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E-BOOK

# Correction of Pathobiochemical Disorders in Women with Pelvic Inflammatory Diseases and Metabolic Syndrome

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## Abstract

The study investigated the possibility of normalizing oxidative homeostasis in female patients with chronic inflammatory uterine disease against the background of metabolic syndrome, by means ubiquinone, lipoic acid, retinol and tocopherol. The study was performed with the participation of 90 women divided into 3 groups. The control group included 15 relatively healthy female patients. Group 2 (n=40) of the subjects consisted of women with an isolated course of chronic inflammatory disease of the uterus, and Group 3 (n=35) included patients with chronic inflammatory disease of the uterus occurring against the background of metabolic syndrome. In the course of the studies, the presence of violations of the functional state of the prooxidant-antioxidant system in patients with chronic inflammatory disease of the uterus was revealed. It was also revealed that the course of the main researched disease against the background of metabolic syndrome was accompanied by more pronounced violations of oxidative homeostasis. Due to the fact that the revealed disorders in patients with a comorbid form of pathology did not normalize after the therapy according to the traditional scheme, it was concluded that it is advisable to carry out additional antioxidant correction. Against the background of antioxidant therapy, normalization of the prooxidant-antioxidant balance was noted, an increase in the concentration of thiol homeostasis metabolites to the level of values determined in practically healthy test women, the activity of antiradical defense enzymes changed, the activity of superoxide dismutase significantly increased in particular. Normalization of the state of oxidative homeostasis in the studied groups of patients can not only improve the course

of the underlying gynecological disease, reduce the frequency and severity of exacerbations of the disease, but also slow down the progression of the metabolic syndrome in these conditions.

*Keywords: inflammatory diseases of the pelvic organs, metabolic syndrome, antioxidant therapy, oxidative stress*

## Introduction

Intensification of free radical processes accompanied by inflammation is one of the key factors in the progression and gradual chronicity of many diseases. An important problem of modern gynecological practice is chronic inflammatory disease of the uterus, the progression of which can lead to infertility [1, 6].

According to many research papers, antioxidant therapy is capable of reducing the activity of the inflammatory process and increasing the effectiveness of control over the disease. Sodium thiosulfate, thiotriazoline, preparations of succinic acid and coenzymes of energy metabolism (cytoflavin) and others are traditionally used to normalize violations of oxidative homeostasis in gynecological patients [3]. The leading role in the progression of the metabolic syndrome is also played by the intensification of free radical processes, as a result of which lipids and proteins of endothelial cell membranes, lipoproteins and other structures are damaged [2, 10]. The course of comorbid conditions, which include chronic inflammatory disease of the uterus, occurring against the background of metabolic syndrome, is characterized by a more severe and unpredictable outcome, a higher risk of exacerbations of the underlying gynecological disease and a more rapid progression of endocrine and metabolic disorders that can lead to the regular development of diabetes mellitus [7-9].

Therefore, the possibility of normalizing oxidative homeostasis in patients with chronic inflammatory uterine disease occurring against the background of metabolic syndrome using ubiquinone, lipoic acid, retinol and tocopherol was studied in the present scientific paper. These are fairly common antioxidant agents, especially in gynecological practice, but their widespread use is hampered by the lack of substantiation, including their effect on biochemical parameters.

## Methodology

The study was conducted with the participation of 90 women divided into 3 groups. The control group included 15 relatively healthy female patients.

Group 2 (n=40) of the subjects consisted of women with an isolated course of chronic inflammatory disease of the uterus, and group 3 (n=35) included patients with chronic inflammatory disease of the uterus against the background of metabolic syndrome.

All patients were observed on the basis of the gynecological department and the day patient department of the Clinic of the FSBEI HE KubSMU of the Ministry of Health Care of Russia. Patients of Groups 2 and 3 were divided into 2 subgroups depending on the received drug therapy: women of subgroups 2-1 and 3-1 received standard treatment, including antibacterial therapy, including local irrigation with antiseptic solutions, anti-inflammatory and detoxifying agents. Patients of subgroups 2-2 and 3-2 additionally received ubiquinone at a dosage of 500 mg/day, lipoic acid at a dosage of 12 mg/day, retinol and tocopherol at dosages of 0.055 g/day and 0.1 g/day for 2 weeks respectively.

