

THE CHARACTERISTICS OF PREVENTIVE AND THERAPEUTIC EFFECTIVENESS OF NEW DOMESTIC ANTI-SEPTIC MEDICINAL PRODUCT HOROSTEN

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The epidemiological situation at the end of the second millennium is characterized by a shift of etiological structure of infectious diseases towards those caused by opportunistic potentially pathogenic microorganisms. But pyoinflammatory diseases annually cause far greater losses for humanity than epidemics of infectious diseases do. Only in the surgical clinic hospital infections occur in average in 3-30% of operated patients [5]. One of the main sources and factors of the transmission of potentially dangerous microorganisms is the skin of patients and medical personnel of medical institutions. In this regard, the global medical practice has a huge range of means of hygienic disinfection of the skin. For example, in Germany, 76 patented medicinal products are used for this purpose. In our country the formation of such a range is at its initial stage, and until recently the list consisted exclusively of imported products.

It should be noted that main active ingredients of German products for hygienic disinfection of the skin registered in Ukraine, namely, Septoderm, Sterillium, Cutasept, Okteniderm, AXD2000 are propanol, isopropanol or ethyl alcohol. Antiseptics based on alcohol are flammable, in case of prolonged daily use they have an adverse effect on the skin, e.g. well-known absence of sporicidal action [2].

Appearance of the first domestic medicinal product for hygienic antiseptics Horosten on the pharmaceutical market, industrial release of which this year was mastered by "Yuria-Pharm", became a notable event for medical professionals. Well-known domestic antiseptic with high antimicrobial activity, decametoxin, is the basic active ingredient of Horosten. The medicinal product has a wide range of antimicrobial, antiviral, antimycotic, and antiprotozoal action, mechanism of which is connected with bacterial

coat destruction. Besides, this medicinal product inhibits production of endotoxines by microorganisms, neutralizes antilysozymic and antiglobulin activity of bacteria, intensively eliminates plasmides of resistance to antibiotics. Decametoxin is distinguished by its polytropic action on human body and it has a desensibilization influence, anti-edema and spasmolytic effect.

Ethanol in concentration of 15% enters the composition of Horosten as an excipient. Such concentration of ethanol does not cause the abovementioned effect of alcohol-containing antiseptics, but it potentiates antimicrobial activity of decametoxin and enforces the abluent properties due to active removal of lipids from the skin. Glycerin in the composition of Horosten softens the skin and protects it from irritation effects.

In accordance with the instruction for medical use, Horosten is recommended for hygienic disinfection of hands skin after completing medical manipulations, in the course of daily patients care, after examining each patient at the outpatient examination in conditions of hospital. In addition, the medicinal product is indicated for prophylactic disinfection of micro-traumas, for skin preparation after epilation and shaving, for staphylococcal and streptococcal superficial pyoderma treatment.

Due to the composition of medicinal product, the list of indications may be significantly extended. The objective of our research was the study of preventive activity of Horosten and its use with wider range of indications. First of all, taking into account the wound-healing properties of decamethoxin, the study of Horosten effectiveness in the treatment of purulent wounds is of great interest. For another thing, contemporary pharmaceutical market of Ukraine has no domestic oral antiseptic presented. Most imported solutions for mouthwash contain chlorhexidine bigluconate (Lacalut, Oral-B products), triclosan (Plax solutions manufactured by Colgate-Palmolive), cetylpyridinium chloride (Aquafresh solutions), herbal extracts and essential oils (products manufactured by Elka Dent Krauter). One of the major drawbacks of drugs with triclosan is the ability of some bacteria in the oral cavity to break down triclosan with formation of highly toxic dioxin compound. Preparations based on plant extracts of Chamomile, Sage, Calendula, unfortunately, have low antimicrobial activity.

A serial antiseptic medicinal product Horosten produced by "Yuria-Pharm" was used in the study (batch 021204, 011204). Disinfecting properties of Horosten were studied by standard methods using test sheets of cambric and quantitative suspension test [4] on the museum test strains *E.coli* M-17, *S.aureus* 209P, *P.aeruginosa* spp., *C.albicans* spp.

