Ozone in complex unclear-ethiology uveitis treatment

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Abstract

In spite of the progress of ophthalmology in the last years the problem of uveitis - an inflammatory disease of the choroid - remains one of the most complex in the clinical picture of the ocular diseases. Uveitis is a serious inflammatory process in the eye. It is mostly common for persons of the young age and quite often ends in a sharp decrease in the visual function or blindness. It forms 7-10% of the general series of the ocular diseases[7]. Uveitis is a cause of blindness in 5-18% of all those who failed eyesight and affects basically young and able-bodied persons[5]. At present, it is well known that any inflammation is mediated by the immune system. So it is difficult to overestimate the role of immunologic reactions in the clinical course and aggressive clinical behavior of the an intraocular inflammation[4]. Having disclosed the mechanisms of immune reactions it has become possible to understand the aggressive clinical behavior of inflammatory processes in eye, as well as to treat them adequately[3]. The Processes lipid peroxidation play the important role in patogenesis uveitis[1].

The endogenous factors in the ethiology of the vascular tract inflammatory diseases occupy the first place. This is due to the anatomical structure of the uveal tract. The uveitis ethiology remains unclear in 38 - 58%[5]. Regardless of the ethiology the treatment of the endogenous uveitis deseased pursues the main purpose: elimination of the inflammation signs, preservation or functional recovery of the eye, and relapse prevention. Searching for the reserves increasing the uveitis treatment efficiency remains one of the most important problems in modern ophthalmology[6]. Starting the present study we suppose that ozone immunomodulatory action can be used on all the levels of pathogenetic therapy.

Introduction

The main purpose. research into some cellular and humoral immunity idecis, lipid peroxidation activity and general antioxidant system in dynamic against a background of bringing ozone in complex treatment of patients suffering from uveitis of unclear origin.

Materials and Methods

Research into some cellular and humoral immunity indices, as well as lipid peroxidation and antioxidant activity has been carried out. 60 patients from 17 to 73 years old suffering from uveitis of unclear origin have been under watch. All of them underwent in-treatment at Republic Ophthalmologic Hospital in Saransk. Out of all the examined patients, 25 persons comprised the control group, as they have been administered traditional treatment. The main group comprised 35 persons and alongside with the traditional treatment the patients have been administered ozone therapeutics. Ozone therapeutics was given at the Medozons-BM apparatus. Ozonation was carried out by means of sparging 200 ml of sterile 0,9% sodium chloride brine with ozonic-oxogenous mixture for 10 minutes, concentration of ozone comprised 2000 mkg/l. The patients were injected the mixture by intravenous drip-feed (8-10 ml/min), course of 5-6 procedures. Research into cellular immunity conditions consisted in computation of the total number of T-lymphocytes, assessment of helper and suppressor T-lymphocytes subpopulations by theophillin trial, examination of the ration of T-helpers to T-suppressors, computation of the number of B-lymphocytes (M-plaque assay), quantification of IgA, IgM, IgG in blood serum (Manchini radial immunodiffusion technique), examination of circulating immune complexes (sedimentation method in polyetheleneglycol), examination of phagocitic activity and indices of NST-test. The intensity of lipid peroxidation and antioxidant activity was determined by the induced chemiluminescences method of Yuri A. Vladimirov and Mikhail G. Sherstnev, 1989. The examination was made twice: before the drug treatment and after it.

