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THE EXPERIENCE OF USING FIBERGLASS PINS FOR THE RESTORATION OF DIARRHEA MOLARS IN PATIENTS OF DIFFERENT AGE GROUPS

I. I. Babich, D. O. Chevshenko, L. Ch. Yuldacheva (Kyiv, Ukraine)

After depulption significantly reduced the strength of the teeth in cause of the reduction of humidity and changes in tissues and changes in the collagen fibers, which leads to fracture of the root and coronal. Features devitalic restoring molars in the mandible through direct restavtrations using reinforcement fiber post and distance results show recovery devitalic molars 6, 12 and 18 months in patients of different age groups.

Key words: devitalic molars, fiber post, direct restavtration, different age groups.

ЕКСПЕРИМЕНТАЛЬНЕ ДОСЛІДЖЕННЯ

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R. FARES¹, L. A. BOBRYTSKA¹, S. M. DROGOVOZ¹, N. V. POPOVA¹,
V. I. HRYTSENKO¹, T. I. IVKO² (Kharkov, Vinnytsya; Ukraine)

RESEARCH OF THE PHARMACOLOGICAL ACTIVITY OF CAPSULES DIAPLANT

¹National University of Pharmacy, Kharkov;

²National Pirogov Memorial Medical University, Vinnytsya <lora2015dm@gmail.com>

We developed the new complex drug diaplant in capsules for pharmacotherapy of acute intestinal infections. Diaplant consist of the nifuroxazide 200 mg and pantaglucidum 200 mg (leaf extract of Plantago major). Antiexudative activity of diaplant was established on the model of carrageenan edema. A comparative drug for the dynamics of antiexudative activity was sodium diclofenac in tablets («Novartis pharma», Sweden). As a result of the experiment, the maximum activity was on the third hour and was 43.1 % in diaplant, and was 64.4 % for sodium diclofenac. Spasmolytic activity of diaplant was studied by the method of «carbon labels». It has been found the identity of indicators for capsules diaplant with comparative drug plantaglucid (Zdorovye, Ukraine).

Key words: nifuroxazide, plantaglucide, capsules, pharmacological activity.

Introduction. Bacterial and viral diarrhea are the most common in last years among infectious diseases according to the data of World Health Organization. Acute intestinal infections (AII) is one of the most urgent problem in the national healthcare. Diarrhea is the third largest among the most common diseases, posing an immediate threat to life [1, 3]. Annually in the world 2.5 billion cases of intestinal diseases with diarrhea is registered. Nifuroxazide is the drug of choice for the treatment of infectious diarrhea according to the prescriptions of physicians. Nifuroxazide is active substance against most pathogens of intestinal diseases such as: *Staphylococcus aureus*, *Streptococcus faecalis*, *Campylobacter jejuni*, *Citrobacter* spp., *Enterobacter* spp., including *Enterobacter cloacae*, *Escherichia coli*, *Hafnia* spp., *Salmonella* spp., *Shigella* spp., *Vibrio cholerae*, *Yersinia enterocolitica*. It does not cause dysbacteriosis. It is indicated in intestinal infections of viral origin also to prevent bacterial superinfection [1, 3].

AII is a polyethological infectious diseases with violation motility of the gastrointestinal tract, diarrhea, intoxication, dehydration. That is why nifuroxazide is combined with prebiotics often for complex correction of intestinal microflora disorders [7].

Plantagluclid (Zdorovyе, Ukraine) is a plant-based remedy (international nonproprietary names leaves extract of *Plantago major*). It contains glycoside aukubin, bitter and tannic substances, carotene, vikasol (vitamin K), methylmethionine sulfonium (vitamin U), flavonoids, polysaccharides, pectins. Plantagluclidum has antispasmodic, anti-inflammatory activity, has enveloping, hemostatic effects, ability to regulate the secretion of gastric juice and pectin substances has protective effect in gastric ulcers. The anti-inflammatory effect is associated with polysaccharides (mucus, pectin), carotene and vitamin U. Glycoside aukubin and bitterness increase the secretion of gastric juice and increase the acidity of gastric juice. The drug regulates digestion, reduces the tone of the smooth muscles of the stomach and intestines, has regenerative effect in gastritis and other inflammatory diseases of the digestive tract. Pectins have immunostimulating action [4].