Comparative study of disinfecting action of several hygienic antiseptics in the conditions of artificial contamination of hands skin by *E.coli* M-17 was conducted to evaluate the effectiveness of Horosten in conditions close to practical use. The effect of Horosten was compared with the effect of usual cosmetic soap, Protex antibacterial soap, preparations for soft skin decontamination Emulsoderm and Extra Protection Antiseptic Desinfectant (EPAD), which include 0.5% benzalkonium chloride solution and 0.46% chlorxylenol solution, as well as with the solution of polyhexamethyleneguanidine phosphate, which is part of the hygienic disinfectant Gembar. In order to assess the effectiveness of antiseptic skin preparation, swab test from the surface of skin before and after treatment with an antiseptic was used. Dilutions of swabs (1:10, 1:100, 1:1000) were sifted



for Endo environment, and after incubation in thermostat for 24 hours average number of viable E. coli in 1ml of swab before and after treatment was determined. Comparative evaluation of the effectiveness of skin preparation by different products was carried out according to the degree of reduction of the number of microorganisms (CFU) in 1 ml of swab after treatment of contaminated sites.

In order to evaluate the therapeutic properties of Horosten a study of the local use of the drug in patients with purulent wounds was conducted. The comparison was carried out with antiseptic drugs for topical treatment of purulent wounds: 0.05% chlorhexidine bigluconate solution, 0.02% aethonium solution, furacilin (1:5000) and 10% sodium chloride solution. The effectiveness of topical application of solutions of these antiseptics was studied in 444 patients with purulent wounds of different origin. Depending on the antiseptic applied, patients were divided into four groups. The reference group (I group) amounted to 254 patients in which after surgical treatment sepsis wound was cleaned with furacilin and was loosely filled with napkins, moistened in 10% sodium chloride. The following 3 research groups contained patients, who received topical application of 0.02% aethonium solution (81 patient), 0.05% chlorhexidine bigluconate solution (86 patients), Horosten (23 patients) after wound cleaning. Criteria for evaluation of effectiveness of antiseptic preparations therapeutic action were as follows: time of wound cleaning from purulo-necrotic content, the emergence of granulation and epithelialization.

Also the possibility to use Horosten as an oral antiseptic was studied in a group of 15 patients who had no signs of periodontal disease or mucous membranes of the oral cavity disorders. The evaluation of efficiency was carried out by comparing the number of microorganisms in the swab from periodontal areas of upper and lower jaw before and after using the drug. The effect of Horosten was compared with that of drugs that are offered for use as therapeutic and prophylactic products for oral cavity: Aquafresh, Plax (Colgate-Palmolive), Elka Dent Krauter. The same method was used for processing, sampling and sifting for all antiseptic preparations.

The study of Horosten disinfecting action on the museum infected bacteria strains test sheets of cambric revealed that sterilization of infected S.aureus 209P test sheets of cambric took lasted for 20 seconds. Decontamination of infected E.coli M-17 and P.aeruginosa spp. sheets lasted 20 and 30 minutes respectively. Exposition of 25 minutes was needed to destruct C. albicans spp.

Reference product polyhexamethyleneguanidine phosphate in the same concentration disinfected test sheets with Staphylococcus within 10 minutes. In order to disinfect the objects infected with E.coli, Pseudomonas aeruginosa and Candida by means of this product, three times longer exposure was needed as compared to Horosten (Fig. 1).

The method of test sheets of cambric enables you to determine the exposure of the full decontamination (sterilization) of artificially infected test sheets. However, the application of hygienic disinfectants is not aimed at achieving sterility, so their effectiveness is often estimated in quantitative solution test, which displays the reduction in the number of bacteria in the stable contact exposure with the drug.

According to the modern requirements, products for antiseptics in *in vitro* studies should reduce the number of staphylococci and E.coli by 100 thousand times when the contact duration is from 30 seconds to 2 minutes [4]. The results of disinfecting action of Horosten in quantitative suspension test is illustrated in figure 2.

Fig. 1. Disinfecting exposition of artificially contaminated test sheets of cambric