Outcomes of the examination

The immunoassay data allowed to reveal changes in the cellular and humoral immunity indices. After evaluation of lymphocyte contents in peripheral blood of the examined patients, a minor leucocytosis was noted in both the main (6, 9±0, 4-109) kl/mkl, and the control group (7, 2±0, 5-109) kl/mkl of patients suffering from uveitis. This is especially visible in comparison with lymphocyte contents in blood of the healthy persons – (5,89±0,27-109) kl/mkl. Under the influence of complex therapy the lymphocytes contents lowered in both the main (5, 8±0, 3-109) kl/mkl and the control group (6, 8±0, 4-109) kl/mkl. However not only had those patients, who had received ozone, lower lymphocytes contents after the treatment than before the treatment ($p<0, 05$), they also had lower lymphocytes contents than the control group ($p<0, 05$). Besides, the patients of the main group after the treatment had normal actual percentage of lymphocytes as distinct from the patients administered traditional therapy. 71 % of the patients of the main group and 69 % of the patients of the comparison group had decrease in the total amount of lymphocytes. Before the treatment the number of lymphocytes of the patients of the main group comprised (53,6±2,3) %, and of the control group – (54,2±2,7) %. After the complex therapy there has been a statistically proven increase in the number of T-lymphocytes in blood of the patients of the main group (64,2±3,8)%, but the patients of the control group didn't perform any increase of this index (58,4±3,4)%. Subpolation of the T-lymphocytes of the majority of the sick (60%) was characterized by the decrease in the number of T-helpers in both the main (32,9±3,2) % and the control groups (33,5±3,5)%. Changes in subpolation of T-helpers by the moment of stopping of inflammatory process after complex therapy administration were characterized by the increase in the percent composition of T-helpers in blood of the patients of the main group (46,4±3,1) %. Thus this index reached the norm. In the same time the patients of the control group had this index at the lower rate than the regulation value (38,6±3,3) %. Analysis of the changes in the quantity of T-suppressors showed that 54 % of the patients as in the main (21,65±1,02)% as in the control (22,45±1,56)% group had higher percent composition of T-suppressors before the treatment than healthy persons usually have (15,3±0,9)%; ($p<0,05$ and $p<0,05$). After the complex therapy their percent composition decreased, bringing the index in the main group down to (15, 97±1, 52), and

in the control group down to (20, 1±2, 4) %. Thus in the patients of the main group a more significant decrease has been observed. In the same time this index remained higher than the norm in the patients of the control group. As concerns immunoregulation index, it was a statistically proven decrease in comparison with healthy persons (2,43±0,62) in both groups of uveitis patients (main group (1,43±0,61); control group (1,56±0,56). After the complex therapy the immunoregulation index decreased in the patients who had been administered ozone (3,1±0,67); p<0,05 in comparison with the initial level, and in the patients who had been administered traditional medicine no statistically proven change could be found (1,92±0,8)

Changes in the cellular immunity indices of patients suffering from uveitis of unclear origin after administration of traditional treatment together with ozone therapeutics.

Table 1

Indices	Control group n=25		Main group n=35	
	Before treatment	After treatment	Before treatment	After treatment
Leucocytes 5,89±0,27 109 kl/mkl	7,2±0,5 *	6,8±0,4**	6,9±0,4 *	5,8±0,3**
T-lymphocytes 70,4±3,61%	54,2±2,7 *	58,4±3,4	53,6±2,3 *	64,2±3,8**
T-helpers 46,32±2,65%	35,5±3,5*	38,6±3,3	32,9±3,2*	46,4±3,1**
T-supressors 15,3±0,9	22,45±1,56 *	20,1±2,4	21,65±1,02 *	15,97±1,52**
IRI 2,43± 0,62	1,56±0,5 *	1,92±0,8	1,42±0,31*	3,1±0,6**

* Difference accuracy in comparison with healthy donors is p<0, 05

** Difference accuracy in comparison with initial amount is p<0, 05

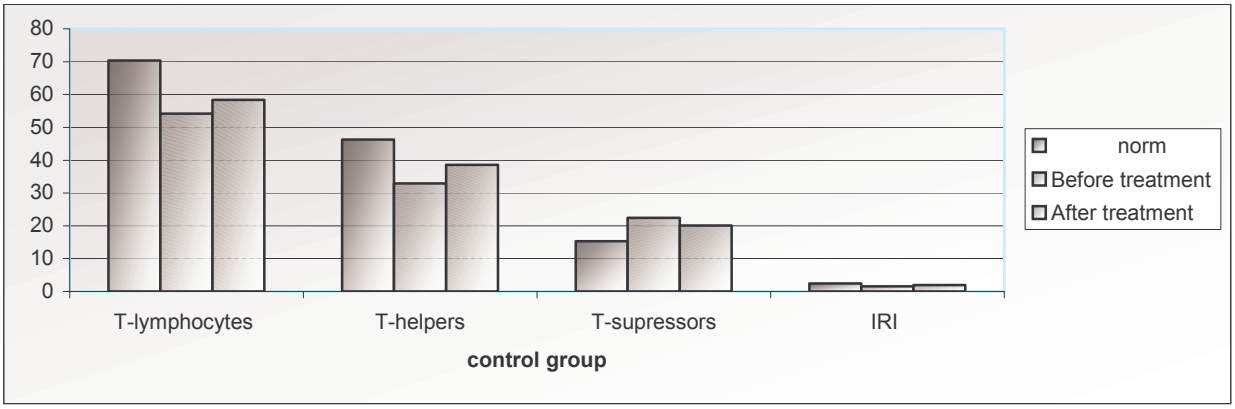

Figure1

Activity indices in the uveitis patients of the control groups before and after complex therapy administration

