

# Characteristics of Blood Lipid Profile in Patients with Reactive Arthritis with Disturbance of Microbiocenosis of the Gastroduodenal Zone and Ways of its Correction

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## Abstract:

The purpose of the study was to study lipid metabolism in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone and to evaluate the clinical possibilities of probiotics in order to correct disorders of the microbiocenosis of the gastroduodenal zone and metabolic disorders. Material and methods: 200 patients with reactive arthritis with microbiocenosis of the gastroduodenal zone were taken for the study.

Results: Based on the data obtained, it can be concluded that the addition of drugs that improve the state of intestinal microbiocenosis to the standard treatment regimen for reactive arthritis in violation of the lipid spectrum contributes to the normalization of the lipid profile in this category of patients.

**Keywords:** Reactive arthritis, lipid profile, microbiocenosis, dyslipidemia.

## Introduction

At present, it is known that a huge number of provocative factors influence the change in the microflora of the gastroduodenal zone: diseases of the internal organs; iatrogenic effects – antibiotics, hormones, cytostatics, radioactive therapy, surgical interventions; acute infectious diseases of the gastrointestinal tract; decreased immunity; stresses of various origins, especially chronic stress; irregular and/or unbalanced diet, dietary fiber deficiency, consumption of food containing genetically modified foods. [1,5,8].

The term "dysbiosis" is used to refer to changes in the bacterial composition of the intestine, which was introduced by A. Nissle in 1916. Initially, the author understood dysbacteriosis as changes related only to *Escherichia coli*. In 1962, L.G. Peretz defined dysbacteriosis as a pathological state of the intestinal microflora, with a decrease in the total number of typical *Escherichia coli*, a decrease in their antagonistic and enzymatic activity, the appearance of lactose-negative and hemolytic *Escherichia coli*, and an increase in the number of aerobic microorganisms [2]. At the moment, dysbacteriosis is

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considered as a clinical and laboratory syndrome that occurs in a number of diseases and clinical situations, characterized by changes in the qualitative and/or quantitative composition of normal microflora, metabolic and immune disorders, accompanied by clinical manifestations in some patients [3,9].

Dysbiosis is widespread in both the general population; and in patients with diseases of internal organs. These include, in addition to the diseases of the digestive system listed above, diseases of the connective tissue (rheumatoid arthritis, reactive arthritis), cardiovascular diseases (coronary heart disease, myocardiopathies), metabolic diseases (obesity, dyslipoproteinemias, urolithiasis), oncopathological processes, allergic and autoimmune diseases (bronchial asthma, rheumatoid arthritis and other diffuse connective tissue diseases). gynecological diseases (endometriosis, dysmenorrhea) and many other clinical syndromes and pathological conditions. The results of many scientific studies indicate the involvement of the microbiota in the pathogenesis of these diseases at different stages [3,7,8].

In reactive arthritis, microbiocenosis disorder occurs in 90% of cases. Dysbiotic changes in the intestine, as they progress, worsen the clinical course of the underlying disease, contributing to an increase in the atherogenic potential of blood serum.

These circumstances predetermine the need to improve approaches to the correction of metabolic disorders in patients with reactive arthritis.

One of them may be the use of probiotics, which help restore normal intestinal microflora. According to the theoretical justification, experimental data, and already accumulated clinical experience, the use of microbiocenosis correction agents in the treatment of blood lipid spectrum disorders is promising [4,6] and requires a more detailed study. It is necessary to assess the relationship between the state of lipid metabolism and intestinal dysbiosis in reactive arthritis. The evaluation of the possibilities of probiotic therapy in order to correct metabolic changes is in high demand. All the above circumstances predetermine the relevance of this study.

**The aim of the study was to** study lipid metabolism in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone and to assess the clinical capabilities of probiotics in order to correct disorders of the microbiocenosis of the gastroduodenal zone and metabolic disorders.

**Materials and Methods:**

For the study, 200 patients with reactive arthritis with the detection of the microbiocenosis of the gastroduodenal zone were taken. The criteria for diagnosing dysbacteriosis were the following:

1. changes in the ratio of aerobic and anaerobic microflora;
2. reduction of bifidobacteria, lactobacilli and bacteroides;
3. changes in the ratios of microorganisms of groups of obligate and facultative

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representatives of normal microflora;

4. increase in the total number of *Escherichia coli* with altered biological properties (with reduced enzymatic activity, lactose-negative, non-motile, etc.);

5. the appearance of hemolyzing *Escherichia* and staphylococci that are absent in the norm;

6. expansion of the microflora beyond the boundaries of the habitual habitat zone, which is expressed in the syndrome of excessive colonization of the small intestine [101, 102, 118].

