

The Significance of Serum Albumin Level as an Indicator for Severity of Hypertensive Disorders in Pregnancy in Samawa City

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Abstract

Background: This study is concerned with determining the severity of preeclampsia according to the value of serum albumin. **Materials and Method :** 100 women were divided into 4 groups according to their blood pressure [control (n=22), gestational hypertension (n=25), mild preeclampsia (n=29), severe preeclampsia (n=24)]. Concerning about comparison of serum albumin level for each woman. Also the following informations were taken in consideration: age, gestational age, parity, systolic blood pressure and diastolic blood pressure. **Results :** comparing serum albumin level between the groups shows a significant difference ($p < 0.05$). Analysis of data shows a significant difference in age between control and severe preeclampsia ($p = 0.04$). The difference in gestational age was significant between control and other groups ($p < 0.05$) and a statistically significant difference in systolic and diastolic blood pressure between the groups ($p < 0.05$). **Conclusion:** This study showed that serum albumin level is lower in mild and severe preeclampsia in comparison with normal and hypertensive cases.

Keywords: Pregnancy; Preeclampsia; Severe preeclampsia; Serum albumin.

Introduction

Preeclampsia is a hypertensive disorder with multisystem involvement, usually occurs after 20 weeks of gestation⁽¹⁾. Hypertension approximately occurs in 12-22% of pregnancies⁽²⁾. The general prevalence of preeclampsia in pregnancy is between 2-8 % of all pregnancies⁽³⁾. Incidence of eclampsia in Baghdad; Iraq according to World Health organization research in 2010 was 20.28%⁽⁴⁾. Perinatal mortality rates are increased 2- to 3- folds in hypertensive mothers and early onset preeclampsia is associated with a 4- folds increased in stillbirth risk⁽¹⁾. During the past two decades, the incidence of preeclampsia has increased by 25% in the united states⁽⁵⁾.

Preeclampsia is characterized by an elevated blood pressure equal to or more than 140/90 mmHg on two separated occasions in a previously normotensive woman, accompanied by proteinuria (300 mg in 24 hours) and blood pressure normalizes by six weeks postpartum⁽⁶⁾. Severe preeclampsia is diagnosed in the presence of these criteria: -(1) systolic blood pressure greater than 160 mmHg or diastolic blood pressure greater than 110 mmHg (2) thrombocytopenia – platelet counts less than 100,000 μ L-; (3) epigastric pain or liver transaminase levels twice normal;(4)pulmonary edema;(5)retinal hemorrhages or papilledema⁽¹⁾.

Hypertensive disorders of pregnancy include : gestational hypertension, preeclampsia, eclampsia and chronic hypertension⁽⁷⁾. Gestational hypertension characterized by raised blood pressure of $\geq 140/90$ mmHg without proteinuria (< 300 mg per 24 hours) . Preeclampsia is defined as raised blood pressure of $\geq 140/90$ mmHg on two separated readings, that is first discovered in the second trimester of pregnancy and proteinuria ≥ 300 per 24 hours . Eclampsia is preeclampsia

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superimposed by convulsions . Chronic hypertension is a hypertension diagnosed before pregnancy⁽³⁾.

The mechanisms of hypertension in pregnancy are largely unknown⁽²⁾. The pathophysiology of preeclampsia is thought to be placental⁽³⁾. Women with abnormal pregnancies e.g. hydatiform mole, suggesting that the presence of trophoblast tissue provides a trigger for the illness . Biopsies of placental bed reveal a patchy trophoblastic invasion in preeclampsia. The cause is not known but may reflect abnormal adaptation of maternal immune system⁽⁶⁾. The specific risk factors that predispose to preeclampsia:

- 1) First pregnancy
- 2) Preeclampsia in any previous pregnancy
- 3) family history of preeclampsia
- 4) Age ≥ 40 years
- 5) Body mass index ≥ 35
- 6) Multiple pregnancy
- 7) Proteinuria ≥ 0.3 g/24 hour or diastolic blood pressure ≥ 80 mmHg at booking visit
- 8) preexisting diseases including e.g. renal disease, diabetes, antiphospholipid syndrome, chronic hypertension and autoimmune disease^(6,8).