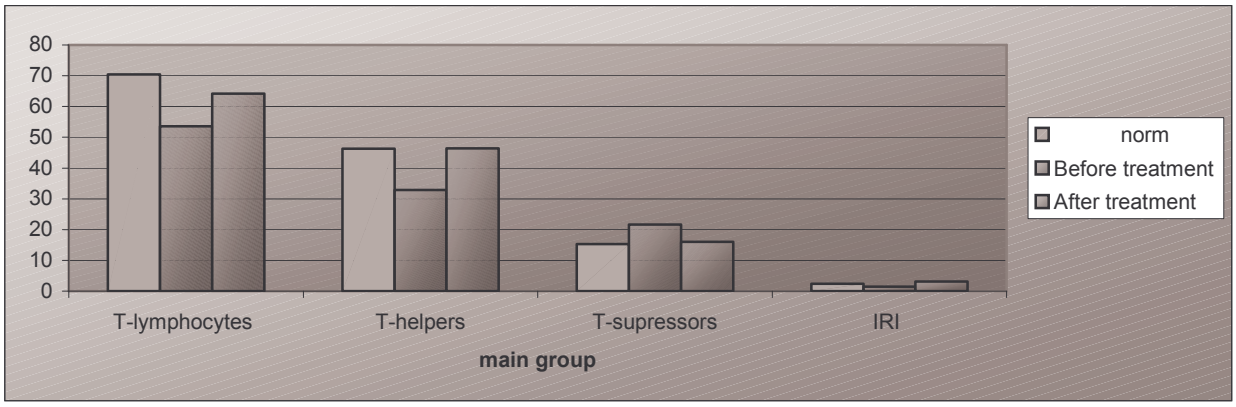

Figure 2

Activity indices in the uveitis patients of the main groups before and after complex therapy administration

Gammapathy – quantative changes in the serum levels of IgA, IgB, and IgM, was discovered in 82% of the patients. More often than not it was characterized by an increase in IgM quantity, which comprised (243,0±21,4) mg % in the control group and (254, 0±30,1) mg % in the main group when p<0, 05 (healthy persons have on average (n=30) 115±17,1 mg %). IgM contents went down to (171,8+30, 1) mg % in patients having undergone complex therapy with ozone inclusions. This decrease was less significant after traditional treatment and in those patients IgM contents were equal to (195,1±24,5) mg %. Upon analysis of changes in the IgA level, its drop was observed in the patients with recrudescent uveitis. The level of IgA amounted to (128,02±28,2) mg % in the control group, and to (120,5±29,5) mg % in the main group when p<0,05 _(healthy persons have on average (n=30) 203,0±25,0 mg %). Statistically accurate rise of the IgA level was detected in the patients of the main group who have undergone complex therapy (168, 0±30,1), but no rise was detected in the patients of the control group (135, 0±32,2) mg %. As concerns changes in the level of IgA in the patients with acute uveitis, it was accurately higher than that of healthy persons (203,0±25,2) mg %, in both the main (259,0±34,3) mg % and the control (257,1±48,2) mg % groups (p<0,05 and p<0,05). After the complex therapy the level of IgA accurately decreased in the patients who had been administered ozone (213,1±31,4) mg %; p<0, 05 in comparison with the initial level), and in the patients who had been administered traditional medicine no statistically proven change could be found (238±43,9 mg %). IgG level in the uveitis patients fluctuated between (1276,0±173, 2) mg % and (1301,8±98,3) mg % in the control group and in the main groups. Either increase or decrease of IgG level could be observed in individual cases only. After the therapy no statistically proven changes in the IgG were discovered in the patients of both groups. High concentrations of serumal circulating immune complexes were found in blood of 90% of the patients, they accounted for 133,6±11,2 standard units in the patients of the control group and 132,0±9,8 standard units in the patients of the main group. After administration of the ozone therapeutics, 25,8 % decrease in the immune complexes concentration was registered in the patients. In our opinion decrease in the level of circulating immune complexes can be explained by reinstitution of eliminating ability of phagocytes by means of realization of so-called “oxygen explosion” reaction and ozone’s rheological effect, which existence has been proved by many Russian scientists[2].