Currently, there is no single classification in determining the degree of dysbacteriosis. Many authors adhere to the classification according to the degree of severity, based on the data of clinical and microbiological (assessment of the qualitative and quantitative composition of the microflora) study.

Total cholesterol (OC) was determined by the Ilk method by reaction with acetic anhydride, and lipoprotein fractions by electrophoresis in polyacrylamide gel. To determine the type of DLP, laboratory data were used: serum OC, TG, HDL-C. The cholesterol content in LDL was calculated using the Friedwald formula ( $JH1HL1 = OH-L11VP-TG/5$ ). Phenotyping of DLP was carried out according to the classification proposed in 1967 by D. Fredrickson et al. and approved and expanded in 1970 by the WHO [74].

Lipid peroxidation was assessed by the method of determining the concentration of malondialdehyde in the reaction of the latter and 2-thiobarbituric acid at high temperature and acidic pH and the formation of a colored trimethyl complex (wavelength - 532 nm) [32].

### **Results of the Study:**

Among the examined 200 patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone, 62 people with dyslipoproteinemia were selected.

In each subject, the main parameters of lipid metabolism and the type of their abnormalities were determined according to the classification of D. Frederickson et al. (1967), extended by WHO experts [185, 205].

Depending on the type of therapy received, two study groups and one comparison group were formed. Group 1 included 22 patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone and lipid metabolism disorders, who underwent complex treatment, including a standard therapy regimen for reactive arthritis (antibiotic therapy, nonsteroidal anti-inflammatory drugs, aminoquinoline drugs, glucocorticosteroids), as well as a biologically active supplement with a probiotic mechanism of action Lacto G at a dose of 1 g 3 times a day during food for 3-4 weeks. Group 2 of Study 2 included 20 patients with reactive arthritis with impaired gastroduodenal microbiocenosis and lipid metabolism disorders, who underwent complex treatment, including a standard therapy regimen for reactive arthritis (antibiotic therapy, nonsteroidal anti-inflammatory drugs, aminoquinoline drugs,

glucocorticosteroids) who received simvastatin at a dose of 10 mg once a day (in the evening) for 3-4 weeks along with the standard treatment regimen.

The third group (control) consisted of 20 patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone and lipid metabolism disorders, who underwent a standard therapy regimen for reactive arthritis (antibiotic therapy, nonsteroidal anti-inflammatory drugs, aminoquinoline drugs, glucocorticosteroids)

The full scope of the following diagnostic measures was carried out in all patients before treatment and 1-1.5 months after the start of therapy.

In 62 examined patients with DLP, the following types of lipid metabolism disorders were revealed: in group 1, 54.5% had type IIa, 21.8% had type IIb, and 27.3% had type IV DLP. Group 2 patients were diagnosed with type II DLP in 45% of cases, type II DLP in 35% and type IV DLP in 20%.

In group 3, patients with type IIa (40%) also prevailed, 30% had type IIb DLP, and 30% had type IV DLP.

The nature of the detected DLPs in patients is presented in Table 1.

Table 1 Indicators of lipid metabolism in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone.

	Group 1	Group 2	Group 3
II a type DLP	54,5%	45%	40%
II b type DLP	18,2%	35%	30%
Type IV DLP	27,3%	20%	30%

Thus, the nature of the detected changes allows us to conclude that the predominant types of dyslipoproteinemia in patients in this category are Pb and Pa according to the classification of D. Fredrickson et al.

Before treatment, all patients had an increase in the level of total cholesterol in the blood serum: in group 1 -  $7.20 \pm 0.18$  mmol/l, in group 2 -  $7.35 \pm 0.33$  mmol/l, and in group 3 -  $7.28 \pm 0.9$  mmol/l (Figure 1).