That is why we developed the new drug diaplant, as a combination of the following substances: nifuroxazide (200 mg) and plantagluclidum (200 mg).

The aim of research – study the antiexudative and spasmolytic effect of diaplant.

Materials and methods. The investigation of anti-exudative activity of diaplant was carried out on the model of acute aseptic carrageenan inflammation. Study of spasmolytic activity was carried out on the model of chlorbaria spasm caused by the introduction of BaCl₂.

Comparison drugs: 1) reference anti-inflammatory drug was diclofenac sodium with the trade mark “Voltaren” (coated tablets, 25 mg) manufactured by «Novartis pharma» (Sweden); 2) reference spasmolytic drug was plantagluclid with the trade mark plantagluclid (granules 1,0 g/2,0 g) produced by the pharmaceutical company “Zdorovyе” (Ukraine).

Methods of research: pharmacological, physiological, methods of mathematical statistics.

We introduce diaplant intragastrically in a dose of 0.5 g/kg in order to determine the anti-exudative activity [2]. We introduced diclofenac sodium intragastrically in an effective dose, which was 8 mg/kg according to the literature [6]. Equivalent amount of solvent was introduced to control animals. The drugs were administered in preventive mode within 4 days before reproducing the model pathology, last time – 1 hour before the induction of inflammation. Solutions or suspension of test substances was introduced from the calculation of 1 ml per 100 g of animal weight in all experiments.

Acute aseptic inflammation was reproduced by administering a 1% solution of carrageenan [2]. The phlogogenic agent was subplantarily administered to rats (0.1 ml per animal) after 1 hour after the last administration of the study drugs.

The measurement of the paw edema in rats performed by Zakharevsky mechanical oncometer in dynamics after 1; 2; 3; 4 and 6 hours after the administration of carrageenin.

Anti-exudative activity of the studied drugs was determined by the ability to reduce the development of edema. Calculation performed by the formula

$$A = 100 \% - \frac{(M_{\text{д}} - M_{\text{з}}) \cdot 100}{M_{\text{д}}^{\text{к}} - M_{\text{з}}^{\text{к}}},$$

where A – anti-exudative activity, %; $M_{\text{д}}$ – volume of swollen paw in experiment (in treated animals); $M_{\text{з}}$ – volume of healthy paw in experiment; $M_{\text{д}}^{\text{к}}$ – volume of swollen paw in control (in treated animals); $M_{\text{з}}^{\text{к}}$ – volume of healthy paw in control.

Experimental studies were performed on the 24 white rats weighing 180–200 g.

The rats were pre-divided into 3 experimental groups: the first group – control pathology, the animals were administered carrageenin; the second group – animals, received diaplant; third group – animals, received reference drug diclofenac sodium.

Spasmolytic activity of drugs was evaluated by the J. Setnicar method [2]. We introduce diaplant intragastrically in a dose of 0.5 g/kg. We introduced plantagluclid

intragastrically in an effective dose, which was 1.0 g/kg according to the literature, recalculation was 0.5 g/kg. Equivalent amount of the solvent was administered to control animal. The drugs were administered in preventive mode within 4 days before reproducing the model pathology, last time – 1 hour before the induction of inflammation. Solutions or suspension of test substances was introduced from the calculation of 1 ml per 100 g of animal weight in all experiments.

10 % of the coal suspension (colorant) was administered intragastrically to reproduce pathology (0.5 ml per animal) and 0.1 % solution of BaCl₂ intraperitoneally (0.2 ml per animal) [2]. Determination of the effect of the diaplant on the evacuation function of the stomach and intestine was carried out on 21 mice weighing 18–22 g. Euthanasia was performed 10 minutes after the introduction of BaCl₂ and an evaluation of peristaltic activity, determined ratio between the total length of the intestine and the filled charcoal. The ratio was expressed as a percentage and was taken into account as the primary result of the experiment.

While applying the method of mathematical statistics, the significance level of $P < 0.05$ was accepted [2]. In order to obtain conclusions when comparing statistical samples of relative variables the Newman – Keils criteria, the Student's criteria for multiple comparisons or Mann – Whitney criterion were used. For the mathematical calculations the standard statistical software package Statistica 6.0 was used [5].

Results and discussion. Maximum volume of paw edema (twice as much as the original size) was registered for the third hour after administration of phlogogen in the control group of animals (Table 1). Edema reduction was recorded after 6 hours. But the size of the paws of animals was still 1.7 times higher than the initial size.

