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# Experimental treatment of dysbiosis in colitis with hepatitis

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## Abstract

Nonspecific colitis (inflammation of the colon mucosa) is a common gastroenterological disease. The causative factors of this disease are intestinal dysbiosis, which leads to an increase in blood concentration of intestinal endotoxin (lipopolysaccharide), as well as impaired liver antimicrobial function.

The purpose of this study was to determine the possibility of preventing colitis, which develops as a result of a combination of dysbiosis and hepatitis, with the help of biotrit, which has an antidysbiotic and hepatoprotective effect.

The experiments were conducted on 24 white rats of the Wistar line (males, 1 month old), divided into 3 equal groups: 1 - control (normal); 2 - dysbiosis + hepatitis without treatment; 3 - dysbiosis + hepatitis + drug "Biotrit".

Dysbiosis was caused by the antibiotic lincomycin, which was given to rats with drinking water at a dose of 60 mg / kg for the first 5 days. Toxic hepatitis was reproduced in rats using hydrazine hydrochloride.

Studies have shown that the phytopreparation Biotrit has a mucosoprotective effect in experimental nonspecific colitis due to both antidysbiotic and antioxidant effects.

**Key words: colitis; hepatitis; dysbiosis; herbal remedies**

Introduction

Nonspecific colitis (inflammation of the colon mucosa) is a common gastroenterological disease. The causative factors of this disease are intestinal dysbiosis, which leads to an increase in blood concentration of intestinal endotoxin (lipopolysaccharide), as well as impaired liver antimicrobial function [1-4].

We have previously shown that the combination of intestinal dysbiosis with hepatitis causes the development of dysbiosis and inflammation of the colon mucosa [7-8].

The purpose of this study was to determine the possibility of preventing colitis, which develops as a result of a combination of dysbiosis and hepatitis, with the help of biotrit, which has an antidysbiotic and hepatoprotective effect.

Materials and research methods

The experiments were conducted on 24 white rats of the Wistar line (males, 1 month old), divided into 3 equal groups: 1 - control (normal); 2 - dysbiosis + hepatitis without treatment; 3 - dysbiosis + hepatitis + drug "Biotrit".

Dysbiosis was caused by the antibiotic lincomycin, which was given to rats with drinking water at a dose of 60 mg / kg for the first 5 days. Toxic hepatitis was reproduced in rats using hydrazine hydrochloride at a dose of 100 mg / kg, administered intravenously / muscle once 2 days before euthanasia. Biotrit was administered per os at a dose of 200 mg / kg from the first to the last day of the experiment [5, 6].

Animal euthanasia was performed on day 22 under thiopental anesthesia (20 mg / kg) by total bloodletting from the heart. The cecum was removed, washed from the contents with 0.9% NaCI, and the mucous membrane was scraped off, which was stored at -30 ° C until the study. Urease activity (a biochemical marker of microbial contamination) was determined in the mucous homogenate by urea cleavage, lysozyme activity (an indicator of nonspecific immunity) by the bacteriological method, the level of biochemical markers of inflammation: the content of malondialdehyde (MDA) [16] and total proteolytic activity (TPA) for casein hydrolysis, activity of the antioxidant enzyme catalase, protein content by the Lowry method. The antioxidant-prooxidant API index was calculated by the ratio of catalase activity and

MDA content. The ratio of the relative activities of urease and lysozyme calculated the degree of dysbiosis according to Levitsky.

Research results and discussion

Table 1 presents the results of determining the activity of urease and lysozyme in the colon mucosa, which indicate a more than twofold increase in urease activity and a 6-fold decrease in lysozyme activity. The introduction of Biotrit normalizes the level of urease and increases 3 times the activity of lysozyme, which gives a 6-fold decrease in the degree of dysbiosis (Table 2).

