

First-Trimester C Reactive Protein As A Predictor Of Gestational Diabetes

Thesis

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By

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Introduction

Gestational diabetes mellitus (GDM) is defined as the new onset or new diagnosis of glucose intolerance during pregnancy. It complicates about 4% of pregnancies.⁽¹⁾ This estimate will likely increase in the future, giving the alarming increase in rates of obesity and type II diabetes among young women .^(2,3)

GDM carries considerable health risks for both the fetus and the mother.⁽⁴⁾ Like type II diabetes, GDM results from a combination of increased insulin resistance and impaired pancreatic insulin secretion.^(5, 6)

Although most women with GDM return to normal glucose tolerance after delivery, it is well established that glucose intolerance detected during pregnancy is predictive of later maternal type II diabetes.^(4, 7, 8)

Inflammation, marked by increased serum levels of C-reactive protein (CRP) is associated with insulin resistance.⁽⁹⁻¹¹⁾ And prospective studies indicate that increased inflammation at baseline is an independent risk factor for the future development of type II diabetes.⁽¹²⁻¹⁶⁾

The molecular basis for the link between inflammation and diabetes likely relates to the actions of cytokines such as interleukin-6 (IL-6) and tumor necrosis factor (TNF), which induce insulin resistance and stimulate the acute phase inflammatory response. Collectively, these data suggest that inflammation is a distinct feature of the atherogenic, prediabetic state.⁽¹⁷⁻²⁰⁾

Thus individuals at risk for developing type II diabetes are more likely to develop the disease if inflammation, as shown by increased CRP, is found before diagnosis.^(16, 21)

CRP was first detected in 1930 by Tillet and Frances, who identified a substance in the sera of a patients acutely infected with pneumococcal pneumonia that formed a precipitate when combined with polysaccharide C of streptococcus pneumonia.⁽²²⁾ Subsequently, it was found that this reaction was not unique to pneumococcal pneumonia but could be found with a variety of other acute infections. This was early evidence of the body's chemical response to inflammatory states and lead to characterization of other so- called "acute phase proteins".⁽²³⁾

Like many acute phase proteins, CRP is normally present in trace levels in serum but increases rapidly and dramatically in response to a variety of infectious or inflammatory conditions.⁽²⁴⁾

Since its discovery, CRP has been studied as a screening device for occult inflammation, as a marker of disease activity and as a diagnostic tool.⁽²⁵⁾

Recently, more rapid and precise methods of quantifying CRP have lead to a new interest in its value in clinical medicine.⁽²⁶⁾

CRP can be measured by either antibodies that are labeled with an enzyme (ELISA) or a fluorescent compound or polystyrene beads-coated antibodies or by latex agglutination slide test.⁽²⁷⁾

Aim of the work

The aim of the present study is to test the hypothesis that increased CRP levels, measured in the first trimester of pregnancy, are associated with the subsequent development of GDM.

Patients and Methods

Place of study

This study will be conducted in Maternity hospital Ain Shams University.

Type of the study

Longitudinal observational study.

Patients group

100 pregnant females visiting the hospital for the routine antenatal care.

Inclusion criterion: Gestational age at the first visit 10-12 weeks.

Exclusion criteria:

1. Diabetic pregnant patients.
2. Chronic hypertension.
3. Infectious diseases with pregnancy.
4. Inflammatory diseases with pregnancy.

Sample calculation:

- Epi Info version 6 was used in calculation of sample size.
- Confidence interval 95%
- Power of the test 80%
- α error 5%.

For all patients:

- A written informed consent to participate in the study will be taken.
- Baseline data will be collected during the first antenatal visit including age, past medical, obstetric and family history, smoking, height, weight and body mass index.
- Complete general and abdominal examination.
- Ultrasonography to calculate the gestational age, and to exclude any congenital malformations.
- Follow up of weight gain during pregnancy.
- Maternal plasma CRP level will be measured between 10-12 weeks gestation through a venous blood sample which will be withdrawn from women after 6 hours fasting into 5 ml test tubes. The blood samples will be centrifuged to separate the serum and stored at -20°C till examined. Level of CRP will be measured by latex agglutination slide test for qualitative and semi-quantitative measurements (cromatest)[®] linear chemicals Barcelona.

Then all patients will undergo routine GDM screening with 50 gm oral glucose-loading test (GLT) between 24-28 weeks gestation. If plasma glucose level after 1 hour is ≥ 140 mg/dl, the female will be considered to be at increased risk for developing GDM and will undergo 3-h glucose tolerance test. This will be

done by measuring fasting blood glucose level then oral intake of 100 gm glucose followed by measuring blood glucose level after 1, 2 and 3 hrs. Patients will be considered to have GDM if 2 or more of the 4 values exceed the followings⁽²⁸⁾:

| | |
|---------|----------|
| Fasting | 90 mg/dl |
| 1-h | 165mg/dl |
| 2-h | 145mg/dl |
| 3-h | 125mg/dl |

Then all the data will be statistically analyzed and tabulated.

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