At the beginning of the study (before the start of therapy) and after 3 months, venous blood was sampled for laboratory studies of changes in the state of the prooxidant-antioxidant defense system. In the blood, the content of the products of oxidative modifications of biomolecules was determined, the main among which was malondialdehyde (MDA); therefore, to simplify the description, it was further assumed that the concentration of MDA was determined.

For an integral assessment of the state of the antioxidant defense system, the total antioxidant activity (TAC) of blood plasma was determined. To detail the changes in the antioxidant status, the content of thiol groups of blood plasma proteins and the reduced form of glutathione in erythrocyte suspension, the activity of superoxide dismutase (SOD) and catalase were determined [4, 5].

The study was conducted in accordance with the requirements set out by the Federal Law of the Russian Federation dated November 21st, 2011 No. 323-***ФЗ*** «On the Basics of Health Protection of Citizens in the Russian Federation» and the Declaration of Helsinki of the World Medical Association (Fortaleza, 2013). Before conducting the research, all subjects included in one of the groups signed a voluntary informed consent. The study was preliminarily approved by the Independent Ethical Committee of the FSBEI HE KubSMU of the Ministry of Health Care of Russia (Protocol No. 81 dated November 11th, 2019).

For statistical processing of the data, we used the statistical analysis program StatPlus Version 7 by AnalystSoft Inc. (see www.analystsoft.com/ru/). Comparison of the data obtained in the study from different groups was carried out by means of the Kruskal-Wallis test (for 3 and more independent groups), the comparison of data obtained from the same subjects before and after therapy was performed by means of the Wilcoxon test (for dependent

groups test persons). Differences in indicators between groups were considered statistically significant at $p<0.05$.

**Results**

The study of the main indicators reflecting the state of the balance of anti-/prooxidants naturally demonstrated the development of oxidative stress in the studied patients of all groups. In patients of the 2nd group, the level of TAC in blood plasma was reduced by 23%, for patients in the 3rd group, a more pronounced decrease in this indicator was characteristic (by 43%). In the course of treatment according to the traditional scheme, the analyzed parameters of both experimental groups increased statistically significantly, but their level remained significantly lower than the control values – by 16% and 31% in the 2nd and 3rd group respectively.

The content of MDA in the erythrocyte suspension of the studied groups of patients was increased statistically significantly relative to the control figures. In patients of the 2nd group, the concentration of MDA exceeded the control figures by 64%, for patients with the combined course of the metabolic syndrome, the values of the same indicator were 2.3 times higher than the level of the same indicator in the 1st group. 3 months after treatment according to the standard scheme, the content of biopolymer oxidation products in patients of Group 2 returned to values that did not differ from the control group, and in patients with metabolic syndrome, the considered indicator remained high and exceeded the control values by 1.7 times. Analysis of changes in indicators against the background of antioxidant therapy demonstrated the possibility of achieving control values in both groups of patients. So TAC in patients with an isolated form of chronic inflammatory disease of the uterus after metabolic therapy even exceeded by 11% the level of the group of relatively healthy test women. The level of MDA content in erythrocyte suspension during the experimental therapy also returned to normal.

The analysis of indicators of the state of the thiol link of the antioxidant defense system demonstrated the presence of an imbalance characterized by a decrease in the level of erythrocyte glutathione by 15% in an isolated course of gynecological disease and by 26% in a combined course with metabolic syndrome. In patients of the 3rd group, a decrease in the level of thiol groups in blood plasma by 15% was also revealed in comparison with the value of the same indicator in the control group. Against the background of therapy according to the standard scheme, the thiol metabolism indices in patients of the 2nd group returned to normal. Patients in Group 3 were characterized by a

more pronounced decrease in the level of thiol homeostasis metabolites, which did not normalize against the background of standard therapy. Against the background of additional antioxidant correction, violations of the thiol link of the antioxidant defense systems completely normalized in patients of the 2nd and 3rd groups.

