

## Comparison of C-Reactive Protein Concentrations of Patients with Preeclampsia and Normal Pregnancies

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**Abstract:** Preeclampsia is one of the complications of pregnancy and is one of the most important causes of maternal and fetal death. This disease usually occurs after the 20<sup>th</sup> week of pregnancy. Hypertension, proteinuria and different degrees of end organ damage may be present in this disease. The aim of this study was to compare CRP levels in normal pregnancies with pregnancies involved with preeclampsia. This was a cross sectional study that was conducted in 2012 among pregnant women who attended Shariati Hospital of Bandar Abbas. About 200 participants were included in this study and were divided into three groups with a 1:1:2 ratios. Blood samples were taken from all the participants and the CRP level was measured by the Latex Agglutination test. Data was analyzed with SPSS v.21 software using t-test and descriptive statistics. The CRP level was  $17.858 \pm 19.7457$  in patients of the severe group,  $15.106 \pm 18.2851$  among the mild group and  $6.576 \pm 7.5491$  among the control group. The differences between the CRP levels of the three groups were statistically significant ( $P < 0.001$ ). On the other hand the difference of the CRP levels of the severe and mild preeclampsia group was not significant (  $P$ -value  $> 0.05$ ). Our results show that CRP can be known as a risk factor for preeclampsia among pregnant women. Although performing a systematic review is necessary for establishing it as a routine test.

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**Keywords:** Preeclampsia, C-Reactive Protein, Case-Control Study.

### 1. Introduction

Preeclampsia is one of pregnancy complications and is an important cause of fetal and maternal mortality and morbidity (FG and MD 1992). This disease usually occurs after the 20<sup>th</sup> week of pregnancy and presents with hypertension, proteinuria and different levels of ischemic damage (BM 2004). It may also be associated with hemolysis, increase in liver enzymes and decrease in platelet count (Y, MD et al. 2002, BM 2004).

Clinical and biochemical evidence suggests that endothelial cellular activity can be the main cause of preeclampsia (Gifford, August et al. 2000). Endothelial cell dysfunction and inflammation has an important role in the physiopathology of preeclampsia (FG and MD 1992). Recent studies have suggested that CRP levels can be known as a risk factor for preeclampsia.

Tran et al showed in their study that the CRP concentrations of preeclamptic women are about 66% higher than the control group (Wang, Knottnerus et al. 2002). Also, Wolf et al reported that women with CRP concentrations above 4. Mg per liter encounter 3.5 times more to preeclampsia (Conde-Agudelo, Villar et al. 2008). The aim of this study was to compare the CRP levels of healthy and preeclamptic women.

### 2. Material and Methods

This was a case control study that was conducted in 2012 on pregnant women with a gestational age between 24 and 40, who attended Shariati Hospital of Bandar Abbas.

Those who experienced premature rupture of membrane, chorioamnionitis, premature labor, history of diabetes, chronic hypertension, kidney disease, history of smoking or substance abuse were excluded from the study.

Using convenience sampling, a sample size of 200 women was allocated into three groups of control, severe preeclampsia and mild preeclampsia with a 2:1:1 ratio. Patients with a systolic blood pressure of 140 mmHg or above, or diastolic blood pressure of 90 mmHg who were normotensive before the 20<sup>th</sup> gestational week along with proteinuria (300 mg protein in 24 hour urine or protein equal or above 1 in dipstick) were diagnosed as mild preeclampsia.

Patients with systolic blood pressure of 160 mmHg or above, or diastolic blood pressure of 110 mmHg or above and had any of the following symptoms were considered as severe preeclampsia: proteinuria (2 grams in 24 hour urine or 2+ or above protein using dipstick), oliguria (below 500 ml in 24 hours), visual or brain dysfunction, papillary edema,

pulmonary edema, cyanosis, epigastric pain, right upper quadrant pain, liver dysfunction, platelet below 100.000, signs of hemolysis, or intrauterine growth retardation.

The samples were taken prior to any treatment. On the other hand, the participants of the control group were selected among women with normal prenatal examinations.

