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IJPBS |Volume 4| Issue 3|JUL-SEPT|2014|42-45

Research Article
Biological Sciences

# SERUM CALCIUM AND MAGNESIUM LEVELS IN PREECLAMPSIA

A P Moholkar [1], M P Bankar[2], K N Pujari [3*] and S P Jadkar [4]

[1]Department of Biochemistry, Yogita Dental College, Khed.
[2]Department of Biochemistry, B J Medical College, Pune.
[3]Department of Biochemistry, RCSM Government Medical College, Kolhapur.
[4]Department of Biochemistry, Government Medical College, Miraj.
*Corresponding Author Email: pujari_karyappa@yahoo.in

## ABSTRACT

*The aim of study was to estimate and compare serum calcium and magnesium in preeclamptic women and normal pregnant women. Study was conducted in Government Medical Hospital Miraj with 120 subjects. The studied population consisted: group I (40 normal pregnant women) and group II (80 pregnant women with preeclampsia). Serum calcium and magnesium levels were measured by o- Cresolphthalein Complexone (o-CPC) and Calmagite method. We found significantly low serum magnesium and calcium levels in preeclamptic women as compare to normal pregnant women (p<0.001).*

***KEY WORDS***

*Calcium, Magnesium, Preeclampsia.*

## INTRODUCTION

Preeclampsia is one of the common causes of maternal and foetal mortality and morbidity during pregnancy [1]. Exact etiology of preeclampsia is still not known but certain hypothesis suggest it may be associated with an increased vascular resistance of uterine artery and decrease in perfusion of placenta [2]. Many clinical studies show the relationship between hypertensive complication and the changes in the level in the various biochemical parameters such as magnesium and calcium in preeclampsic women [3-5].

Physiologically calcium plays an important role in muscle contraction and water balance. Lowering of serum calcium and increase in intracellular calcium can cause an elevation in blood pressure in preeclamptic patients. Magnesium has been known as an essential cofactor for many enzymes. It also plays an important role in nerve transmission and peripheral vasodilatation [3].

Present study was done to measure serum levels of calcium and magnesium in preeclamptic pregnancy and to compare with those in normal pregnancy.

## MATERIAL AND METHODS

**Place of Work:**

Study was carried out in the department of Biochemistry Government Medical College Miraj during period 2008-2010. Study protocol was approved by ethical committee of Government Medical College Miraj.

**Selection and Distribution of subjects:**

**Sample size:** Study includes total 120 subjects with age above 18 years and classified into two groups.

**Group 1(control):** Consist of 40 non hypertensive pregnant women individual matching in age with patients serve as control. Controls were selected from those who are attaining OPD of P.V.P. Government Hospital Sangli and Government Medical College Miraj.

**Group 2 (Patients):** Includes total 80 hypertensive pregnant women. These are classified into 2 groups.

a) **Mild preeclampsia:** 40 as severe mild preeclamptic patient.
b) **Severe preeclampsia:** 40 as severe preeclamptic patient.

**Sample (Blood) collection:**

Informed consent was obtained from all the participants. To avoid contamination plain tubes were washed with double distilled water and autoclaved previously. Blood samples were withdrawn by using twenty gauze stainless still disposable needles attached to 10ml polythene disposable syringe from anticubital vein with aseptic precautions. Needle was removed and blood was collected in plain bulb.

Two hours after the collection of blood, the test tube with blood samples were centrifuged at 3000 R.P.M. for 5 min. Serum was separated and stored in polythene tube with cork. Serum samples were preserved in freezer at 0-4˚ C until tested. The stored sera were used for Estimation of Magnesium and Calcium. Serum Magnesium and Calcium was estimated by Calmagite and o- Cresolphthalein Complexone (o-CPC) method respectively [6, 7].

## OBSERVATIONS AND RESULTS

Table no 1 shows the mean ± SD of serum calcium level. In control group serum calcium level is 9.965±0.663 mg/dl and in preeclamptic is 6.93 ± 1.23 mg/dl. The mean level in mild cases of preeclampsia is 7.983 ± 0.514 mg/dl and in severe cases of preeclampsia is 5.885 ± 0.741mg/dl. Significantly decreased calcium level was seen in preecalmpsic women as compared to control (P<0.001).

Whereas the mean ± SD of serum magnesium level in preeclampsia patients and in control group is 0.838 ± 0.204mg/dl and 1.918 ± 0.346mg/dl respectively. In mild cases of preeclampsia mean ± SD of serum magnesium level was 0.960 ± 0.161mg/dl and in severe cases was 0.715 ± 0.166. The serum magnesium levels in cases of preeclampsia were significantly (P<0.001) decreased as compared to control.

## DISCUSSION

Calcium and magnesium are two intracellular ions that are very important for the cellular metabolism such as muscle contraction, neuronal activity and cellular death [8]. We found a decrease in both serum calcium and serum magnesium in preeclamptic pregnant woman. These findings confirmed the hypothesis that hypocalcaemia and hypomagnesaemia may be etiologies of preeclampsia (**Fig-1**) (9-11).

The effect of serum calcium on changes in blood pressure could be explained by the level of cellular concentration of calcium. The increase of cellular calcium concentration when serum calcium went lower lead to constriction of smooth muscles in blood vessels and increase in vascular resistance (9).

