

RESISTANCE INDEX OF THE FETAL UMBILICAL ARTERY AND OXIDATIVE STRESS IN PREECLAMPSIA

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OKSIDACIONI STRES I REZISTENTNI INDEKS UMBILIKALNE ARTERIJE U PREEKLAMPSIJI

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ABSTRACT

Preeclampsia is a pregnancy complication with serious consequences for mother and infant. The disorder is diagnosed by hypertension and proteinuria. Several hypotheses invoke oxidative stress as a cellular process contributing to pathologic changes in preeclampsia. Literature data showed that activation and/or dysfunction of the maternal and fetal vascular endothelium may be the consequence of increased oxidative stress. Increased vasoconstriction lead to maternal hypertension and reduced uteroplacental blood flow. Increased vasoconstriction of umbilical artery can be demonstrated using Doppler velocimetry as increased resistance. Our study involved 22 healthy (control) and 20 pregnant women with mild preeclampsia (study group). The aim of this study was to investigate relationship between resistance index of the fetal umbilical artery and concentration of GSH and GSSG (indicators of oxidative stress) in maternal circulation.

Key words: oxidative stress, preeclampsia, fetal umbilical artery

SAŽETAK

Preeklampsija predstavlja za trudnoću specifičan sindrom, koji je praćen povećanim morbiditetom i mortalitetom majke i fetusa. Kliničku sliku karakterišu pojava hipertenzije i značajne proteinurije u drugoj polovini trudnoće. Etiopatogenetska zbivanja tokom preeklampsije još uvek nisu dovoljno razjašnjena, ali nekoliko hipoteza pominje oksidacioni stres kao značajnu komponentu patogeneze preeklampsije. Literarni podaci ukazuju da je za disfunkciju odnosno aktivaciju endotela najverovatnije delom odgovoran i pojačani oksidacioni stres. Hipertenzija i smanjena uteroplacentalna cirkulacija su posledica vazokonstrikcije karakteristične za preeklampsiju. Primenom Doppler ultrazvuka možemo registrovati pojačanu vazokonstrikciju kroz umbilikalnu arteriju. U našoj studiji je bilo ispitano 22 zdrave trudnice (kontrola) i 20 trudnica sa umerenim oblikom preeklampsije. Cilj studije je bio da se ispita odnos između oksidacionog stresa (koncentracije u krvi GSH i GSSG) i rezistentnog indeksa (RI) u umbilikalnoj arteriji.

Ključne reči: oksidacioni stres, preeklampsija, umbilikalna arterija

INTRODUCTION

Preeclampsia is human pregnancy-specific syndrome that adversely affects the mother and the fetus, with increased morbidity and mortality. The incidence of preeclampsia is between 4% and 8 % of pregnancies. Preeclampsia is diagnosed by new development of hypertension and significant proteinuria after 20 weeks of gestation. Other manifestations of preeclampsia include reduced perfusion to organs and platelet activation. After delivery, these signs remit [1]. The etiology and pathogenesis of preeclampsia remain poorly understood. Increasing evidence indicates that activation and/or dysfunction of the maternal and fetal vascular endothelium may be the consequence of increased oxidative stress. Increased vasoconstriction lead to maternal hypertension and reduced uteroplacental blood flow [2-4].

Oxidative stress is disturbance of the redox-balance, caused by increased amounts of oxidants such as reactive oxygen species – ROS (anion radical (O_2^-), hydrogen peroxide (H_2O_2) and hydroxyl radical ($OH\cdot$) or a deficiency of antioxidants [5]. Under physiological conditions, overproduced ROS are neutralized by the activity of antioxidative defense system (AOS), which consists of enzymatic and non-enzymatic components [5].

Glutathione (GSH) is non-enzymatic component of AOS and plays a major role in defenses against oxidative and nitrosative stress. GSH reacts with hydroxyl radical, the cytotoxic Fenton reaction product, and with N_2O_3 and peroxynitrite, cytotoxic products formed by the reaction of nitric oxide (NO) with O_2 and superoxide, respectively. In addition, GSH acts as a co-substrate of

