

**ORIGINAL RESEARCH**

# Comparison of Maternal Serum Magnesium Level in Preeclampsia and Normal Pregnant Women

Dr. Syed Osman Basha

Professor, Department of Biochemistry, Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India

**Corresponding Author**

Dr. Syed Osman Basha

Professor, Department of Biochemistry, Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India

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**ABSTRACT**

**Aim-** To compare the magnesium levels between preeclampsia and control groups from the early stages of pregnancy. **Materials and methods-** The research population consisted of 200 pregnant women at 18-22 weeks of gestation, with 50 participants divided into clinical (N=20) and control (N=30) groups using purposive sampling. Data analysis was performed using SPSS software. **Results-** The serum magnesium in preeclampsia pregnant women was significantly less than the control group that consisted of normal pregnant women. **Conclusion-** Our study revealed a progressive decline in the average serum magnesium levels as the gestational period advanced in women with preeclampsia.

**Keywords-** magnesium, gestational, preeclampsia.

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**INTRODUCTION**

Preeclampsia is a multisystem disorder characterized by hypertension and new-onset proteinuria ( $> 300$  mg/24 h) which develops after the 20th week of pregnancy in previously normotensive women.<sup>1, 2</sup> Preeclampsia may be mild or severe based on its presentation. A systolic blood pressure (SBP) of 160 mmHg or a diastolic blood pressure (DBP) of 110 mmHg with proteinuria of 5 g/24 hr or more is considered severe preeclampsia.<sup>3</sup> While mild preeclampsia is described by an elevated blood pressure less than 160 mmHg (systolic) or 110 mmHg (diastolic) with proteinuria greater than 300 mg, but less than 5 g per day.<sup>4</sup>

Mineral deficiencies like calcium, magnesium, zinc, etc., have been identified to cause significant health problems for women of reproductive age, especially in developing countries due to inadequate dietary intake. The risk of deficiency becomes increased during pregnancy because of increased need of the growing fetus for various nutrients.<sup>5</sup> Serum magnesium levels have been a subject of interest in studies investigating preeclampsia, a serious pregnancy complication characterized by high blood pressure and damage to other organs, typically after 20 weeks of pregnancy. Research has shown that in pregnant women with preeclampsia, both initial and

secondary serum magnesium levels tend to be lower compared to those in normal pregnancies.<sup>6, 7</sup> This decrease in serum magnesium levels was notably observed as the gestational period advanced. Magnesium plays a crucial role in the pathophysiological regulation of blood pressure by influencing the contractility and tone of blood vessels.<sup>8</sup> Hence; the present study was conducted for comparing Maternal Serum Magnesium Level in Preeclampsia and Normal Pregnant Women.

**MATERIALS AND METHODS**

The research population consisted of 200 pregnant women at 18-22 weeks of gestation, with 50 participants divided into clinical (N=20) and control (N=30) groups using purposive sampling. Exclusion criteria for the clinical group included specific medical histories. Serum magnesium levels were analyzed using a colorimetric method with Xylidl Blue on an auto-analyzer, showing high precision. The findings may shed light on the role of serum magnesium in preeclampsia development. Data analysis was performed using SPSS software.

**RESULTS**

In the initial phase of the study, 200 pregnant women aged 18-35 years at 18-22 weeks of gestation were

enrolled. Subsequently, 20 of these women were identified with preeclampsia for comparison with a control group. The control group comprised 30 normal pregnant women at a similar gestational age.

**Table 1 Serum Level of Magnesium in Study Groups**

Variable	Control group	Pre-clampsia	P value
Serum magnesium(mg/dl)	2.9	1.54	0.001*

\*: Significant

In Table 1 the serum magnesium in preeclampsia pregnant women was significantly less than the control group that consisted of normal pregnant women.

**Table 2 Serum Magnesium Levels at Different Gestation Periods**

Period of Gestation, week	Serum Magnesium of Control Group (mg/dl)	Serum Magnesium of Preeclampsia Women (mg/dl)	P value
18-22	3.17	2.01	<0.001*
30-35	2.89	2.22	<0.001*

\*: Significant

Serum magnesium levels were compared at different stages of gestation in the study. The initial magnesium levels were measured when women were at 18-22 weeks of gestational age, and secondary levels were determined when preeclampsia diagnosis was confirmed (30-35 weeks). Magnesium levels were significantly lowered in preeclampsia subjects.

