



# Expression of Cell Adhesion Molecules in Preeclampsia

Nnodim J<sup>1\*</sup>, Edward U<sup>1</sup>, Nkiruka OA<sup>2</sup>, Isah SY<sup>3</sup> and Bako H<sup>4</sup>

<sup>1</sup>Department of Medical Laboratory Science, Faculty of Health Science, Imo State University, Nigeria

<sup>2</sup>Department of Nutrition and Dietetics, Faculty of Health Science, Imo State University, Nigeria

<sup>3</sup>Department of Medical Laboratory Science, Faculty of Allied Health Sciences, Bayero University, Nigeria

<sup>4</sup>Department of Medical Laboratory Science, College of Medical Sciences Ahmadu Bello University, Nigeria

## Research Article

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**\*Corresponding author:** Nnodim Johnkennedy, Department of Medical Laboratory Science, Faculty of Health Science, Imo State University, Owerri, Nigeria, Email: johnkennedy23@yahoo.com

## Abstract

**Aim:** The serum P-Selectin and E-Selectin levels of preeclamptic patients attending General Hospital Owerri, Nigeria were evaluated.

**Materials and Methods:** A case control study involving 200 primigravida (100 preeclamptic and 100 apparently healthy) between the ages of 20 and 32 years attending General Hospital Owerri. Fasting venous blood was collected for the determination of serum selectin. The serum selectins were estimated using enzyme linked immunoabsorbent assay (ELIZA). The Independent Student t test was used for statistical analysis.

**Results:** The levels of P-Selectin and E-Selectin were significantly increased in preeclampsia ( $p < 0.05$ ), when compared with the control.

**Conclusion:** The result suggests, that preeclampsia is linked with increased P-Selectin and E-Selectin level which may be useful for predicting the severity of pre-eclampsia.

**Keywords:** P-selectin; E selectin; Preeclampsia

## Introduction

Preeclampsia is an abnormal vascular endothelial malfunction and vasospasm that results after 20 weeks' gestation. It is characterized by proteinuria and hypertension in which the systolic blood pressure (SBP) is greater than or equal to 140 mm Hg or a diastolic blood pressure (DBP) greater than or equal to 90 mm Hg or higher, on two occasions at least 4 hours apart in a previously normotensive patient. Specifically, proteinuria of greater than or equal to 0.3 grams in a 24-hour urine specimen, a protein (mg/dL)/creatinine

(mg/dL) ratio of 0.3 or higher, or a urine dipstick protein of 1+ is an indication of preeclampsia diagnosis [1,2].

In fact, the cause of preeclampsia is linked to several factors. It is believed that the placenta which is the organ that nourishes the fetus throughout pregnancy play a major role [3]. Early in pregnancy, new blood vessels develop and evolve to efficiently send blood to the placenta. However, in preeclampsia, these blood vessels do not seem to develop or function properly. They are narrower than normal blood vessels and react differently to hormonal signaling, which

limits the amount of blood that can flow through them [4]. This abnormal development may include insufficient blood flow to the uterus, damage to the blood vessels, a problem with the immune system and certain genes [5].

Adhesion molecules especially selections play a major role in cell-cell interactions particularly in endothelial cells, monocytes, smooth muscle cells and platelets as well as in cell-extracellular matrix interactions which are between extracellular matrix and leukocytes, platelets or fibroblasts [6,7]. When endothelium is activated, adhesion molecules are expressed [8,9]. The selections are cell surface lectins which tend to mediate the adhesion of white blood cells to endothelial cells and platelets under flow [10,11]. They recognize fucosylated, sialylated and in some cases sulfated ligands expressed on scaffold glycoproteins serving as functional counter-receptors. Selectins are involved in constitutive lymphocyte homing, and in chronic and acute inflammation processes. During an inflammatory response, P-selectin is expressed on endothelial cells first, followed by E-selectin later [12,13].