Table 1. Diaplant effect on the dynamics of edema under on the model of carrageenan edema in rats ($M \pm m$)

Experiment group ($n = 8$)	Original paw size (units)	Paw size (units)				
		1 hour	2 hours	3 hours	4 hours	6 hours
Control pathology	37,4 ± 1,1	56,7 ± 1,2	66,0 ± 0,7	73,6 ± 1,6	70,8 ± 1,6	65,2 ± 1,4
Diaplant, 0,5 g/kg	38,2 ± 0,6	50,9 ± 1,2*	55,0 ± 1,2*. **	58,8 ± 1,1*. **	60,0 ± 0,9*. **	57,5 ± 1,3*
Diclofenac sodium, 8 mg/kg	37,6 ± 0,9	46,0 ± 0,9*	48,3 ± 1,5*	50,5 ± 1,7*	53,0 ± 1,3*	48,8 ± 1,0*

* Differences are statistically significant with respect to the group of control pathology ($P < 0,05$).

**Differences are statistically significant with respect to the group with diclofenac sodium ($P < 0,05$).

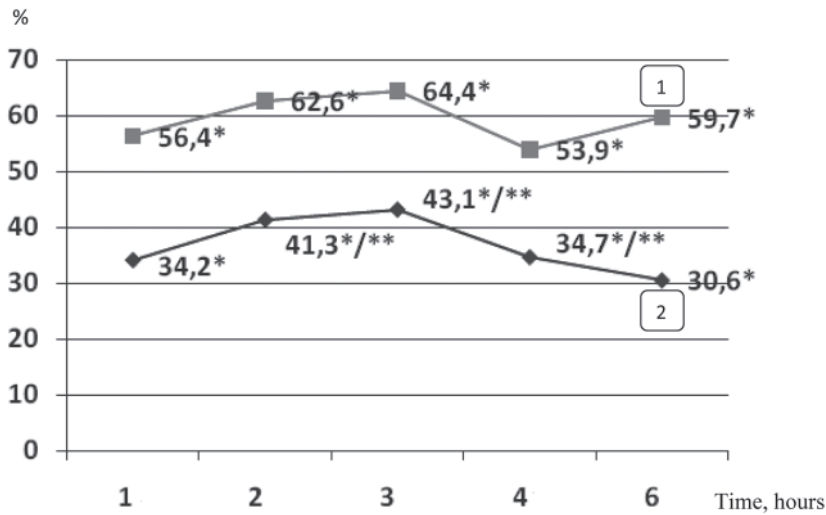
n – number of animals in the group.

Diaplant and diclofenac sodium showed different anti-exudative activity during the first hour of the experiment. Antiexudative activity of diaplant was 34.2 %, diclofenac sodium – 56,4 % in the first hour of researche ($P < 0,05$) (Figure).

Anti-exudative activity in the second hour of Diaplant was 41.3 %, diclofenac sodium – 62.6 %, in the third hour diaplant was 43,1 %, diclofenac sodium – 64,4 %. So, anti-exudative activity diaplant and comparative drug diclofenac sodium showed a maximum value for the third hour of the experiment. Anti-exudative activity of diaplant and diclofenac sodium decreased in 1.2 times and were 34.7 % and 53.9 %, respectively, in the fourth hour (significant differences). Biggest anti-exudative activity showed diclofenac sodium on the fourth hour (see Table 1, Figure). Diaplant showed of 30.6 % anti-exudative effect at the end of the experiment (6 hours). Anti-inflammatory effect of diclofenac sodium was 59.7 % (6 hours), all differences were statistically significant (see Table 1).

We determined the average anti-exudative activity (6 hours) according to the data obtained in the experiment. Anti-exudative activity of Diaplant was 36, 8 %, diclofe-

nac sodium – 59,4 %. So, anti-exudative activity of diclofenac sodium was more in 1.6 times.



Anti-exudative activity of diaplant (indicator deviation significantly in relation to *control pathology, **diclofenac sodium, P < 0,05):

1 – diclofenac sodium; 2 – diaplant

Diaplant showed the presence of antiexudative activity on the model of carrageenan edema. Diaplant was active throughout the experiment. Therefore, in the mechanism of the anti-exudative action of diaplant there is an inhibition of biogenic amines (histamine, serotonin), kinins, prostaglandins and leukotrienes. Diaplant component plantaglucide increases antioxidant protection and suppresses the processes of lipid peroxidation according to the literature [8].