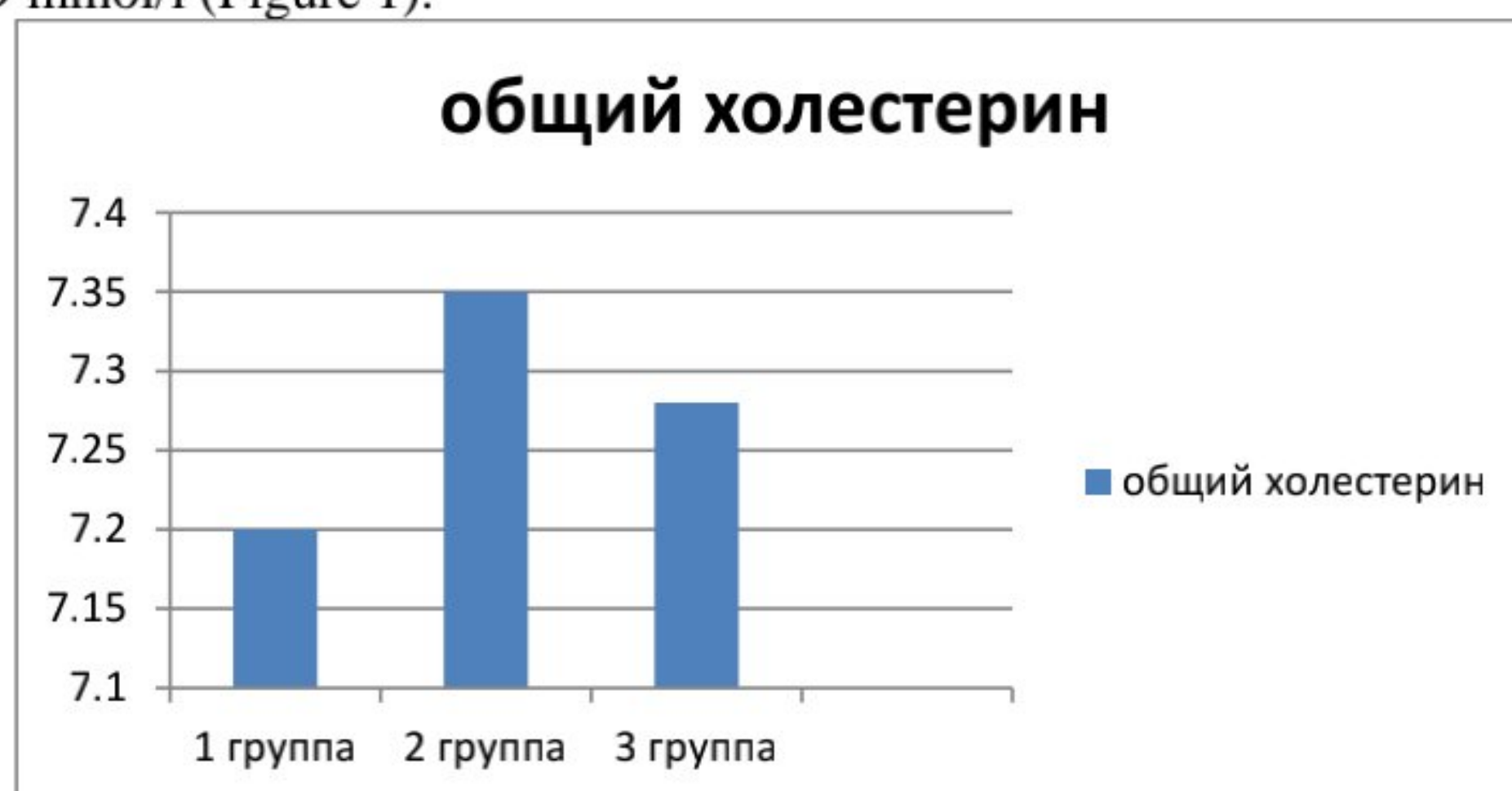


Figure 1.

Rice. 1. Serum total cholesterol level in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before treatment (norm - 3.6 - 5.2 mmol/l)

The amount of triglycerides in the blood serum did not exceed the normal level: in the first group -  $1.89 \pm 0.12$  mmol/l, in group 2 -  $1.98 \pm 0.35$  mmol/l and in group 3 -  $1.87 \pm 0.09$  mmol/l.

