

The Influence of Smoking Behavior in Relation to Antioxidant Status and DNA Damages during Pregnancy

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The adverse fetal effects of maternal smoking have been extensively documented including intrauterine growth retardation, an increase in perinatal mortality, premature birth, and an increased risk for the development of serious diseases in childhood and in later life. The purpose of this study was to determine the effect of cigarette smoking during pregnancy on the antioxidant status and DNA damages measured by sister chromatid exchanges (SCE) in lymphocytes. The total study population consisted of 49 healthy Austrian pregnant women, 28 of non-smokers and 21 smokers, who were 19-22 weeks gestation, aged 19-40 years. There was no difference with age, BMI and intakes of alcohol, coffee or antioxidant (vitamin A, C, and E, β -carotene, and folate) between the two groups. The smoking pregnant women had lower plasma concentration of β -carotene than non-smoking pregnant women (0.5 ± 0.06 vs 0.68 ± 0.06 , $P < 0.05$). Plasma level of selenium was also significantly lower than non-smoking women (0.79 ± 0.06 vs 0.97 ± 0.03 , $P < 0.05$). Other plasma vitamin concentrations (retinol, tocopherol, coenzyme Q10, ascorbic acid) were lower in smokers, although these were not statistically significant. There were no differences in plasma lipid profiles and erythrocyte antioxidant enzyme activities (GSH-Px and SOD) between the two groups. Smoking pregnant women had 23% higher SCE frequency than non-smoking women (10.11 ± 0.35 vs 8.20 ± 0.24 , $P < 0.001$). The effect of smoking on SCE was linearly correlated with the number of cigarettes/d, duration of smoking and smoking packyears. This result suggests that both extent and duration of exposure might determine cigarette smoke-induced SCE frequencies. In conclusion, our findings indicate that cigarette smoking during pregnancy causes DNA damage that may increase the risk of pregnancy complications and also indicate that plasma β -carotene and selenium are consumed excessively in smokers because of an increased demand for antioxidants. Therefore, women planning to have children would be well advised to stop smoking before becoming pregnant and to refrain from smoking during pregnancy.