Preeclampsia is a highly prevalent with its attendant morbidity and mortality [14]. It is on the light of the above that this study was embarked upon to evaluate status of E selectin and P selectin in preeclampsia. This study was equally undertaken so that the knowledge gained from the research work may suggest a better understanding and management of preeclampsia

## Materials and Methods

**Research Design:** This case control study was carried out from February 2014 to April 2015 at General Hospital Owerri.

**Research Subjects:** The subjects of the study were 100 pregnant women within the age range of 20-32 years, who had been clinically diagnosed with preeclampsia during the third trimester (30-40 weeks), and were visiting General Hospital Owerri. Subjects were selected on the basis of high blood pressure (systolic and diastolic), proteinuria and pathological edema, which are the diagnostic criteria of preeclampsia. As normal controls were taken 100 healthy normotensive pregnant women, also within the age range of 20-32 years, who were in their third trimester (30-40 weeks). Patients with a past history of hypertension, diabetes, and renal disease were excluded from the study. The following information was recorded by the trial midwife: age, blood pressure; date of the last menstrual period/gestational age; weight and height.

**Blood Collection:** In all subjects, 5ml of venous blood was collected into a non - anticoagulated tubes. The sample was spun in a Wisterfuge (model 684), centrifuge at 1000g for

10 minutes and the serum collected into a clean dry bijou bottle. The Serum E Selection and P selection were measured by enzyme linked immunoabsorbent assay (ELIZA) using standard commercial kits (Bachem UK). Informed consent of the participants was obtained and was conducted in line with the ethical approval of the hospital.

**Statistical Analysis:** The values were expressed as mean  $\pm$  standard deviation. The independent Student t-test was used to calculate the significant differences at  $p < 0.05$ .

## Results

Parameters	Control	preeclampsia
E-Selectin(ng/ml)	36.64 $\pm$ 7.9	64.51 $\pm$ 8.3*
P- Selectin(ng/ml)	134.41 $\pm$ 9.4	177.21 $\pm$ 20.8*

\*Significantly different from control at  $P < 0.05$ .

**Table 1:** E-Selectin and P- Selectin levels in preeclampsia and control.

The level of E-Selectin and P- Selectin were significantly increased in preeclampsia when compared with the control. ( $P < 0.05$ ) (Table 1).

## Discussion

Preeclampsia is a condition that pregnant women develop. It's marked by high blood pressure in women who haven't had high blood pressure before. Preeclamptic women will have a high level of protein in their urine and often also have swelling in the feet, legs, and hands [15]. This condition usually appears late in pregnancy, though it can happen earlier and may even develop just after delivery [16].

In this study, the level of p- selectin was significantly increased in Preeclampsia when compared with the control. P-selectin acts as a marker for platelet and endothelial activation and as an inducer of the procoagulant condition, as well as playing a crucial role in atherosclerosis [17]. The elevated P-selectin in preeclampsia seems to confirm that these processes occur in preeclamptic pregnancies [18]. Higher levels of P-selectin in preeclamptic pregnancies suggest that the excess circulating P-selectin contributes to the pathogenesis of this pregnancy-specific disorder. This is in line with the work of Djurovic, et al. [12]. Endothelial dysfunction is thought to be a central pathogenic feature in preeclampsia on the basis of elevated p-selectin.

Similarly, the level of E-selectin was significantly increased in preeclampsia when compared with the control. This could probably be due to inflammatory occurrences. This is in agreement with the work of Bersinger, et al. [14]. E-selectin is a member of the selectin family which is

cytokine inducible and largely restricted to endothelial cells [19,20]. It mediates the adhesion of various leukocytes, like neutrophils, monocytes, eosinophils, natural killer cells, and a subset of T cells, to activated endothelium [21]. The increase in E-selectin could be induced in human endothelium in response to cytokines such as interleukin-1 and tumor necrosis factor- $\alpha$  through transcriptional up regulation [22].

Preeclampsia could be linked with increased E-Selectin and P- Selectin level which promote the increased risk of complications. Hence, the E-Selectin and P- Selectin may have significant potential as clinical marker of preeclampsia.

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