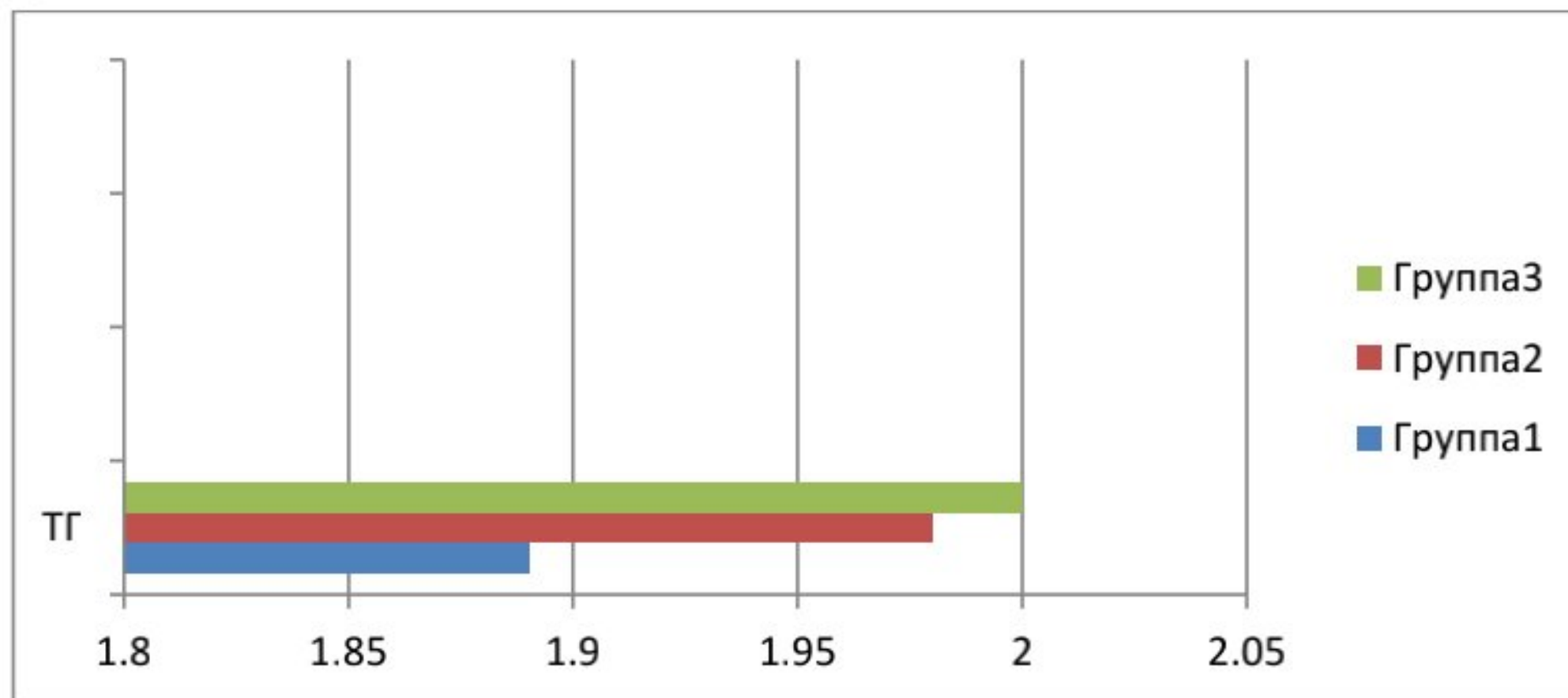


Figure 2.

Rice. 2. Serum triglyceride level in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before treatment (norm - 0.4-1.88 mmol/l) An increase in serum LDL cholesterol in all groups (group 1 -  $4.03 \pm 0.04$  mmol/l, group 2 -  $3.85 \pm 0.05$  mmol/l, group 3 -  $3.89 \pm 0.11$ ) (Figure 3).