Prevention of preeclampsia is best started before 16 weeks gestation in which most of the transformation of the spiral arteries occurs, to avoid the maternal and perinatal complication⁽⁹⁾.

1. Dietary changes and exercise: Interventions include aerobic exercise and weight loss, reduce salt intake, increase potassium intake, zinc supplementation and magnesium supplementation^(3,9).
2. Trial of aspirin: A trial of aspirin (150 mg) might be effective in prevention of preeclampsia if used at week 16 till the end of 32 weeks of pregnancy⁽³⁾.
3. Vitamin D may have a protective role against preeclampsia⁽⁹⁾.
4. Antioxidant vitamins: A high dose of antioxidants e.g. vitamins E and C can be used for preeclampsia prevention⁽³⁾.

Complication of preeclampsia⁽¹⁰⁾:

A. Maternal Complication

1. Seizure
2. Hypertensive encephalopathy or cerebral edema due to vasospasm and hypoxia
3. Intracranial hemorrhage
4. Renal dysfunction
5. Retinal detachment
6. HELLP syndrome (defined as : hemolysis, elevated liver enzyme levels and low platelet levels) .
7. Placental abruption
8. Systolic and diastolic myocardia dysfunction and pulmonary edema .
9. DIC and hemorrhage
10. Death

B. Perinatal Complication: Including stillbirth or neonatal death, bronchopulmonary dysplasia, oligohydramnios and fetal growth restriction, it has been estimated that 9-20 % of stillbirth is directly related to hypertensive disorder of pregnancy. Preeclampsia is a significant contributor to iatrogenic preterm birth and neonatal morbidity⁽¹¹⁾.

Material and Method

This cohort study was done in Al Samawah maternal and child teaching hospital, enrolled between August 2018 and November 2018 . Total 100 women, age between 17-26 years who participated in the study were divided into 4 groups:

1. Control group; 22 women having no hypertension.
2. 25 women with hypertension and no protein in urine.
3. 29 women with mild preeclampsia.
4. Severe preeclampsia group consist of 24 women.

This study was approved the medical ethics committee of the college of medicine university of Al Muthanah . In the selected cases we exclude chronic illnesses such as chronic kidney diseases, chronic hypertension and diabetes mellitus.

We are concerned about the age, weeks of gestation, systolic blood pressure and diastolic blood pressure for each woman in this study . A blood samples were aspirated for the estimation of serum albumin level and the reference value is 3.40 g/dl – 4.8 g/dl . For estimation of albumin in urine, a random urine specimen was collected and a dipstick urine measurement for albumin was done . To evaluate the distribution of blood pressure and serum albumin we divided the groups into

2 subgroups according to the age : G1(17-21) years and G2 (22-26) years.

Results

The results of the distribution of blood pressure and serum albumin are shown in Table (1). There was no significant difference between the age groups (p>0.05) for all our involved groups.

Table (1): Distribution of systolic,diastolic blood pressure and serum albumin according to age groups for control, Gestational hypertension, mild preeclampsia and sever preeclampsia groups.

Sever Preeclampsia			Mild Preeclampsia			Gestational Hypertension			Control			Age groups (years)
Serum albumin g/dl	DBP	SBP	Serum albumin g/dl	DBP	SBP	Serum albumin g/dl	DBP	SBP	Serum albumin g/dl	DBP	SBP	
2.855±0.050	113.56±3.358	163.44±2.651	3.136±0.087	103.50±2.309	152.56±1.788	3.44±0.04	94.75±3.38	142.58±2.021	3.621±0.111	79.00±1.12	114.75±4.35	G1 17-21
2.841±0.044	116.60±3.680	166.40±3.776	3.167±0.078	104.46±2.634	153.23±2.242	3.415±0.053	97.15±2.57	144.38±2.181	3.616±0.112	78.10±0.99	115.9±3.87	G2 22-26
0.649	0.857	0.212	0.463	0.445	0.468	0.065	0.431	0.90	0.979	0.750	0.102	P value

*Represents a significant difference at p≤0.05 using independent sample T test. Data are expressed as Mean ±SD .SBP=Systolic blood pressure (mmHg).DBP=Diastolic blood pressure (mmHg).