In the study of spasmolytic activity in the group of mice that received diaplant was maximum distance coal promote the intestines of mice (in 1.6 times more) (Table 2). Comparative preparation plantaglucide had similar effects. Thus, gastrointestinal tract spasm (result of BaCl₂ introduction) decreased. It is showed the spasmolytic activity of the diaplant and plantaglucide.

Table 2. Evaluation of spasmolytic action by method “Coal marks”(BaCl₂) (M ± m)

Experiment group (n = 8)	Length of the coal-filled part of the	
	intestine by 1 mouse, sm	total length of the intestine, %
Control pathology	21,3 ± 1,6	38,4 ± 2,5
Diaplant, 0,5 g/kg	35,1 ± 1,2*	61,3 ± 2,2*
Plantaglucide, 0,5 g/kg	34,2 ± 1,4*	59,9 ± 1,9*

*Differences are statistically significant with respect to the group of control pathology (P < 0,05).

Similarity of the indicators shows the similarity of the mechanism of action. this is due to the composition of diaplant. So, the study showed that diaplant has an antispasmodic effect and this effect corresponds to the action of the reference drug.

Conclusions. For complex pharmacotherapy of acute intestinal infections we developed the new drug diaplant in capsules. Diaplant consist of the nifuroxazide and plant substance plantaglucide. Anti-exudative activity of diaplant was established on the model of carrageenan edema. A comparative drug for the dynamics of anti-exudative activity was sodium diclofenac. As a result of the experiment, the maximum activity was on the third hour and was 43.1 % in diaplant, and was 64.4 % for sodium diclofenac. Spasmolytic activity of diaplant was studied by the method of «carbon labels».

It has been found the similarity of indicators for capsules diaplant with comparative drug plantaglucide.

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ВИВЧЕННЯ ФАРМАКОЛОГІЧНОЇ АКТИВНОСТІ КАПСУЛ ДІАПЛАНТ

*Р. Фарес, Л. О. Бобрицька, С. М. Дроговоз, В. І. Гриценко,
Н. В. Попова, Т. І. Івко (Харків, Вінниця)*

Для комплексного лікування гострих кишкових інфекцій нами розроблено оригінальний комбінований лікарський засіб діаплант, одна капсула якого містить 200 мг ніфуроксазиду (діюча речовина) і 200 мг плантаглюциду (рослинна субстанція). На моделі каррагенінового набряку встановлена антиексудативна активність препарату. Порівняльна динаміка антиексудативної активності проведена з таблетками натрію диклофенаку («Novartis pharma», Швеція). В результаті експерименту активність досягла максимального значення до 3-ї години і склала 43,1 % для діапланту і 64,4 % для натрію диклофенаку. Методом «вугільних міток» вивчена спазмолітична активність капсул діаплант. Встановлено ідентичність показників діапланта з плантаглюцидом (ФК «Здоров'я» Україна).

Ключові слова: ніфуроксазид, плантаглюцид, капсули, фармакологічна активність.

ИЗУЧЕНИЕ ФАРМАКОЛОГИЧЕСКОЙ АКТИВНОСТИ КАПСУЛ ДИАПЛАНТ

*Р. Фарес, Л. А. Бобрицкая, С. М. Дроговоз, В. И. Гриценко,
Н. В. Попова, Т. И. Ивко (Харьков, Винница)*

Для комплексной терапии острых кишечных инфекций нами разработано оригинальное комбинированное лекарственное средство диаплант, одна капсула которого содержит 200 мг нифуроксазида (действующее вещество) и 200 мг плантаглюцида (растительная субстанция). На модели каррагенинового отёка установлена антиэкссудативная активность препарата. Сравнительная динамика антиэкссудативной активности проведена с таблетками натрия диклофенака («Novartis pharma», Швеция). В результате эксперимента активность достигла максимального значения к 3-му часу и составила 43,1 % для диапланта и 64,4 % для натрия диклофенака. Методом «угольных меток» изучена спазмолитическая активность капсул диаплант. Установлена идентичность показателей диапланта с плантаглюцидом (ФК «Здоров'я» Украина).

Ключевые слова: нифуроксазид, плантаглюцид, капсулы, фармакологическая активность.