Due to cellular injury and cellular death, there is influx of calcium ions into cell leading increased intracellular calcium ions and loss of calcium homeostasis. When serum calcium was lowered there was increase in intracellular calcium concentration, which leads to constriction of smooth muscles in blood vessels and increase of vascular resistance [12]. Thus, assay of especially serum calcium activity is a sensitive test and is of great value in diagnosis of preeclampsia.

The hypomagnesaemia in most pregnant women is associated with hemodilution, renal clearance during pregnancy and consumption of minerals by growing fetus. Magnesium levels may have significant effects on cardiac excitability and on vascular tone, contractility and reactivity [13, 14]. The consequences of Hypomagnesaemia may lead to a reduction cerebral blood flow, cerebral vasospasm and increase in neuronal burst. Macdonald et al have shown experimentally that magnesium has a vesoprotective effect [15].

**Correlation between serum magnesium and serum calcium:**

The serum magnesium and serum calcium levels were found to be significantly decreased in severe preeclamptic group (P<0.001) than that of mild preeclampsia. In our study we found positive and significant correlation (r=0.586) between serum magnesium and serum calcium (**Graph No.1**). The serum magnesium and serum calcium were concomitantly decreased in mild and severe cases of preeclampsia. The serum calcium test is routinely performed in cases of preeclampsia; it can be useful in predicting severity and may be used for better management.

**Table No.1 Serum Calcium and Magnesium level in preeclamptic and normotensive pregnant women**

| Subjects | Sr. Calcium (mg/dl) Mean ± SD | Sr. Magnesium (mg/dl) Mean ± SD |
|---|---|---|
| **Group 1** Control (n=40) | 9.969 ± 0.663 | 1.918 ± 0.346 |
| **Group 2** Preeclampsia | 6.93 ± 1.231*** | 0.838 ± 0.204*** |
| Mild Preeclampsia | 7.983 ± 0.514*** | 0.96 ± 0.161*** |
| Severe Preeclampsia | 5. 885 ± 0.741*** | 0.715 ± 0.166*** |

The statistical method used to compare data was "t" test.

***P<0.001-highly significant

**Graph No. 1: Correlation between Magnesium and Calcium in Preeclampsia.**

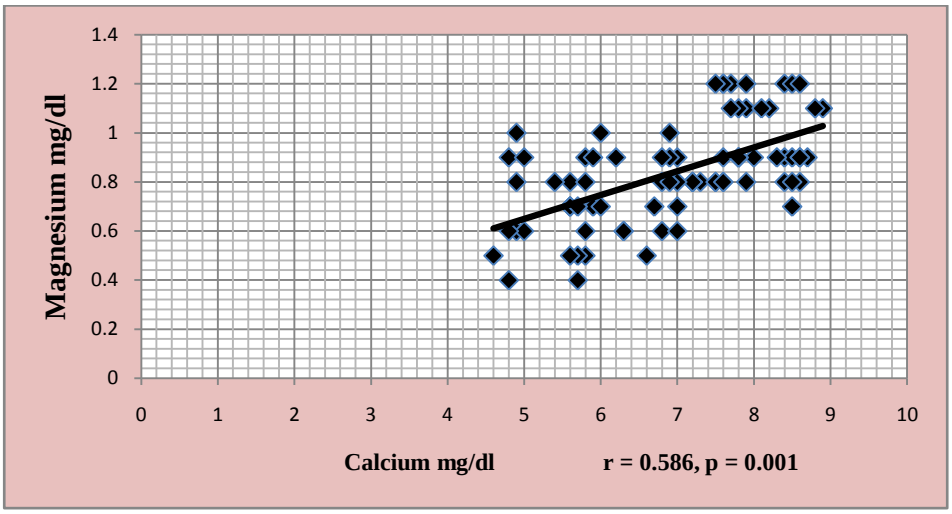
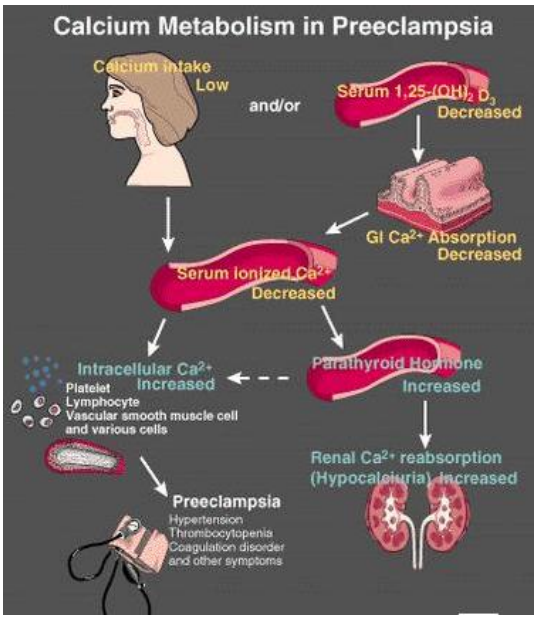



**Figure: 1 Calcium Dysregulation in Preeclampsia**

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***Corresponding Author:**
***Dr. K. N. PUJARI****
*Associate professor,*
*Department of Biochemistry,*
*RCSM Government Medical College,*
*Kolhapur.*
*Phone No. 09850275893*
*Email: pujari_karyappa@yahoo.in*