UNIVERSITATEA DE MEDICINĂ,
FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE
„GEORGE EMIL PALADE"
DIN TÂRGU MUREȘ

Doctoral School

PhD Thesis Summary

Title: Correlations between maternal and fetal antioxidant level, the antioxidant status as predictor in distinct neonatal pathologies

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Introduction:

Oxidative stress is the imbalance between pro-oxidant and antioxidant factors. Free radicals become mediators of cell and tissue damage when they are produced excessively in the body. While evaluating oxidative stress in pregnant women and the fetus, we must take into consideration physiological aspects, i.e., the pregnancy, which exposes the pregnant woman to increased oxidative stress, the placenta as the source of free oxygen radicals. Intensive oxidative aggression and the disturbance of the defense mechanisms can lead to multiple complications in the pregnant woman, and in case of the fetus this aggression might cause the "oxygen radical diseases of neonatology". Our objective was to find correlations between the mother's and neonate's oxidative stress levels, to measure it and to determine whether it is influenced or not by maternal lifestyle habits, in the selected categories, based on four markers determined by an HPLC-UV method.

Objective:

1st study: to evaluate the lifestyle habits of the participants using a self-reported questionnaire and comparing birth characteristics for the neonates.

2nd study: to determine the nitrite/nitrate levels of maternal plasma and cord blood.

3rd study: to evaluate the MDA levels of maternal plasma and cord blood.

4th study: to evaluate the reduced and oxidized glutathione levels in maternal plasma and cord blood.

5th study: to evaluate the above-mentioned biomarkers in the presence of maternal smoking in all groups and subgroups.

General methodology: Our study was conducted with voluntary participation. Pregnant women, who were admitted to the Obstetrics-Gynecology Clinic I of the Emergency County Clinic Hospital (ECCH) of Tg-Mures between November 2019-October 2020 were enrolled in three groups: control, premature and CHD groups, and secondary in subgroups according to their smoking/non-smoking status, and low-Apgar score/high Apgar score subgroups for the neonates. We obtained the approval of the Ethics Committee of ECCH Tg-Mures and George-Emil Palade University of Medicine, Pharmacy, Science and Technology of Tg-Mures, Romania. The plasma biomarkers of oxidative stress in mother-newborn couples were determined with an HPLC-UV/VIS method validated by Croitoru M.D. and Fogarasi E.

Results: Our study compared two categories of pathology usually associated with maternal smoking: premature birth and CHDs, compared to healthy controls. We observed that maternal smoking enhanced oxidative stress levels in the mother, reflected by elevated maternal stress marker levels, and consequently by elevated fetal oxidative stress levels. Our study showed significantly higher nitrite levels in the maternal plasma and cord blood of control groups, compared with the other groups (premature and CHD), smoking and non-smoking subgroups.

We obtained significantly different MDA levels in cord blood samples of control smoking and non-smoking subjects, and in maternal plasma controls versus CHD affected pregnancies in both smoking and non-smoking subgroups, corresponding to an increased oxidative stress, as consequence of smoking or pathological pregnancy. According to our results, reduced glutathione showed statistically significant differences between maternal plasma GSH levels and cord blood GSH levels, in both control smoking and control non-smoking subgroups, while no significant differences were seen in case of premature and CHD groups.

Originality of the thesis: we measured all the selected biomarkers of oxidative stress with an HPLC method, used mainly for research purposes, simultaneously from maternal plasma and cord blood. Previous studies limited their measurements only to nitrite, nitrate, GSH, GSSG with an HPLC method, using different assays to measure other parameters. Another novelty of this study is the simultaneous measurements of the above-mentioned parameters in the two study groups (premature and CHD).