

Zadorozhnyi O. A., Rozhkovskaya N. M., Zadorozhnaya O. B., Tarnovska G. P. Characteristics phetoplacental complex change in women with pulmonary tuberculosis, complicated by iron deficiency anemia. *Journal of Education, Health and Sport*. 2022;12(9):818-823. e-ISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2022.12.09.093>  
<https://apcz.umk.pl/JEHS/article/view/40043>  
<https://zenodo.org/record/7082799>

The journal has had 40 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of December 1, 2021. No. 32343. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical Culture Sciences (Field of Medical sciences and health sciences); Health Sciences (Field of Medical Sciences and Health Sciences).

Punkty Ministerialne z 2019 - aktualny rok 40 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 1 grudnia 2021 r. Lp. 32343. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przynależność dyscypliny naukowej: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).

© The Authors 2022;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland

Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 26.08.2022. Revised: 01.09.2022. Accepted: 15.09.2022.

## CHARACTERISTICS PHETOPLACENTAL COMPLEX CHANGE IN WOMEN WITH PULMONARY TUBERCULOSIS, COMPLICATED BY IRON DEFICIENCY ANEMIA

O. A. Zadorozhnyi, N. M. Rozhkovskaya, O. B. Zadorozhnaya, G. P. Tarnovska

Odessa National Medical University

### Abstract

87 pregnant women have been examined, 57 of them had pulmonary form of TB, complicated by IDA (main group). The control group consisted of 30 conditionally somatic-healthy patients with physiological pregnancy. Changes in the parameters of erythron, increased metabolic acidosis, development of placental dysfunction (93%), violation of hemodynamics in the utero-placental-fetal basin, and low biophysical profile of the fetus were found. The main group patients received comprehensive anti-anemic, antihypoxic, detoxificative, antioxidant and membrane-stabilizing therapy. After the pathogenetic treatment, the general condition of mother and fetus improved, e. g. the total index of biophysical profile of fetus in the pregnant women of the main group increased from  $(6.87 \pm 0.18)$  points to  $(8.73 \pm 0.12)$  points. Women with pulmonary tuberculosis and iron-deficiency anemia require complex pathogenetic therapy, which significantly improves the erythron signs, fetal, newborn and general mother's condition.

**Key words:** pulmonary tuberculosis; anemia; fetoplacental complex; placental dysfunction; biophysical profile of the fetus.

**Introduction.** Incidence of pulmonary tuberculosis (TB) is steadily increasing every year, especially among women of reproductive age, due to chemo-resistant severe forms of TB. The most frequent (70-75%) complication of the gestational process in pregnant women with pulmonary tuberculosis is iron deficiency anemia (IDA), which prevalence remains high [1 - 4]. The impact of TBI and IDA on the course and delivery of pregnancy, condition of the fetus and the newborn remains an unexplored and actual problem, as there are increased risks of gestational and perinatal complications.

**The purpose of the study:** investigate changes in the mother-placenta-fetus interrelationship in women with pulmonary tuberculosis complicated by iron deficiency anemia.

**Materials and methods:** 87 pregnant women were observed and divided into two groups for further study: the main group (MG) - 57 pregnant women with pulmonary TB, and the control group (CG) - 30 conditionally somatic healthy patients with physiological course of pregnancy. The age of women varied from 18 to 39 years, the mean value in both groups was  $28.5 \pm 6$  years. The number of first and re-births in both groups was 37% and 63% accordingly. Examination of women was conducted in the third trimester of pregnancy respectively to the protocol. In the research process we had investigated several general clinical and laboratory studies: general blood analysis (hemoglobin, erythrocyte level, hematocrit, iron and serum ferritin), general urine analysis, biochemical blood test (ALT, AST, thyroid test). In parallel, the concentration of serum hormones (estriol, progesterone, placental lactogen, cortisol), gas and acid-basic compound of blood (level pCO<sub>2</sub>, pO<sub>2</sub>, pH, BU). Also, attention was paid to indicators of vaginal microbionics, cervical canal and urethra using bacteriological, bacterioscopic methods of diagnostics and polymerase chain reaction. Instrumental methods included ultrasound (ultrasound), cardiotocography (CTG) and dopplerometry. Ultrasound was performed in the dynamic of pregnancy progression using a Toshiba NEMIO ultrasound scanner (Japan) with transabdominal and transvaginal sensors at a frequency of 3.5 MHz. Evaluation of the cardiac activity characteristics of the fetus was carried out using the Feta RPT VMT 9141 Heacain real time for 30 minutes at a tape speed of 1 cm / min, starting from 28-30 weeks of gestation, weekly, or more often when pathological variants of cardiac rhythm reactivity were found. During the dopplerometric study curves of blood flow velocity in uterine artery vessels, umbilical arteries, aorta and middle cerebral artery of the fetus were studied, followed by the computation of vascular resistance indices, systole diastolic ratio, pulsation index (PI), and resistance index (IR). Clinical diagnosis of pulmonary TB and IDA were determined jointly with the pulmonologist and therapist.

