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STUDY OF THE STATE OF COMPENSATORY-ADAPTIVE MECHANISMS IN PREGNANT WOMEN WITH ADENOMATOUS GOITER

Abstract. *One of the most important functions of the thyroid gland is maintenance of a normal course of pregnancy and development of different organs and systems of the fetus. Any changes in the thyroid functions associated with metabolic disorders, disturbances of neuron-endocrine regulation can result in disorders of compensatory-adaptive mechanisms of the maternal organism and fetus. The state of lipid peroxide oxidation processes and efficacy of blood antioxidant defense in pregnant women with adenomatous goiter was studied depending on the degree of severity of the pathology. Pregnant women with I degree adenomatous goiter were found to have insufficiency of the protective antioxidant system (AOS) and exertion of the body compensatory-adaptive mechanisms. Pregnant women with II degree adenomatous goiter were found to have exhaustion of AOS components in response to considerable activation of lipid peroxide oxidation, which is indicative of exhaustion of the body compensatory-adaptive mechanisms before labor.*
Key words: *pregnancy, adenomatous goiter, lipid peroxide oxidation, protective antioxidant system.*

Thyroid diseases are one of the most frequent endocrine pathologies. They are found 10-15 times more frequently among women than in men. They are manifested during young reproductive age [3, 5]

The thyroid gland of the mother and fetus is considered to be regulated independently. At the same time, the hormones of the maternal thyroid gland are partially transmitted through the placenta. The hormones of the maternal thyroid gland play an important role during the whole gestational period. They effect the growth and differentiation of tissues, ossification processes, and formation of the central nervous system of the fetus [3, 5, 6].

On the level of target tissues thyroid hormones stimulate protein synthesis, regulate thermogenesis and energy balance, effect sexual development, menstrual function, and different metabolic processes. The most important function of the thyroid hormones is providing development of other organs and systems during the whole period of embryogenesis beginning from the first weeks of pregnancy. Due to this fact any changes in the thyroid function, even inconsiderable ones, provoke an increased risk of disorders in the development of the nervous and other systems of the body. Association with other disorders from the side of the neuron-endocrine regulation, hormonal balance, metabolic processes can result in disturbances of the compensatory-adaptive mechanisms of the maternal organism and fetus [3, 5, 6]

Investigation of clinical issues from the position of examination of membranous disorders is considered to be perspective [4, 7]. Lipid peroxide oxidation (LPO) is known to be one of the causes provoking disorders in the structure and function of cellular membranes. Toxic radicals formed in the process of lipid peroxidation produce harmful action on the proteins of the cellular membranes promoting disorders of enzymatic and hormonal functions of the body [1, 7, 8]. LPO processes within the norm are maintained on the physiological level due to the protection system existing in the cells of living organisms, and which is called antioxidant system (AOS) [2, 4, 7].

Metabolic processes in pregnant women suffering from adenomatous goiter have not been studied substantially. Lipid peroxide oxidation processes and antioxidant defense in pregnant women depending on the degree of adenomatous goiter have not been studied adequately either. These data are essential for identifying the mechanisms of adaptive response under stressful situation during labor, which is important for improvement of tactics of management of pregnancy and labor.

Objective: to study the state of lipid peroxide oxidation and efficacy of antioxidant blood defense in pregnant women suffering from adenomatous goiter depending on the degree of the pathology.

Materials and methods. The indices of LPO and AOS of the blood were studied during 22-24 and 34-36 weeks of pregnancy in 20 healthy women (control group) and 54 patients suffering from adenomatous goiter including 34 pregnant women with I degree adenomatous goiter (I group) and 20 individuals with II degree of adenomatous goiter (II group).

The content of LPO products in erythrocytes was determined by the level of lipid hydroperoxides and Malone dialdehyde. The state of AOS was assessed according to the content of reduced glutathione in erythrocytes and activity of glutathione peroxidase enzyme.

The data obtained were statistically processed by means of Student t-criterion. Changes were considered to be statistically significant with $p < 0,05$. Statistical calculations were performed by means of the electron table Exel for Microsoft Office.

Results and discussion. The age of the examined women varied from 20 to 34 years, and its was on an average 24,51±2,71 years in the main group and 25,12±2,21 – in the control one ($p>0,05$).

The structure of extragenital pathology mostly included increased anemia during pregnancy among the women from the main group in comparison with the control one (64,8% against 15%, $p<0,001$), bacteriuria (31,48% against 5%, $p<0,001$), gestational pyelonephritis (11,7% against 5%, $p<0,005$), hypotension (20,37% against 5%, $p<0,005$).

