



Introduction

Currently, the production of new generation dressings has become a field of chemistry of medical polymers, which is developing rapidly. Modern dressings are significantly different in design and properties from traditional ones. Before these were exclusively textile materials (gauze, mesh, knitwear, nonwoven fabric), but now it is films, film compositions, sponges, hydrocolloids, gels, pastes, and combinations of different materials. Therefore, polymer hydrogels as materials for pharmaceuticals and medicine, on the basis of which are developed tools of different physical forms and purposes, are of considerable interest. Hydrogel dressings in the wet therapy of injuries of various origins have already found widespread use in medicine and have shown a significant advantage over traditional dressing materials. In veterinary medicine, moist wound healing has not yet found such a spread.

Results

This investigation aimed to create a hydrogel dressing with antiseptic properties based on polysaccharides with satisfactory physical and mechanical properties for medicine and veterinary medicine during surgery and postoperative wound care. The developed antiseptic bandage is a hydrogel plate (water content up to 40%) 16±20 mm wide and 2-4 mm thick, reinforced with cotton or polypropylene mesh up to 0.3 mm thick and up to 20-30 mm long. The hydrogel plate is formed based on a mixture of polysaccharides (citrus pectin and sodium alginate). The formation of the hydrogel plate provides its sufficient physical and mechanical properties and the ability to absorb 45 g/dm² of exudate (table 1). At the same time, the hydrogel plate remains vapor and air permeable, which has a positive effect on the course of skin regeneration processes during postoperative wound care.

Table 1
The properties of pectin hydrogel depending on the degree of relative deformation

No	Hydrogel plate thickness, mm	Degree of compression	Polymer content, %	Ca content in the gel, %	Initial water content in the gel, g/g	Equilibrium swelling in water, g/g	Relative increase in swelling in water, %	Equilibrium swelling in exudate, g/g	Relative increase in swelling in exudate, %
1	0,4	0,89	54,1	3,41	0,85	25,6	2911,8	17,4	1947,1
2	0,59	0,84	39,6	2,60	1,53	22,2	1351,0	17,2	1024,2
3	0,78	0,79	31,4	2,0	2,18	24,5	1023,9	13,2	505,5
4	1,1	0,71	12,4	1,06	7,06	40,0	466,6	28,5	303,7
5	1,25	0,67	9,4	0,77	9,64	43,9	355,4	36,9	282,8
6	1,9	0,5	8,7	0,61	10,49	33,1	215,5	21,5	105,0
7	3,8	0	6,4	0,59	14,63	18,1	23,7	16,70	14,1

Materials:

Material & Methods

Pectin is a plant polysaccharide whose molecules consist of α-D-galacturonic acid residues the carboxyl groups of which are mainly esterified with methanol. The molecular weight of citrus pectin - 20000-30000. The degree of esterification - 81,5 %.

Sodium alginate, polypropylene glycol (PPG-2000), glycerin, distilled water.

Structuring agent - CaCl₂.

Antiseptics - betadine, chlorhexidine.

