

## **Original Research Article**

### **Role of Serum Calcium Level in Pregnancy Induced Hypertension**

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**Abstract:** Reports have proposed an association between serum calcium level and preeclampsia. The Aims and objective was to measure the level of serum calcium level in antenatal women and to evaluate its role in pregnancy induced hypertension. The study was done for one year at Deptt of Obstetrics & Gynecology, GR Medical College, and Gwalior including 100 antenatal patients in their third trimester of pregnancy. All the included patients were divided into two groups: Cases (50 patients of pregnancy induced hypertension) and Control (50 normotensive patients). Serum calcium was estimated in the Department of Biochemistry and correlated to pregnancy induced hypertension. In Results the Mean serum calcium level in normotensive, mild PIH and severe PIH patients was  $9.64 \pm 0.77$  mg%,  $9.18 \pm 0.83$  mg% and  $8.45 \pm 0.58$  mg% respectively ( $p < 0.05$ ). There was a negative correlation of serum calcium level with mild and severe pregnancy induced hypertension ( $p < 0.05$ ). In Conclusion the Decreased level of serum calcium can be an etiological factor of PIH and can be a predictor of different fetal and maternal complications in women with preeclampsia.

**Keywords:** calcium, pregnancy induced hypertension, antenatal patients.

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#### **INTRODUCTION**

Different studies have proposed a connection between serum calcium level and preeclampsia. The woman who is consuming less calcium in her diet is expected to develop increase in blood pressure in her pregnancy [1]. It is supported by the evidences that pregnant women who develop preeclampsia found to have lower serum level of calcium as compared to normal healthy women [2].

Calcium supplementation is required in women with preeclampsia in order to decrease hypertensive disorders in pregnancy. Calcium supplementation decrease parathyroid calcium release and calcium which is present in cells, this in turn reduce contraction of smooth muscle and lead to dilation of vessels [3, 4]. The present study was done to measure the level of serum calcium level in antenatal women and to evaluate its role in pregnancy induced hypertension.

#### **MATERIALS AND METHODS**

One hundred antenatal patients in the third trimester (28-40 weeks of gestation) having age between 18-40 years were selected and divided in two groups: Cases (50 patients of pregnancy induced hypertension)

and Control (50 normotensive patients) in the Department of Obstetrics and Gynaecology, KRH, GR Medical College, Gwalior.

A Written informed consent from all the patients and Ethical Committee approval was obtained before starting the study. Pregnancy induced hypertension was classified as mild when systolic blood pressure is  $>140$  mmHg, diastolic blood pressure is  $>90$  mmHg and urinary albumin traces or +1) and severe as systolic blood pressure  $>160$  mmHg, diastolic blood pressure  $>110$  mmHg and urinary albumin +2. Above alteration in blood pressure was observed at least on two different occasions at least 6 hours apart.

A detailed history along with detailed general physical examination of patients and obstetric examination were also performed. Serum calcium level was estimated and correlated with mild and sever PIH. All the data were analyzed using IBM SPSS- ver.20 software. Analysis was performed using chi-square test and independent sample student t test. P values  $<0.05$  was considered to be significant.

**RESULTS**

Out of 100 patients, 50% were normotensive and 50% were having PIH, out of 50 PIH patients, mild PIH was present in 30 (60%) patients whereas severe PIH was observed in 20 (40%) of the patients. The age distribution of the enrolled patients showed that, maximum patients [30 (60%)] in Control group belonged to age group of 21-25 years and 10 (20%) patients were in age group of 26-30 years. In Cases, most common age group was 21-25 years [24 (48%)] and second most common age group was 26-30 years [14 (28%)] ( $p > 0.05$ ).

In Control group, 20 (40%) patients were primi gravida and in Case group 15 (50%) patients with mild preeclampsia and 16 (80%) patients who had severe eclampsia were primigravida ( $X^2$ ,  $df=1$ ,  $p=0.02$ ). Educational status of both Control and Case group were comparable, maximum patients in Control group were illiterate [17 (34%)], intermediate level education in 13 (26%) patients and 14 (28%) were graduate. In Cases, 19 (38%) were illiterate, 11 (22%) patients each were

intermediate and graduates respectively ( $X^2=0.17$ ,  $df=1$ ,  $p > 0.05$ ).

In Control group, maximum patients had gestational age of 33-36 weeks [24 (48%)] followed by 18 (36%) patients who belong to gestational age of 28-32 weeks ( $X^2=0.04$ ,  $df=1$ ,  $P > 0.05$ ). Patients in both Control and Cases were comparable with respect to gestational age. All the patients who underwent study were in their third trimester ( $X^2=0.04$ ,  $df=1$ ,  $p > 0.05$ ).

