

A study of serum calcium level and severity of pre-eclampsia in pregnant women at tertiary health care centre

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Abstract

Background: A condition in pregnancy characterized by abrupt hypertension, albuminuria and edema of the hands, feet, and face. Pre-eclampsia is the most common complication of pregnancy. **Aim and Objective:** To study the relationship between serum calcium level and severity of pre eclampsia in pregnant women. **Methodology:** 100 diagnosed cases of pre eclampsia in age range of 18-35 years were selected as group 1 that is cases and 100 normal healthy age matched pregnant women were selected as group 2. Data was collected with pre tested questionnaire. Patients were investigated with serum calcium. **Results and Discussion:** Mean BMI, gestational age, systolic and diastolic blood pressure were significantly different in both the groups. Mean serum calcium in Group 1 (preeclamptic patients) was significantly lower than group 2 (normal healthy patient) ($p < 0.05$). Serum calcium level showed declining trend as severity of preeclampsia increases.

Key Words: serum calcium, preeclampsia.

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INTRODUCTION

Preeclampsia is one of the common causes of maternal and fetal morbidity and mortality. Preeclampsia is characterized by high blood pressure $\geq 140/90$, oedema and proteinuria.¹ It typically occurs sometime in the second or third trimesters - after 14 weeks of pregnancy - with symptoms like swelling of the hands and face, and sudden weight gain. In severe cases, symptoms include nausea, vomiting, vision changes, headache, belly pain, haemolysis, elevated liver enzymes, thrombocytopenia, pulmonary oedema and foetal growth restriction.² The

exact cause of preeclampsia is still unknown. The relationship between the aggravation of hypertension and the change in maternal serum level of calcium during pregnancy have been shown in many clinical studies³. The lowering of serum calcium and the increase of intracellular calcium can cause an elevation of blood pressure in pre-eclamptic mothers⁴. Hypertensive disorders account for 40,000 maternal deaths annually⁵. So investigations and treatment in these patients is utmost important. This study was conducted to study the relationship between serum calcium level and severity of pre eclampsia in pregnant women

MATERIAL AND METHODS

A cross sectional study was conducted at a tertiary care centre. Study population included 200 pregnant women visiting OPD of OBGY department. All women were in third trimester their gestational age was above 32 weeks. 100 diagnosed cases of pre eclampsia in age range of 18-35 years were selected as group 1 that is cases and 100 normal healthy age matched pregnant women were selected as group 2.

Inclusion Criteria

1. Patients diagnosed as pre eclampsia age matched normal pregnant women
2. Age group 18-35 years
3. Those willing to participate

Exclusion Criteria

1. Women with pre existing disease like hypertension, diabetes mellitus and renal disease.
2. Those who are not willing to participate

Study was approved by ethical committee of institute. A written valid consent was taken from patients after explaining the study to them. Data collection was done with a pre tested questionnaire. It included sociodemographic data, detailed history and clinical examination. Patient were investigated with serum calcium. Blood samples were collected under aseptic precautions in plain vacutainer for serum total calcium estimation. Pre-eclampsia was diagnosed in a women who had a blood pressure of 140/90 or more on two occasions each 6 hours apart associated with proteinuria of at least 300 mg per 24 hours or at least 1+ on dipstick testing. Severe pre-eclampsia was defined as a blood pressure of 160/110 mm Hg or above measured on two occasions each 6 hours apart. The repeat measurement of blood pressure was done in the hospital after adequate rest. Data was analyzed for comparison of serum calcium level with severity of pre eclampsia. It was analyzed with appropriate statistical tests.