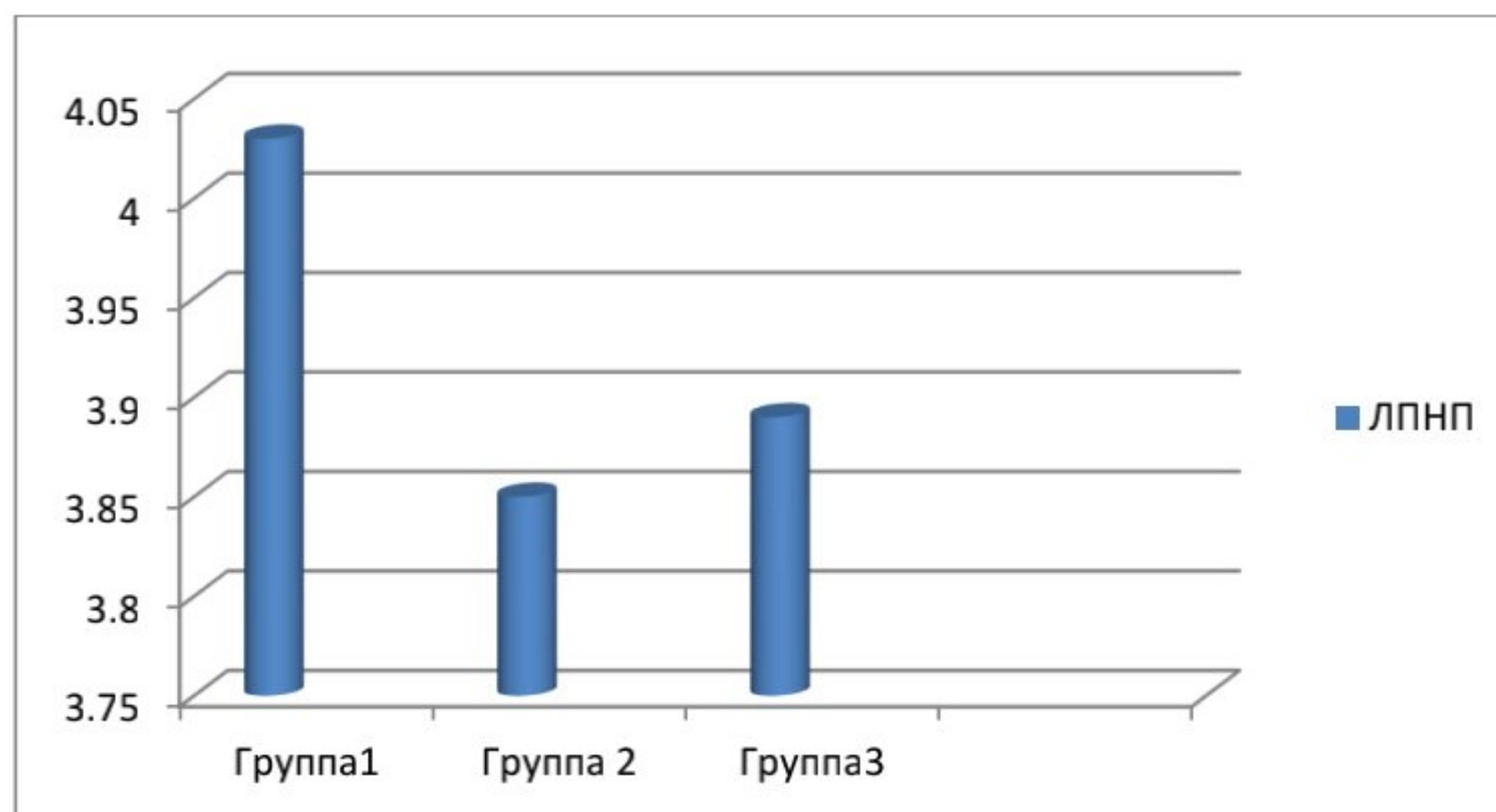


Figure 3 Rice. 3. Level of low-density lipoprotein cholesterol in blood serum in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before treatment (norm < 3.4 mmol/l)

The content of VLDL cholesterol in the blood serum in patients of group 1 was  $0.39 \pm 0.02$  mmol/l, in patients of group 2 -  $0.41 \pm 0.38$  mmol/l, in patients of group 3 -  $0.43 \pm 0.04$  mmol/l.

