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**SERUM MAGNESIUM LEVEL IN TOXEMIAS OF PREGNANCY****DR. B. VODELU* AND DR. S. LAXMI NARAYANA²**

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ABSTRACT

The cases for the present study were selected from the antenatal outpatient, Gandhi Hospital, Secunderabad, Telangana, India, according to specific criteria like women with age group between 18-28 years, primigravide with known last menstrual period and gestational age between 20-30 weeks. A total of 34 subjects were selected in this study, out of which 22 were Pregnancy Induced Hypertensive (B.P. >140/90 mmHg), who were considered as the experimental group and remaining 12 were normotensive (B.P. <140/90 mmHg) taken as controls. The experimental group was further categorized into two groups, having 16 women with preeclampsia (Group II) and six were eclampsia (Group III). Serum magnesium levels were estimated utilizing the calorimetric method. The mean serum magnesium level in preeclampsia (Group II) and eclampsia (Group II) was 1.81 ± 0.14 and 1.74 ± 0.036 mg/dl respectively. About 43.75% of the preeclampsia and 83.33% of the eclampsia women had serum magnesium level less than 1.80 mg/dl. The serum magnesium levels were observed to be decreased in pregnancy. A significant decrease in serum magnesium levels was observed in the experimental group III (eclampsia). Whereas, in pre-eclampsia though there was a marked decrease in serum magnesium level, the decreases were not statistically significant. The prevalence of magnesium deficiency status was higher among the pregnancy women in the present study.

KEYWORDS: eclampsia, magnesium deficiency, preeclampsia, serum magnesium

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INTRODUCTION

Magnesium is a chemical element with a symbol of Mg⁺⁺, atomic number 12 and atomic mass 24.3. Magnesium is one of the eleven major elements of a human body essential to all living cells; it plays an important role in the structure and function of the human body. Normal body content of magnesium for a man of weight 70kg is 24-48gm making it the fourth most abundant cation in the body and is essential to good health. Approximately 60% of total body magnesium resides in bone at the concentration of 90mEq/kg net weight. Most of the remaining magnesium is distributed equally between muscular and nonmuscular soft tissue. Only 1% of magnesium is found in blood, but the body works very hard to keep blood levels of magnesium constant¹. Pregnant women require higher magnesium intakes for the function of new tissues. Recommended daily allowance of magnesium in normal nonpregnant women is 450mg/kg. Pregnant women require 550-600mg per day for the formation of new tissue (maternal and fetal) during pregnancy. Magnesium plays an important role during pregnancy. Therefore, pregnant women tend to have low blood magnesium level than non pregnant women because of increased demand for mother and growing fetus and increased renal excretion of magnesium 25% more than non-pregnant women due to increase in glomerular filtration rate (GFR) and haemodilution in 2nd and 3rd trimester^{2,3}. Serum magnesium levels are usually lower during pregnancy than in nonpregnant state and rapidly return prepregnancy concentrations after delivery. Pregnancy is marked by a state of hypomagnesemia. The magnesium deficiency during pregnancy has been reported to be associated with hypertension, IUGR, pre-eclampsia, eclampsia, toxemia of pregnancy⁴, pregnancy induced hypertension, fetal growth retardation, preterm labour/births, low birth weight babies and leg cramps⁵, increased maternal hospitalization, incidence of low birth weight and small for gestational age infants^{6,7}. Magnesium has been established as an

essential element for fetal well-being. The administration of magnesium sulphate helps in the treatment of convulsions⁸. Trials have documented that oral magnesium supplementation during pregnancy reduces hypertension miscarriage, prenatal birth and fetal growth retardation^{6,9}. Limited data is available on the serum magnesium level among pregnant women hence, the present study was conducted. This study was conducted to observe the serum magnesium level during pregnancy in study groups because magnesium deficiency in pregnant ladies will lead to life threatening complications for mother as well as their babies.

MATERIALS AND METHODS

The present study was conducted in the Department of Biochemistry, Gandhi Medical College, Secunderabad, Telangana, State, India. The cases for the present study were selected from the antenatal outpatient, Gandhi Hospital, Secunderabad according to specific criteria like women with age group between 18-28 years, primigravide with known last menstrual period and gestational age between 20-30 weeks. If menstrual history and examination findings were not correlating, ultrasonography was done to find out the exact period of gestation. Those with known hypertension, diabetes mellitus, multiple pregnancy and ultrasound proven congenital malformation in the fetus were excluded. Consent from the pregnant women was taken to participate after explaining the objective of the study. Total of 34 subjects were selected in this study. All the 34 patients included in the present study were subjected to a detailed history taking, systematic examination, obstetric examination and routine antenatal investigations. Among 34 women, 22 were Pregnancy Induced Hypertensive (B.P. >140/90 mmHg), who were considered as experimental group and remaining 12 were normotensive (B.P. <140/90 mmHg) taken as controls. The experimental group was further categorized into two groups, having 16 women in Preeclampsia (Group II), and six in eclampsia (Group III).