Changes in the humoral immunity indices of patients suffering from uveitis of unclear origin after administration of traditional treatment and together with ozone therapeutics.

Table 2

Indices	Control group n=25		Main group n=35	
	Before treatment	After treatment	Before treatment	After treatment
Immunoglobulins:				
IgM 115,0±17,1 mg %	243,0±21,4*	195,1±24,5	254,3±28,9*	171,8±30,1**
IgG 1236,0±115,0 mg %	1276,1±153,2	1329,0±113,6	1301,8±129,4*	1345,6±130,5
IgA 203,0±25,2 mg% acute uveitis	257,1±48,2*	238±43,9	259,0±34,3*	213,1±31,4**
Recrudescent uveitis	128,0±28,2*	135,0±38,2	120,5±29,5*	168,0±30,1**
Circulating ImmuneComplexes, small 65,0±12,1 standard units	133,6±11,2*	131,7±14,2*	132,0±9,8*	98,0±13,1**

* Difference accuracy in comparison with healthy donnors is p<0, 05

** Difference accuracy in comparison with initial amount is p<0, 05

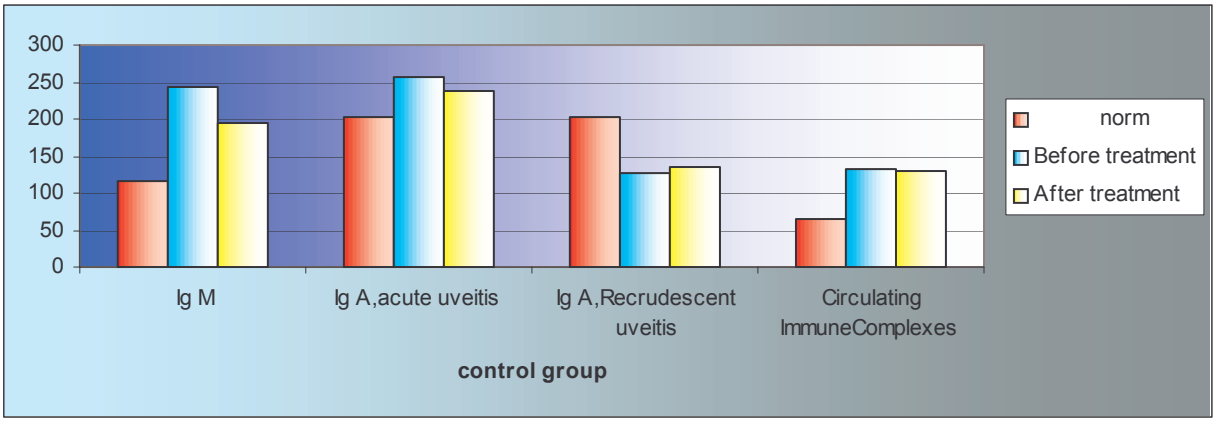

Figure 3

Changes in the humoral immunity indices of patients suffering from uveitis of unclear origin after administration of traditional treatment

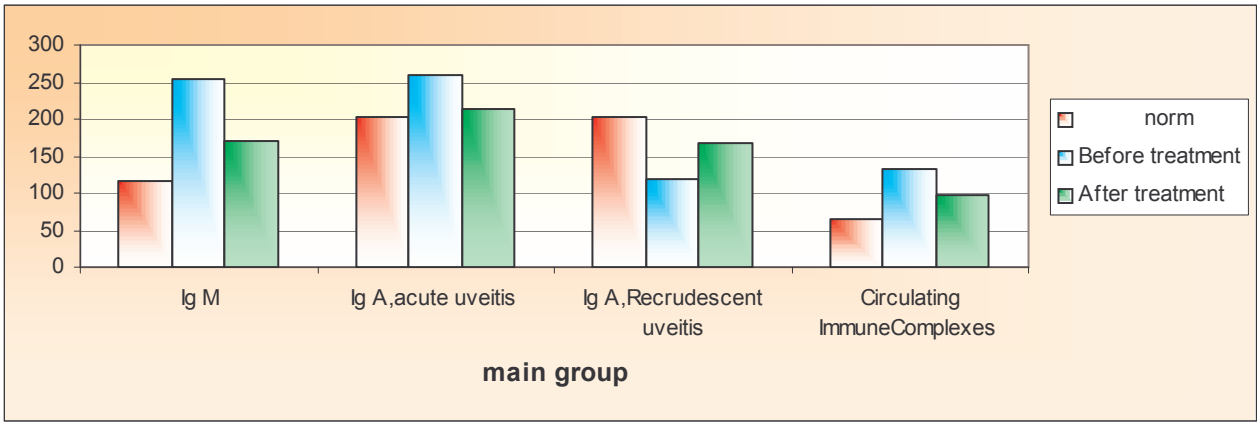

Figure 4
Changes in the humoral immunity indices of patients suffering from uveitis of unclear origin after administration of treatment together with ozone therapeutics