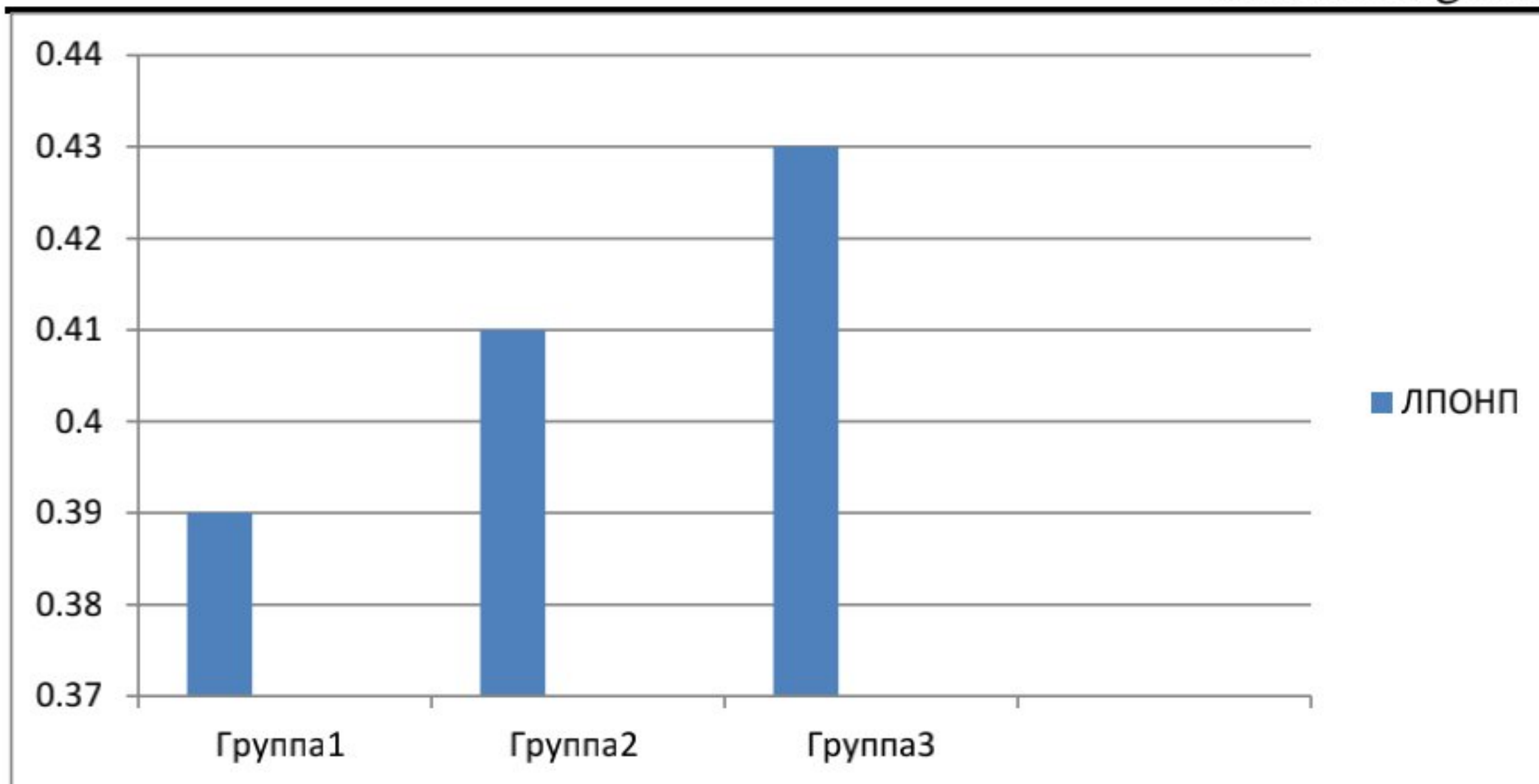


Figure 4. Rice. 4. The level of very low-density lipoprotein cholesterol in blood serum in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before treatment (the norm is not < 038 mmol/l)

The content of HDL cholesterol in the blood serum before treatment was: in the first group -  $1.28 \pm 0.05$  mmol/l, in the second group -  $1.39 \pm 0.13$  mmol/l, in the third group -  $1.29 \pm 0.07$  (Figure 5).

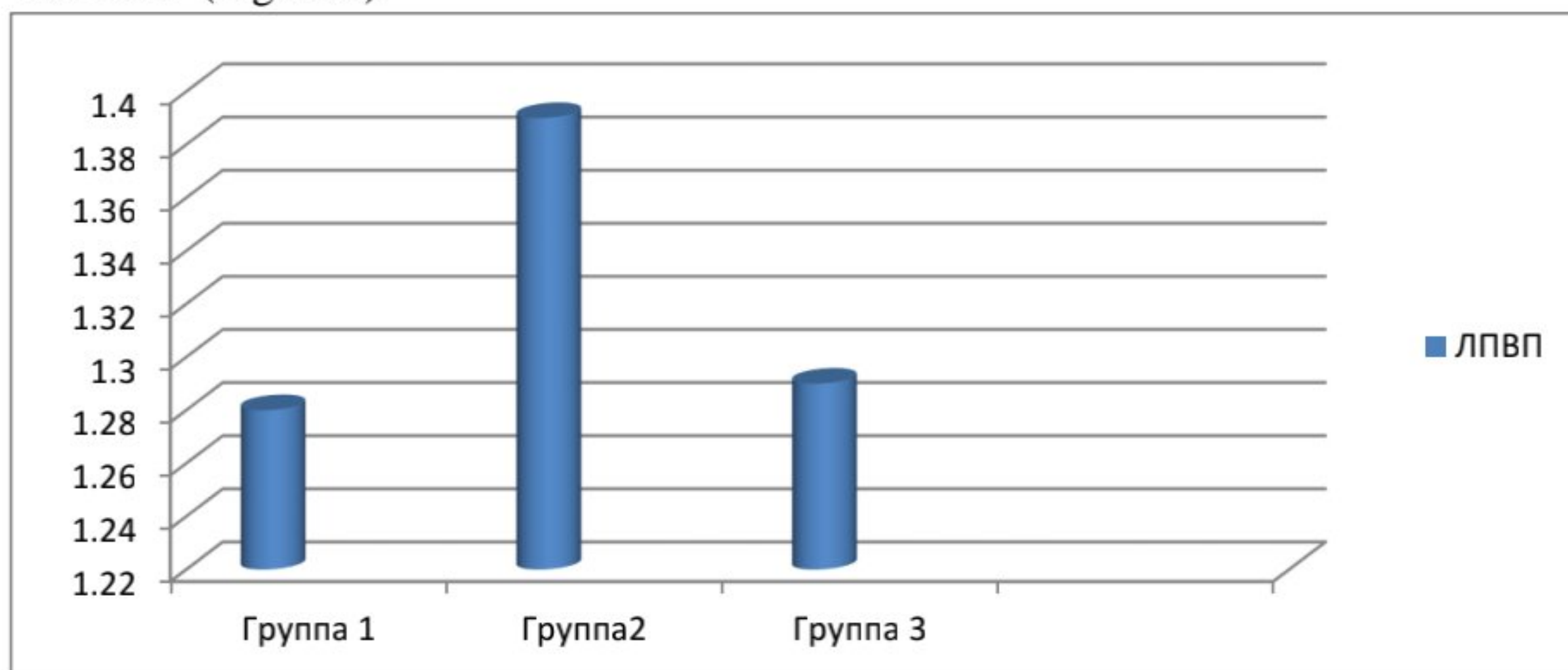


Figure 5. Rice. 5. Level of high-density lipoprotein cholesterol in blood serum in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before treatment (norm not less than 0.9 mmol/l)

Lipid metabolism disorders are naturally manifested by changes in CA, which were manifested in all types of DLP. The CA in group 1 was 4.625, in group 2 - 4.29, in group 3 - 4.64 (Figure 6).