## DISCUSSION

Magnesium (Mg) serves as an essential micronutrient crucial for various physiological functions across cells and organisms. It acts as an activator for numerous enzymes, contributes to bone formation, supports immune function, enhances mitochondrial activities, influences neuromuscular functions, aids in protein synthesis, and participates in DNA synthesis.<sup>6-8</sup> In the bloodstream and serum, magnesium is primarily bound to serum albumin and stored in muscle fibers and bones. The bioactive form of magnesium is the ionized state, which is quantified in the plasma. The regulation of serum magnesium levels involves a balance between gastrointestinal magnesium absorption and renal magnesium excretion.<sup>9-11</sup>

Serum magnesium in preeclampsia pregnant women was significantly less than the control group that consisted of normal pregnant women. Tavana Z et al enrolled 500 pregnant women with gestational age of 18-22 weeks who had referred to the Section of Obstetrics and Gynecology of Hafez hospital of Shiraz. Initially, blood samples were obtained from all subjects. 26 cases with diagnosis of preeclampsia were detected at the next referral. For each case, two normal pregnant women, at the same gestational age, were considered as the control group. The second blood samples were obtained from all the cases and controls. All of the samples were sent to check the level of magnesium. The data was analyzed with the SPSS and Student's t-test. The initial level of magnesium in pre-eclampsia women was not only significantly less than the control group, but also the secondary level was low, when the diagnosis was confirmed. They found a gradual decrease in mean serum magnesium level with increasing period of gestation in the pre-eclampsia women. This implicates that the level of magnesium in preeclampsia was lower than the control group since the beginning of pregnancy.<sup>12</sup> Owusu Darkwa E et al compared serum

magnesium and total calcium levels of preeclamptic and normal pregnant women. A comparative cross-sectional study involving 30 normal pregnant and 30 preeclamptic women with >30 weeks gestation and aged 18–35 years, was conducted at the Korle-Bu Teaching Hospital. Magnesium and calcium were determined using a flame atomic absorption spectrometer. Mean serum magnesium and total calcium levels in preeclamptic women were  $0.70 \pm 0.15$  and  $2.13 \pm 0.30$  mmol/L, respectively. Mean serum magnesium and total calcium levels in normal pregnant women were  $0.76 \pm 0.14$  and  $2.13 \pm 0.35$  mmol/L, respectively. There was a statistically nonsignificant difference in serum magnesium and total calcium in preeclamptic women compared to normal pregnant women, with p-values of 0.092 and 0.972, respectively. Serum magnesium and total calcium, therefore, seem not to differ in preeclamptic women compared to normal pregnant women.<sup>13</sup>

## CONCLUSION

Our study revealed a progressive decline in the average serum magnesium levels as the gestational period advanced in women with preeclampsia.

## REFERENCES

1. Moser M. Working group report on high blood pressure in pregnancy. *J Clin Hypertens.* 2001;3(2):75–88.
2. Ag Mersha, Tm Abegaz, Ma Seid. Maternal and perinatal outcomes of hypertensive disorders of pregnancy in ethiopia: systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2019;19(1):1–123.
3. Roccella Ej. Report of the national high blood pressure education program working group on high blood pressure in pregnancy. *Am J Obstet Gynecol.* 2000;183(1):1–22.
4. Landon Mb Gh . *Gabbe's obstetrics: normal and problem pregnancies* 7th edition, 7; 2016.

5. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC, Wenstrom KD. Hypertensive disorders in pregnancy. In: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC, Wenstrom KD, editors. *Williams obstetrics*. New York: McGraw-Hill; 2005. pp. 761–808.
6. Raman L, Shatrugna V. Nutrition during pregnancy and lactation. In: Mahtab SB, Prahlad Rao N, Vinodini R, editors. *Textbook of human nutrition*. New Delhi: IBH; 2002. p. 509.
7. Sarma PC, Gambhir SS. Therapeutic uses of magnesium. *Indian J Pharmacol*. 2005;27:7–13.
8. Gimenez-Mascarell P, Schirrmacher CE, Martinez-Cruz LA et al. Novel aspects of renal magnesium homeostasis. *Front Pediatr*. 2018;6(00077):1–13.
9. Rajmakers MT, Dechend R, Poston L. Oxidative stress and preeclampsia: Rationale for antioxidant clinical trials. *Hypertension*. 2004;44(4):374–80.
10. Romani AMP. Beneficial Role of Mg<sup>2+</sup> in Prevention and Treatment of Hypertension. *Int J Hypertens*. 2018;9013721:1–7.
11. VanWijk Mj, Kublickiene K, Boer K et al. Vascular function in preeclampsia. *Cardiovasc Res*. 2000;47(2000): 38–48.
12. Tavana Z, Hosseinmirzaei S. Comparison of Maternal Serum Magnesium Level in Pre-eclampsia and Normal Pregnant Women. *Iran Red Crescent Med J*. 2013 Dec;15(12):e10394.
13. Owusu Darkwa E, Antwi-Boasiako C, Djagbletey R, Owoo C, Obed S, Sottie D. Serum magnesium and calcium in preeclampsia: a comparative study at the Korle-Bu Teaching Hospital, Ghana. *Integr Blood Press Control*. 2017;10:9-15