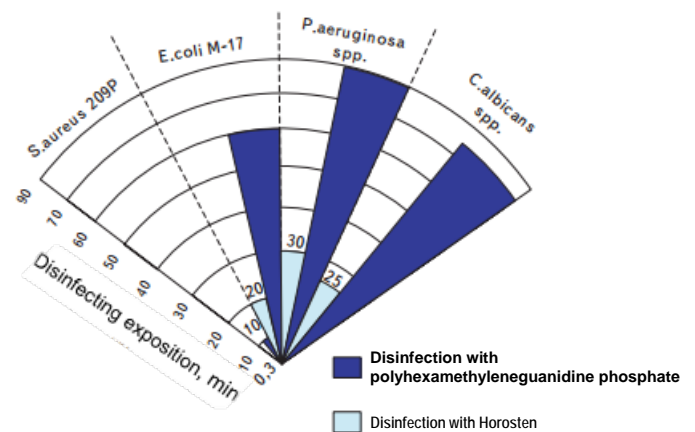
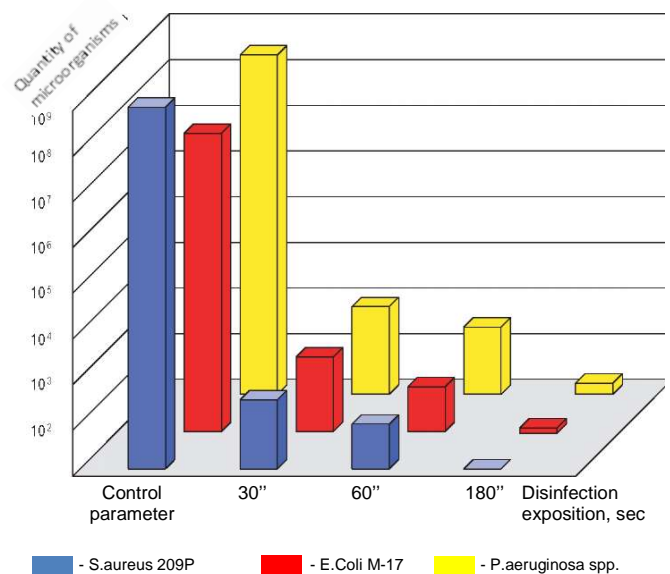


Fig. 2. Disinfecting action of Horosten in quantitative suspension test



Given the following data, after the contact of Horosten and museum test strain of S. aureus during 1 minute, the reduction of CFU in ml compared to control group is more than by 3 million times. After the contact of Horosten and E. Coli for 1 minute the number of recent showed reduction in 1 million times. The corresponding data for Pseudomonas aeruginosa show a decrease in the number of microorganisms during exposure for 1 minute - by 40 thousand times, while in case of 3-minute exposure - by 3 million times. Thus, the results strongly suggest that medicinal product Horosten meets modern requirements for hygiene antiseptics.

The study of clinical efficacy of Horosten on the skin was conducted in conditions of artificial microbial contamination (see Table). As it is evidenced by the data from the table, the average number of viable E. coli M-17 in 1 ml of swab after artificial contamination was varying within 1.1-2,8x10⁶ CFU. When analyzing the effectiveness of skin decontamination by hygienic antiseptics, Horosten showed the highest activity. After a single treatment of hands with Horosten for 3 minutes the reduction of E. Coli in 1 ml of swab was by 50 times. Consecutive two-time skin treatment helped to reduce the amount of contaminants in the swab by almost 200 times compared with the control.

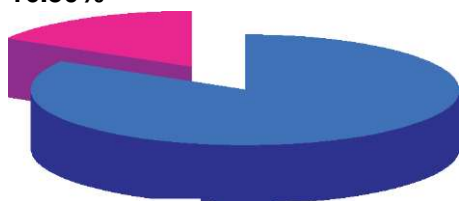
Hygienic product based on chlorxylenol is close to Horosten in its effectiveness. The reduction in the number of microorganisms in swab after applying EPAD was by 25 and 158 times after one- and a two-time application respectively. Antibacterial soap showed poorer disinfecting properties.

Table. The effectiveness of hygienical antiseptic skin preparation

Gr. No.	Name of drugs	The average number of E. coli M-17 in 1 ml of swab (CFU)			Frequency rate of reduction of contaminants compared to control	
		control	after cleaning	after second cleaning	after cleaning	after second cleaning
1	Horosten	1.26x10 ⁶ ± 1.25	2.51x10 ⁴ ±1.58	6.33x10 ³ ± 1.58	50.2	199.7
2	Antibacterial soap	1.99x10 ⁶ ± 1.14	1.26x10 ⁵ ±1.07	3.16x10 ⁴ ± 1.05	15.8	63
3	EPAD	1.25x10 ⁶ ± 3.16	5.01x10 ⁴ ±5,01	7.94x10 ³ ± 1.58	25	157.4
4	Emulsoderm	1.01x10 ⁶ ± 1.58	1.2x10 ⁵ ±2.51	3.98 x 10 ⁴ ± 2.03	8.4	25.4
5	Cosmetic soap	2.82x10 ⁶ ± 1.25	3.98x10 ⁵ ± 1.25	1.26x10 ⁵ ± 1.05	7.08	22.4

Fig. 3. The effectiveness of oral cavity sanitation by different products (% of bacterial destruction)

16.50%



ElkaDent Krauter

37%



Aquafresh

84%



Colgate Plax

94%



Horosten

According to our results, the least effective was hygienic processing of hands skin with Emulsoderm on the basis of benzalkonium chloride and with regular soap.

