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COMPARATIVE PROBIOTIC ACTIVITY AGAINST STREPTOCOCCUS PYOGENES.

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Annotation. *This article presents the results of studying the activity of two probiotic drugs of Russian origin Lactobacterin+, Sporobacterin, one probiotic created by employees of the Samarkand state university of veterinary medicine, livestock and biotechnology - Innoprovect2 and the antibiotic ciprofloxacin, which demonstrated high antimicrobial activity against the pyogenic microbe Str.pyogenes isolated from abscesses of cattle. A comparative study showed that all probiotics showed high antimicrobial activity equal to antibiotic activity.*

Keywords. *Wound, probiotic, pus, Streptococcus pyogenes, antibiotic, abscess, in vitro.*

Introduction. Nowadays, the leading role in the fight against infectious and purulent-inflammatory diseases, as well as in the prevention of postoperative complications belongs to highly active antibiotics, which are widely used locally or systemically [6,10]. However, they increasingly show low efficacy, and in some cases harmful effects due to their toxicity, the possibility of allergic reactions, the development of intestinal dysbacteriosis, negative effects on the immune system, the formation of resistance to antibacterial drugs of wound microflora, constant selection and intensive spread of multidrug-resistant strains of microorganisms [1,3]. The lack of possibility to determine the sensitivity to antibiotics of pathogens of purulent-inflammatory processes leads to their uncontrolled and unjustified therapeutic abuse. With empirical use of antibiotics, especially broad-spectrum antibiotics, not only bacteria responsible for the emergence of purulent-inflammatory process, but also representatives of normal microflora suffer. In addition, survive bacteria that are able to resist their action, which leads to the selection of multidrug-resistant strains, resulting in the formation of resistance to the applied antibiotic, which is transmitted to all future generations of surviving pathogens.

Despite the creation of new generations of antibacterial drugs, continuous improvement of aseptic and antiseptic methods, the number of wounds complicated by purulent infection in animals not only does not decrease, but on the contrary, increases [4,5,9]. Therefore, it is necessary to search for new, evolutionarily sound, safe and effective means to successfully combat purulent-inflammatory processes in animals. Many pathogens of wound infections have multiple resistance to antibiotics.

Probiotics are complex bioproducts of live bifido- and lactobacilli (eubiotics), a number of other bacteria (Bac.subtillis, Esh.faecalis, etc.) and products of their metabolism (postbiotics). The action of probiotics is based on competitive antagonism of the flora introduced with the preparation with the pathogenic

microflora of the purulent focus, and there is no pronounced immune reaction of the organism to the introduced flora, as it is “familiar” to it. Recently, considerable attention has been paid to the studies of probiotics action on the microflora of wounds, phlegmons, abscesses, trophic ulcers and other pathologies of microbial nature. The strengths of this review are the originality of the study and the methods and strategies used to find experts. However, a major limitation is the low reliability of evidence due to the small number of studies evaluating the outcomes of interest. This may be due to the fact that the use of probiotics to treat several types of wounds is an increasingly interesting topic. There are also notable differences in the scales used to assess the effect of probiotics on wound healing, which prevented us from conducting a meta-analysis [2].

The aim of our work was to design, characterize and investigate the antimicrobial properties of probiotic preparations such as: *Lactobacillus fermentum*, *Lac. plantarum*, *Lac. acidophilus*, *Lac. casei* (*Lactobacillus+*), *Bac. subtilis*, *Bac. licheniformis* on purulent pathogens of surgical wounds. Tasks performed included:

1. The isolation of pus pathogens from various sources, study of their properties and identification.
2. Study of antimicrobial activity of selected probiotic preparations “in vitro” on the isolated gnorobic microorganisms.

2. Materials and methods of research.

2.1 The isolation of gnorobic microorganisms was carried out from abscesses of cattle. The wool in the abscess area was clipped, treated with alcohol, opened and the material was pipetted into a sterile tube, the preparation was prepared and stained by Gram staining. The material in the tube was diluted with sterile physiological solution 1:20 and sown on simple nutrient media. The isolated culture of gnorobic microorganisms was identified by culture and biochemical properties. To determine the microbe species, the culture was grown at +10° and 45° C, on medium with 6.5% NaCl, on medium with pH 9.6, on medium with 40% bile, in milk with 0.1% methylene blue and after heating for 30 min at 60° C. The cultures were examined for the formation of pus microorganisms. The isolated cultures were examined for the formation of gas and hydrogen sulfide, indole, catalase with 3% hydrogen peroxide and fermentation of galactose, maltose, mannitol when grown on carbohydrate media.

2.2 Study of antimicrobial activity of selected probiotic preparations.

2.2.1 The study of antimicrobial activity of selected probiotic preparations was carried out on isolated gnorobic microbes, which were sown on Petri dishes with meat-peptone agar with blood. Pure daily culture grown on solid nutrient medium was used for seeding, identical, clearly isolated colonies were selected. A set of cells from a single colony cell was transferred to a tube with sterile physiological saline solution and turbidity seeded to McFarland's standard. One drop (0.2 ml) of probiotic preparation in the volume of $1,5 \times 10^9$ CFU/ml was dripped on the surface of agar with culture, left for 2-3 min, then the Petri dish was inverted and placed in the thermostat for 1-2 days at 37° C. A total of four petri dishes were used for the experiment. The result was evaluated visually by the presence of a “clean zone” at the site of probiotic action. In the first Petri dish, the probiotic *Lactobacterin+* was injected into the

streptococcal culture, in the second - Sporobacterin, in the third - Innoprovect2, in the fourth - Ciprofloxacin antibiotic.

3. Research results.

3.1 The study of culture, tinctorial and biochemical properties of isolated gnorobic microorganisms from bovine abscesses showed their belonging to *Str.pyogenes*.



3.2 As a result of the analysis of literature data, 2 probiotics of Russian origin (Lactobacterin+, Sporobacterin) with high activity against gnorobic microbes were selected, also a probiotic created by the staff of SamSUVMLB (Innoprovect2) and the antibiotic ciprofloxacin with high antimicrobial activity against a number of other antibiotics, which was determined in advance, were taken into the experiment. When the seeded cups were examined on the second day after seeding around the disk with probiotic Lactobacillus+, Sporobacterin,

Innoprovect2 and antibiotic Ciprofloxacin, weaker growth of streptococci was noted on the second day after seeding, which was manifested by fewer microbial colonies.

The results of this systematic review show that there is no consensus or conclusive evidence for the efficacy of probiotic therapy for wound healing due to differences in wound type, target population and criteria for assessing effect between studies. However, it is important to emphasize that none of the studies reported side effects associated with probiotic therapy or a marked increase in wound healing time.

The first studies focusing on the use of probiotics in dermatology, particularly in atopic dermatitis, were conducted in the first decade of the 2000s. Thus, it is a new topic that has been mainly studied using in vitro and animal studies [8].

Probiotic has different effects on cytokine production by strains of different species. Thus, the biological importance of these strain-specific effects in vivo still needs to be clarified [7].

Analysis of the literature data and our studies allow us to draw the following conclusions:

1. The antimicrobial activity of probiotic preparations Lactobacterin+, Sporobacterin, Innoprovect2 is equal to that of the antibiotic ciprofloxacin.

2. Probiotics - Lactobacterin+, Sporobacterin, Innoprovect2 are effective against gnorobic *Str.pyogenes*.

3. Probiotics - Lactobacillus+, Sporobacterin, Innoprovect2 can be used to treat purulent inflammatory wounds.

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