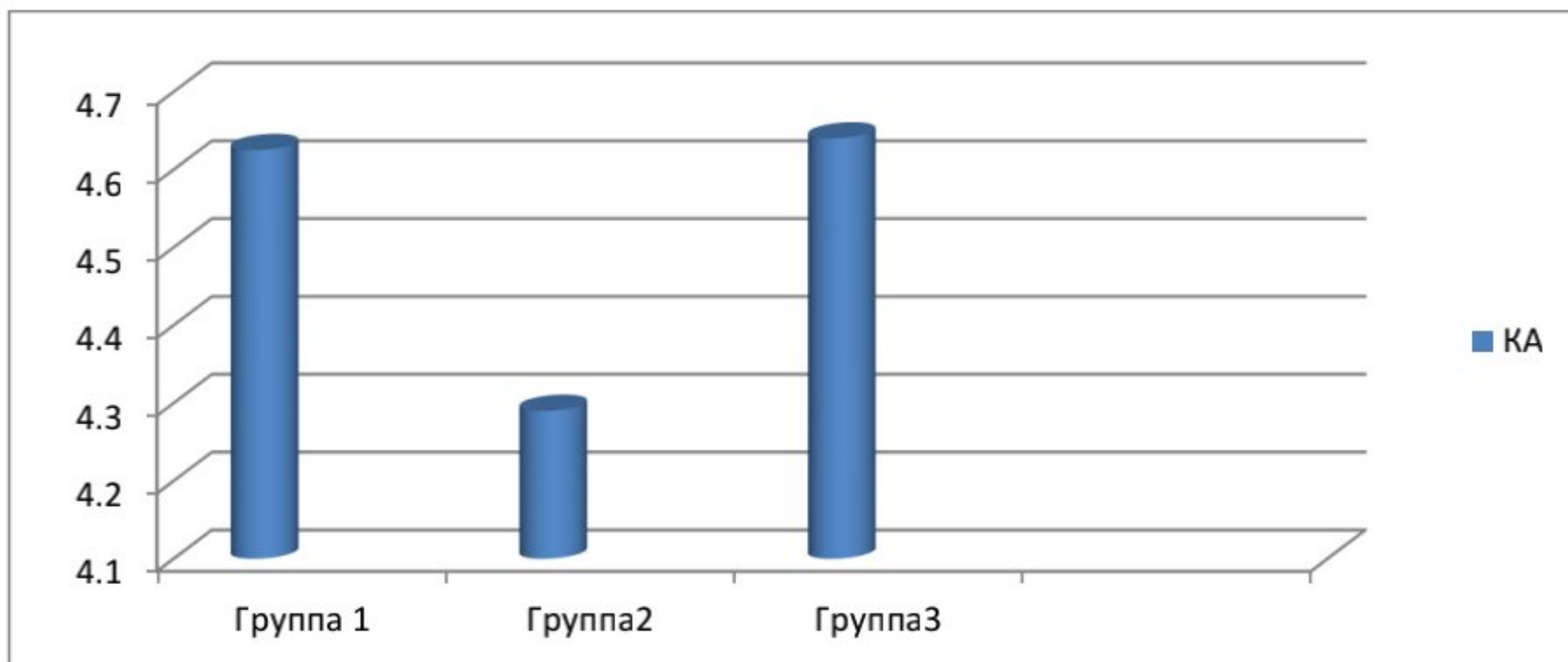


Figure 6.

Rice. 6. Atherogenicity coefficient in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before treatment (norm not more than 2.5) It seems to us that DLP reflects the systemic reaction of the body in the form of pathological processes that go beyond one organ and are characterized by dysmetabolic disorders.

**Dynamics of blood lipid spectrum indicators against the background of various therapy regimens in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone.**

The results obtained in the studied groups of patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone are given in Table 2.

Table 2. Indicators of blood lipid profile in the studied groups of patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone (after treatment).