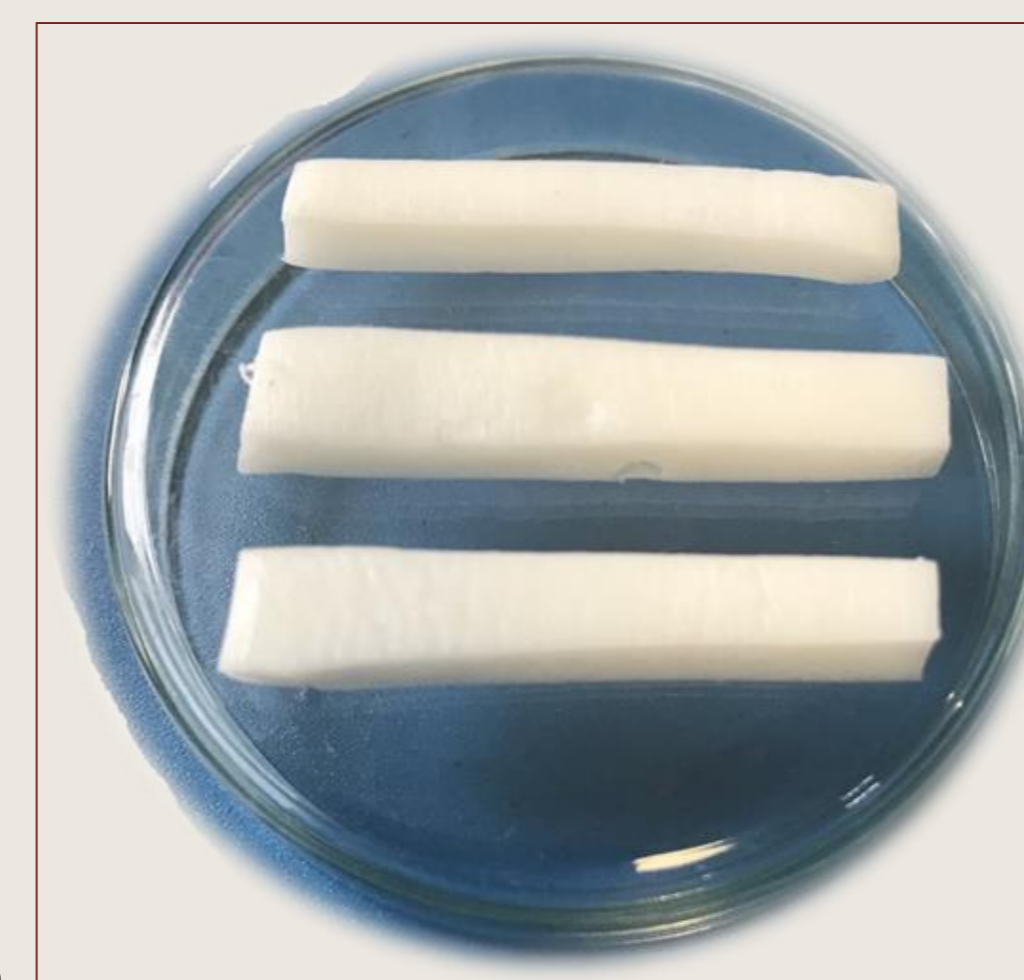
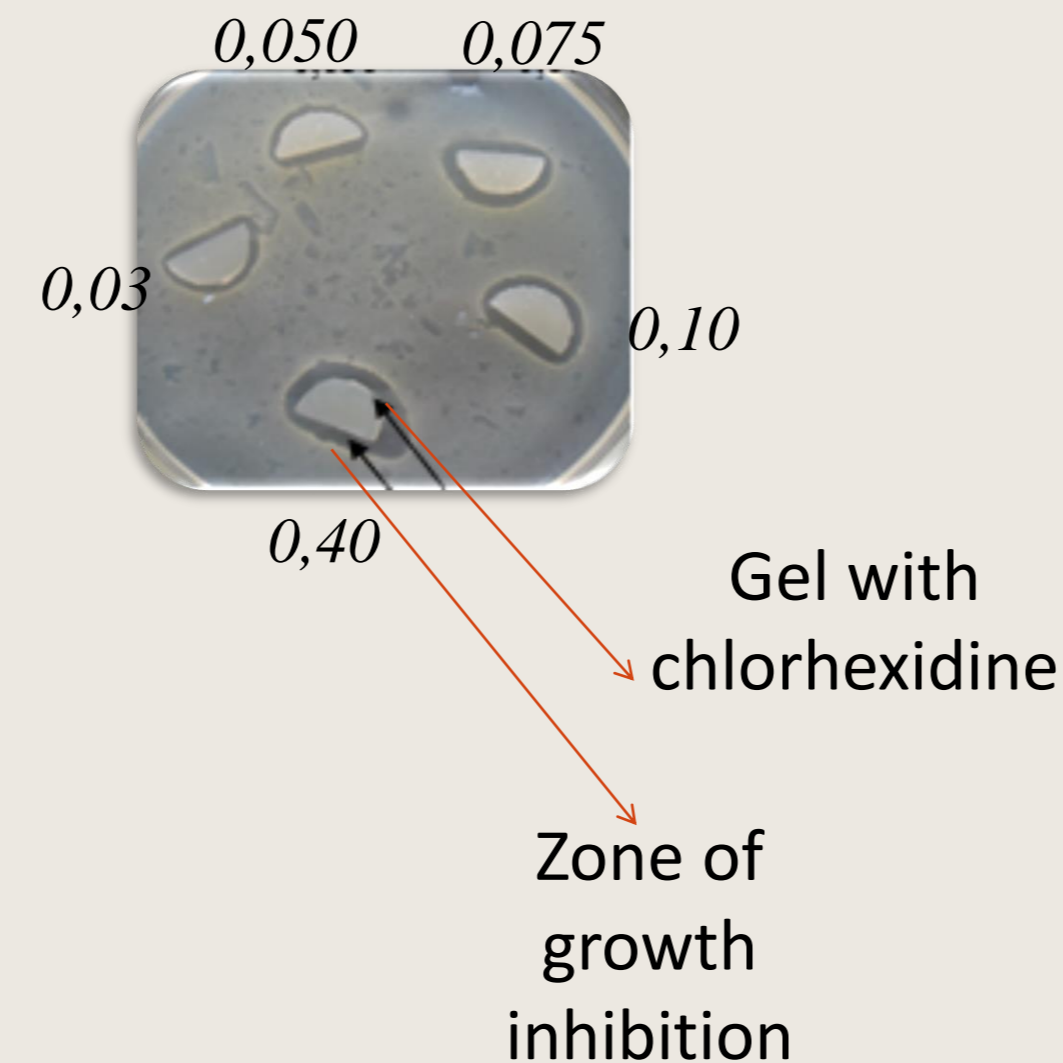
Methods:

Hydrogel plates were obtained using pectin and sodium alginate as a polymer-gelling agent and calcium salt as a structuring agent and glycerin / PPG-2000 as the plasticizers. After receiving the hydrogel plates, they are pressed.

Swelling degree of the hydrogel samples (the ratio of the mass of water to the mass of polymers in the hydrogel sample) was determined by gravimetric method at 20 °C in distilled water/ exudate.

Filling of hydrogel samples with the drug was performed by swelling them in a solution of the drug.

Inhibition of *S. aureus* growth due to the influence of chlorhexidine (0.03-0.40%) in the gel after 72 hours.



Conclusions

The making of chlorhexidine or betadine into the hydrogel dressing provides bactericidal properties. The prolonged release of these drugs from the hydrogel plate into the affected area inhibits gram-positive and gram-negative bacteria development for 100-140 hours. The obtained antiseptic hydrogel dressings provide comfort in use, maintain the water balance of the wound, and to a large extent, prevent physical effects on the injury.