The course of pregnancy among the women from the main group was often complicated by preeclampsia: mild preeclampsia was found in 15 (27,78%) cases, moderate in 6 (11,7%), severe in 2 (3,7%). In the control group of women mild preeclampsia was found in 1 (5%) case. Threat of miscarriage was determined in 27 (50%) women from the main group and 2 (10%) – from the control group, $p<0,001$. Retardation of the intrauterine fetal development was diagnosed in 4 (7,4%) cases from the main group, and it was not diagnosed in the control group. A high rate of colpitis of various etiology should be noted here among the women from the main group (66,7%). Fungal infection caused by Candida albicans was registered in 27 (50%) pregnant women. These results correlate with those found in scientific literature [3, 5].

LPO processes were found to be activated even among healthy women. Thus, in 22-24 weeks of pregnancy the content of lipid hydroperoxides was 1,29±0,02 micromole/ml of erythrocytes, and in 34-36 weeks – 1,34±0,01 micromole/ml of erythrocytes ($p< 0,05$). The amount of Malone dialdehyde increased at the same time. In 22-24 weeks of pregnancy its content was 110,3±3,4 micromole/ml of erythrocytes, and in 34-36 weeks – 122,6±4,2 micromole/ml of erythrocytes, ($p< 0,05$). In response to increased content of LPO products healthy pregnant women developed activation of AOS of the blood. The content of glutathione in 22-24 weeks of pregnancy was 30,6±1,2 micromole/ml of erythrocytes, and in 34-36 weeks – 34,8±1,1 micromole/ml of erythrocytes, ($p< 0,05$). The content of glutathione peroxidase in 22-24 weeks was 23,4±1,1 micromole/ml of erythrocytes, and in 34-36 weeks – 27,6±1,2 micromole/ml of erythrocytes, ($p< 0,05$). Therefore, in healthy pregnant women LPO processes are intensified parallel to AOS activation, which is a compensatory-adaptive response of the body to prevent a harmful action of free radical lipid peroxidation products on different organs and tissues.

Higher intensification of LPO processes was found among women suffering from adenomatous goiter. Women with I degree adenomatous goiter developed increased content of lipid hydroperoxides (1,47±0,04 micromole/ml of erythrocytes in 22-24 weeks of gestation and 1,55±0,06 micromole/ml of erythrocytes in 34-36 weeks, ($p< 0,05$) and Malone dialdehyde (128,6±4,2 micromole/ml of erythrocytes and 135,8±3,5 micromole/ml of erythrocytes in 22-24 and 34-36 weeks of pregnancy respectively). At the same time, the content of reduced glutathione did not raise (34,3±1,2 micromole/ml of erythrocytes), which is indicative of the signs of antioxidant insufficiency of the body.

More considerable disorders in LPO and AOS systems were found in women suffering from II

degree adenomatous goiter. At the end of pregnancy in response to considerable activation of LPO the content of glutathione decreased (34,3±1,2 micromole/ml of erythrocytes and 24,5±0,9 micromole/ml of erythrocytes in 22-24 and 34-36 weeks of gestation respectively (p< 0,001), as well as activity of glutathione peroxidase reduced (33,4±1,3 micromole/ml of erythrocytes in 22-24 weeks and 27,6±1,2 micromole/ml of erythrocytes in 34-36 weeks of gestation, p< 0,001). It is indicative of exhaustion of AOS defense and compensatory-adaptive mechanisms of the organism of pregnant women.

Among the examined women from the control group the outcome of pregnancy was physiological labor in 20 (100%) of cases. Premature rupture of amniotic fluid sac (PRAFS) was registered in 1 (5%) women. The following complications in labor were found among the patients from the main group: poor birth activity – in 12 (22,2%) cases, PRAFS – in 15 (27,75%), bleeding in labor and early postnatal period – in 5 (9,25%), severe preeclampsia – in 2 (3,7%), fetal distress – in 3 (5,55%). 48 (88,9%) women with goiter gave birth through the maternal passages (physiological labor). The rest of women – 6 (11,1%) underwent Cesarean section. Indications for surgery were the following: poor birth activity, premature exfoliation of normal placenta, and fetal distress. This percentage of complications and pathologic labor in women from the main group was likely associated with high frequency of complications during the gestational period.

An average score of newborns according to Apgar scale in the main group was 7,6±0,1 which is reliably lower than that of the control group – 8,8±0,1 (p<0,05). It should be noted that 6 (11,1%) newborns required consultations of allied professionals concerning different developmental defects.

Conclusions. 1. In healthy women in the dynamics of pregnancy AOS activation of the blood protection occurs in response to intensification of LPO processes.

2. Pregnant women with I degree adenomatous goiter experience insufficient OAS defense and exertion of the compensatory-adaptive mechanisms of the body.

3. Pregnant women with II degree adenomatous goiter experience exhaustion of AOS defense components in response to considerable activation of lipid peroxidation processes, which is indicative of exhaustion of the compensatory-adaptive mechanisms before labor.

Prospects of further studies. Improvement of a comprehensive method of preparation and management of labor in women with adenomatous goiter considering anti-stress protective mechanisms is an advanced study. It will promote decrease of maternal and perinatal pathology.

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