Before the treatment percentage of neutrophils in uveitis patients of both groups was accurately higher than in healthy persons. After the complex therapy a statistically proven drop in the percentage of neutriphils has been observed in the main group, but in the patients of the control group no drop could be detected. Examination of phagocitic activity revealed its decrease in the patients of the main (61,07±2,67) % and control (62,78±3, 9) % groups. Phagocitic activity under the influence of ozone by the time of clinical recovery increased up to (78,57±3,8) %. This rate is higher than that of healthy persons (66, 9±1,14) %, as well as of patients administered traditional treatment (69,16±3,7)%. Decrease in phagocitic activity was accompanied by oxidation-reduction potential of neitrophils. This fact can be proven by the increased indices of NST-test in both the main (30,92±3,59) % and control (29,94±3,72)% groups. After the complex treatment the indices of this test accurately dropped. In the patients who had been administered ozone (15,94±3,26%, p<0,05 in comparison with the initial rate) it nevertheless remained higher than the donors' indices (8,71±1,14)%, and in the patients who had been administered traditional medicine (25,66±3,51) % no statistically proven changes were observed.

Activity indices in the uveitis patients of the main and the control groups before and after complex therapy administration

Table 3

Indices	Control group n=25		Main group n=35	
	Before treatment	After treatment	Before treatment	After treatment
Neutrophils, abs. 3653,0±352,0	4656,1±342,0	4286,3±363,2	4849,2±361,6	3894,1±298,1
Neutrophils, %70,0 ±3,8	85,4±4,8	79,5±4,4	86,2±4,3	74,8±4,5
Phagocytosis activity, 66,10±1,20 %	62,78±3,9	69,16±3,7	61,07±2,67*	78,57±3, 8**
NTS-test 8,71±1,14%	29,94±3,72*	25,66±3,51*	30,92±3,59*	15,94±3,26*

* Difference accuracy in comparison with healthy persons is p<0, 05

** Difference accuracy in comparison with initial amount is p<0, 05

Analysis of research data revealed accurate increase in lipid peroxidation index in comparison with regulatory value characteristic of healthy persons (2,77±0,33 counts per second) in both the main (7,5±0,57 counts per second), and the control group (7,35±0,44 counts per second). Under the influence of the complex therapy lipid peroxidation level dropped in the patients of the main group (4,8±0,35 counts per second) in comparison with its rate before the treatment (p<0,001), although it didn't reach the regulatory value. In the patients of the control group no drop in lipid peroxidation index has been observed (6,1± 0,46 counts per second). As concerns overall antioxidant activity there was a statistically proven decrease in comparison with healthy persons (7, 97±0, 19 1/ml) in both groups of uveitis patients (main group (3,07+0,18 1/ml); control group (3,09+0,32 1/ml)). Reinvestigation of those patients who had been administered ozone revealed an increase in the antioxidant activity index (4,8±0,20 1/ml), although it didn't reach the regulatory value. During the period of clinic stabilization no statistically proven increase of the overall antioxidant activity has been detected (3.94±0,39 1/ml) in the patients of the control group. Changes in the tear antioxidant activity index were analogous: if before the treatment this index in the patients of both groups was lower than in healthy persons, than after the treatment it accurately increased in the patients of the main group (0,76±0,14 1/ml). In the patients of the control group no statistically proven increase of this index could be found (0.44±0,18 1/ml) after the course of traditional therapy.

Lipid peroxidation and antioxidant activity indices in the uveitis patients in the main and in the control groups before and after complex therapy.