RESULTS

Table 1 shows distribution of patients according to variables like BMI, gestational age, systolic and diastolic blood pressure. Mean BMI of group 1 (28.03±1.4) was significantly higher than group 2 (25.2±1.6). Mean Gestational age of group 1 was (36.2±0.7weeks) significantly less than that of group 2 (38.49±0.9weeks). Mean systolic and diastolic blood pressure of group were 151.6±11.9 mmHg and 105.4±8.4 mmHg respectively. Mean systolic and diastolic blood pressure of group 2 were 107.41±5.3mmHg and 71.2±5.1mmHg, difference between them was statistically significant. Mean serum calcium in Group 1 (7.27±0.8 mg/dl) was significantly lower than group 2(7.94±1.6 mg/dl). Table 2 shows distribution of patients according to severity of preeclampsia and their serum calcium level. Out of 100 patients, 36 had pregnancy induced hypertension, 33 had moderate preeclampsia and 25 had severe preeclampsia. Mean serum calcium level in PIH, moderate preeclampsia and severe preeclampsia was 7.86±0.7 mg/dl, 7.14±0.4 mg/dl and 6.82±0.6 mg/dl respectively. It showed declining trend as severity of preeclampsia increases.

Table 1: Comparison of Group 1 and Group 2 with different variables

Sr No	Variables	Group1	Group 2	P value
1	BMI	28.03±1.4	25.2±1.6	<0.05
2	Gestational age(weeks)	36.2±0.7	38.49±0.9	<0.05
3	Systolic blood pressure(mmHg)	151.6±11.9	107.41±5.3	<0.05
4	Diastolic blood pressure(mmHg)	105.4±8.4	71.2±5.1	<0.05
5	Mean serum calcium (mg/dl)	7.27±0.8	7.94±1.6	<0.05

Table 2: Distribution of patients according to severity of pre eclampsia and serum calcium level

Sr no	Serum calcium (mg/dl)	Mean	SD	SEM	95% confidence interval
1	Pregnancy induced hypertension (42)	7.86	0.7	0.06	(7.03-7.54)
2	Moderate preeclampsia (33)	7.14	0.4	0.02	(7.01-7.42)
3	Severe Preeclampsia(25)	6.82	0.6	0.03	(6.5-7)
	Total(100)	7.27	0.8	0.04	(6.2-7.8)

DISCUSSION

Mean BMI of group 1 (28.03±1.4) was significantly higher than group 2 (25.2±1.6). similar results were observed in Sukopan and Phupong *et al*⁶ and Akthar *et al*⁷ where they found significantly higher BMI in the hypertensive group. Mean Gestational age of group 1 was (36.2±0.7weeks) significantly less than that of group 2 (38.49±0.9weeks). Difference between mean systolic and diastolic BP among both groups was statistically significant. (p<0.05) Mean serum calcium in Group 1 was significantly lower than group 2 (p<0.05). In one study by Deepa Kanagal *et al*,⁸ the serum calcium concentration was significantly lower in the pre-eclamptic group compared to normotensives (7.84 ± 0.87 mg/dl Vs 8.97± 0.69 mg/dl, p<0.001. Chaurasia *et al*.⁹ found significantly lower levels of serum calcium and magnesium in pre-eclamptic women compared to normal pregnant women. Calcium plays an important role in muscle contraction and regulation of water balance in cells. Modification of plasma calcium concentration leads to the alteration of blood pressure. The lowering of serum calcium and the increase of cellular calcium can cause an elevation of blood pressure in pre-eclamptic mothers. The increase of cellular calcium concentration led to constriction of smooth muscles in blood vessels and increase of vascular resistance⁷ Mean serum calcium level in PIH, moderate preeclampsia and severe preeclampsia was 7.86±0.7 mg/dl, 7.14±0.4 mg/dl and 6.82±0.6 mg/dl respectively. It showed declining trend as severity of preeclampsia increases. Similar results were observed in Sandip *et al*¹⁰ where found significantly lower levels of calcium and

magnesium in severe pre-eclamptic women compared to normotensive and mild pre-eclamptic women. An inverse relationship between calcium intake and hypertensive disorders of pregnancy was first described in 1980 and led to the hypothesis that an increase in calcium intake during pregnancy might reduce the incidence of high blood pressure and pre-eclampsia among women with low calcium intake.¹¹

CONCLUSION

Serum calcium level showed declining trend as severity of preeclampsia increases so it should be monitored during pregnancy.

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