As per the modified P Kumar's classification for socioeconomic status, most of the patients in Control [30 (60%)] and Cases [31 (62%)] belonged to class III socioeconomic status. In Control group, 48 (96%) patients had DBP between 70-80 mmHg, 16 (53.33%) patients of mild PIH patients had DBP of >80-90 mmHg and 14 (70%) patients of severe PIH group had blood pressure of >100-110 mmHg. In present study, 45 (90%) Control group patients had their no albumin in urine whereas majority of Case group patients had their urine albumin either +1 or +2.

**Table 1: Correlation of plasma calcium level with both the groups**

Investigation		Normotensive n (%)	Mild PIH n (%)	Severe PIH n (%)
Plasma calcium (mg %)	10-11	17 (34)	4 (13.33)	0 (0)
	<10-9	24 (48)	9 (30)	3 (15)
	>9-8	9 (18)	15 (50)	12 (60)
	>8-7	0 (0)	2 (6.66)	5 (25)

Data is expressed as no of patients (%), P value for mean serum calcium level; between Control and mild PIH ( $t=2.49$ ,  $df=78$ ,  $p < 0.015$ ), Control Vs severe PIH ( $t=6.18$ ,  $df=68$ ,  $p < 0.01$ ), mild PIH Vs severe PIH ( $t=3.46$ ,  $df=48$ ,  $P < 0.002$ ), PIH; pregnancy induced hypertension.

Mean serum calcium level in normotensive, mild PIH and severe PIH patients was  $9.64 \pm 0.77$  mg%,  $9.18 \pm 0.83$  mg% and  $8.45 \pm 0.58$  mg% respectively ( $p < 0.05$ ).

**DISCUSSION**

Deficiency of calcium may result in to state of convulsion, if calcium homeostasis is not maintained properly. Blood pressure change in women with preeclampsia can alter serum calcium levels, this change can be better explained by estimation of intracellular calcium [5].

Elevation in intracellular calcium or reduction in serum calcium levels may contribute to smooth muscle contraction of blood vessels and later increase in vascular resistance. For the synthesis of nitric oxide and prostacylin, ionized form of calcium is required; therefore in deficiency of calcium oxidative stress may worsen [1].

Reports have also shown that diet low in calcium which arouse 1, 25- dihydroxy vitamin D response, is anticipated to increase blood pressure [1].

In present study, serum calcium level was significantly lower in sever PIH ( $8.45 \pm 0.58$  mg %) patients as compared to normal women ( $9.64 \pm 0.77$  mg %). Sirajwala *et al.*; also reported that mean serum calcium level was lower in Cases ( $7.0937 \pm 0.37$  mg/dl) as compared to Control ( $7.9113 \pm 0.91$  md/dl) group ( $P < 0.0001$ ) [1].

Also serum calcium level was much lower in sever PIH patients as compared to mild PIH patients. Sirajwala *et al* did a similar study on 80 patients and reported that mean serum calcium was significantly lower in patients with severe PIH ( $6.8909 \pm 0.31$  mg/dl) as compared to mild PIH ( $7.1308 \pm 0.26$  mg/dl) patients ( $p < 0.001$ ) [1].

Mohieldein *et al.*; in their study involving 90 women with PIH, reported lower serum calcium level in study group ( $8.38 \pm 1.04$  mg/dl) as compared to control group ( $9.04 \pm 1.13$ mg/dl) ( $P= 0.001$ ) [6].

Manjareeka *et al.*; studied serum electrolytes levels in women with preeclampsia and found a

significantly lower level of calcium in them ( $p < 0.05$ ) [7]. Pairu *et al.*; [8] also found lower level of serum calcium in women with preeclampsia [8].

Koley *et al.*; performed a similar study on 100 pregnant women who had had 28 or more weeks of pregnancy and reported that there was a significantly less serum calcium level in eclampsia and severe pre-eclampsia than normal pregnant woman ( $7.06 \pm 0.16$  mg/dl and  $7.22 \pm 0.41$  mg/dl vs  $8.81 \pm 0.59$  mg/dl respectively ( $p$  value  $< 0.05$ ) [9].

A study done by Prada *et al.*; also reported that hypocalcaemia was significantly associated with pregnancy induced hypertension and level changes with the severity of the disease [10].

## CONCLUSION

The present study showed that deficiency of serum calcium level may result in the development of preeclampsia which may be associated adverse pregnancy outcome. Corrective measures are required to improve the serum calcium in women with preeclampsia.

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