

## STUDY OF SERUM CALCIUM AND MAGNESIUM LEVELS IN PREECLAMPSIA AND ECLAMPSIA COMPARED TO NORMOTENSIVES AND ITS EFFECTS ON MATERNAL AND PERINATAL OUTCOME

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### Abstract

**Background:** In developing countries, women of reproductive age group are frequently faced with deficiencies of both micro and macro nutrients. Epidemiological evidences of the association of low dietary calcium levels with increased occurrence of preeclampsia indicate the role of altered calcium metabolism in pregnant women in the pathogenesis of preeclampsia. Two of the main intra-cellular ions that are significant in cellular metabolism are calcium and magnesium. Sufficient intake of calcium and magnesium through diet and proper maternal serum levels of these micronutrients can alleviate the possibility of pregnancy induced 2 hypertensive disorders. **Aim:** The aim of the study is to find out the relationship of serum levels of calcium and magnesium in preeclamptic and eclamptic pregnancies compared to normal pregnancies and to analyse its effect on maternal and perinatal outcome **Materials and Methods:** Study population is pregnant women attending the antenatal clinic and admitted in obstetric ward in the Department of Obstetrics and Gynaecology in Govt. Kilpauk Medical College, Chennai. Based on inclusion and exclusion criteria the study participants were recruited during the study period. The finally obtained sample size is 80.40 in each group Patients with diagnosis of pre-eclampsia/eclampsia (Group-1) Similarly normotensive patient (Group-2) also selected. The data collected will be entered in Excel sheet and analysis will be done by SPSS 23. P value <0.05 is considered as statistically significant. **Result:** The study showed a significant reduction in the levels of serum calcium and magnesium in preeclamptic women when compared with normotensive pregnant women. Since there are changes in the levels of these micronutrients, the estimation of these elements during pregnancy might become a possible index for the early diagnosis and treatment of preeclampsia. **Conclusion:** The study showed a significant reduction in the levels of serum calcium and magnesium in preeclamptic women when compared with normotensive pregnant women. In view of reduction in serum concentration levels of calcium and magnesium, dietary supplementation of these elements might be beneficial in reducing the fetal and maternal mortality and morbidity associated with preeclampsia. The recommendation of the World Health Organization (WHO) on calcium supplementation in pregnancy as a step in preventing the occurrence of preeclampsia should be practiced.

## INTRODUCTION

Calcium plays an important part in muscle contractility secretions, neuronal activities as well as

cellular death. Through a reduction in the release of parathormone and accordingly the intra-cellular calcium concentration ensuing in reduced smooth muscle contractility, calcium might ward off the

occurrence of preeclampsia. A proper balance of calcium and magnesium levels is essential in controlling the blood pressure. Sufficient calcium levels help the blood vessels to contract and sufficient magnesium levels are required by the blood vessels to relax. Magnesium antagonizes the increase in intra-cellular calcium concentration that can cause vasodilation. Magnesium opposes the arterial constriction which is calcium dependent and magnesium thus acts as a calcium channel blocker.<sup>[7,8, 9]</sup>

## MATERIALS AND METHODS

**Type Of Study:** Prospective Cohort study

**Period Of Study:** 1 year

**Place Of Study:** Government Kilpauk Medical College Hospital, Chennai

### Inclusion Criteria

- All pregnant mothers more than 20 weeks of gestation with preclampsia and without preeclampsia were included
- In the absence of proteinuria, the syndrome of pre-eclampsia should be diagnosed when gestational hypertension is present in association with new onset of any one of the following severe features: Thrombocytopenia – Platelet count less than 100,000.
- Renal insufficiency: Serum creatinine concentrations greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease.
- Impaired liver function Elevated blood concentrations of liver transaminases to twice the normal concentration.
- Pulmonary oedema

- New-onset headache unresponsive to medication and not accounted for by alternative diagnosis or visual symptoms.
- Preeclampsia complicated by generalized tonic-clonic convulsions

### Exclusion Criteria

Women with medical disorders like Chronic hypertension, Women on antihypertensive therapy, Diabetes, Autoimmune disease, Renal disease, Thyroid disease, Multiple gestation, Intrauterine death, Cardiovascular disease, Liver disorder, Endocrine disorder, Malignancy, Hydatidiform mole, Hematological disorder, Metabolic disorders, Patients with history of smoking and alcohol consumption.

### Sample Size

Based on inclusion and exclusion criteria the final sample size recruited during the study period was 80, 40 in each group (40 in Group-1 and 40 in Group-2)

**Group 1:** Pregnant women with gestational age > 20 weeks with BP > 140/90 with proteinuria.

**Group 2:** Pregnant women with gestational age > 20 weeks in good health, normotensive with dipstick proteinuria nil.

## RESULTS & DISCUSSION

For the purpose of the study, 40 numbers of cases (Group 1) and 40 numbers of controls (Group 2) were recruited. Out of the 40 women in Group 1, 5 of them had eclampsia, 27 of them had non-severe preeclampsia and 8 of them had severe preeclampsia. Out of the 40 number of patients in Group 1 majority were diagnosed with non-severe preeclampsia (67.5 per cent).

**Table 1: Subcategories of Cases**

Cases	Number (N)	Percentages (%)
Eclampsia	5	12.5
Non -Severe Eclampsia	27	67.5
Severe Eclampsia	8	20
Total	40	100%

**Table 2: Comparison of Serum Calcium and Magnesium levels**

Groups		Mean	Standard deviation	P value
Group 1(N=40)	Serum Calcium	7.2	0.65	<0.001
Group 2(N=40)		9.4	0.44	
Group 1(N=40)	Serum Magnesium	1.3	0.48	<0.001
Group 2(N=40)		2	0.16	

### Independent t test

**Table 3: Comparison of Serum calcium levels among Group 1**

Cases	Number (N)	Mean	Standard deviation	P value
Eclampsia	5	7.08	0.8	0.68
Non -Severe Eclampsia	27	7.4	0.6	
Severe Eclampsia	8	6.9	0.6	
Total	40	One way anova		

In a comparison of the serum calcium levels among the study groups, the mean serum calcium level was observed to be 7.2 mg (per dL) in Group 1 and 9.4 mg in Group 2; with a corresponding standard

deviation of 0.65 and 0.44 respectively. A difference of 2.2 mg was observed between the groups 1 and 2 and this difference is statistically highly significant as the p value is <0.001. Similarly in the comparison

of serum magnesium levels among the study groups, the mean serum magnesium level was observed to be 1.3 mg in Group 1 and 2 mg in Group 2. This corresponds to a standard deviation of 0.48 and 0.16 respectively. The difference of the mean levels between the groups 1 and 2 was observed to be 0.7 mg. Like calcium levels, this difference is statistically highly significant as the p-value is <0.001.

On Comparison of the serum calcium levels among Group 1, it was observed that the mean serum calcium levels in the cases with Eclampsia, Non severe preeclampsia and Severe Preeclampsia were 7.08 mg, 7.4 mg and 6.9 mg with a corresponding standard deviation of 0.8, 0.8, 0.6 and 0.6 respectively. On analysis the p value (0.68) obtained shows no significant association between the subcategories of Group 1.

## CONCLUSION

The study showed a significant reduction in the levels of serum calcium and magnesium in preeclamptic women when compared with normotensive pregnant women. In view of reduction in serum concentration levels of calcium and magnesium, dietary supplementation of these elements might be beneficial in reducing the fetal and maternal mortality and morbidity associated with preeclampsia. The recommendation of the World Health Organization (WHO) on calcium

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