Maternal Characteristics Analysis: The clinical characteristics of 100 pregnant women are shown in Table (2). There were no significant differences in age between control group and gestational hypertension (p= 0.65), control group and mild preeclampsia group (p=0.9) . But there was a significant difference between control group and severe preeclampsia group (p =0.04).

The analysis of parity shows no significant between control and gestational hypertension, mild preeclampsia and sever preeclampsia (p= 0.84, p = 0.51 and p= 0.23 respectively) .

Gestational age analysis shows the following results; the differences between control and the other groups were significant (p < 0.05).

Table (2): Comparison of maternal characteristics between control,gestational hypertension, mild and sever preeclampsia groups.

Number	Control	Gestational hypertension	Mild Preeclampsia	Sever Preeclampsia	P value
	22	25	29	24	
Age (years)	21.091±1.477	21.320±1.2819	21.034±2.3827	22.125±1.4283	a-0.111 b-0.65 c-0.9 d-0.04
Parity	0.818±0.795	0.76±0.83	1.00±1.10	1.167±1.12	a-0.47 b-0.84 c-0.51 d-0.23
Gestational age (weeks)	39.045±0.7854	37.8±0.7638	36.00±0.8018	36.00±0.978	0.000

*Represents a significant difference at p ≤ 0.05 using ANOVA. Data are expressed as Mean ± SD./=statistical analysis is not implemented. a-represents the total difference between the groups, b-represents the difference between control and gestational hypertension, c-represents the difference between control and mild preeclampsia,d-represents the difference between control and sever preeclampsia. NS = not significant.

Serum albumin and blood pressure analysis: The results are shown in Table (3) . The analysis shows a statistically significant difference in serum albumin level between control,gestational hypertension,mild preeclampsia and sever preeclampsia ($p<0.05$)

There was a statically significant difference in systolic and diastolic blood pressure between control and the other groups ($p<0.05$).

Table (3): Comparison of serum albumin,systolic and diastolic blood pressure between the studied groups.

	Control	Gestational Hypertension	Mild preeclampsia	Sever preeclampsia	P value
S. albumin g/dl	3.61±0.109	3.42±0.048	3.15±0.0831	2.84±0.046	0.000
Systolic blood pressure (mmHg)	115.27±4.18	143.52±2.256	152.86±2.38	165.29±3.64	0.000
Diastolic blood pressure (mmHg)	78.59±1.14	96.00±3.17	103.931±2.46	115.458±3.79	0.000

*Represents a significant difference at $p \leq 0.05$ using ANOVA. Data are expressed as Mean ± SD.

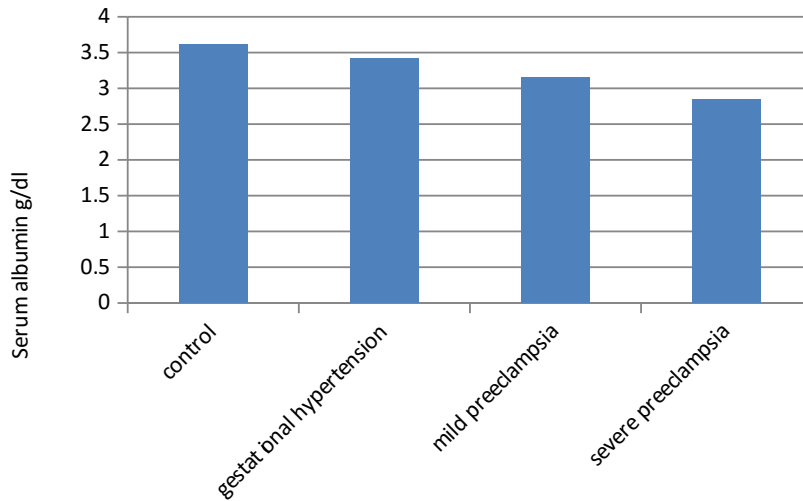


Figure (1): Bar chart shows serum albumin level in each group

As shown in Figure (2); women with mild and sever preeclampsia will give birth preterm.

