Serum Immunoglobulins (IgG, IgA, IgM) levels in Preeclampsia and Eclampsia Pregnancies

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Citation

T Ahsan, F Wahab, M Kamal, S Islam. *Serum Immunoglobulins (IgG, IgA, IgM) levels in Preeclampsia and Eclampsia Pregnancies*. The Internet Journal of Third World Medicine. 2008 Volume 8 Number 1.

Abstract

Bacground:
Preeclampsia is the most common pregnancy-specific complication. It is thought to be associated with modulation of immune response.
Objective:
The aim of this study was to investigate the serum levels of immunoglobulins-IgG, IgA and IgM in pre-eclampsia and eclampsia, and to examine the influence of the immunoglobulins with pre-eclampsia and its complication eclampsia, if any.
Methods:
The study was conducted among fortythree subjects consisting of seventeen pre-eclampsia patients, eleven eclampsia patients and fifteen healthy normotensisve pregnants of singleton gestations in their third trimester. Serum immunoglobulin levels were analyzed by solid phase indirect ELISA method.
Results:
It was shown that serum IgG concentrations were 7.95±0.69g/L, 7.66±0.46g/L and 7.10±0.61g/L; IgA concentrations were 4.07±0.32g/L, 4.10±0.32g/L and 3.65±0.32g/L; and IgM concentrations were 2.01±0.21g/L, 2.92±0.29g/L and 2.16±0.16g/L in pre-eclampsia, eclampsia and normotensive pregnant respectively. There were no significant change in IgG and IgA between pre-eclampsia and eclampsia, but IgM level was found to be significantly higher in eclampsia than that in pre-eclampsia (t=7.87, p=0.0001). Except systolic blood pressure with IgG (r=0.689, p=0.04) and to some extent with IgA (r=-0.637, p=0.065), gestational age (r= -0.890, p=0.0001) and proteinuria (r=0.747, p= 0.008) with IgM; none of the maternal characteristics is associated with the serum immunoglobulin concentration in pre-eclampsia or eclampsia.
Conclusion:
It is revealed that serum immunoglobulins levels are elevated with pre-eclampsia and its complication eclampsia.

INTRODUCTION

Preeclampsia is the most common pregnancy-specific complication that still ranks as one of obstetrics major problems. It is a placenta dependent pregnancy disorder. Preeclampsia is associated with modulation of immune response and defective trophoblast invasion (1). Syndrome of preeclampsia is described as excessive maternal inflammatory responses, perhaps directed against foreign fetal antigens that induce a chain of events including surface trophoblast invasion, defective spiral artery remodeling, placental infarction and release of pro-inflammatory cytokines and placental fragments in the systemic circulation. Currently preeclampsia, consequently eclampsia are suggested to be caused by changes in immunity. Therefore, in addition to treating hypertension in preeclampsia, attempts of modifying immune responses may be a future treatment modality. There have been several observations on modulation of immune responses in pregnancy (2,3) and preeclampsia (1,4-9), most of which documented inflection of lymphocytes and cytokines. Report on immunoglobulin status is rare. We report here the serum IgG, IgA and IgM levels in preeclampsia and eclampsia patients.

MATERIALS AND METHODS

Study population. It was a cross sectional case control study and was conducted prospectively in Sir Salimullah Medical College and Hospital, Dhaka. The study included 17 preeclampsia patient, 11 eclampsia patient and 15 nonhypertensive pregnant women (as controls). They are

mostly from the middle class and lower class society. All the patients had have pregnancy within 25 to 40 gestational weeks and had primi to multi gravida. Though they were from middle class society, they are aware of taking proper food and antenatal care during pregnancy. Most of them were hypertensive and had have convulsion once or more. A structured questionnaire was developed to collect the maternal clinical characteristics. Ethical permission was taken from the head of the department of obstetrics and gynecology, Sir Salimullah Medical College and Hospital.

Analysis of Immunoglobulins. A 5mL venous blood sample was collected from antecubital vein of each of the case and control subjects. The blood sample was kept undisturbed for at least 60 minutes and was then centrifuged at 3000rpm for 10 minutes. Serum thus extracted was stored at -20ºC for analysis of IgG, IgA and IgM.

Serum Immunoglobulins were estimated by solid phase indirect enzyme-linked immunosorbant assay (ELISA), as described by Islam (10). In brief, microtitre ELISA plates (Nunc Immuno plate, Denmark) were coated with 100 µl of anti-human IgG, IgA and IgM (Sigma Chemicals Company, USA; diluted 1:1000 with PBS), incubated overnight at 4ºC, washed (×3) with PBS (containing 0.5% Tween 20) and dried by wads of paper towels. The wells were blocked with 100 µl of sheep serum solution, incubated for 1 hour at 37ºC and treated as above. Then 100µl of diluted test sera and serially diluted standard immunoglobulins-IgG, IgA, IgM (Sera-Pak®, Immuno, Bayer, USA) were pipetted into the premarked wells, incubated and treated as above. Next, 100 µl of peroxidase-conjugated anti-human IgG, IgA or IgM of Sigma Chemicals Co., USA; diluted 1:500 with 0.1% BSA) was pipetted into each well and incubated and treated as above. Finally, 100 µl of substrate solution (0.001% tetramethylbanzidine in 0.1M sodium acetate buffer containing H_2O_2) was added to each well of the plates and incubated in the dark at room temperature for 50 minutes. Peroxidase reaction was stopped by adding 50 µl of 10% sulfuric acid to each well. The plates were read at 450nm in an ELISA plate reader (Labsystems, MultiskanEX, Finland).

