

Abstract

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Reduced Selenium Concentrations and Glutathione Peroxidase Activity in Preeclamptic Pregnancies

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BACKGROUND: Preeclampsia is pregnancy-specific, affecting 2% to 7% of women, and is a leading cause of perinatal and maternal morbidity and mortality. Preeclampsia may also predispose the fetus to increased risks of adult cardiovascular disease. Selenium, acting through the selenoprotein glutathione peroxidases, has critical roles in regulating antioxidant status. Recent reports implicate poor maternal selenium status as a nutritional factor predisposing the mother to preeclampsia but the fetus and placenta have not been studied in tandem.

OBJECTIVE AND METHODS: Measurement of selenium concentrations, expression, and activity levels of glutathione peroxidase and markers of oxidative stress were performed on maternal and umbilical venous blood samples or the placenta from 27 normal pregnant, 25 preeclamptic, and 22 healthy age-matched nonpregnant women.

RESULTS: The results of this study revealed highly significant reductions in serum selenium concentrations and plasma glutathione peroxidase activity in pregnancy per se compared to nonpregnant controls. Moreover, these levels were further decreased in the preeclamptic mothers and babies compared to normal pregnancies. Umbilical venous selenium was particularly low (42.1+/-11.8 and 29.0+/-9.9 microg/L; mean+/-SD; P<0.05). Both mother and baby had significantly increased levels of markers for oxidative stress in the preeclamptic group. The placental glutathione peroxidase activity and immunohistochemical staining were also reduced in the preeclampsia placentae.

CONCLUSION: Oxidative stress associated with preeclampsia may be a consequence of reduced antioxidant defense pathways specifically involving glutathione peroxidases, perhaps linked to reduced selenium availability. Reduced glutathione peroxidases could be associated with increased generation of toxic lipid peroxides contributing to the endothelial dysfunction and hypertension of preeclampsia.

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