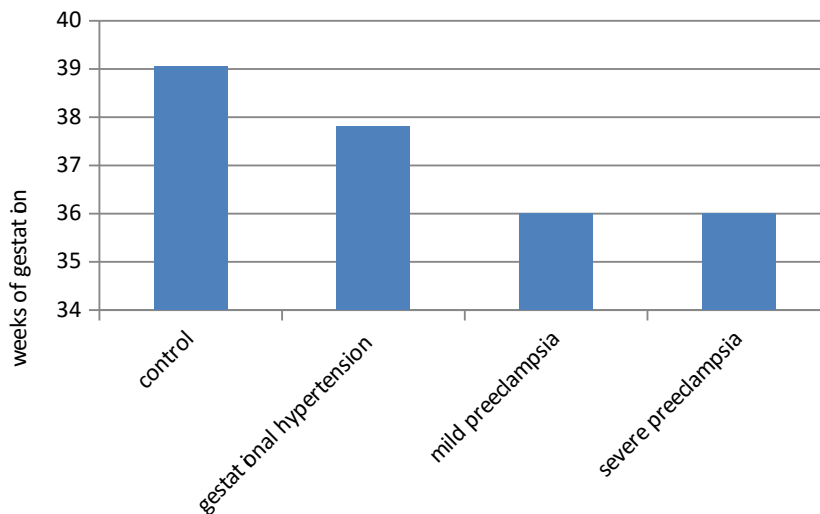


Figure (2): Bar chart shows gestational age in each group

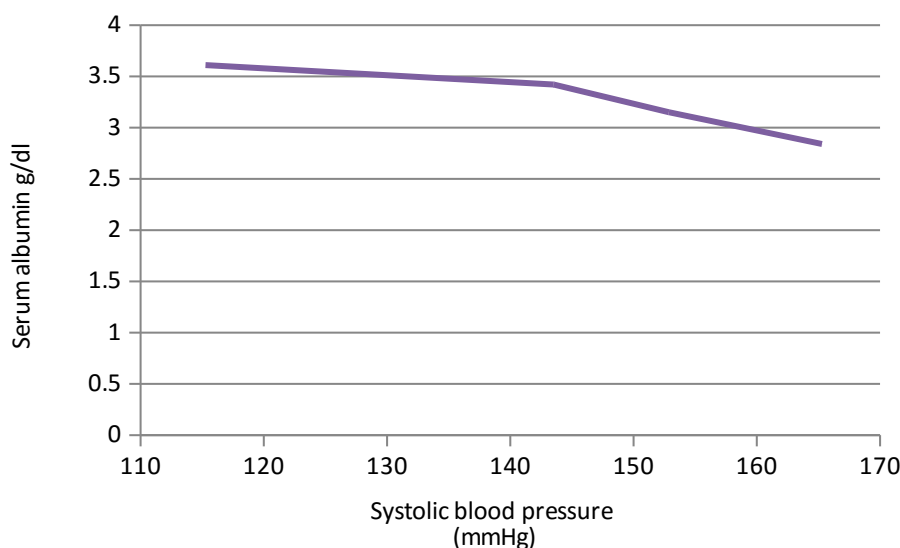


Figure (3): The correlation between systolic blood pressure and serum albumin level

Discussion

Preeclampsia remain a leading cause of maternal morbidity and mortality . This study has shown a significant relation between severe preeclampsia and low gestational age either due to iatrogenic termination of pregnancy or due to preterm labour . This agreed by Cruz, et al⁽¹²⁾ and Chen H,et al⁽¹³⁾. This study found that serum albumin level is significantly related to the severity of preeclampsia . This agreed by Gojnic, et al⁽¹⁴⁾ where 60 patients diagnosed as preeclampsia and nearly all severe cases had albumin values below 3g/dl .According to this results parity is not related to the severity of preeclampsia . This is agreed by a study done by Basima Al Ghazali, et al⁽¹⁵⁾ where 100 patients were divided into 4 groups and found that no significant difference in parity when comparing between the groups.

Conclusion and Recommendation

This study showed that serum albumin level is lower in mild and sever preeclampsia comparing with normal and hypertensive cases. Prediction of severity of hypertensive disorders in pregnant women is possible with serum albumin level and they should have their Serum albumin level measured .

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq.

Conflict of Interest: The authors declare that they have no conflict of interest.

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