DEVELOPMENT OF THE COMPOSITION OF THE GEL WITH GLUCOSAMINE HYDROCHLORIDE AND NANOSILVER

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Introduction. Traditionally, in clinical surgery on the second phase of wound healing process continue apply different of composition and properties drugs on hydrophobic (mainly vaseline-lanolin) or synthetic unbalanced poliethilenoksid-based. Their use must be considered hyperosmotic and drying effects the components of substrate, and the possibility of creating a "greenhouse effect" in the wound.

Therefore, we have proposed a composition of drug in gel form on hydrophylic-based, namely on the basis of carbomer, which will be reliably protect the granulation tissue from mechanical damage and will exhibit a moderate drying effect.

The desired therapeutic effect in a soft dosage form can be achieved only in case the correct choice of active and auxiliary substances.

The main active ingredients in the gel are glucosamine hydrochloride and silver nanoparticles.

Glucosamine hydrochloride is a basic natural metabolite, which takes part in the formation of tissues, and also has hydrating properties, stimulates the production of collagen. Due to the fact that glucosamine stimulates the production of hyaluronic acid, it has a pronounced reparative, anti-inflammatory and antimicrobial activities.

Substance of nanosilver in gel composition was incorporated as an antimicrobial component, which, in contradistinction to antibiotics, does not cause the dysbiosis, contribute to the normalization of microbiocenosis, exhibits antioxidant properties and stimulate the healing processes in the wound. Substance of nanosilver (Ag) was introduced in dispersed form in a solution of polyvinylpyrrolidone(PVP).

The basic excipient is a gel carrier. Based on the analysis of literature data for researches as gelling agents carbopol (BF Goodrich, USA) was selected.

Aim. The aim of our work is to develop the optimum composition of the gel with glucosamine hydrochloride and substance of nanosilver for effective wound healing in the second stage of wound healing.

Materials and methods. Objects of the study is the model based on the samples of the gels of Carbopol Ultrez 10 with various neutralizers: triethanolamine (TEA) and sodium hydroxide.

We have conducted the investigation on the solubility of the main active ingredients and also the study about choice of neutraliser for the base of carbopol.

The gels we of obtained was monitored characteristic appearance and organoleptic properties (color, smell, texture, etc.) investigated the structural and mechanical properties. Also we monitored for signs of physical instability (aggregation of particles, coalescence, coagulation, separation), controlled the homogeneity of the samples and their osmotic activity.

In research and color appearance viewed smears samples layer 2-4 mm, which were deposited on a glass slide.

Measuring rheological parameters was carried out on a rotary viscometer "Myr 3000 V2R" (Viscotech, Spain) in a system of coaxial cylinders by the method of SPhU (ed., P. 2.2.10, p. 24) in a wide range of shear rates. Research was carried out at a temperature (25 ± 0.1) °C.

Osmotic activity was determined using the method of dialysis through a semipermeable membrane.

Uniformity gel samples were obtained by the method of SPhU 1.0, p. 511.

Results and discussion. The results on the solubility of the basic active substances showed that glucosamine hydrochloride and a complex of PVP/Ag well soluble in water and glycerol mixture (1: 1), so that in the dosage form was included the unhydric hydrophilic solvent – glycerol, in the amount of 5%. Furthermore, glycerol prevents drying of gels and facilitates the penetration of the active ingredient.

Selection of neutraliser was carried out on the basis of organoleptic properties of the gels. At storage the received samples the gels we observed a change a color in gel, in which manufacturing process was used sodium hydroxide as neutraliser. Therefore, as a neutraliser for in the dosage form was chosen triethanolamine, because during storage we did not observe visible changes in gel.

Subsequent studies, including the structural and mechanical conducted for gel sample for neutralization which triethanolamine was used.

The results of these studies indicate that the sample is a thixotropic gel system, which is a rapid full restoration of the structure. Due to these characteristics of the gel, it is sufficient plasticity, easy to spread on the skin and squeezed out of the tube; that is why it has a good consumer properties.

As a result of osmotic investigation revealed that gel sample has an insignificant osmotic activity that will not obstruct the wound repair processes.

For a given sample was carried out the microscopic analysis, which allows to make a conclusion about the homogeneous structure of the gel.

Conclusions. The proposed composition of the gel corresponds all requirements that apply to drugs for the treatment of wounds in the second phase of wound healing process; and the obtained gel sample has a homogeneous structure and good consumer properties; which are caused by the rheological properties of the gel.