Collection of samples

3 ml of venous whole blood sample was collected from each subject in a plain, dry and properly labelled bottle under strict aseptic conditions. Precautions were taken to prevent haemolysis. Samples were brought to Clinical Biochemistry Laboratory, Gandhi Hospital and were centrifuged after clotting at 3500 rpm at 4°C for 30 min for separating the serum and retraction at room temperature. Clear serum was collected and subsequently analysed for serum magnesium level measured in triplicates by colorimetric assay¹⁰. The mean of the three values was considered as the serum magnesium concentration of the study subject.

Statistical analysis

The data obtained was subjected to statistical tests of mean and standard deviation utilizing the SPSS-7.5 version. To compare the mean serum magnesium levels among pregnant women of different parity, one-way analysis of variance (ANOVA) was utilized. The multiple comparison test was carried out to identify significant difference in the mean magnesium levels among the pairs of groups of pregnant women. The results were considered significant at $p \leq 0.001$ level of significance.

RESULTS

The mean serum magnesium levels in various study groups selected for the present study are presented in Table 1. The serum magnesium levels in various study groups are presented in Table 2. Modified 't' test to denote pairs of groups significant from each other showed that

there was a significant decrease in mean magnesium levels in eclampsia (Group III), when compared to control group (Group I), the difference being statistically significant at $p \leq 0.001$ level. Pre-eclampsia (Group II) did not show any significant difference compared to the control group (Group I). The serum magnesium levels were observed to be decreased in pregnancy. This decrease was more marked in the experimental groups. A significant decrease in serum magnesium levels was observed in the experimental group III (eclampsia) ($p \leq 0.000$). Whereas, in pre-eclampsia though there was a marked decrease in serum magnesium level, the decreases were not statistically significant. The mean serum magnesium level in the experimental groups, preeclampsia (Group II) and eclampsia (Group II) was 1.81 ± 0.14 and 1.74 ± 0.036 mg/dl respectively and in control 1.94 ± 0.11 mg/dl. About 43.75% of the preeclampsia and 83.33% of the eclampsia women had serum magnesium level less than 1.80 mg/dl (Table 2). The present study results revealed that 43.75% preeclampsia and 83.33% eclampsia women had deficiency of magnesium as revealed by the serum level. Our results are similar to the findings of¹¹. The prevalence of magnesium deficiency status was higher in the present study. The haemodilution during the last trimester of pregnancy could probably be a contributing factor leading to a higher prevalence of deficiency of magnesium. Earlier studies have also reported similar findings^{12,13}. The findings are in agreement with our present study results.

Table 1***The mean serum magnesium levels in various study groups selected for the present study***

Subjects	Mean \pm SD
Control group (I)	1.94 ± 0.11
Pre-eclampsia (Group II)	1.81 ± 0.14
Eclampsia (Group III)	1.74 ± 0.036
P	0.000

p at 0.001 level of significance

Table 2
Serum magnesium levels in various study groups

S. No.	Control (Group I) mg/dl	Pre-eclampsia (Group II) mg/dl	Eclampsia (Group III) mg/dl
1	1.89	1.76	1.77
2	2.0	1.97	1.81
3	2.0	1.85	1.76
4	1.79	1.57	1.88
5	1.82	1.95	1.72
6	1.82	1.86	1.70
7	2.10	1.89	-
8	2.0	1.80	-
9	2.0	1.72	-
10	1.89	1.88	-
11	1.90	1.62	-
12	2.1	1.96	-
13	-	1.55	-
14	-	1.70	-
15	-	1.96	-
16	-	1.90	-
Mean	1.94	1.81	1.74
SD	± 0.11	± 0.14	± 0.09
SE	0.03	0.35	0.036

Toxemia of pregnancy is the most common complication of pregnancy, particularly in our country. Pre-eclampsia and eclampsia are the two major categories of toxemias of pregnancy. It is characterized by hypertension, edema and proteinuria. Various factors are involved in the development of toxemias of pregnancy. In the present study serum magnesium levels were estimated in patients with toxemias of pregnancy. Study was carried out with the view to establish the correlation between severity of toxemias of pregnancy and serum magnesium level. The study may provide possible biochemical parameters in toxemias of pregnancy. The findings of the present study indicate a high prevalence of magnesium deficiency among pregnant women. In pregnancy micronutrients including magnesium are important for normal growth and development of the baby. Deficiency of magnesium in pregnant mother causes impact not only on the health of mother but also on their babies. The formation of new tissue (maternal and fetal) during pregnancy requires high magnesium intakes than that of the normal non pregnant women of comparable age¹⁴. The magnesium deficiency in pregnant women is an

important risk factor for the complications which, can be prevented by timely detection and proper management. Magnesium supplementation is important for prevention of pregnancy associated complications. Hypomagnesemia is explained on the basis of greater degree of hydroplasma expected in pre-eclampsia¹⁵.¹⁶ proposed that dietary magnesium deficiency might be etiologic in pre-eclampsia. Magnesium is concerned with normal neuromuscular conduction. Its main hypomagnesemic effect has been observed to be associated with central nervous system and peripheral neuromuscular hypersensitivity. It is difficult to say whether hypomagnesemia causes eclampsia or is caused by eclampsia. However, magnesium sulphate therapy has been extensively used to control convulsions but not the hypertension in eclampsia.

CONCLUSION

Magnesium deficiency in pregnant women is frequently seen because of inadequate or low intake of magnesium, maternal serum magnesium normally declines during pregnancy.

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