Table 1 - The effect of the drug "Biotrit" on the activity of urease and lysozyme in rat mucosa with combined pathology: dysbiosis + hepatitis (M ± m, n = 8 in all groups)

| № | Groups | Urease<br>mk-cat / kg | Lysozyme<br>u / kg |
|---|---|---|---|
| 1 | The control | 9,43 ± 0,81 | 62±5 |
| 2 | Dysbiosis + hepatitis (D + H) | 19,76 ± 2,85<br>p < 0,01 | 10 ± 4<br>p < 0,01 |
| 3 | D + H + Biotrit | 9,51 ± 2,87<br>p > 0,5<br>$p_1$ < 0,05 | 33 ± 3<br>p < 0,05 |

*Notes: p - in comparison with column 1, p1 - in comparison with column 2.*

Table 2 shows that the introduction of biotrit slightly increases the protein content in the colon mucosa (however, p> 0.05).

Table 2 - The effect of the drug "Biotrit" on protein content and degree dysbiosis in the mucosa of the colon of rats with combined pathology: dysbiosis + hepatitis (M ± m, n = 8 in all groups)

| № | Groups | Protein,<br>g / kg | Power<br>dysbiosis, units |
|---|---|---|---|
| 1 | The control | 43,32 ± 4,65 | 1,00 ± 0,15 |
| 2 | Dysbiosis + hepatitis (D + H) | 43,35 ± 5,31<br>p > 0,9 | 13,12 ± 1,06<br>p < 0,001 |
| 3 | D + H + Biotrit | 56,33 ± 5,20<br>p > 0,05<br>$p_1$ > 0,05 | 33 ± 3<br>p < 0,05<br>$p_1$ < 0,001 |

*Notes: p - in comparison with column 1, p1 - in comparison with column 2.*

Table 3 presents the results of determining the level of biochemical markers of inflammation. From these data it is seen that with dysbiosis with hepatitis, the level of both markers of inflammation significantly increases, indicating the development of mucositis. The introduction of biotrit significantly reduces the level of inflammation markers: by 9.6% the content of MDA and by 48.3% the activity of proteases.

Table 3 - The effect of the drug "Biotrit" on the level of markers inflammation in the mucosa of the colon of rats with combined pathology: dysbiosis + hepatitis (M ± m, n = 8 in all groups)

| № | Groups | MDA<br>mmol / kg | TPA,<br>mk-cat / kg |
|---|---|---|---|
| 1 | The control | 4,07 ± 0,28 | 2,70 ± 0,29 |
| 2 | Dysbiosis + hepatitis (D + H) | 6,80 ± 0,09<br>p < 0,01 | 5,49 ± 0,51<br>p < 0,01 |
| 3 | D + H + Biotrit | 6,15 ± 0,18<br>p < 0,01<br>$p_1$ < 0,05 | 2,84 ± 0,26<br>p > 0,3<br>$p_1$ < 0,01 |

*Notes: p - in comparison with column 1, p1 - in comparison with column 2.*

Table 4 presents the results of determining the activity of catalase and the API index, which indicate a significant decrease in the level of antioxidant protection in the mucosa of the colon of rats with a combined pathology. The introduction of biotrit increases both indicators, but they do not reach the control indicators.

Table 4 - The effect of the drug "Biotrit" on the activity of catalase and antioxidant-prooxidant API index in rat mucosa with a combined pathology: dysbiosis + hepatitis (M ± m, n = 8 in all groups)

| № | Groups | Catalase<br>mkat / kg | API,<br>units |
|---|---|---|---|
| 1 | The control | 5,11 ± 0,06 | 12,55 ± 0,60 |
| 2 | Dysbiosis + hepatitis (D + H) | 4,55 ± 0,14<br>p < 0,05 | 6,79 ± 0,42<br>p < 0,001 |
| 3 | D + H + Biotrit | 4,95 ± 0,05<br>p < 0,05<br>$p_1$ < 0,05 | 8,03 ± 0,51<br>p < 0,01<br>$p_1$ > 0,05 |

*Notes: p - in comparison with column 1, p1 - in comparison with column 2.*

Thus, the studies showed that the phytopreparation Biotrit has a mucosoprotective effect in experimental nonspecific colitis due to both antidisbiotic and antioxidant effects.

Conclusions:

1. Combined pathology (dysbiosis + hepatitis) cause the development of nonspecific colitis (geopathogenic colitis).

2. Phytopreparation "Biotrit" has a mucosoprotective effect in colitis, showing antidisbiotic and antioxidant properties.

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