	OH	TG	LDL	VLDL	HDL
Group 1	5,43	1,56	3,3	0,33	2,08
Group 2	5,4	1,63	3,2	0,35	1,41
Group 3	7,27	1,88	3,9	0,41	1,27

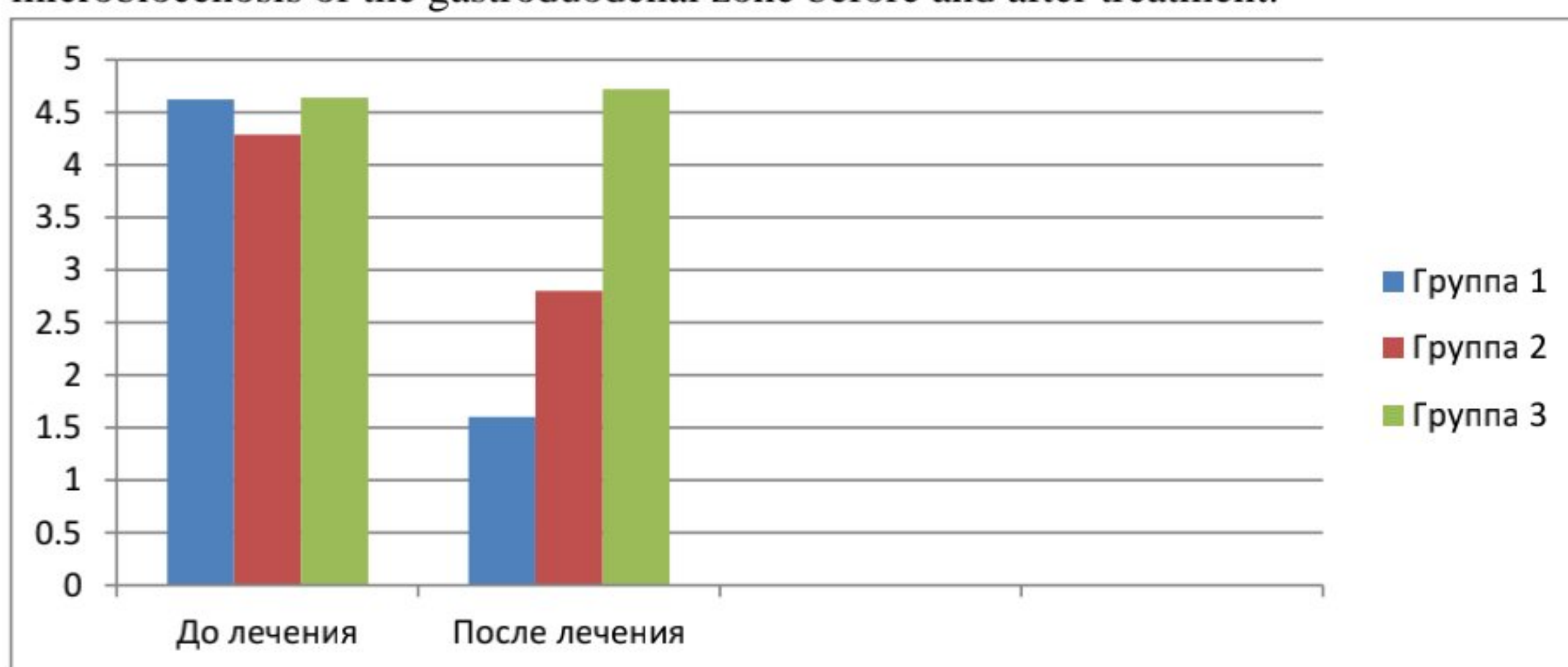
In the biochemical blood test against the background of therapy, there was a positive dynamics of lipid profiles, comparable in indicators in the first group and in the second, there was a tendency to reduce cholesterol, triglycerides, low-density lipoproteins, but a significant increase in the level of high-density lipoproteins was registered only in the first group that received probiotic therapy.

From the above data, it can be seen that the use of probiotic drugs as part of complex therapy in patients with reactive arthritis has a pronounced lipid-lowering effect, comparable to the action of simvastatin, increases the level of antiatherogenic high-density lipoproteins.

The dynamics of changes in the atherogenicity coefficient are shown in Figure 7.

Figure 7.

Atherogenicity coefficient in patients with reactive arthritis with impaired microbiocenosis of the gastroduodenal zone before and after treatment.



Based on this, it can be concluded that the addition of drugs that improve the state of the intestinal microbiocenosis to the standard therapy regimen for reactive arthritis in case of lipid spectrum disorders contributes to the normalization of the lipid profile in this category of patients.

The use of probiotics as part of the complex therapy of patients with reactive arthritis is accompanied by: lipid-lowering effect comparable to that of simvastatin, while probiotics, to a greater extent than simvastatin, contribute to an increase in the level of the antiatherogenic fraction of high-density lipoprotein cholesterol, reducing the atherogenicity coefficient from 4.625 to 1.6 has a positive effect on the possible development of complications of cardiovascular diseases and improves the quality of life Patients.

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