**Results of the research and their discussion:** During the examination of pregnant MG, special attention was paid to patients complaints of rapid fatigability, weakness, sweating, sub-febrile temperature and body weight loss. We were interested in the presence of pulmonary TB in her husband, relatives, and others. Among the pregnant women of this group, the following forms of pulmonary TB were ascertained: focal - in 33,3% of patients; disseminated - at 29.8%; infiltrative - in 26,3% and fibro-cavernosus - in 10,6% of pregnant women.

In general blood analysis in MG patient's moderate leukocytosis, monocytosis, lymphopenia, decreased hemoglobin levels, red cell count, color index, increase in the rate of erythrocyte sedimentation were detected, in CG there were no changes. Mild anemia was detected in 40.3% of patients, with a moderate degree of 54.4%, severe in 5.3%. The level of serum iron in women of MG ( $10.91 \pm 0.21$ )  $\mu\text{mol} / \text{L}$ , and in CG - ( $15.32 \pm 0.14$ )  $\mu\text{mol} / \text{L}$  ( $p < 0.05$ ), the concentration of ferritin - ( $14, 34 \pm 0.56$ )  $\mu\text{mol} / \text{L}$  against ( $20.10 \pm 1.51$ )  $\mu\text{mol} / \text{L}$  ( $p < 0.05$ ). That is, as a result of the study, a 1.4- time decrease in the concentration of iron and ferritin in the blood of pregnant MG compared with CG showed a decrease in the deposit of this iron-containing protein and compensatory erythron reactions.

Decrease in the hormones concentration in CG patients to 30% was determined in 22.8% of women, 30-50% in - 33.4% of observed patients, more than 50% stated in - 36.8% of pregnant women. Normal levels of hormones before treatment in CG were observed in 7.0% of patients, that is, placenta dysfunction occurred in 93% of women.

When studying blood acid-base parameters in women of the MG, pronounced metabolic acidosis was found, while in healthy pregnant women, the functional tension of the respiratory system, which arose due to the increased need for oxygen, can be regarded as an infectious metabolic acidosis.

A slight decrease in blood pH was found in women of MG ( $7.3311 \pm 0.0027$ ) compared with healthy pregnant women ( $7.3400 \pm 0.0014$ ), ( $p > 0.05$ ). In the examined patients, MG showed a decrease in pO<sub>2</sub> values to ( $57.73 \pm 1.30$  mm Hg), compared with women of CG - ( $78.10 \pm 1.31$ ) mm Hg ( $p < 0, 05$ ), an increase in the values of pCO<sub>2</sub> ( $58.14 \pm 0.12$ ) mm Hg against ( $46.60 \pm 0.48$ ) mm Hg and BU ( $-6.10 \pm 0.24$ ) versus ( $-3.20 \pm 0.12$ ) mmol / L), which leads to violation of ventilation-perfusion ratios and was one of the causes and development factors of fetal distress syndrome.

The results of studying the indices of the biophysical profile of the fetus prior to the conducted therapy in pregnant MG were ( $6.87 \pm 0.18$ ) points, which was significantly lower than in the patients of the CG group - ( $9.06 \pm 0.32$ ) points ( $p < 0.05$ ).

According to CTG, a satisfactory condition of the fetus (7-8 points according to Fischer score) was observed in 96.7% of pregnant CG group and in 56.7% of MG patients, indicating fetal hypoxia on the background of chronic intoxication and chronic hemic hypoxia of the mother's organism in women with pulmonary TB, complicated by IDA. At dopplerometry, hemodynamics changes were detected in utero-placental-fetal basin in 85.9% of MG patients and 3.7% of pregnant women.

In 36.8% women of MG and 3.7% of CG patients, haemodynamic changes in uterine arteries of grade IA were detected. These hemodynamic changes were manifested by a decrease in diastolic blood flow and an increase in the index of resistance. Hemodynamic violations of the I degree were reported in 29.8% of pregnant women, and the second degree in 19.3% of the MG patients, in women of CG these haemodynamic changes in the uterine arteries did not state.

Pregnant of MG received a comprehensive antihypoxic, detoxificative, antioxidant and membrane stabilizing therapy with L-arginine intravenously for 5-7 days, after which L-arginine was continued 12-14 days orally, 5.0 ml three times a day. Daily dose 15.0 ml. (3.0 g) regardless of food intake. For the correction of anemia recommended rational nutrition, and with anemia of moderate to severe degree iron filling therapy with salts of bivalent iron orally to 300 mg / day, not less than 3 months after normalizing level of hemoglobin.

As a result of the therapy, women of MG had an improvement in general condition, sleep and appetite, decreased symptoms of oxygen deficiency and intoxication, such as weakness, fatigue, dizziness.