After treatment of contaminated areas with Emulsoderm the amount of e. Coli in the swab decreased by 8 times, and after washing with antibacterial soap - by 16 times. Hygienic cleaning of contaminated skin with cosmetic soap led to reduction of a number of artificial contaminants in the swab by only 7 times.

The results of Horosten effectiveness evaluation for the oral cavity sanitation in comparison with recommended antimicrobial agents are listed in Figure 3.

As the obtained data show, sanitizing activity of Horosten exceeded that of drugs designed specifically for cleaning the mouth. Thus, the number of facultative anaerobic microorganisms in 1 ml of swab from periodontal sites hardly diminished when using Aquafresh (active ingredient - benzalkonium chloride) and Elka Dent Krauter (contains herbal extracts of chamomile, calendula, sage, peppermint essential oil). The use of Colgate-Plax with triclosan resulted in reducing the number of microorganisms in swabs by 6 times. Hygiene of the oral cavity by means of Horosten allowed the reduction of the number of microorganisms in swab by 16 times. This fact opens up prospects for wider use of the drug as an oral antiseptic.

The results of the study of the therapeutic effectiveness of Horosten compared with other antiseptics on wounds confirmed the appropriateness of the use of Horosten for the treatment of purulent wounds. According to the data received, the application of 0.02% aethonium solution showed a slight tendency to a reduction of the terms of wound cleaning and healing (> 0.05) compared with the control group. The use of 0.05% chlorhexidine bigluconate solution and the antiseptic medicine Horosten reduces the time needed for cleaning the wounds for 1-1.7 days (p<0.001). In general, all indicators taken into account in the wound-healing process show that in patients who were treated with Horosten, the wound-healing process was in average by 2 days faster than in using furacilin, aethonium, chlorhexidine bigluconate.

CONCLUSIONS AND PROSPECTS OF FURTHER DEVELOPMENTS

Thus, the results of the study of Horosten properties demonstrated its high preventive and therapeutic effectiveness. Horosten has powerful disinfecting properties, its efficiency is significantly higher than the efficiency of traditional hygiene products and imported drugs and it prevents spreading of intra-hospital infections. Given the softening properties of Horosten, it is reasonable to use it for a long period of time because the drug does not make the skin condition worse. A handy pocket drug polymer packaging with spray (spray) is also attractive and it allows to apply a thin layer evenly on the skin. The cost of Horosten is low, which makes it available for public use.

The study of efficiency of Horosten topical application in the treatment of purulent wounds indicates the advisability of replacing a number of well-known products used in antiseptic surgery by this drug.

Horosten's ability to significantly reduce the number of microorganisms in periodontal area allows the use of this drug in general dental practice. In this case there is no need to use more expensive and less effective imported products.

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LITERATURE:

CHARACTERISTICS OF ANTIMICROBIAL PROPERTIES OF A NEW DOMESTIC ANTISEPTIC PREPARATION HOROSTEN

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The results of study of the antimicrobial properties of preparation Horosten are given in this research. It is estimated that a new antiseptic preparation has high sterilization effect. It is found that a preparation Horosten corresponds to contemporary demands for hygienic scrub solution in vitro. The research of the Horosten effect under conditions of the artificial microbial skin contamination allowed estimating that a new product precedes the activity of the foreign antiseptics Emulsoderm and Extra Protection Antiseptic Desinfectant and antibacterial sapon. In research the results of the local application of the Horosten for treatment of purulent wound are given too. It is demonstrated that Horosten administration in the complex management of the purulent wound accelerated the process of reparation. Research of Horosten's properties is executed as antiseptic preparation for the swab of oral cavity. It is estimates that decontaminated properties of preparation with decametoxin go over the actions of most oral antiseptics, which are realized in Ukraine.