Table 4

Indices	Control group n=25		Main group n=35	
	Before treatment	After treatment	Before treatment	After treatment
Serum lipid peroxidation (n=20) 2,77±0,33	7,35±0,44 *	6,1±0,46	7,5±0,57 *	4,7±0,35**
Serum antioxidant activity (n=20) 7,97±0,19 1/ml	3,09±0,32 *	3,94±0,39	3,07±0,18 *	4,8±0,20**
Tear Antioxidant activity (n=25) 0,886±0,08 1/ml	0,2±0,12 *	0,44±0,18	0,26±0,20 *	0,76±0,14**

* Difference accuracy in comparison with healthy persons is p<0, 001

** Difference accuracy in comparison with initial amount is p<0, 05

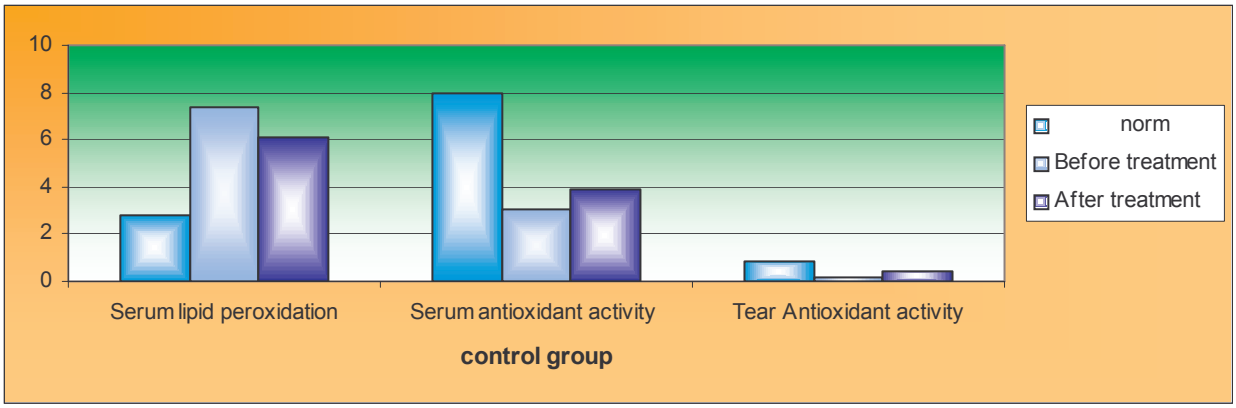

Figure 5

Lipid peroxidation and antioxidant activity indices in the uveitis patients in the control groups before and after complex therapy.

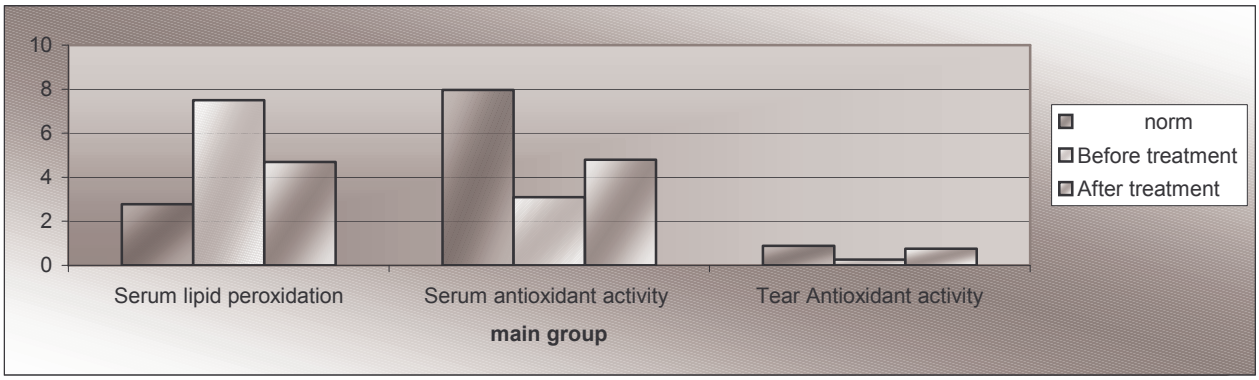

Figure 6

Lipid peroxidation and antioxidant activity indices in the uveitis patients in the main groups before and after complex therapy.

Conclusions

1) The obtained data has proven certain abnormalities of some cellular and humoral immunity indices.

2) An improvement of T-cellular protection and phagocytic activity, gammapathy correction and decrease of circulating immune complexes concentration has been observed in the uveitis patients who were administered complex therapy with ozone inclusions.

3) The research has revealed disorder of dynamic equilibrium between lipid peroxidation and antioxidant activity in the uveitis patients and the necessity of its correction.

4) An improvement of antioxidant organism defense has been detected in the patients who were administered complex therapy with ozone inclusions.
5) Ozone therapeutics helps to decrease intensity of lipoperoxidation processes

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