In the general blood test after complex treatment hemoglobin compound, number of red blood cells, color index and hematocrit increased, level of ferritin was normalized.

Study results of acid-base compound of blood in patients of MG after therapy were next: increased blood pressure pO<sub>2</sub> to (76.86 ± 1.47) mm Hg in comparison with the baseline - (57,73 ± 1,30) mm Hg (p <0,05), in patients with CG- (78,10 ± 1,31) mm Hg. Art., (p > 0,05). Tension of pCO<sub>2</sub> significantly decreased from (58.14 ± 0.12) mmHg to (48.5 ± 1.21) mmHg), (p > 0.05) and reached the rates of healthy women (46.60 ± 0.48 mm Hg), (p > 0.05). Also, the level of BU in the blood decreased from (-6.10 ± 0.24) mmol / l to (-3.02 ± 0.2) mmol / l, (p <0.05), and reached the level of control numbers (-3.20 ± 0.12) mmol / L, (p > 0.05).

The total biophysical profile index of the fetus in pregnant of MG after treatment (8.73 ± 0.12) points was significantly higher than before the start of therapy (6.87 ± 0.18) points and reached the level of MG (9.06 ± 0.32) points, (p > 0.05). Also, after pathogenetically

directed therapy, levels of placental and fetal hormones in women of the MG increased significantly.

Fischer test of the fetal condition at 7-10 points after complex therapy was found at 85.9% pregnant of MG (before therapy in 56.7% of patients). After complex therapy in pregnant of MG, violation of uterine arteries of the IA degree was noted in 8.7% of subjects, and hemodynamic changes in IB and II degrees were not observed at all.

As a result of the study was found that 82.4% of women in MG and 93.3% of CG cases gave birth in time, and 17.6% of MG women and 6.7% of CG gave premature birth. The state of children on the 1<sup>st</sup> and 5<sup>th</sup> minute on the Apgar scale for women of MG was 8-10 points in 93% and 7-8 points in 7.0%. In the CH indicators were next 8-10 points - 93.4%, and 7-8 points - 6.6%.

Early neonatal period wasn't complicated in 84.2% of newborns from MG women and 86.6% of newborns from mothers of CG. In the examined newborns from women of MG complications were detected in 15.8% and CG in 13.4% of infants, respectively. In the early neonatal period, complications such as conjugation jaundice and the effects of chronic intrauterine hypoxia were noted.

### **Conclusions:**

1. Women with pulmonary tuberculosis and iron deficiency anemia constitute a high-risk group of perinatal and obstetric complications.
2. As a result on the survey, changes of the parameters of erythron and increased metabolic acidosis were found: decrease of pO<sub>2</sub> to (57,73 ± 1,30 mm Hg), in CG - (78,10 ± 1,31) mm Hg, (p <0.05), increase of concentration of pCO<sub>2</sub> to (58.14 ± 0.12) mm Hg, at CG - (46.60 ± 0.48) mm Hg, (p <0, 05) and BU (-6.10 ± 0.24), on CG - (-3.20 ± 0.12) mmol / L), (p <0.05).
3. In MG women parallel development of placenta dysfunction (93%), violation of hemodynamics (85.9%), and low biophysical profile of the fetus ((6.87 ± 0.18) was observed. In CG it was (9.06 ± 0, 32) points, (p <0,05)).
4. Women with pulmonary tuberculosis and iron-deficiency anemia require complex pathogenetic therapy, which statistically significantly improves the erythron signs, fetal and newborn condition, significantly improves general mother's condition.
5. Prospects on further researches are in assessment of newborns and children condition in the early neonatal period from mothers with pulmonary tuberculosis.

### References:

1. Polyova S.P. Problems on Tuberculosis and Women's Reproductive Health / S. P. Polyova, A. V. Goshovska, Yu. V. Krupenko [et al.] // Achievements on clinical and experimental medicine. - 2008. - №1. - P. 51 - 53.
2. Savula M.M. Tuberculosis and maternity / M. M. Savula, M. I. Sahelashvili, Yu. I. Slyvka // Ukrainian pulmonologist magazine. - 2008.- N 4. – P. 317
3. Abramowsky C.R. Mycobacterium tuberculosis infection on the placenta; a study on the early on nate on flammatory response on two cases / C.R. Abramowsky, J. Gutman, J.A. Hillinski // PedDev. Pathol Ped Dev Pathol. - 2012. - Vol.2 - P. 132
4. Goshovskaya A. V. Forecast on the development on placental dysfunction and certain complications during pregnancy and childbirth on women with pulmonary tuberculosis by calculation on confidence intervals percent / A.V.Goshovska, S. P. Polyova, V. M. Goshovsky // Sb. Sciences works Asoc. Akush.-Gynek. of Ukraine. – K. :Intermed. - 2011. - P. 198 - 200