Five milliliters of venous blood were collected from each patient and the quantitative and qualitative amounts of c-reactive protein (CRP) was measured using latex agglutination test.

Data was entered SPSS v. 21 and analyzed using t-test and descriptive statistics. A p-value below 0.05 was considered as significant.

### 3. Results

In this study, 200 pregnant women were enrolled and were randomly allocated into three groups of random, mild pregnancy and severe pregnancy group with a 2:1:1 ratio. The mean age of the participants of the control, mild and severe preeclampsia was  $27.7 \pm 5.598$ ,  $28.24 \pm 6.766$  and  $27.7 \pm 6.659$  years, respectively. This difference wasn't statistically significant ( $p>0.05$ ).

The mean CRP levels were  $17.858 \pm 19.7457$  in the severe preeclampsia group,  $15.106 \pm 18.2851$  in the mild preeclampsia group and  $6.576 \pm 7.5491$  in the control group (Figure -1).

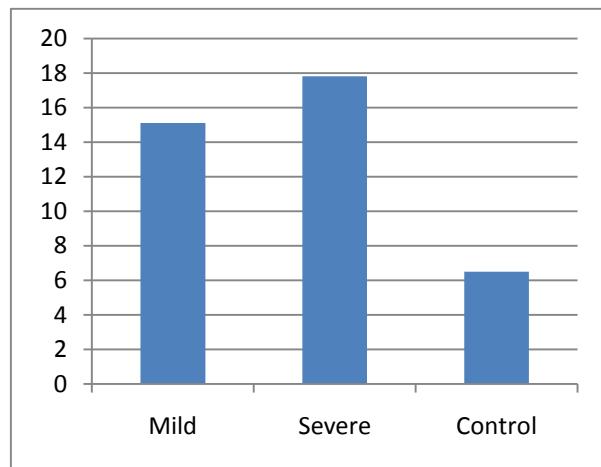


Figure -1: The CRP levels of patients of the three groups

The level of CRP among severe preeclampsia and mild preeclampsia compared with the control group was statistically different ( $P<0.001$  and  $P=0.001$ , respectively).

### 4. Discussions

This was a case control study that was conducted in 2012 on 200 pregnant women who

attended Shariati Hospital of Bandar Abbas in order to determine the associations between serum CRP levels and the incidence of preeclampsia.

The CRP level is an indicator for inflammatory response of the body. Usually pregnant women have higher levels of CRP compared to non pregnant women (Guven, Coskun et al. 2009). Inflammatory responses occur in different stages of pregnancy such as implantation. Also, the increase of the estrogen level during pregnancy can be another reason for inflammatory responses (García, Celedón et al. 2007, Cebesoy, Balat et al. 2009).

The findings of this study showed a statistically significant difference between the CRP levels of the control and preeclampsia group. This result was consistent with the results of Huang et al, Cebosoy et al, Goon et al and Tejoa et al. Wolf et al also showed that women with high levels of CRP are 3.5 times more likely to become preeclamptic (Tjoa, van Vugt et al. 2003, Cebesoy, Balat et al. 2009).

On the other hand, animal studies have also shown that inflammatory processes have a role in preeclampsia incidence. Fas et al injected pregnant rats with low dose endotoxin and induced hypertension and proteinuria and observed an elevation in CRP levels.

Since high CRP levels are indicative of vascular injury and vasoconstriction, we suggest that systemic infections have an important role in the incidence of preeclampsia. On the other hand, the severity of preeclampsia had no significant relations with CRP levels. This result was not consistent with the results of Guven et al, Cebosoy et al, and Garcia et al (García, Celedón et al. 2007, Cebesoy, Balat et al. 2009, Guven, Coskun et al. 2009).

One of the limitations of this study was that blood samples were obtained only once during pregnancy. However, CRP levels do not change at the end of pregnancy. The results of this study showed that CRP can be known as a risk factor for preeclampsia incidence among pregnant women. However, systemic reviews have to be conducted to establish if routine assessment is necessary

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