Statistical analysis. SPSS software package (Version 12.0, SPSS Inc., Chicago, USA) was used to analyze the data. Descriptive statistics- mean and standard deviation were used for all variables, independent sample t test were performed for significance level. The correlation and significance level were used to show the effect of maternal characteristics on the serum immunoglobulins.

RESULTS

Clinical parameters of preeclampsia, eclampsia and normotensive pregnant are shown in the table 1. The mean age of preeclampsia patient (27.18±6.49years) was found to be higher than the eclampsia patient (22.67±3.57years), but was equivalent to the normotensive pregnant (24.11±4.93years). Gestational age for preeclampsia and eclampsia were also matched. As anticipated, the mean systolic and diastolic blood pressures of eclampsia patient (162.78±20.17mmHg, 111.67±15.21mmHg respectively) were higher than the preeclampsia patient (143.18±12.3mmHg, 102.27 ± 6.47mmHg respectively).

Figure 1

Table 1: Maternal characteristics of preeclampsia, eclampsia & normotensive pregnants

Clinical Characteristics	Case		Control
	Preeclampsia	Eclampsia	Normotensive preganat
Maternal Age (yr)*	27.18±6.49	22.67 ± 3.57	24.11±4.93
Gestational age (wk)*	35.82±3.71	35.89 ± 2.26	36.23±2.64
Proteinuria Primi	2+(6)	2+(2)	nil
Multi	3+(11)	3+(9)	
Systolic blood pressure*	143.18 ± 12.3	162.78 ± 20.17	109.86±9.27
Diastolic blood pressure*	102.27 ± 6.47	111.67 ± 15.21	72.29±7.81

*Values were expressed in mean±sd.

In preeclampsia patients, serum IgG, IgA and IgM concentrations were 7.95±0.69g/L, 4.07±0.32g/L and 2.01±0.21g/L; in eclampsia, it were 7.66±0.46g/L, 4.10±0.32g/L and 2.92±0.29g/L; and in normotensive pregnant, it were 7.10±0.61g/L, 3.65±0.32g/L and 2.16±0.16g/L respectively. There were no significant change in IgG and IgA between pre-eclampsia and eclampsia, but IgM level was found to be significantly higher in eclampsia than that in pre-eclampsia (t=7.87, p=0.0001). Compared to the normotensive pregnants, serum concentrations of all of the immunoglobulins were found significantly high in both pre-eclampsia and eclampsia (table 2). It was observed that except systolic blood pressure with IgG (r=0.689, p=0.04) and to some extent with IgA (r=-0.637, p=0.065), gestational age (r= -0.890, p=0.0001) and proteinuria (r=0.747, p= 0.008) with IgM; none of the maternal characteristics is associated with the serum immunoglobulins concentrations in pre-eclampsia or eclampsia. Multiple regression analysis did not show any effect of systolic or diastolic blood pressure on any of the serum immunoglobulins.

Figure 2

Table 2: Serum immunoglobulins levels preeclampsia, eclampsia and normotensive pregnants

Immunoglobulin g/L	Preeclampsia[x] mean±sd	Eclampsia[y] mean±sd	Normotensive[z] mean±sd
IgG[a]	7.95±0.69	7.66±0.46	7.10±0.61g
IgA[b]	4.07±0.32	4.10±0.32	3.65±0.32
IgM[c]	2.01±0.21	2.92±0.29	2.16±0.16

Level of significance (independent sample t-test)

axy: t = 1.09, p = 0.289	bxy: t = 0.189, p = 0. 853	cxy: t = 7.87, p = 0.0001
axz: t = 3.00, p = 0.007	bxz: t = 2.94, p = 0.008	cxz: t = 1.84, p = 0.081
ayx: t = 7.21, p = 0.0001	byz: t = 3.02, p = 0.008	cyz: t = 2.25, p = 0.038

DISCUSSION

Preeclampsia affects 2.7% of all pregnancies with varying severity and it is a leading cause of maternal and fetal morbidity and mortality (9). In addition to etiopathophysiology hypothesis, it is suggested that preeclampsia may be caused by modulation or maladaptation of both adaptive and innate immunity (4). Several reports addressed modulation of lymphocyte populations and cytokine levels in preeclampsia (5-8). We report here the changes in serum immunoglobulin levels in preeclampsia and eclampsia patients.

Analysis of serum immunoglobulins showed that there was a significant increase of IgG, IgA and IgM in both pre-eclampsia and eclampsia as compared to normotensive pregnants. The raised immunoglobulin concentrations may be because of increased lymphocyte populations5, particularly of immunoglobulin producing B-lymphocytes. This study also observed that with few exceptions such as systolic blood pressure with IgG, and gestational age and proteinuria with IgM; none of the maternal characteristics is associated with the serum immunoglobulins concentrations in pre-eclampsia or eclampsia. It is revealed that serum immunoglobulins are found to be elevated in preeclampsia and eclampsia.

ACKNOWLEDGEMENT

Authors thank the University of Dhaka for part financial support to conduct this study.

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