HYBRID MATERIALS INCORPORATED WITH THE NANOCARRIER-DRUG SYSTEM AS MULTI-COMPARTMENTAL DRESSINGS SUPPORTING THE TREATMENT OF *PSORIASIS*

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Introduction

The proposed research solution addresses issues related to *Psoriasis* treatment problems. So far, no effective way to treat this disease has been found. It is estimated that it covers 2-5% of the world's population, representing approximately 140-210 million patients. Various types of ointments are most commonly used in the topical treatment of psoriasis. They include corticosteroids (predominantly betamethasone dipropionate), analogs of vitamin D3 (calcipotriol, calcitriol or takalcytol), tar, retinoids (e.g. tazarotene) or calcineurin inhibitors (tacrolimus, pimecrolimus). A significant drawback of this type of skin care is the necessity of frequent application of the drug, low effectiveness and often short-lived effect [1-4]. Last time the tendency to design and obtain new modified hydrogels containing the combination of the natural and synthetic active substance for medical applications, was observed [5-7].

Materials and Methods

Here, studies were focused on the design and development of bio-hybrid hydrogels based on sodium alginate (SA), poly(vinyl alcohol) (PVA), glycerine and *Aloe vera* solution (AV). Additionally, salicylic acid and fluocinolone acetonide-thermosensitive nanocarrier were incorporated into SA/PVA/AV hydrogel matrix. The bio-hybrid hydrogels were obtained through the chemical crosslinking method using poly(ethylene glycol) diacrylate (PEGDA, M_n = 700 g/mol) as a crosslinking agent [8].
After that, the chemical structure of the obtained bio-hybrid hydrogels was confirmed using FT-IR spectroscopy. The morphology was analyzed based on SEM microphotographs. Additionally, the physicochemical properties, such as gel fraction, swelling behaviour and degradation in distilled water and simulated body fluids, were carried out. In the next step, the release profiles of selected drugs, were determined. Finally, the cytotoxicity tests using *in vitro* method were conducted.

Results and Discussion

On the basis of the results, we can conclude that the presence of the nanocarrier-drug system does not influence significantly on the physicochemical and structural properties. Generally, the bio-hybrid matrix is characterized by very similar parameters in comparison to the basic matrix without drugs, which is a positive aspect. Moreover, SEM images exhibit the presence of the nanocarrier-drug system in the inside of the bio-hybrid hydrogel structure (FIG. 1).

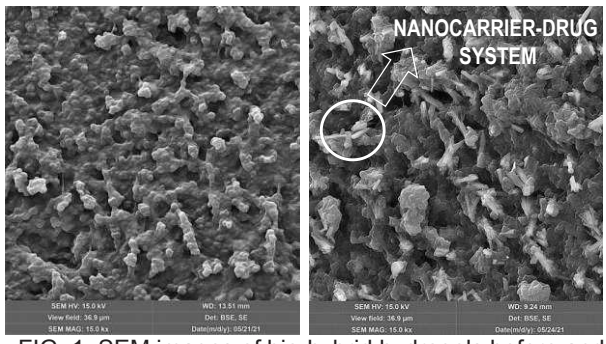

FIG. 1. SEM images of bio-hybrid hydrogels before and after modification.

Conclusions

The main goal of the research was the development of an effective method of the preparation of transparent bio-hybrid hydrogels containing salicylic acid and fluocinolone acetonide - thermosensitive nanocarrier system, which was achieved successfully. Moreover, this solution allows obtaining a double system, in which the release time of drugs is prolonged significantly, even up to 7 days.

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