The state of the enzyme link of the antioxidant defense system in the studied groups of patients was characterized by changes in the catalase and superoxide dismutase activity of the erythrocyte suspension. In patients of the 2nd group, the SOD activity values decreased by 16% were determined against the background of the catalase activity values increased by 20%. Patients in Group 3 were characterized by a 42% decrease in SOD activity and a 14% increase in catalase activity respectively. Standard therapy had no influence on the state of SOD activity in the erythrocyte suspension of patients in Groups 2-3. In patients of Group 3, catalase activity after a course of standard therapy decreased by 24% down to the values by 14% below the control figures.

Against the background of the activation of the inflammatory process in patients with exacerbation of chronic inflammatory disease of the uterus, there was a compensatory increase in catalase activity. At the same time, after the transition of the disease to the stage of remission, the depressive effect of the metabolic syndrome on the state of various links in the system of nonspecific resistance of the organism acquired key importance. Against the background of antioxidant correction, there was an increase in SOD activity in Group 2 to the level of control values and in Group 3 by 34% respectively.

## Conclusions

In the course of the studies, it was revealed that the course of chronic inflammatory disease of the uterus against the background of metabolic syndrome is accompanied by more pronounced violations of oxidative homeostasis. Due to the fact that the revealed disorders in patients with a comorbid form of pathology did not normalize after the therapy according to the traditional scheme, it was concluded that it is advisable to carry out additional antioxidant correction. Further studies confirmed the effectiveness of the inclusion of lipoic acid, coenzyme Q10, vitamins A and E in the therapy regimen. Against the background of antioxidant therapy, normalization of the prooxidant-antioxidant balance was noted, an increase in the concentration of metabolites of thiol homeostasis to the level of values determined in practically healthy test women, and the activity of antiradical defense enzymes changed.

Normalization of the state of oxidative homeostasis in the studied groups

of patients can not only improve the course of the underlying gynecological disease and reduce the frequency and severity of exacerbations of the disease, but also slow down the progression of the metabolic syndrome in these conditions.

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## REFERENCES

1. Agarwal A., Aponte-Mellado A., Premkumar B.J., Shaman A., Gupta S. (2012) Reprod. Biol. Endocrinol. 10, pp. 329-336.
2. Bykov I., Alexeenko E., Sepiashvili R., Popov K. (2016) Change of intensity of oxidative processes in patients with psoriasis. Allergy, Asthma & Immunophysiology: innovative technologies, Filodiritto International Proceedings, Bologna, Italy, pp. 139-142.
3. Bykov I.M., Popov K.A., Egorova I.A., Storozhuk A.P. (2018) Medical news of North Caucasus. 13 (2), pp. 402-406.
4. Kamyshnikov V.S. (2004) «Spravochnik po kliniko-biohimicheskim issledovanijam i laboratornoj diagnostike» M.: MEDpress-inform.
5. Karpishchenko A.I. (2002) «Meditsinskie laboratornye tekhnologii. Spravochnik» SPb.: Intermedika.
6. Khodos M.Ya., Kazakov Yan E., Vidrevich M.B., Brainina Kh Z. (2017) Journal of Ural Medical Academic Science. 14 (4), pp. 381-398.
7. Kitaya K., Matsubayashi H., Yamaguchi K., Nishiyama R., Takaya Y., Ishikawa T., Yasuo T., Yamada H. (2016) Am. J. Reprod. Immunol. 75 (1). pp. 13-22.
8. Marie D.B., Ateba G., Felicite K.D., Fernando K.L., Chia A.M., Henry L.N. (2017) J. Autoimmune Disord. 3 (4), pp. 281-287.
9. Pestrikova T.Yu., Yurasov I.V., Yurasova E.A. (2018) Gynecology. 20 (6), pp. 35-41.
10. Popov K., Sepiashvili R., Bykov M., Bykov I. (2017) The effect of the sodium dichloroacetate on metabolic indices in rats suffering from the alloxan diabetes mellitus. Allergy, Asthma, COPD, Immunophysiology & Norehabilitology: innovative technologies, Filodiritto International Proceedings, Bologna, Italy, pp. 329-334.