

Atherogenic Lipid Profile in Early Pregnancy Associated with Pre-Eclampsia

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Abstract: Preeclampsia, a syndrome defined by hypertension and proteinuria is associated with increased maternal mortality and morbidity in United States and worldwide. There is no clear distinction between normotensive and preeclamptic pregnancies in terms of pathogenic factors and disease mechanisms. However, various factors are implicated in the pathogenesis of pre-eclampsia including genetic, immune, vascular, and oxidative stress. These have led to identification of potential candidate markers from cross-sectional studies. Maternal plasma lipids are significantly elevated during pregnancy. Women who develop preeclampsia experience even more dramatic lipid changes. Most, although not all, case-control studies have shown a preeclampsia–dyslipidemic pattern of increased triglycerides, cholesterol, low-density lipoprotein (LDL) and decreased high-density lipoprotein (HDL) concentrations. Inferences from these studies are limited by the fact that plasma lipid profiles were determined using blood samples collected after the diagnosis of preeclampsia. Evidence from few available prospective cohort studies suggest that women destined to develop the disorder are more likely to have elevated plasma triglycerides and decreased HDL cholesterol concentrations compared with their normotensive counterparts. However, results are not consistent, and investigators generally have not adjusted for possible confounding factors. We therefore used available information and plasma specimens from an ongoing prospective cohort study of women receiving prenatal care before 16 weeks gestation to examine whether varying concentrations of maternal plasma lipids and lipoproteins, measured in early pregnancy, are independently associated with an increased risk of preeclampsia.

Keywords: Plasma lipids, obesity, pregnancy, pre-eclampsia

1. Background

We investigated the relationship between early pregnancy plasma lipid concentrations and risk of preeclampsia.

2. Methods

In a prospective cohort study, maternal blood samples were collected at an average of 13 weeks gestation. From the cohort, we selected 57 women who developed preeclampsia and 510 who remained normotensive and served as control subjects. Plasma lipid concentrations were measured enzymatically by standardized assays. Logistic regression procedures were used to calculate adjusted odds ratios (OR) and 95% confidence intervals (CI).

3. Results

Women who subsequently developed preeclampsia had 10.4%, 13.6%, and 15.5% higher concentrations of LDL cholesterol, triglycerides, and LDL/HDL ratios, respectively, than did control subjects ($P < .05$). The HDL cholesterol concentrations were 7.0% lower in women with preeclampsia than in control subjects ($P < .05$). After adjustment, there was a 3.60-fold increase in risk of preeclampsia among women with total cholesterol > 205 mg/dL (95% CI 1.23 to 10.51) and a 4.15-fold increase in the risk of preeclampsia among women with triglyceride levels > 133 mg/dL (95% CI 1.50 to 11.49). A linear increase in preeclampsia risk was observed with increasing tertiles of LDL cholesterol, triglyceride concentrations, and LDL/HDL ratio (all $P < .05$ for trend).

4. Discussion

In this study, we observed an association between maternal early pregnancy dyslipidemia, particularly hypertriglyceridemia, and the subsequent risk of preeclampsia. Pregnant women who subsequently developed preeclampsia had increased total cholesterol and LDL cholesterol concentrations as compared with pregnant women who remained normotensive. The expected inverse relationship between preeclampsia risk and HDL concentrations, however, was not as evident. Our findings are consistent with results from the few available prospective cohort studies, and many case-control studies, of maternal fasting or nonfasting plasma lipid and lipoprotein concentrations in pre-eclamptic and normotensive pregnancies. In a prospective cohort study involving 393 pregnant women, Wladimiroff et al reported that women with serum total cholesterol concentrations ≥ 6 mmol/L (> 233 mg/dL), compared with those whose concentrations were ≤ 5 mmol/L (< 194 mg/dL), experienced a fivefold increased risk of preeclampsia (95% CI 1.2 to 22.5) after accounting for confounding by 16 maternal BMI and gestational age. Notably, results from two prospective studies also indicate that maternal hypertriglyceridemia is evident as early as 10 to 20 weeks of gestation in women destined to develop pre-eclampsia.

5. Conclusion

Early pregnancy dyslipidemia is associated with an increased risk of preeclampsia. This association may be significant in understanding the pathologic processes of preeclampsia and may help in developing strategies for prevention or early diagnosis of the disorder.

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